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Ethical Considerations in Data Collection Procedures in Health Professional Educational Researches

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Medical education is the foundation upon which the future healthcare system is built. Ensuring its quality and effectiveness is paramount to producing competent and ethical healthcare professionals. However, the evaluation of medical education programs is a complex and multifaceted process that raises significant ethical concerns. Pakistan Medical and Dental Council (PMDC) and World Federation of Medical Education (WFME) mandate all medical and dental colleges in Pakistan to have quality assurance department for program evaluation and improvement. Institutional Review Board (IRB), present in medical colleges are usually designated for ethical consideration of research proposals and data collection procedure of research. However data collected during program evaluation has no standard operating procedure. There should be a separate Educational ethics Review Board to review program evaluation data collection procedure, teaching courses content and assessment process. There are many factors which need to be reviewed. Ethical evaluation of medical education necessitates transparency and accountability[1]. The purpose of this article is to shed light on the attitudes and practices of quality assurance teams in a medical organization when it comes to considering ethical measures during the data collection process for program evaluation. Ensuring ethical data collection is crucial for maintaining the integrity of evaluations and upholding ethical standards in research and program assessment. The aim of article is to emphasize the importance of implementing ethical considerations by quality assurance team in their work. Stakeholders, including students, faculty, institutions, and the public, have a right to know how medical education programs are evaluated and how their data is used. Transparency in evaluation methods and outcomes builds trust and ensures accountability for program improvement. Ethical considerations in program evaluation data collection in health professional education are crucial to protect the rights and well-being of all stakeholders involved. It should be mandatory to obtain informed consent from all participants, including students,

faculty, and other stakeholders, before collecting any data. Explain the purpose of the evaluation, what data will be collected, how it will be used, and any potential risks and benefits. Ensure that the privacy and confidentiality of participants are protected. Anonymize data whenever possible to prevent the identification of individuals. Use secure data storage and transmission methods to safeguard sensitive information. Participation in the evaluation should be voluntary, and participants should be able to withdraw at any time without consequences. Avoid coercion or undue pressure to participate. Implement strict data security measures to prevent unauthorized access or breaches. This includes encryption, access controls, and regular data audits to maintain data integrity[2]. Assess the potential risks of data collection, both physical and psychological, and take steps to minimize or mitigate these risks. Ensure that the evaluation process does not harm participants or the educational program. Respect the autonomy and rights of participants to make informed decisions regarding their involvement in the evaluation. Avoid any form of manipulation or deception. Strive to maximize the benefits of the evaluation for educational improvement while minimizing any potential harm. Share results with all relevant stakeholders in a clear and understandable manner. Medical education evaluations must be designed and implemented in a manner that eliminates bias and discrimination. This includes considerations for diverse student populations and ensuring that evaluation criteria do not disadvantage any group. Maintaining the confidentiality and privacy of students and faculty during evaluations is paramount. Deductive disclosure or internal confidentiality occurs when the traits of students or faculty member or groups make them recognizable in program evaluation reports. Internal confidentiality is when a participant in an interview may recognize what other participant's views on a specific agenda, it is distinct from external confidentiality in which data protection is assured from external participants not involved in program evaluation data collection. Evaluation process should consider a conflict between conveying detailed, accurate accounts of the specific program process and protecting the identities of the students and faculty who participated in that program. Vulnerable populations such as students or junior faculty members in the workplace might face negative consequences if their identities are revealed. Dominant approach to confidentiality

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can be used during program evaluation that argues use of pseudonyms to ensure confidentiality, it assumes that students and faculty details in the data can be changed to protect our respondents without compromising the meaning of the data. Alternative approach can also be used especially if evaluation process is using qualitative data collection tools as interviews. Post data collection confidentiality form should be formulated. Aim of the form is to ask students and faculty feedback data representation and handling. You may ask participants whether they want to share the information just as they provided, with no personal details needing to be changed or if they want some changes to be made such as their name or any other information. Participant should be given options in written that the information can be shared just as provided. They should also be given an option to remove data segments that reflect their identity if they are not comfortable. Institutions must use evaluation results not for punitive measures but as a basis for enhancing the quality and effectiveness of medical education. Assessors should be impartial and free from undue influence, ensuring that the evaluation process remains unbiased. Continuously monitor the ethical aspects of the evaluation throughout the data collection process[3,4]. Be prepared to address any ethical concerns that may arise promptly. Develop a plan for the responsible disposal of data once the evaluation is complete, in accordance with ethical and legal requirements[5,6]. By uncovering attitudes, practices, challenges, and strategies, the research can inform the development of guidelines and best practices for ethical data collection in program evaluation efforts[7,8]. To address these ethical challenges, institutions should prioritize ongoing professional development for faculty members involved in program evaluation. Workshops, training sessions, and resources on research ethics and best practices in data collection can empower faculty to navigate these ethical considerations confidently. Collaboration with research ethics committees and experienced evaluators can also provide guidance and oversight[9,10]. By considering these ethical principles throughout the program evaluation data collection process in health professional education, you can help ensure that the evaluation is conducted with integrity, fairness, and the well-being of all participants in mind.

Authors Contribution:
Khadija Farrukh: Conception of design, writing, proof reading

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Expression of ZAP 70 in Chronic Lymphocytic Leukemia (CLL) and its Correlation with Clinical Stages

Zahra Tasleem, Hamid Saeed Malik, Hassan Shaukat, Halima Babar, Kehkashan Hasan, Saima Bashir

ABSTRACT

Objective: To ascertain the levels of ZAP-70 expression within the context of Chronic Lymphocytic Leukemia (CLL) patients and to subsequently analyze the potential correlations between ZAP-70 expression and the clinical staging of the disease.

Study Design & Setting: Cross-sectional, descriptive study. Department of Hematology, Armed Forces Institute of Pathology (AFIP), Rawalpindi from July 2021 to December 2021.

Methodology: We included 73 CLL patients of various ages and both genders. and patients having lymphoproliferative disorders other than CLL were excluded. Sysmex XN-3000 was used to do complete blood counts. Diagnosis of CLL was confirmed immunophenotypically by flow cytometry. Samples were processed by standard methods for ZAP70 analysis. Descriptive statistics were expressed in terms of mean ± standard deviation (SD). A Chi-square test was conducted, with a significance level of p-value =0.05 being considered significant.

Results: Among 73 patients, 24 were females (32.9%) and 49 were males (67.1%). Females had a mean age of 69.00±9.47 years, whereas males had a mean age of 65.73±11.12 years. ZAP-70 expression was positive in 8 (11%) and negative in 65 (89.0%) cases. The expression of ZAP-70 in CLL and its correlation with Binet Stages was significant (p=0.002). ZAP-70 expression in males and females showed no significant difference (p 0.059). ZAP-70 analysis showed no significant difference in patients with age more than 60 years from = 60 years of age (p= 0.275)

Conclusion: ZAP-70 gene expression should be used in routine laboratory settings and can be correlated with the clinical stages of CLL.

KEYWORDS: ZAP-70, Chronic Lymphocytic Leukemia (CLL), Binet Stages, Multiparameter flow cytometry(MFC).

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INTRODUCTION:

In the Western world, Chronic Lymphocytic Leukemia (CLL), is the most prevalent hematologic cancer, and it constitutes approximately 25% of all leukemias in the United States. It is characterized by the gradual buildup of immature monoclonal CD5+ B-cells in various body tissues.[1] CLL cells rely heavily on signals from the microenvironment. CLL is related to a characteristic immune phenotype in lymphoid tissue, peripheral blood, and bone marrow.[2]

There is a great deal of heterogeneity in the disease, whether it is in terms of the stage of the disease at diagnosis, or terms of the cytogenetic abnormalities, as well as the clinical outcomes among patients. CLL prognosis relies on specific markers, e.g. immunoglobulin heavy chain gene (IgVH) mutational status and ZAP-70 expression. The disease can progress quickly in some patients and result in early death, but in others, it remains stable without the need for treatment and lasts for several years .[3,4] To identify stable or progressive forms of CLL, other prognostic factors should be considered in the early stages of the disease.[5]

Somatic mutations in the immunoglobulin heavy-chain variable region (IgVH) are among the most influential

prognostic factors for distinguishing two B-CLL subsets.[5] Patients are classified into two categories based on the presence (50 to 60%) or absence of somatic hypermutation in the immunoglobulin heavy chain variable region (IGHV) genes of the clonotypic B cell receptor (BCR). Those with low IGHV mutation levels (<2% change from germline) are termed unmutated (um-CLL) and typically experience more aggressive disease than mutated (m-CLL) patients.[1] These mutations lead to anergic B-cell receptors, which hinder the proliferation of leukemic cells. Patients with mutated IgVH genes tend to have a more favorable prognosis compared to those with unmutated IgVH genes who tend to have reduced survival and are lower response to chemotherapy.[1,5]

While IGHV mutation status is a strong prognostic marker, it does not fully capture CLL's heterogeneity. In contrast to other prognostic factors, it is not suitable for routine practice due to the complexity of the method of analysis, unlike other prognostic factors.[6] While noting IgVH mutations are costly and not routinely available, ZAP-70, a protein found to increase in CLL, offers a more accessible prognostic marker. It has been observed that protein tyrosine kinase ZAP-70 expression in CLL cells, measured through flow cytometry, is closely linked to IGHV mutational status, survival, and disease progression. ZAP-70's abnormal expression affects CLL cell biology by enhancing B-cell receptor (BCR) signaling (reducing threshold), proliferation, and migration toward the tumor microenvironment. Assessing ZAP-70 expression is crucial, with multiparameter flow cytometry (MFC) being a valuable method. MFC measures the fluorescence intensity of anti-ZAP-70 labeling in different cell subtypes, improving our ability to assess B cell clonality. This understanding is valuable for patient care and the development of interventions to manage the risk of additional B cell malignancies in CLL patients.

A genome-scale gene expression analysis has shown that Ig-mutated and Ig-unmutated CLL can be distinguished by the expression of a few hundred genes, and ZAP-70 expression is the most useful discriminator.[7] Additionally, its expression would remain stable throughout B-CLL, making it a prognostic factor. ZAP-70 is a protein tyrosine kinase that belongs to the Syk-ZAP-70 family. ZAP-70 was found to be expressed on B-CLL cells but not on normal B lymphocytes.[8,9] In routine laboratory settings, ZAP-70 gene expression has emerged as a promising surrogate marker for IGHV mutation status, aiding in the identification of patients with a more aggressive disease course.[4,10] This study was designed to investigate ZAP-70 expression patterns in B-CLL patients to gain insights into the prevalence of low-expression cases and their correlation with the clinical stages.

METHODOLOGY:

Our investigation constituted a six-month cross-sectional descriptive study conducted from July 2021 to December 2021, within the Department of Haematology at the Armed Forces Institute of Pathology (AFIP) Rawalpindi. Ethical approval for the study was granted by the institutional review board (IRB) under the reference FC-HEM20-5/READ-IRB/21/1297. For sample size determination, we meticulously reviewed existing literature and employed the WHO calculator. This calculation yielded a sample size of 45, factoring in a 5% margin of error, a 95% confidence level (CI), and a previously reported ZAP-70 expression incidence of 2.97%.[11] Our sampling methodology adhered to nonprobability consecutive sampling principles, and a total of 73 eligible participants were included in the study during the designated research period, encompassing the maximum sample size available for our investigation.

Inclusion criteria: This research encompassed individuals newly diagnosed with Chronic Lymphocytic Leukaemia (CLL), spanning all age groups and both genders.

Exclusion Criteria: This study excluded individuals who had previously received a CLL diagnosis and were actively undergoing treatment.

Before enrolling patients, written consent was obtained diligently, rigorously adhering to stringent confidentiality protocols throughout all research phases. Thorough patient history collection and comprehensive physical examinations were meticulously conducted. To assess their condition, complete blood counts were carried out using the Sysmex XN-3000 system. The confirmation of Chronic Lymphocytic Leukemia (B-CLL) diagnoses was achieved through immunophenotypic analysis, utilizing flow cytometry and immunohistochemistry (IHC). Standard techniques were applied to process samples for ZAP70 analysis. The antibodies employed in this procedure consisted of CD22FITC/HLADRPE, ZAP70FITC/CD38PE, and CD45FITC/14PE. As a negative control, an isotype control (antimouse IgG1FITC/IgG2aPE) was meticulously utilized. In the context of the ZAP-70 assessment, a positivity threshold was set at an antibody population exceeding 20%, while antibody populations below this threshold were considered negative.

Method for ZAP70 analysis

3mL of whole blood samples obtained in an EDTA tube were used to measure total leucocyte count and differential leucocyte count. Flourochrome labelled monoclonal antibodies were used including Anti CD22 FITC, Anti HLA-DR-PE, Anti ZAP-70 FITC, Anti CD38 PE, Anti CD45 FITC and Anti CD14 PE. Tubes were labelled according to the defined panel and 10µL of antibody was added in each tube and 50µL of whole blood sample. It was then mixed thoroughly followed by incubation in the dark for 30 minutes at room temperature. 1:10 dilution of FACSYLyse solution was prepared in distilled water 2mL of this was added in each tube and incubation was done in the dark for 10 minutes. Tubes were centrifuged for 5 minutes at 300g and the supernatant was discarded. The remaining almost

50µL fluid was shaken to resuspend the cells. 2mL RPMI 1640/PBS was dissolved in distilled water in each tube. Then 2mL of this was added in each tube and incubated for 10 minutes in the dark. Centrifugation of the tubes was done again for 5 minutes at 300g, the supernatant was discarded and the remaining solution was shaken. 0.5mL of 3.3% Formalin solution was added to each

Data was inputted into Microsoft Excel, and then it was subjected to analysis using the Statistical Package for Social Sciences (SPSS) 21.0. Descriptive statistics were presented in terms of mean ± standard deviation (SD). Additionally, a Chi-square test was conducted, with a significance level of p-value =0.05 being considered significant.tube and kept at 4^0C till analysis on a flow cytometer.

RESULTS:

Among 73 patients, males were 49 (67.1%) and females were 24 (32.9%) with male to female ratio of 2:1. Females had a mean age of 69.0±9.47 years, whereas males had a

Table 1: Gender distribution in different age groups

Age Range	Females (%)	Males (%)	Total (%)
<60	5 (20.8)	19 (38.8)	24 (32.9)
>60	19 (79.2)	30 (61.2)	49 (67.1)
Total	24 (32.9)	49 (67.1)	73 (100)

Table 2: Correlation of ZAP-70 with Binet Stages using the Chi-Square test

ZAP-70	Binet Stages			Total (%)	p-value
	A	**B**	**C**		
Positive	0 (0.00%)	4 (12.9%)	4 (40.0%)	8 (11.0%)	0.002
Negative	32 (32.0%)	27 (87.1%)	6 (60.0%)	65 (89.0%)	
Total	32 (100%)	31 (100%)	10 (100%)	73 (100%)	

Figure 1: Distribution of ZAP-70 within Gender
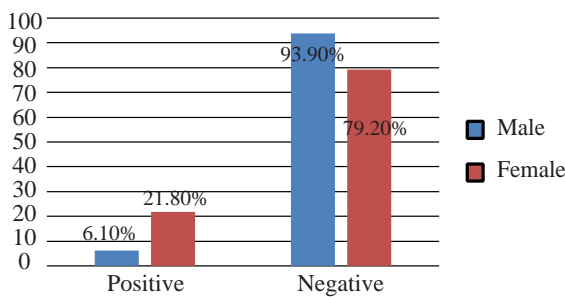
Figure 2: Distribution of ZAP-70 within age group
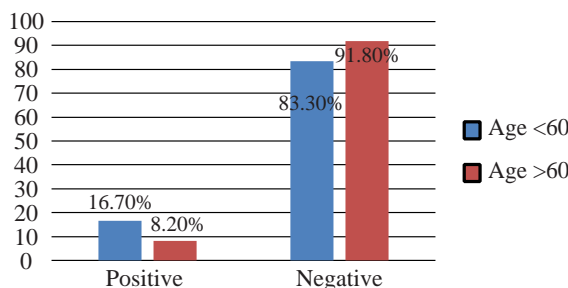
mean age of 65.7±11.12 years. Both males and females showed the highest frequency of cases in the age group > 60 years. (Table 1). ZAP-70 expression was positive in 8 (11%) and negative in 65 (89.0%) cases. We assessed the correlation between ZAP-70 expression and Binet Stages in Chronic Lymphocytic Leukemia (CLL) using the Chi-Square test, yielding a significant result (p-value=0.002). (Table 2). Distribution of ZAP-70 within gender is shown in Figure 1. Forty nine 49 (67.1%)patients were above 60 years of age. Distribution of ZAP-70 within age group as shown in Figure 2.

DISCUSSION:

CLL is a heterogeneous disease and has widely variable outcomes i.e in a study by Strati P et al, the analysis of causes of death revealed the multifaceted nature of mortality in CLL patients. Few patients have sluggish disease and they have a survival of up to 20 years and usually, in such cases, death is not directly related to CLL. Infections, other malignancies, and comorbid health conditions emerge as pivotal determinants of patient outcomes, exerting significant influence. This underscores the importance of adopting a comprehensive approach to caring for CLL patients, to enhance the care and prognosis of individuals with CLL.[12]

However, in some patients, a benign course is followed by an aggressive disease. The findings from a study by Greipp PT et al, provided significant insights into a rare CCL subgroup, having male predominance corresponding to our research and diagnosis at an advanced stage of the disease, associated with the aggressive nature of this particular subtype of CLL. These patients experience a significantly shorter overall survival (OS) i.e. death occurs within three to five years of diagnosis, underscoring the severe consequences. These deaths are usually because of complications that are directly related to CLL.[13]

In our study, the majority of cases were males(67.1% n 49/73) while females accounted for about one-third. Similar to our study, Diehl F et al.[14] also observed that males consistently represented the majority of CLL cases. This study was conducted on a much larger scale providing a comprehensive overview of CLL demographics and outcomes. They noted a mean age of 69.6 years. We also observed the same mean age in females 69±9.47SD years while 65.7±11.12 years was the mean age in males. It revealed that CLL primarily affects older individuals, with a substantial proportion diagnosed at the age of 60 or older. This could be due to the fact that older patients were more likely to opt for no treatment, as compared to younger patients. This study reported 5-year and 10-year overall survival rates which got worse for older patients, particularly those aged 80 or older.

Similarly in alignment with our study, Mjali et al,[15] also reported that CLL primarily affects patients over the age of 50, with no reported cases in individuals below 30. This

study specifically emphasized different types of leukemia across various age groups. This is likely due to differences in sample sizes and the inclusion of diverse leukemia types in the later study, showing the multifaceted nature of leukemia and the need to consider diverse factors, including age and gender, in both leukemia research and clinical practice. However, Strati P et al,[12] noted a slightly higher mean age of 72 years.

In our study, ZAP-70 expression was positive in 8 (11%) and negative in 65 (89.0%) cases however, no significant differences were observed in ZAP-70 expression between genders or age groups. A previous study done by Shaikh M et al,[16] in the year 2020 in our country gave a greater sample size for analysis, showing male predominance having an M: F ratio of 2:1 in rasonance with our study. Similarly, the median age for the entire study population was 62 years with minimal age difference between males and females. The analysis of ZAP-70 expression revealed that 15% exhibited high expression, 43.3% had low expression, and 41.7% were negative for ZAP-70, giving similar positive results, delving further into categorizing expression levels. However, ZAP-70 expression showed no significant distinction between males and females echoing the findings of our research.

In a study done in India by A Gogia et al,[17] ZAP -70 positivity was noted in 25% of cases of CLL which is roughly double of noted by us. These variations may arise from differences in patient demographics and testing Techniques. The median age of CLL patients was 57 years, indicating slightly younger average ages for both genders with 64 male and 16 female consistently showing male predominance, emphasizing this gender pattern within the disease. These discrepancies in their findings are likely due to differences in patient populations and assay methods. Fordefinig positivity of ZAP 70 expression Shaikh M et al,[16] and A. Gogia et al,[17] both used a cut off of 20%. The same was used by us.

The expression of ZAP-70 and its correlation with Binet Stages was significant in our study (p-value =0.002). Out of total 73(100%), all 32/73 (43%) analysesd cases show negative results for Binet Stage A, while out of 31/73 (42.4%) patients which were analysed for Binet Stage B, 4 (12.9%) showed positive results while 27 (87.1%) showed negative results. Out of total 10/73 (13.4%) patients 4 (40%) showed positive results and 6 (60%) negative results. Attia HR et al,[18] documented in their study that in the Binet staging system, there was a noteworthy increase in the expression of ZAP-70 in group C patients compared to groups A and B (p-value 0.008, 0.034 and 0.017 respectively) which were linked to higher CD38 expression, hepatomegaly, splenomegaly, and specific genetic markers. This study showed a more comprehensive analysis of prognostic markers with males being more prevalent as in our study.

R. Zeeshan et al,[19] in a local study in Pakistan indicated a similar male predominance with a slightly lower mean age of 57.5 years. In our study, females tended to be older than males. Conversely, the second study did not reveal a significant age difference between genders. However, both studies concurred that CLL predominantly affects individuals in their middle to later years. This study also correlated age and gender with ZAP-70 expression in CLL and noted that no correlation existed between ZAP-70 with age and gender (p <0.05). ZAP-70 positivity was identified in 13.5% of the cases (slightly higher rate) associated with stage III disease and a high lymphocytic count. These associations underscore the potential prognostic value of ZAP-70. Similar results were noted in our study and by Rossi D et al.[20]

CONCLUSIONS:

ZAP-70 expression was shown to be substantially associated with advanced binet stages, extensive intrathoracic/abdominal lymphadenopathies, splenomegaly, and cytopenias, all of which are signs of active and aggressive illness. Increased ZAP-70 expression is an important predictor of disease progression and a helpful indicator for risk assessment in newly diagnosed CLL patients. It predicts overall survival in CLL patients

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Evaluating Successful Pregnancy Outcome in Women Undergoing Trial of Labour after Caesarean Section (TOLAC)

Shazia Iffet, Ayesha Arif, Sadaf Moin, Surayya Jabeen, Samina Rehan

ABSTRACT:

Objective: To determine the successful pregnancy outcome in women who opted for trial of labour after one lower segment transverse caesarean section (TOLAC).

Study Design and Setting: Descriptive cross-sectional study. Department of Obstetrics and Gynaecology, Combined Military Hospital Abbottabad, from Nov 2022 to April 2023.

Methodology: 54 pregnant women were included in our study who had previously undergone one lower segment caesarean section more than 18 months back. They were booked at their first visit, briefed and counselled for trial of labour after caesarean section (TOLAC), and were advised to await spontaneous labour till 40 completed weeks of gestation and in case of failure of onset of labour then for induction of labour. Data was collected in terms of successful vaginal birth/repeat caesarean section and fetomaternal outcome.

Results: In our study, 54 women agreed for trial of labour who had one caesarean section more than 18 months back. Vaginal birth was successful in 39 women (72.22%). Gestational age, BMI, and age of the woman did not show any significant effect on trial of labour. Factors leading to successful outcome include previous vaginal delivery, spontaneous onset of labour, favourable bishop score, women who are keen for vaginal delivery.

Conclusion: The study concluded that most pregnant women prefer labour trial after one CS. Adequate counselling and briefing of women reduce their anxiety, and help them to make decisions about their preferred mode of delivery.

Keywords: Artificial induction of labour, bishop score, CS, TOLAC,

INTRODUCTION:

Women undergoing caesarean delivery have a higher mortality and morbidity rate compared to those having spontaneous vaginal delivery. In Pakistan, the caesarean delivery rate has exceeded (10-15%) the recommended level by WHO.[1] With this alarming increase in the rate of caesarean delivery worldwide, several attempts have been made to reduce the rate. Pregnant women with previous one caesarean delivery, who opted for trial of labour is called to undergo TOLAC, which is now becoming an accepted practice both by the women and treating obstetricians.

Options have been proposed to the pregnant women after one caesarean section (CS), either to opt for trial of labour after caesarean (TOLAC) or go for elective repeat caesarean section (ERCS) and therefore increase their morbidity and mortality associated with high order caesarean. Current caesarean section rate worldwide represents 95.5% of the world's live births as of 2018. The global CS rate was 21.1% with average of 8.2%, 24.2% and 27.2% in the least, less and more developed regions, respectively.

Trial of labour after caesarean section has been proposed as an option of reducing the increasing caesarean rate worldwide.[1,2] Recent data shows that it is a well-established evidence-based practice with success rate varying from 60% -80% (2) and its safety has been demonstrated in various studies .[3] Elective repeat caesarean section (ERCS), although safe, is not devoid of adverse outcomes like placenta previa, morbidly adherent placenta (accreta, increta), bladder and bowel injury and increased neonatal respiratory morbidity.[4,5]

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Complications of trial include risk of scar dehiscence and rupture, which is associated with increase in maternal and foetal morbidity and mortality can be life-threatening for both the mother and baby .[6] Careful selection of the patient with appropriate counselling and briefing at every antenatal visit reduces their apprehension and anxiety. Fear of opting trial can be over come by explaining two major key aspects, one is to provide the woman with her individual 70%-80% chance of success and secondly, a conversation about maternal and neonatal risks and benefits associated with trial are the key steps for the successful outcome. Previous vaginal delivery, spontaneous onset of labour, favourable bishop score at the time of delivery, less apprehension and willingness of the patient and obstetrician are factors involved in its success in literature.

Therefore, a study was planned to determine the success rate of trial and its effect on fetomaternal outcome in our dependant clientele. Results of our study will help to offer trial to all pregnant women with previous one caesarean delivery in our general population and by exploring these factors, we can strengthen our counselling services and thus reduce the CS rate among this subset of women, which contributes maximum to the rising CS statistics.

METHODOLOGY:

A cross sectional study was carried out in Department of Obstetrics and Gynaecology of Combined Military Hospital Abbottabad, for the duration of six months from November 2022 to April 2023. Women were selected by consecutive sampling technique. After institutional ethical committee approval (vide reference no.CMHAtd-ETH-85-Gynae-23), trial was offered to all women fulfilling the inclusion criteria. According to the departmental protocol.

Inclusion criteria:

Age 18-40 years.
• Women with previous one uncomplicated lower segment transverse caesarean section for nonrecurrent cause (foetal distress, placenta previa, post term pregnancy, failed induction, malpresentation, malposition).
• With single cephalic pregnancy at term (37 weeks - 40 completed weeks).
• Clinically adequate pelvis.
• In spontaneous labour.
• Willing to undergo induction of labour at 40 completed weeks.
Exclusion criteria:
• Women with previous uterine scar of unknown site.
• Medical comorbidities.
• IUGR.
• Post-term pregnancy (than 42 weeks).

Those willing to undertake TOLAC, will wait till 40 completed weeks for spontaneous labour, or artificially induced (with cervical foleys or prostaglandin E2) at 40 weeks if spontaneous labour does not occur. At the time of admission, they were subjected to a detailed history and abdominal and vaginal examination was done. Demographic and obstetrical factors (age, BMI, weight, height, gestational age, apprehension of the patient to undergo trial, indication of previous caesarean section) were noted. Written informed consent was taken in labour room. Intrapartum risk assessment including bishop score at admission, partogram maintenance to monitor progress of labour and scar tenderness was done and fetomaternal outcome was recorded. Emergency caesarean delivery was considered in case with scar tenderness, foetal distress, failed progress. Data was analysed using SPSS21. Descriptive statistics were calculated, followed by the secondary analysis of the suspected maternal and obstetrical factors of unsuccessful TOLAC.

RESULTS:

A total of 54 women were recruited for the study, who were fulfilling the inclusion criteria. Out of 54 women 39 (72.22%) have a successful trial of labour, and the trial was unsuccessful in 15 (27.78%) women who had to undergo repeat Caesarean section (LSCS) for various indications. Demographic characteristics of all the participants were noted on Table-1. On the basis of demographic information, there was no significant (p-value > 0.05) difference between women in group A (successful TOLAC) then those in group B (with failed trial leading to LSCS) on the basis of maternal age, gestational age and presenting complaints. Mean BMI was lower in group A. Mean value of Bishop score of 6 at the time of admission was found to be significant (p-value < 0.05) and favourable in group A (4.41 ± 2.26) as compared to (2.93 ± 1.03) group B.The distribution of spontaneous labour, induction of labour and duration of labour showed no significant (p-value > 0.05) difference between both groups as elaborated in table 2. Neonatal outcome like birth weight, Apgar score and gender showed that there is no significant (p-value > 0.05) effect in both groups. The apprehension of the patient undergoing trial was a significant contributor for its success. The rate of less apprehension was significantly (p-value < 0.05) higher in group A (89.7% vs. 20%) as compared to group B. The results also showed that there was no significant (p-value > 0.05) effect of previous indication of caesarean on success of trial as elaborated in table 2.

The univariate logistic regression analysis was done to see the effect of demographic characteristic of the women on successful trial and it was observed that age and gestational age did not show any significant (p-value > 0.05) effect. The bishop score of 6 was found to be significantly (p-value < 0.05) associated with successful trial. The results showed that bishop score has negative relationship with trial, and it plays a preventive role with odds ratio 0.64. It showed that the odds of successful trial decreases by 0.447 with one-unit decrease in bishop score. Similarly, induction, birth weight and baby gender were independent of trial outcome and did not show any effect as elaborated in table 3.

DISCUSSION:

Caesarean sections are becoming more common in both developed, developing and underdeveloped countries, leading to three fourth increase in short term and long term maternal

Table-1:

Variables	B	P-value	OR [Exp(B)]
Age	0.081	0.269	1.08
BMI	0.691	0.104	2.00
Gestational age	0.240	0.219	1.27
Bishop score of 6	-0.447	0.029	0.64
Duration of labour in (hrs)	0.080	0.311	1.08
INDUCTION		**0.079**	
PG2	2.079	0.018	8.00
Cervical Foleys	2.303	0.018	10.00
PG2/Foleys	-18.90	0.999	0.00
Birth weight	0.111	0.835	1.12
Baby gender	0.229	0.708	1.26

Table-2:

morbidity and mortality as compared to vaginal deliveries.[7]

One in five babies is delivered by caesarean section in Pakistan. The most recent report of Pakistan demographic and health survey (PDHS) shows a rapid increase in the rates of caesarean deliveries from 14% in 2012-13 to 22% in 2017-18.[8]

Primary Caesarean section rate is increasing in Pakistan because of feasible access and availability of health care facilities at private and public hospitals, over diagnosis of foetal distress due to the use of continuous electronics foetal monitoring (CEFM),more liberal use of CS for breech presentation, growth retardation, multiple gestation and prematurity.

The main aim of our study is to find out the success rate of TOLAC at tertiary care centres with the facility of vigilant fetomaternal monitoring during labour and various contributors which can predict its success. BMI was significantly lower in the successful trial group compared to the unsuccessful group, and the number of women with

Characteristics	TOLAC (Group A)		LSCS (Group B)		P-value
	Frequency	Percentage	Frequency	Percentage	
Age of patient					
Mean ± SD	27.67 ± 3.90		29.07 ± 4.7		0.316
Body Mass Index					
Normal weight	32	82.1	9	60.0	
Overweight	4	10.3	3	20.0	0.227
Obese	3	7.7	3	20.0	
Gestational age					
Mean ± SD	37.97 ± 2.66		38.93 ± 1.49		0.101
Presenting complaints					
Pain abdomen	7	17.9	2	13.3	
Labour pain	13	33.3	3	20.0	
Leaking	3	7.7	0	0	
IUD	2	5.1	0	0	0.450
Preterm labour	3	7.7	1	6.7	
PROM	3	7.7	2	13.3	
Nil	8	20.5	7	46.7	
Bishop score of 6					
Mean ± SD	4.41 ± 2.26		2.93 ± 1.03		0.019
Induction					
PG2	10	25.6	8	53.3	
Cervical Foleys	5	12.8	5	33.3	0.016
PG2/Foleys	4	10.3	0	0	
Nil	20	51.3	2	13.3	
Duration of labour (hrs)					
Mean ± SD	7.55 ± 4.25		8.80 ± 3.49		0.316
Spontaneous					
Yes	20	20	5	33.3	
No	19	19	10	66.7	0.236
Total	**39**	**39**	**15**	**100.0**	

Figure 1: Mode of Delivery in Patients opting for TOLAC
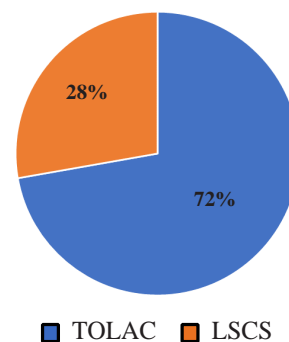
Figure 2: Mode of artificial induction
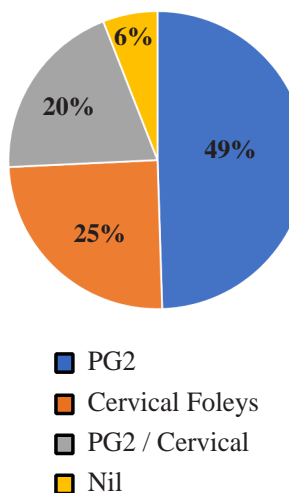
BMI =25kg/m2 was high in unsuccessful group. Cheng et al, and Srinivas et al[9,10] analysed the relation between maternal age and trial success. Both the studies concluded that women more than 35 years of age were more likely to have failed trial. In our study, the mean age was similar, so it does not show any association between increasing maternal age and failed trial. The overall chance of successful TOLAC is greater in women who had spontaneous onset of labour with Bishop score of more than 6 than those who were induced artificially. Failure of induction of labour has been supported by Sondgeroth et al in his study.[11] The success rate in our study is more in women who went into spontaneous labour with favourable Bishop score 6 at the time of admission, implying that modified Bishop score is an important contributor for success.[12,13] Another study found that the successful trial group had a considerably lower mean gestational age then the unsuccessful group.[14] The number of women admitted in labour with a gestation of less than 40 weeks was much greater in the unsuccessful group.[15] Study showed that the success of TOLAC is dependent on several contributing factors including parity, bishop score of more then 6 and spontaneous labour at the time of admission.[16] The labour induction has negative effect on success of trial and directly increases the chance of failure.[18] It is pertinent to mention that the findings of our study is consistent with those of Grobman et al.[19]

The challenges we face in our study associated with TOLAC outcome cannot be ruled out. Despite all consideration, the estimation of its success was affected by patient willingness, apprehension to opt for trial, Bishop score vis-à-vis patient needing proper counselling and encouragement.[20] Therefore, giving full chance of having successful trial to women who are very apprehensive, fearful, and less willing to opt for TOLAC should be done by facilitating and helping them in decision making which ultimately affects the success estimation.

CONCLUSUON:

The current study concluded that women prefer trial of labour (TOLAC) after one caesarean section (CS). Adequate information, counselling and support could impact their choice of delivery. In carefully selected women, trial of labour is safe and often successful with less maternal and foetal morbidity. We intend to conduct the study with much larger sample size regarding preferences and actual mode of delivery might be useful for future research and diverse datasets to establish significant association.

Table 3: Comparison of foetal and maternal characteristics in both groups

Characteristics	TOLAC (Group A)		LSCS (Group B)		P-value
	Frequency	Percentage	Frequency	Percentage	
Birth weight					
Mean ± SD	3.02 ± .60		3.06 ± .58		0.838
Apgar score					
Mean ± SD	7.26 ± 2.31		7.47 ± .91		0.735
Baby gender					
Boy	16	41.0	7	46.7	0.707
Girl	23	59.0	8	53.3	
Apprehension of patient undergoing TOLAC					
Yes	35	89.7	3	20.0	
Refused trial of labour	0	0.0	3	20.0	
Very Apprehensive	1	2.6	1	6.7	
Failed progress	0	0.0	5	33.3	0.000
Meconium 2	0	0.0	2	13.3	
Meconium 3	0	0.0	1	6.7	
Nil	3	7.7	0	0.0	
Indication of previous scar					
Breech	6	15.4	5	33.3	
Placenta Previa	4	10.3	3	20.0	
Failed progress	15	38.5	3	20.0	
Transverse lie	2	5.1	0	0.0	0.460
Twins	1	2.6	0	0.0	
Foetal distress	7	17.9	4	26.7	
APH	3	7.7	0	0.0	
Abruption	1	2.6	0	0.0	
Total	**39**	**100.0**	**15**	**100.0**	

Authors Contribution:
Shazia Iffet: Conception, study design, drafting the manuscript, approval of the final version to be published.
Ayesha Arif: Data analysis, data interpretation, critical review, approval of the version to be published.
Sadaf Moin: Data analysis, data interpretation, critical review, approval of the version to be published.
Surayya Jabeen: Data analysis, critical review, approval of final version to be published.
Samina Rehan: Proof reading, write up, approval of the final version to be published.

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Original Article

Dental Caries, Periodontal Health Status, and Oral Hygiene Related Habits of Women Behind Bars in Central Jail Karachi, Sindh, Pakistan

Hina Shah, Imran Khan, Sibghat Ullah Khan, Jai Kershan, Sanaa Ahmed, Sumbal Ayaz

ABSTRACT

Objective: To assess the frequency of dental caries and periodontal health status among incarcerated women in Karachi facility, Sindh, Pakistan.

Study design and Setting: A cross-sectional study was conducted between December 2021 to February 2022 at the department of Department of Community, Sindh Institute of Oral Health Sciences.

Methodology: All female inmates between the ages of 18-65 years, serving various jail terms including those sentenced for life, prisoners condemned to death and awaiting trial were included in the study. Women younger than 18 years or older than 65 years and those who refused to give consent to participate were excluded. For each participant, dental caries and periodontal status examination were performed. Dental caries were scored using DMFT index.

Results: A total of 131 incarcerated women were examined with a mean age 34.73 ± 9.94 years. The mean DMFT score was 4.76 ± 4.46. Older age was significantly associated with dental caries (p<0.0001). Participants who had diabetes had significantly increased caries as indicated by their high DMFT score (p=0.045). The participants who claimed to brush their teeth twice a day had significantly lower DMFT scores (p<0.0001).

Conclusion: The study brings light to the poor oral care and the need to address oral health facilities for disadvantaged incarcerated groups. It emphasizes the need to regularly conduct dental checkups for diagnosis and treatment among the vulnerable population.

Keywords: CPI index, dental caries, DMFT, oral health, periodontitis.

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INTRODUCTION:

In Pakistan, periodontal diseases and dental caries are highly prevalent.[1] Caries varies between very low in rural areas to moderate in some urban communities. The prevalence varies between 4 – 30% with prevalence being higher in urban areas than rural areas.[2]

While most oral health surveys conducted have consistently focused primarily on children, adolescents and adults from the general population, few have been conducted on disadvantaged groups. Worldwide there are disparities in the oral health of those from poor families compared with their counterparts of higher status and for disadvantaged groups with special health care needs.[3]

Among the disadvantaged groups the health of prisoners is particularly of interest because of the increasing number of inmates and unhealthy environment.[4] Prisoners are more vulnerable to a wide range of health problems including alcohol and drug abuse, infectious diseases, chronic diseases, psychosocial and psychiatric problems.[5] One area that is currently under-researched is the oral health status of individuals in the prison environment. Prisoners are a vulnerable and socially deprived group requiring attention as they are often neglected with little or no access to health

care.[6-8] Oral health is also linked to the quality of life indicating that the prisoners are at disadvantage in comparison to population at large.

Evidence indicates that women make up a tiny percentage of the overall population in prison; however, they have been recognized to be less educated, marginalized, and liable to the prevailing criminal justice system. In terms of legislation and debate on prisoner rights, their gender-specific issues and concerns are frequently disregarded or neglected. According to the official figures issued by the Ministry of Human Rights in 2020, female prisoners are up to 1,121 out of 73,242 in Pakistan, or 1.5 percent of the total population in prison. Punjab has the most female inmates (727), accompanied by Sindh (205) and KPK (166). A total of 24 female medical staff are on board to cater to the health and nutritional requirements of these female prisoners. Sindh has seven medical officers, out of a total of 24.[8] When compared to the female inmates to whom they must cater, these figures appear to be insufficient.

Periodontitis and dental caries are the commonest two problems causing tooth loss across the globe. These studies have shown that the common oral health problems affecting the normal population are to be seen in prisoners.[6,7]. Maintaining hygiene and oral health in prison is a challenge itself. Our objective is to find out the oral and nutritional health and oral health-related behaviors among the women prisoners at the Central Jail facility, Sindh, Pakistan.

Pakistan is a developing country. There is usually low priority, corruption and negligence in government institutions in fulfilling their responsibilities. Since prisoners are generally unprivileged and hated individuals, not considered for the equal human rights as with the rest of the citizens, it is very important to know the dental health and nutritional status of prisoners beside their social and mental wellbeing during their stay in prison. Women are already a vulnerable group and are at an increased risk of having compromised mental and dental health and nutritional deficiency. Depression, aggression and isolation are common mental health related issue in these women. Taking care of these issues will be helpful in making women in prisons useful citizens of the society when they are released. Till date only one study is present related to the oral health of the imprisoned persons providing limited data of male prisoners.[2] Though several explored the health that is the mental and physical wellbeing of these prisoners. The present study was conducted to assess the frequency of dental caries and periodontal health status among incarcerated women in Karachi facility, Sindh, Pakistan.

METHODOLOGY:

A cross-sectional study was conducted between December 2021 to February 2022 at the department of Community, Sindh Institute of Oral Health Sciences and Women Prison Karachi. The study was started after approval from the Institutional Review Board of JSMU (JSMU/IRB/2021/-579) and permission from the prison facility.

By employing non-probability convenience sampling technique participants were recruited in the study. For sample size, Select Statistics was used. Prevalence of dental caries was reported to be 47% among women in Pakistan. Keeping 47%,as the sample proportion, and a population of women incarcerated in Sindh prisons as 205, the margin of error as 5%, and a confidence level of 95%, a sample size of 134 was calculated.[8-9]

All female inmates between the ages of 18-65 years, serving various jail terms including those sentenced for life, prisoners condemned to death and awaiting trial were included in the study. Women younger than 18 years or older than 65 years and those who refused to give consent to participate were excluded.

Data was collected using structured questionnaires and oral examination. The data on socio demographics age, duration of incarceration, frequency of teeth brushing, material used for teeth brushing and educational level, marital status, number of children, husband occupation, nutritional/dietary habits, etc were recorded in a predefined structured questionnaire.

For each participant, oral examination was done. The dental caries and periodontal status examination were also performed under direct sunlight while wearing proper personal protective equipment (PPE), using a mouth mirror, explorer and CPITN probe. Dental caries were scored using DMFT index. All findings were properly documented. Community Periodontal Index (CPI) was used for periodontal health assessment. The examination was conducted by a single dentist with over five years of experience who remained blinded to the study objective - to reduce the chance of bias.

All data was entered and analyzed using Statistical Package for the Social Sciences version 26. All quantitative variables were presented as mean and standard deviation including age, DMFT Scores, duration of substance abuse, frequency of food intake, etc., while all categorical variables (severity of caries, socioeconomic status, etc.) were presented as frequency and percentages. Association of categorical sociodemographic variables and dental hygiene habits with DMFT Score and severity of periodontal disease were explored using chi-square test and for counts < 5, Fisher-Freeman-Halton test was used. A p-value of < 0.05 was set as cut off value for significance.

The participants were assured about the maintenance of their anonymity and confidentiality throughout the period of the study. The participants were allowed to leave the interview at any time they felt uncomfortable. No personal identifiers such as full name, address, or home number, were collected or documented. The data always remained accessible to the principal author and the co-authors.

RESULTS

A total of 131 incarcerated women were examined for oral health status with a response rate of 98.4%. The mean age of prisoners was 34.73 ± 9.94 years at the time of data collection while it was 28.46 ± 11.46 years at the time of incarceration. The mean DMFT score was 4.76 ± 4.46 with a very small percentage of women having DMFT however, 21 (16%) of women had hypertension. The majority of the prisoners had no formal education. Table 1 illustrates the oral hygiene habits among incarcerated women and the frequency of dental caries among women prisoners.

In total 362 decayed, 252, and 10 filled teeth were reported in the study population. We found that only 35 (26.7%) of women have had caries while about 71.7% women had at least one decayed tooth, 63 (48.1%) had at least one missing tooth, and 7 (5.3%) had at least one filled tooth (Table 2). Only 37 (28.2%) women had healthy gums.

The study showed that about 76 (58%) participants had a DMFT score between 0-5, 42 (32.1%) had a score between 6-10, and 13 (9.9%) score above 11. Older age was significantly associated with dental caries (p<0.0001). Furthermore, it was found that participants who had diabetes had significantly increased caries as indicated by their high DMFT score (p=0.045). Furthermore, the association between oral hygiene habits and dental caries were assessed; the participants who claimed to brush their teeth twice a day had significantly lower DMFT scores while those who claimed to not brush their teeth at all, had considerably higher DMFT scores (p<0.0001). Of those 21 participants who had hypertension, 61.9% had a DMFT score between 6-10 in contrast to only 26.4% participants who did not have hypertension (p=0.005). See Table 3 for detailed analysis.

DISCUSSION

We evaluated the oral hygiene status of female inmates at Central Jail, Pakistan. In this study, 72% women were suffering from some degree of periodontitis Women with more severe periodontitis scored significantly higher on DMFT criteria. Severity of periodontal disease was significantly associated with lack of formal education and medical comorbidity such as diabetes mellitus type 2 and hypertension. Furthermore, in our study, the majority of the women had dental caries. In fact only a small number of women i.e. one-fourth of them did not have any dental caries. About seven women out of 10 had at least one decayed tooth, and one half of the women had at least one missing tooth, while only a handful had at least one filled tooth highlighting the burden of dental caries in this cohort.

Incarcerated population remains a disadvantaged group of the community. It is difficult to work with them and often they remain inaccessible. This explains why there is little published literature to acknowledge their health needs.[10] Where dental health has remained a neglected and less touched health sector for all populations, similar is true for incarcerated individuals too. To the best of our knowledge, this is among the first few pieces of evidence on the oral health of Pakistani female inmates. Hence, this study remains robust in highlighting a barely touched community health issue.

Literature from other low-to-middle-income countries is not vastly different from our results. A study from Nigerian inmates reported that 67% had decayed / missing due to caries teeth. CPI of 1 or more was reported in 95% of their sample.[11] However, their population comprised only 2.6% females, as compared to our female exclusive sample. Comparatively, in our study, almost three-fourth (73%) had dental caries along with at least one tooth decay (71%) with

Table 1. Oral Hygiene Habits of Study Participants

History of Diabetes Mellitus	10 (7.6)
History of Hypertension	21 (16)
History of Cardiovascular Disease	10 (7.6)
History of Psychiatric Disease (Depression/anxiety, etc.)	27 (20.6)
Habits	
Frequency of Brushing Teeth	
I do not brush my teeth	34 (26)
Once daily	71 (54.2)
Twice Daily	26 (19.8)
What material do you use for brushing teeth?	
Toothpaste	72 (55)
Only toothbrush	25 (19)
The duration of brushing teeth	
Upto 2 minutes	88 (67.2)
> 2 minutes	9 (6.9)
Tongue cleaning	18 (13.7)
Use of Dental Floss	Nil
Use of Mouthwash	5 (3.8)

Table 2: Prevalence of Dental Caries and Severity of Periodontitis among Incarcerated Participants

Dental Caries	Frequency
Prisoners with Caries	35 (26.7)
Prisoners without Caries	96 (73.3)
At Least one decayed tooth	94 (71.7)
At Least one missing tooth	63 (48.1)
At Least one filled tooth	7 (5.3)
Severity of Periodontitis	
Healthy	37 (28.2)
Bleeding	29 (22.1)
Calculus	50 (38.2)
4-5 mm Pocket Depth	14 (10.7)
6 mm or more Pocket Depth	1 (0.8)

Table 3: Association between sociodemographic features of participants and dental caries

Characteristics	DMFT Score			P-value
	0-5	6-10	11-31	
Age				
35 years and younger	58 (81.7%)	10 (14.1%)	3 (4.2%)	<0.0001
36 years and older	18 (30%)	32 (53.3%)	10 (16.7%)	
Ethnicity				
Sindhi	13 (54.2%)	8 (33.3%)	3 (12.5%)	0.612
Punjabi	19 (52.8%)	14 (38.9%)	3 (8.3%)	
Baloch	6 (37.5%)	7 (43.8%)	3 (18..8%)	
Pashtun	8 (72.7%)	3 (27.3%)	Nil	
Urdu	22 (64.7%)	9 (26.5%)	3 (8.8%)	
Other	8 (80%)	1 (10%)	1 (10%)	
Education				
No formal education	39 (48%)	29 (36.3%)	12 (15%)	0.076
Primary to Secondary	20 (69%)	9 (31%)	Nil	
Matric or higher	17 (77.2%)	4 (22.2%)	1 (5.6%)	
Residence (Prior to incarceration)				
Urban	61 (60.4%)	29 (28.7%)	11 (10.9%)	0.338
Rural	15 (50%)	13 (43.3%)	2 (6.7%)	
History of Diabetes Mellitus				
Yes	3 (30%)	7 (70%)	Nil	0.045
No	73 (60.3%)	35 (28.9%)	13 (10.7%)	
History of Hypertension				
Yes	6 (28.6%)	13 (61.9%)	2 (9.5%)	0.005
No	70 (63.6%)	29 (26.4%)	11 (10%)	
History of Cardiovascular Disease				
Yes	3 (30%)	6 (60%)	1 (10%)	0.125
No	73 (60.3%)	36 (29.8%)	12 (9.9%)	
History of Psychiatric Disease (Depression/anxiety, etc.)				
Yes	12 (44.4%)	13 (48.1%)	2 (7.4%)	0.156
No	64 (61.5%)	29 (27.9%)	11 (10.6%)	
Frequency of Brushing Teeth				
I do not brush my teeth	11 (32.4%)	14 (41.2%)	9 (26.5%)	<0.0001
Once daily	43 (60.6%)	24 (33.8%)	4 (5.6%)	
Twice Daily	22 (84.6%)	4 (15.4%)	Nil	
What material do you use for brushing teeth?				
I do not brush my teeth	11 (32.4%)	14 (41.2%)	9 (26.5%)	<0.0001
Only toothbrush	14 (53.8%)	10 (38.5%)	2 (7.7%)	
Toothpaste	51 (71.8%)	18 (25.4%)	2 (2.8%)	
The duration of brushing teeth				
1 minute	31 (53.4%)	24 (41.4%)	3 (5.2%)	.004
2 minutes	27 (90%)	2 (6.7%)	1 (3.3%)	
> 2 minutes	7 (77.8%)	2 (22.2%)	Nil	
Tongue cleaning				
Yes	18 (100%)	Nil	Nil	<0.0001
No	58 (51.3%)	42 (37.2%)	13 (11.5%)	

48% having missing teeth and 5% having filled teeth. In an Indian study, 54.2% of female inmates had decayed teeth, 37.1% had missing teeth, and 2.9% filled teeth.[12] A Sudanese study reported their results separately for males and females. They utilized CPI-treatment needs criteria and reported that as compared to 0% males, 14% females scored 0 indicating healthy gingiva. Most of their female population (47%) scored 1. As compared to 4% of male prisoners; 12% of their female prisoners scored 4 - periodontal pocket > 5.5mm. Overall their female prisoners were worse oral health and the gender based differences were statistically significant.[13] This depicts how even within a disadvantaged group, women face further vulnerability. In our study, 12% of women had a periodontal pocket of 4mm or deeper. There are quite a few studies on the incarcerated population from India. A recent systematic review published in 2017 included 13 studies which assessed the oral health of the incarcerated population from January 2010 till May 2016.[10] They reported a range of DMFT scores 2.7-5.7 in at least 60 to 90 percent of the prison population. In our study, the range of the DMFT score was 4.76 (4.46), with 58% scoring low (0-5) and 10% scoring the highest (>11). The mean DMFT score of female inmates is reported to be 8.7.[14] Further 60-90% of their population reported poor periodontal status which is comparable to 72% reported in our study. The mean DMFT in female inmates aged above 35 years was 13.64 which is in line with our study. One cross-sectional was conducted with prisoners in Pakistan. A 98% frequency of caries was reported, 88% required restorations, and 67% required extraction. It was alarming that 12% were suffering from premalignant lesions.[15] Results from high-income countries like South Africa are also not very different. Their mean DMFT score was 9.8 and most individuals were classified as CPI score. The mean DMFT in elderly patients was 11.31.[16]

In our study, older age was significantly associated with dental caries which is also seen in the general population as well as in the incarcerated population.[17-18] Sharma et al., revealed that periodontal status significantly associated with age (p<0.05).[18] In our study, inmates with diabetes mellitus and those who were obese were also associated with higher DMFT score. In another study by Soares GH et al., it was found that 84% imprisoned women had untreated dental caries. Furthermore, the study also revealed that the highest DMFT scores of 19.9 ± 5.04 and 22.4 ± 7.23 were found in women aged between 45 to 54 years and 55 to 60 years, respectively.[19]

To sum it up, the current evidence highlights the burden of dental caries and periodontal disease among incarcerated women. Therefore, it is essential to include the dental health indicators in the assessment of the prison system in order to enhance the wellbeing of women in prisons.[20]

CONCLUSION:

The results of this study bring light to the poor oral care and the need to address oral health facilities for disadvantaged incarcerated groups. It emphasizes the need to regularly conduct dental checkups for diagnosis and treatment but also to introduce preventive measures and awareness on the importance of maintaining oral hygiene among this isolated population to government organizations and NGOS involved in the providing facilities and services to these women.

Authors Contribution:
Hina Shah: Conceptualized the study, acquisition, collection, statistical analysis & interpretation of data, manuscript writing
Imran Khan: Contributed to the oral examination, study design, data collection, reviewed the manuscript
Sibghat Ullah Khan: Contributed to the questionnaire design and interpretation of data
Jai Kershan: Contributed to the questionnaire design, reviewed and approved the manuscript
Sanaa Ahmed: Contributed in data collection, statistical analysis, an edited the manuscript
Sumbal Ayaz: Contributed to the oral examination, collection and interpretation of data

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Comparison of Neck Extension versus Ultrasound Guided Distance Measured From Skin to Epiglottis (DSE) As Sole Predictors of Difficult Intubation

Hassan Nasir Minhas, Mobeen Ikram, Nabeel Tahir Butt, Hafiz Ahmed Hassam Bhalli, Mansoor Ayub, Shahzada Irfan

ABSTRACT

Objective: The objective of this study is to compare the conventional measurement of neck extension versus ultrasound guided distance measured from skin to epiglottis (DSE) as sole predictors in determining difficult airway and laryngoscopy.

Study Design & Setting: Prospective observational study. Anesthesia department of Combined Military Hospital, Rwp from Jan-Jun 2023.

Methodology: All the patients included in the study were divided into two groups, Group N (n=75) undergoing neck extension as sole predictor and Group E (n=75) using DSE by USG as a sole predictor for difficulty airway. Primary variables measured were the sensitivity, specificity, positive and negative predicted values for neck extension and ultrasound guided DSE when compared with the outcome of the gold standard Cormack Lehane classification at intubation.

Results: Comparison of sensitivity and specificity of both parameters in diagnosing difficult airway showed a sensitivity of 76.9% in Group N (neck extension) versus 88.4% in Group E (DSE). Specificity showed 69.4% in Group N versus 87.5% in Group E. Neck extension had a positive predictive value of 73.2% whereas DSE was superior with a positive predictive value of 90.5%. The negative predictive value was also considerably less with neck extension as the sole perimeter with 73.5% versus 84.8% when DSE was used.

Conclusion: We conclude that the ultrasound guided distance measured from skin to epiglottis is superior to conventional neck extension when used as sole agents to diagnose difficult airway in suspected patients.

Key Words: Difficult, DSE, intubation, neck extension, ultrasound

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INTRODUCTION:

The management of difficult airway remains a priority for the anesthetist. The catastrophic unanticipated difficult airway remains an emergency in the operating room as well as in the emergency department during resuscitation of patients.[1] It is estimated that the incidence of number of difficult airways encountered in the operating room is around 10%.[2] A difficult airway is associated with considerable complications including hypoxia, aspiration, cardiac instability and critical arrythmias.[3,4] Early suspicion and confirmation through standard methods of airway assessments can prevent these adverse effects resulting in better patient outcome. Various international bodies have proposed various algorithms to deal with unanticipated difficult intubation, but all recommend an early assessment of the airway especially in non-emergency cases so that complications can be prevented in otherwise elective cases ending up in an emergency situation. The difficult airway society recommends guidelines for difficult intubation but also stresses the need for early recognition of at-risk cases and prepare and plan accordingly.[5]

Various parameters have been used to assess for difficult airway and it is rather the comparison between these

parameters and comparing them with each other in a system of assessment methods results in the best possible outcome for the patient. Studies have been carried out in comparing these parameters one by one and many of these have been proven to be better than the other with respect to sensitivity and specificity when comparing airway in a diverse group of patients. The presence of beard, advanced age, loose or lost teeth, short neck, inter-incisor distance have different specificities and sensitivities for airway assessment and anticipating difficulty in intubation in the operating room for the anesthetist.

Neck extension has been used as an acceptable method for predicting difficult airway and subsequent laryngoscopy in patients.[6] It has a good sensitivity and specificity, however, many patients who present with a decreased neck extension usually have easy intubations during laryngoscopy. Therefore, sole prediction of airway is usually combined with other methods to increase the reliability in the assessment.[7] But the more sensitive and specific a single predictor is in identifying the airway as difficult, the more it can add to the overall assessment criteria in diagnosing difficult airway and laryngoscopy.

Upper airway ultrasound techniques have been employed recently especially in the developing countries and confer advantages in predicting difficult airway.[8] Various measurements done by ultrasound have been used as predictors for difficult airway but the distance from skin to epiglottis (DSE) has merit in accurately measuring difficult airway in various studies.[9] Not only is it easy to perform but if added to the early assessment of patients in the emergency department or operation theater as a standard protocol, they may provide valuable information to the anesthetist in managing the airway of patients requiring subsequent intubation.

The aim of this study is to thus compare the conventional measurement of neck extension versus ultrasound guided distance measured from skin to epiglottis (DSE) as sole predictors in determining difficult airway and confirmed by subsequent laryngoscopy using the standard Cormack Lehane assessment.[10]

METHODOLOGY:

This prospective observational study was carried out at the Department of Anesthesiology, Combined Military Hospital from Jan-Jun 2023 after approval form the local institutional ethical review board Sr no. 431/12/21. 150 patients (minimum sample size 139 as per WHO calculator) were included in the study as per the inclusion criteria furnished keeping the confidence interval at 95%, margin of error at 5% with the incidence of difficult airway encountered by anesthesiologists in the operating room at 10%.[11] The method of sampling was non-probability consecutive via lottery method.

Inclusion criteria included all ASA I and II patients aged 20-40 years presenting to the anesthesia department after pre-anesthesia assessment for subsequent elective surgeries under general anesthesia with neck extension angles less than 21 degrees as difficult and more than 21 as not difficult airway for Group N[12] and DSE distance more than 2.70 cm as difficult and less than 2.70 cm as not difficult for Group E.[13]

Exclusion criteria excluded patients with patients with a history of burns or trauma to the airways or to the cranial, cervical, and facial regions, patient with a history of tracheostomy or lower airway surgeries and patients unwilling to be included in the study.

A written informed consent was taken from each participant explaining in detail about the study procedure but not the outcome or analysis protocol and discussing possible complications.

The study method included all patients as per the inclusion criteria furnished. All the patients included in the study were divided into two groups, Group N (n=75) undergoing neck extension as sole predictor and Group E (n=75) using DSE by USG as a sole predictor for difficulty airway. Maximum angle for neck extension in Group N was measured with the patient sitting while keeping the head erect directly looking at the front with mouth wide open and then asked to extend the head maximally while the anesthetist measured the angle traversed by the occlusal surface of the upper teeth (Grade 1 >35 degrees, Grade 2, 24-32 degrees, Grade 3, 12-21 degrees, Grade 4, <12 degrees)(Figure-I). Measured angles of < 21 degrees as predictors of difficult airway and vice versa. In Group E, linear probe using ultrasound guidance was used to measure the distance from skin to epiglottis in the sniffing position with the patient lying supine by a consultant anesthetist with 5 years of USG experience. A cut-off value of 2.70 cm from literature was taken as a predictor of difficult airway and vice versa. To remove bias, the anesthetist performing pre-operative airway assessment were different to those confirming through Cormack Lehane scoring during intubation. Cormack-Lehane grade I (glottis fully exposed) and II (glottis partially exposed with anterior commissure not seen) were rated as easy intubations. Cormack-Lehane classifications of grade III (only epiglottis seen) and IV (epiglottis not seen) were rated as difficult intubations.[14]

After confirming nil per oral status, patients were taken to the OT. Standard monitoring including non-invasive blood pressure, heart rate, capnography and ECG were attached to participants in both groups. Anesthesia was induced in both groups and after adequate sedation and paralysis with standard doses of IV Propofol 2 mg/kg and IV Atracurium 0.5 mg/kg. IV Nalbuphine 0.15 mg/kg was given for analgesia with pre-induction agents IV Ondansetron 4mg and IV Dexamethasone 2 mg. Once adequate depth with 1.0 MAC was achieved of Isoflurane, the patient was then placed on the sniffing position, and a No. 3 Macintosh curved blade

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was used to obtain the laryngoscope view by a consultant anesthesiologist.

Primary variables measured were the sensitivity, specificity, positive and negative predicted values for neck extension and DSE when compared with the outcome of the gold standard Cormack Lehane classification.

Demographic data were statistically described in terms of mean and SD, frequencies, and percentages when appropriate. Sensitivity, specificity, positive and negative predictive values were calculated for both tests. All statistical calculations were performed using Standard Package for Social Sciences 26.0.

RESULTS:

A total of 150 participants were included in the study divided into Group N (n=75) and Group E (n=75). Mean age of patients in Group N was 29.893.54 years versus 30.564.00 in Group E. Mean weight between both the groups was 75.234.91 kg in Group N versus 73.954.37 kg in Group E. Gender distribution showed 42 (56%) males versus 33 (44%) females in Group N versus 36 (48%) males and 39 (52%) females in Group E (Table-1).

When comparing the diagnostic accuracy of neck extension with the gold standard Cormack Lehane score, frequency distribution revealed 30 (40%) participants as true positives and 25 (33.3%) as true negatives. Similarly, when comparing DSE with the Cormack Lehane score, 38 (50.6%) participants were true positives versus 28 (37.3%) participants as true negatives (Table-2).

Comparison of sensitivity and specificity of both parameters in diagnosing difficult airway showed a sensitivity of 76.9% in Group N (neck extension) versus 88.4% in Group E (DSE). Specificity showed 69.4% in Group N versus 87.5% in Group E. Neck extension had a positive predictive value of 73.2% whereas DSE was superior with a positive predictive value of 90.5%. The negative predictive value was also considerably less with neck extension as the sole perimeter with 73.5% versus 84.8% when DSE was used (Table-3).

DISCUSSSION:

The study was carried out to assess the sole predictive values of the most common parameters used to assess difficult airway. The rationale was that the higher the predictive values and sensitivity and specificity, the more that predictor

Figure 1: Measuring Maximum Angle for Neck Extension
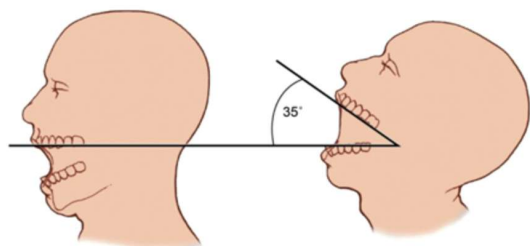
Table 1: Demographic Variables (n=150)

VARIABLE	GROUP N (n=75)	GROUP E (n=75)
MEAN AGE (YEARS)	29.893.54	30.564.00
MEAN WEIGHT (KG)	75.234.91	73.954.37
GENDER DISTRIBUTION		
• **MALE**	42 (56%)	36 (48%)
• **FEMALE**	33 (44%)	39 (52%)

Table 2: Comparison Between Neck Extension and Distance from Skin to Epiglottis (DSE) with Cormack Lehane Findings (N=150)

		Difficult	Not Difficult
Neck extension (n=75)	Difficult	30 (a)	11 (b)
	Not difficult	09 (c)	25 (d)
Distance from skin to epiglottis (DSE) (n=75)	Difficult	38 (a)	04 (b)
	Not difficult	05 (c)	28 (d)

Legend: A: (True Positives/Sensitivity), B (False Positives/Type-I Error), C (False Negatives/Type Ii Error), D (True Negatives / Specificity)

Table 3: Sensitivity, Specificity, Positive and Negative Predictive Values (n=150)

Variable	Sensitivity	Specificity	Positive predictive value	Negative predictive value
Neck extension	76.9%	69.4%	73.2%	73.5%
DSE	88.4%	87.5%	90.5%	84.8%

would add to correct assessment of difficult airway when added to part of a combined scoring or assessment system.[15] The reason for using neck extension and DSE was to compare their individual power to diagnose difficult airway and compare whether one is superior to the other quickly and effectively.

The advent of ultrasonography has revolutionized the assessment and diagnosis of various parameters in the field of anesthesia. From interventional procedure using fast and focused assessment to rule our critical diagnoses to regional anesthesia techniques and blocks, the effects of USG in the field of anesthesia are paramount. Therefore, the use of this fast, effective, non-invasive, and safe modality to diagnose difficult airway was the point of focus during our study. We aimed to see whether results compared to conventional methods proved to be subpar or superior so we can propose to add novel methods that can quickly diagnose patients with anticipated difficult airways. The use of this modality would also be very useful in patients where neck extension and mobility are partially restricted due to injury, trauma, burns and contractures.

A study carried out by Carsetti et al[16] revealed that DSE was an excellent parameter in diagnosing difficulty airway when compared to conventional methods of neck extension,

thyromental distance and thyrohyoid distance. It was also proposed in a study carried out by Moura et al[17] that the diagnostic value can be further increased by adding Mallampatti score along with DSE in diagnosing difficult airway. Studies carried out by Giordano et al[18] showed that the sensitivity of DSE was around 95% which is line with findings of our demographic setup as well. The study also included obese patients with similar results but lesser negative predictive values.[19] Various studies carried out by the difficult airway society also mention the modern use of USG guided airway assessment methods to be superior yielding better overall sensitivity and specificity for airway assessment.[19] We also recommend the routine use and practice of residents and consultants in USG guided airway assessment methods as they provide better overall idea of whether a difficult airway should be anticipated during intubation in the patents.

Studies done at the local demographic levels remain scarce on the predictive value of USG for difficult airway. The reason can be attributed to non-availability and non-widespread use of the modality for airway assessment in pre-anesthesia clinics as well as operating rooms. The study aims to propose its frequent use because of better results in difficult airway diagnosis. The same has been proposed by studies done by Wu et al.[20]

The use of USG guided methods for employment in anesthesia have been less developed in our treatment setups. Lack of resources and decreased expertise have hindered their effective and widespread use. The use of USG guidance in regional nerve blocks is gaining momentum and acceptance both from anesthetist and surgical specialists and we hope the results of this study will direct physician towards using this excellent modality for methods and procedures other than pain relief and regional anesthesia practice.

CONCLUSION:

We conclude that the ultrasound guided distance measured from skin to epiglottis is superior to conventional neck extension when used as sole agents to diagnose difficult airway in suspected patients.

Authors Contribution:
Hassan Nasir Minhas: Conception, design, acquisition, analysis and interpretation of data, drafting of article
Mobeen Ikram: Conception, design, acquisition, analysis and interpretation of data, drafting of article
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The outcome of Ketamine and Propofol for Procedural Sedation and Analgesia (PSA) in Pediatric Patients in the Emergency Department: A Cross-Sectional Study

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ABSTRACT

Objectives: We aim to evaluate the outcomes of Ketamine and Propofol for PSA in pediatric Pakistani Emergency Department (ED) patients. Our primary objective is to observe sedation duration and recovery time. Secondary objective is to assess the need for repeat doses and potential complications associated with the use of these drugs.

Study Design & Setting: Descriptive cross-sectional study. Urban tertiary care hospital: Aga Khan University Hospital (AKUH) ED, Pakistan.

Methodology: 179 eligible patients requiring painful procedures in the emergency, under 16 years, selected through non-probability consecutive sampling, after consent from caregiver/children, were included. PSA was performed by certified PALS and PSA personnel, with single IV Ketamine dose (0.5 mg/kg) and Propofol (1 mg/kg, followed by 0.5-1 mg/kg as needed). [15] Oxygen saturation and vital signs were continuously monitored during and after the procedure until full consciousness was regained and patients were observed for potential complications.

RESULTS: 179 patients underwent PSA with Ketamine and Propofol combination; (57.0%) male and (43.0%) female, with a mean age of 3.91 years ($\pm$ 2.80). Majority of patients were 1-5 years old (80.4%), 6-10 years (15.6%), and 11- 16 years (3.9%). Of these, (82.1%) required laceration repair. Some reversible complications were observed, including tachypnea in (28.5%) of cases, hypotension (22.3%), tachycardia (21.8%), bradycardia (2.2%) and hypoxia in (1.1%).

CONCLUSION: In our study, PSA using Ketamine and Propofol combination in the ED, by non- anesthesiologists, was found to be safe and linked to a low rate of reversible complications.

Key Words: Anxiety, Ketamine, Pain, Procedural Complications, Propofol.

INTRODUCTION:

To provide comfort to infants and children undergoing diagnostic or therapeutic procedures in the ED, it's crucial to achieve sedation with adequate analgesia. This requires an agent with rapid induction, smooth recovery, and the ability to maintain adequate cardiovascular and respiratory functions, amnesia, anxiety and motor control throughout the procedure.[1] The goal of sedation is patient safety, minimize pain and psychological trauma, control anxiety and behavior, and movement throughout the procedure.[2]

While there are limited medications available, a combination of pharmaceutical agents at different doses can be used to achieve the desired sedation level, maintaining airway reflexes and patency.[3, 4] this approach not only achieves controlled sedation but also reduces healthcare resource utilization by decreasing operating room patient load, anesthesia personnel, patient waiting time, hospital and ED stay, recovery time, and overall health care costs.

Procedural sedation and analgesia (PSA) involve administering sedation and analgesia to facilitate therapeutic or diagnostic procedure in the Pediatric ED (PED). Propofol combined with Ketamine has become standard practice for procedural sedation in a conscious patient in ED.[5-7]

A local retrospective study and several international studies that explored the safety, success rate, and side effects of combined use of Propofol and Ketamine during PSA by non-anesthesiologists in pediatric patients, yielded largely consistent findings. [8] However, these studies were out of the emergency room, but were controlled trials, though the results remained consistent.

Ketamine is a dissociative agent known for its strong amnesia and analgesic properties, maintains muscle tone, airway

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reflexes, and respiration. However, some children may experience vivid dreams, nausea, or vomiting. In contrast, Propofol has a rapid onset of action, a short half-life, and quick recovery. Propofol has good antiemetic, and amnestic properties but may cause dose-dependent hypotension and respiratory depression. [9] Combining these drugs is theorized to preserve sedation potency while minimizing their respective adverse effects, potentially balancing out each other's side effects.

Procedures like lumbar puncture, laceration repair, foreign body removal, chest tube insertion, fracture/dislocation reduction, electrical cardioversion, abscess drainage, imaging studies like computed tomography (CT) scan or magnetic resonance imaging (MRI), endoscopy, etc. are painful and distressing for children. PSA is used to alleviate pain and stress in both children and parents. Hence, PSA is recommended in most developed EDs.

Few studies have addressed the success rate and side effects of Propofol and Ketamine combined for PSA by non-anesthesiologists in pediatric patients. Some institutions and physicians remain cautious due to known complications and parental concerns. Different dose regimens have been employed across studies, with no universally superior dose regimen identified.

Combining low-dose ketamine with carefully administered small doses of Propofol for effective PSA minimizes complications related to drug and dosage. This approach helps to achieve a balance between the two drugs and reduces the need for escalating or subsequent doses. [10]

Our study aims to evaluate the outcome of combining Ketamine and Propofol for pediatric PSA during diagnostic and therapeutic procedures in the emergency department of Aga Khan University Hospital, a tertiary care teaching hospital, in Pakistan. Our focus is on our unique population, which has distinct anatomical and genetic characteristics, making it challenging to apply results from other population. This study aims to evaluate the effect of PSA on sedation duration, recovery time as primary outcomes. The secondary objective is to assess the need for repeat doses and complications incurred. Additionally, the study seeks to reduce healthcare resource utilization, lower operating room patient load, anesthesia personnel requirements, reduce patient waiting time and healthcare cost at the study center.

METHODOLOGY:

This was a prospective cross-sectional hospital-based study. Nonprobability consecutive sampling was done of all subjects aged below 16 years presenting to the ED of an urban tertiary care hospital from January 1st, 2018 to December 31st, 2019, who required procedural sedation and analgesia, after approval from the Ethical Review Committee of The Aga Khan University Hospital; Reference number 2018-0529-1001. The study center currently practiced PSA with Ketamine and Propofol or Ketamine and Midazolam across

the hospital and especially in the ED during PSA in children. Patients who were allergic to Ketamine, Propofol, egg, and soy or had a history of low blood pressure or hemodynamic instability were excluded from the study. Patients with a Mallampatti score of class =2, Modified Alderate score =6, or American Society of Anesthesiologist classification score of =3 were excluded from the study. Inclusion criteria include all children who need to go through painful procedures in the PED and caregiver/children agree to consent for PSA and don't fall under the exclusion criteria. Sample size calculated using Raosoft software with 3.2% margin of error and 95% confidence interval and sample size of 179 was calculated. Response distribution of Hypoxia was 5%. [7]

Informed consent from parents was taken as per the hospital policy, both for sedation and the procedure being undertaken. The PSA was taken care of by an ED physician who was credentialed for PSA and advanced airway care, while the procedure required was dealt with by another physician from ED or from another subspecialty. All cases had at least 4-6 hours of fasting.

We used ketamine 0.5 mg/kg IV as a single dose, repeat ketamine dose was used among children who during procedure perceived pain as per the visual analog pain scale among younger children and tachycardia or irritability in older children. Propofol with an initial dose of 1 mg/kg followed by 0.5-1 mg/kg as and when required. [15] Subsequent doses of Propofol were given as per physician advice when necessary in cases when tachycardia was observed and/or observed bodily movement/awakening child. Oxygen via face mask and crash cart was available at all times during the procedure. Continuous monitoring for oxygen saturation and vitals was carried out throughout the procedure and post-procedure till the patient gained full consciousness.

A predesigned and institutional approved official form was used by ED personnel for the data collection to record demographic characteristics of patient information related to the procedure, which included time out, procedure start and end time, doses administered, total sedation time (from initial sedation injection to spontaneous eye-opening), recovery time (time passed from end of the procedure to awakening), vital signs (Respiratory rate, Heart rate, Blood Pressure, Oxygen Saturation, and Temperature) and any complications associated with PSA (like bradycardia, hypoxia, apnea, hypotension, seizure, arrhythmia, laryngospasm, stridor, rash, vomiting or aspiration, etc.) and interventions undertaken. The primary outcome was to observe the duration of sedation, recovery time, and length of hospital stay, while the secondary outcome was to assess the need for repeat dose and complication. The Faces pain scale was used to record pain scale among children below 5 years of age while a numerical pain scale from 0 to 10 (where 0 as No pain and 10 severe intensity pain) was used in children who can understand and communicate their pain intensity. However, pain assessment was recorded pre and post-procedure (during

recovery). [8] The patient was discharged only when able to maintain good airway, was fully awake, presence of swallowing reflex, with ability to swallow clear liquids, and achieving the pre-sedation level of responsiveness.

Statistical Analysis: Data was entered and analyzed using IBM statistical package for social sciences (SPSS) software version 22. Frequency and percent were calculated for qualitative variables like gender and complications. Mean and standard deviation was calculated for age, sedation, and recovery time. Effect modifiers like age, gender, sedation, and recovery time were addressed through stratification. The post-stratification chi-square test was applied by taking $p = 0.05$ as significant.

RESULTS:

We enrolled 179 children who required PSA in the ED for various procedures. Among them, 102 (57.0%) were males, 77 (43.0%) females, with a mean age of 3.91±2.80 years. The majority of cases 147 (82.1%) involved laceration repair on the face, with forehead lacerations (66%) being the most common (49), followed by eyebrow lacerations (27). (Table 1)

Table 1: Procedures Undergone PSA

DIAGNOSIS	FREQUENCY	PERCENT
Forehead laceration	49	27.4
Eyebrow laceration	27	15.1
Eyelid laceration	10	5.6
Femur dislocation	2	1.1
Chin laceration	20	11.2
Radius fracture	4	2.2
Head trauma	2	1.1
Ear laceration	2	1.1
Cheek laceration	5	2.8
Nail bed laceration	4	2.2
Supracondylar fracture	2	1.1
Nose laceration	4	2.2
Lip laceration	13	7.3
Heel laceration	2	1.1
Back laceration	2	1.1
Facial laceration	2	1.1
Lateral canthus laceration	1	.6
Pleural effusion	2	1.1
Forearm laceration	1	.6
Left leg staples	1	.6
Finger laceration	6	3.4
Meningoencephalitis	2	1.1
Lumbosacral wound	2	1.1
Forearm fracture	6	3.4
Glass cut injury	2	1.1
Crush injury	2	1.1
Meningitis	4	2.2
Total	179	100.0

Total ED stay averaged 38 ± 15.5 minutes, ranging from 15 to 104 minutes. Sedation time averaged 16.63 ± 9.44 minutes, with a minimum of 04 minutes and maximum of 70 minutes. When examining sedation time further, we found that 100 (56%) children were sedated for < 15 minutes, and 72 (40%) were sedated for 16-30 minutes. (Table 2). Recovery time from PSA averaged 21.45 ± 11.81 minutes, varying from 10 to 87 minutes, before safe discharge. Further analysis showed that 43% of cases recovered in <15 minutes, 50% in 16-30 minutes, while 4% took 31-45 minutes, and 3.4% recovered after 45 minutes. (Table 2). All cases received a combination of Propofol and Ketamine, with ketamine given as a single dose in 170 (95%) cases, only 09 required (= 2) repeat dose. Regarding repeat doses of Propofol, 71 (40%) children received up to 3, 4, 5, or more doses, while 108 (60%) children responded well to a single dose. Notably, all 09 cases that required a repeat dose of ketamine also needed >3 doses of Propofol (Table 3). When examining gender distribution and the number of repeat doses of PSA drugs (Ketamine and Propofol), the majority of children underwent PSA with < 2 doses. (Figure 1). Reversible complications following PSA in this study included: bradycardia in 04 (2.2%), hypoxia in 02 (1.1%) cases. Tachypnea and tachycardia were noted among 51 (28.5%) and 39 (22%) children respectively. Fluid responsive hypotension was identified in 41 (23%) children. Vomiting was not recorded in any case. Secretion and gurgling associated with hypoxia were managed with position change, and deep suction was not required. No episode of apnea, seizure, laryngospasm, stridor, or rashes were observed in any patient during PSA.

Children under 5 years of age had a higher likelihood of experiencing complications following PSA. Among the 179 cases, 85% of those with hypotension were aged less than 5 years. Of which 28 were males and 13 females. 64% of tachycardic patients were under 5 years of age. Chi- square

Table 2: Sedation and Recovery Time in PSA

Time in minutes	Sedation Time	Recovery Time
<15	100 (56%)	77 (43%)
16 – 30	72 (40%)	89 (50%)
30 - 45	05 (2.8%)	07 (04%)
> 45	02 (01%)	06 (3.4%)

Table 3: Age and (Ketamine/Propofol) Repeat Doses Correlation

Age in years	Propofol repeat doses			Ketamine repeat doses	
	<2	3-4	>5	<2	>2
< 5	91	33	20	139	05
6 -10	15	07	06	25	03
11 -16	02	01	04	06	01
Total	108	41	30	170	09

Figure 1: Gender relation with PSA, sedative drug and Doses

Propofol	Ketamine	
<2(Tota: 108)	58(Male)	50(Female)
3-4(Total: 41)	26(Male)	15(Female)
>5(Total: 30)	18(Male)	12(Female)

value= 24.351, P-value = 0.001. All cases of hypoxia and bradycardia were in children under 5 years of age. None of the patients vomited, and there was no need for either basic or advanced ventilatory support.

DISCUSSION:

The Ketamine and Propofol combination, though studied in a small single-center sample, has shown promising results when used by PED physicians. While the study's limited size prevents it from detecting significant differences, it demonstrates positive outcomes such as improved sedation, reduced hypotension, and increased patient comfort and safety. [10]

PSA is crucial in caring for children, reducing anxiety, and ensuring pain-free medical procedures. The demand for safe, painless diagnostic and therapeutic procedures is increasing. Children in ED are more anxious and frightened of pain during these procedures. [10, 14] Effective pain management and anesthesia in ED are pivotal for providing quality care, alleviating anxiety, and ensuring good sedation and analgesia.

Different medications and combinations are used for PSA. Ketamine is used effectively as an anesthetic and analgesic during PSA, but can lead to complications like delayed recovery, vivid dreams, increased salivation, nausea, and vomiting. Propofol, while safe due to its favorable pharmacokinetics, can cause hypotension and respiratory depression and lacks intrinsic analgesic properties. Combining low-dose ketamine with carefully measured small doses of Propofol for PSA helps minimize drug and dose-related complications, balance the effects of each other, potentially reducing the need for additional doses. [2, 10, 15] Heterogeneity in Ketamine and Propofol dosing has been observed in the literature, and optimal combination dose is debatable. Ketamine dose range from 0.5–1.5 mg/kg, while Propofol doses follow a similar pattern, often as small boluses. Some studies also use a single dose of ketamine before inducing unconsciousness with small doses/infusion of Propofol. [19]

The current study was conducted to determine the outcome of Ketamine and Propofol for PSA in pediatric Pakistani patients in the emergency department of Aga Khan University Hospital.

In this study, we observed minimal complications in patients who received PSA with Ketamine and Propofol, using lower individual drug doses compared to other studies using Ketofol as a single drug combination. [11] Likewise, similar studies, such as Jurair H, et al. and Grunwell JR, et al. have reported lower adverse effects with Ketamine and Propofol

combination, in only 0.60% of children. [8,16] Oxygen desaturation in 3.86%, cough 1.46%, apnea 1.57%, etc. [16] On the contrary, Khutia SK, et al. reported higher complication rates: hypotension in 14.58%, apnea 4.16%, emergence reaction 10.42%, nausea and vomiting 10.42%. [17]

Similar to a study conducted in a low-resource setting by Bengono BR et al., our study demonstrated comparable sedation times. Bengono reported a mean sedation time of 17 minutes, while our study indicated a mean sedation time of 16 minutes. [25]

A meta-analysis by Foo. TY et al. found that Ketamine and Propofol didn't significantly improve clinician satisfaction and led to increased respiratory adverse events like airway obstruction, apnea, desaturation, and respiratory depression. However, they may reduce the incidence of hypotension, unlike our findings, and didn't result in bradycardia. Additionally, no significant gastrointestinal adverse events like nausea and vomiting were observed. [20]

This study aligns with Alletag et al.'s analysis of Ketamine and Propofol for PSA. [1] Combining low-dose Ketamine and Propofol lowers complication risks during sedation and recovery, in line with our findings. [16] Similarly, Andolfatto. G et al.'s study on intravenous (IV) Ketofol (mixed 1:1 ketamine-propofol) and A. Chiaretti et al's research comparing Propofol alone and in combination with Ketamine support our results, highlighting a lower risk and complication incidence with the combination, even without a control group. [13]

Kannikeswaran compared the need for re-dosing, sedation efficacy, duration, and adverse events between 3 commonly administered doses of parenteral ketamine in the ED in children aged 3 to 18 years. [18] Another study found that 1mg/kg of IV ketamine led to sedation-related dissatisfaction and painful recollections. [18] In our study, where Ketamine and Propofol were combined, some patients experienced short-lived hypotension, tachypnea, and tachycardia, but sedation-related dissatisfaction was not observed in any case.

In a meta-analysis by Foo. TY et al., comparing Ketamine and Propofol with Propofol alone in ED patients, with six RCTs, they found a higher frequency of adverse respiratory events when the combination (Ketamine and Propofol) compared to isolated Propofol. [20] In our unpublished comparative analysis of Ketamine/Propofol vs Ketamine alone, preliminary results indicate that Ketamine/Propofol is safer than Ketamine alone.

Males predominated among patients who undergoing PSA, similar to finings in studies by Jurair H, et al. and Grunwell JR, et al. [8,16] The younger age group had a significantly higher representation. [8] Possibly influenced by regional factors and healthcare availability. Combining Ketamine and Propofol reduced major desaturations, especially in children under 5 year, mirroring our findings. Using low-dose Ketamine and

Propofol for PSA offers benefits such as effective sedation, good analgesia and amnesia, hemodynamic stability, and minimizing distressing adverse effects like hallucinations.[13]

CONCLUSION:

In our study, PSA using Ketamine and Propofol combination in the ED, by non-anesthesiologists, was found to be safe and linked to a low rate of reversible complications. No episode of apnea, seizure, laryngospasm, stridor, or rashes were observed in any patient during PSA. However, its efficacy and associated complications need to further be investigated by a larger sample size, case-control, or randomized trial.

Authors Contribution:
Bushra Qaiser Qureshi: Did the literature search, formulated the study design and concept, questionnaire, data collection, and analysis with interpretation and drafting.
Emad Uddin Siddiqui: Data collection and drafting. All authors read and approved the final manuscript
Sayyeda Ghazala Kazi: Authors read and approved the final manuscript

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Prevalence of Intradialytic Muscle Cramps and Quality of Life in Haemodialysis Patients

Somiya Naz, Mubashar Nazar, Waqas Khalid, Laraib Akhtar Malik, Abeera Tahir, Muhammad Mujtaba ur Rehman

ABSTRACT

Objective: The aim of this study was to find out prevalence of intradialytic muscle cramps and quality of life in hemodialysis patients.

Study design and settings: This was a cross-sectional study conducted in three different hospitals in Rawalpindi and Islamabad.

Methodology: Following ethical approval, a cross-sectional study was conducted on 361 patients undergoing hemodialysis through Convenience Sampling Technique. A self-structured questionnaire was used for demographic data and clinical characteristics. Numeric pain rating scale (NPRS) was used to assess severity of muscle cramps and WHOQOL- BREF was used to assess quality of life in hemodialysis patients.

Result: During hemodialysis, 78% participants experienced muscle cramps, the mean severity of cramps during hemodialysis was noted to be 7.08±1.94. The most of participants i.e. 45% reported muscle cramps in leg region. The QOL of patients undergoing hemodialysis was low in physical (59.95±19.19), psychological (58.60±17.04), and environmental (33.06±10.51) domains while good in the social domain (83.26±23.75) of WHOQOL- BREF questionnaire

Conclusion: The current study's findings showed that muscle cramps in patients undergoing hemodialysis is common. The most reported muscle cramps region were legs. Patients undergoing hemodialysis have a low quality of life except social domain.

Keywords: Hemodialysis, Intradialytic muscle cramps, Quality of life.

INTRODUCTION

Renal disorders are a serious public health concern and the tenth biggest cause of mortality worldwide.[1] The number of people suffering from chronic renal failure is increasing every year. Individuals above the age of 40 are more likely to have chronic renal disease.[2] Chronic renal disease is characterized as a gGlomerular filtration rate (GFR) reduction of less than 60ml/min.[3] Chronic renal failure is an irreversible progressive illness that causes significant morbidity and mortality. Patients' quality of life (QOL) is considerably reduced because it necessitates lifelong treatment in the form of renal replacement therapy.[4] The quality of life is defined as "The physical, psychological, socioeconomic and environmental well-being". when the World Health Organization defined health as being not only the absence of disease and infirmity but also the presence of physical, mental, and social well-being, quality-of-life issues have become steadily more important in health care practice and research. There has been a nearly exponential increase in the use of quality-of-life evaluation as a technique of clinical research. The chronic kidney disease is treated with lifestyle changes, medicine, dialysis, and kidney transplantation. Hemodialysis is an effective treatment for chronic as well as acute renal failure.[5] Extracorporeal circulation is utilized in the hemodialysis technique to eliminate irritants from the patient's blood. The kidney's normal function is to filter waste materials from the blood and generate urine. Blood passes through nephrons, which filter waste and store essential nutrients within the body. Kidneys that are failing eventually

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lose their ability to focus and eliminate waste materials. Hemodialysis is a common treatment for people with end-stage renal failure.[5] Surgery is performed to construct an entrance point (vascular access) into blood arteries in order for blood to flow during hemodialysis. There are three types of entrance points: Arteriovenous fistula, AV graft and vascular catheter access.[6] Hemodialysis treatment lasts for 4 to 5 hours. Despite being a life-saving procedure, hemodialysis has many deleterious effects on overall body. Patients undergoing hemodialysis may experience life-threating or life-altering intradialytic complications.[7] These complications can affect quality of life of patients going through hemodialysis. Muscle cramps are among other intradialytic complications like hypotension, intradialytic weight gain, arrhythmias, nausea, shortness of breath, headaches and complications of vascular access. These complications affect the patient in multiple ways ultimately compromising the quality of life.[8] Muscle cramps occur frequently in patients on maintenance hemodialysis. Muscle cramps during hemodialysis can be caused by a variety of factors. The first is intradialytic hypotension, which occurs when there is a failure in systolic or mean arterial pressure of more than 20 mmHg. The second most common cause of muscle cramps during hemodialysis is hypo osmolality.[9] Muscle cramps can be caused by disturbances in electrolyte and mineral metabolism, such as raised plasma calcium, phosphorus, and decreased sodium, potassium, and magnesium levels, increased parathyroid hormone levels, Carnitine deficiency, and vitamin inadequacy.[10] Disruption of muscular energy metabolism is one of the proposed reasons for hemodialysis-associated muscle cramps (HAMC). Excessive dialysis ultrafiltration or tissue hypoxia promotes aberrant energy utilization by muscles, resulting in cramps. Sometimes dialysis process has to be stopped because of severity of muscle cramps and patient goes into state of under dialysis.[5] At the national level, there is a scarcity of research on muscle cramps, particularly among hemodialysis patients. The Current study focused on finding prevalence and severity of the intradialytic muscle cramps and quality of life in hemodialysis patients.

METHODOLOGY

The cross-sectional study was conducted in dialysis units of public and private sectors of Rawalpindi and Islamabad, from May, 2019 to December, 2020. The sample size was calculated to be approximately 360 with confidence level 95%, level of alpha 5 % and estimated proportion 0.39 by using Epi tool Software.[11] Data was collected from patients undergoing hemodialysis for more than 3 months, age more than 18 year either gender. Patients with history of muscle cramp before the initiation of hemodialysis were not included. Self-structured questionnaire was used for demographic data and dialysis related questions, Severity of muscle cramps was assessed by using Numeric Pain Rating Scale (NPRS) and the Urdu version of World Health Organization Quality

of Life Scale (WHOQOL-BREF) was used for assessing quality of life in dialysis patients. The validity and reliability of both tools has been proven in literature.[12,13] The WHOQOL-BREF is a self-reported questionnaire and consists of 26 items, of which the first two items measure the perceived QOL and general health satisfaction whereas the remaining 24 items are grouped into four domains of QOL (physical health, psychological health, social relationships and environment). The physical domain of quality of life addresses the following factors: pain, energy, sleep, mobility, activities of daily living, medications, and work. The psychological domain of Quality of life considers the following factors: Positive Feeling, Thinking, Esteem, Body Image, Negative Feeling, and Spirituality. The social domain takes into account the following factors: personal relationships, social support. The environmental domain comprises aspects such as safety, home environment, financial resources, access to services, access to information, leisure activities, physical environment, and access to transportation. All items were assessed on a 5-point Likert scale by the subjects. The mean score of items within each domain was used to produce the mean domain score, which was then multiplied by four to make domain scores comparable with WHOQOL-100 scores, as per the measure's recommendations. Domain scores were scaled in a positive direction on a 0-100 scale, with higher scores indicating higher QOL.[14] In this study Intradialytic muscle cramp is defined as, "Episodic, strong, painful contraction or tightening of a muscle that comes on suddenly and lasts from a few seconds to several minutes during hemodialysis" and Quality of life is defined as, "The physical, psychological, socioeconomic and environmental well-being". Written informed consent was obtained from every individual for his or her voluntary participation. The Margalla Institute of Health Sciences ethical committee approved the project. (ERC Ref No: LA/57/19)

DATA ANALYSIS

Result was analyzed in terms of Descriptive statistics i.e. Mean, frequency and percentage. The data was given in tabular and graph formats. SPSS 23 version was used for data analysis.

RESULTS

In this study, total 400 participants were approached for data collection, out of which 35 refused to take part in study and 04 participants were not fulfilling the eligibility criteria so finally data was analyzed for 361 participants.

The mean age of the participants was 49.62±15.9. The most of participants reported having multiple comorbidities (32.68%) followed by diabetes mellitus (35.18%) and 11.63% had hypertension and diabetes both as shown in Table 1.

Among the participants, 78% had muscle cramps during hemodialysis. The participants had variability of region of cramps. The most reported muscle cramps were in the region of leg i.e. 45% as displayed in Figure 1.

Among the participants 61% had cramps during the second half of hemodialysis and 39% had cramps during first half. Among participants 45% reported that dialysis never had to be stopped because of severity of cramps, 39% reported few times it happened, 13% stopped only once and 3% reported it frequently. Major consultations regarding muscle cramps were made to nephrologists and dialysis technician i.e. 129 and 80 respectively and only 14 participants consulted a physical therapist for their muscle cramps (Figure 2)

Highest scores were observed in social domain indicating support from family and friends, good interpersonal relationships and strong moral values. Lowest scores were observed in environmental domain because of lack of health ensuring environment and lack of financial resources as represented in Table 2

Table 1 shows patients characteristics, frequency and severity of muscle cramps

Variables	Mean±SD	Frequency / Percentage
Age	49.62±15.9	
BMI	24.64 ± 3.21	
Marital status		
Single		50/14
Married		277/77
Divorced		21/6
Widowed		13/3
Duration of disease		
Less than 6 months		106/29
6 months- 1 year		78/22
2-5 years		110/30
More than 5 years		67/19
Comorbidities		
Hypertension		48/13.29
Diabetes mellitus		127/35.18
Cardiovascular disease		16/4.43
Anemia		05/1.38
Hepatitis B and C		04/1.10
HIV AIDS		01/0.27
Hypertension & diabetes mellitus		42/11.63
Multiple		118/32.68
Frequency of dialysis		
Twice every week		305/84.48
Thrice every week		45/12.46
Everyday		01/0.27
Others		10/3.3
Muscle cramps		
Yes		283/78.39
No		78/21.60
Severity of muscle cramps	7.08±1.94	

Figure 1 shows region of muscle cramps in participants
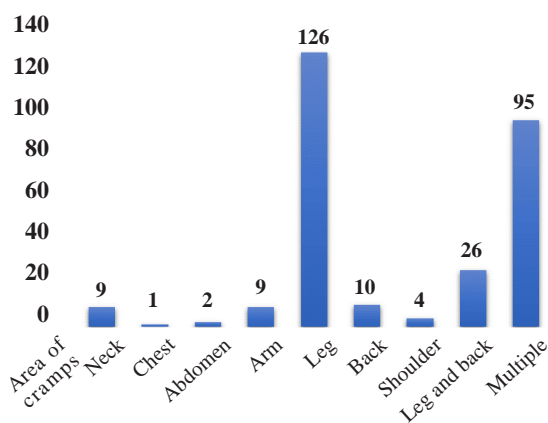
Figure 2 shows consultation to health care provider by participants for muscle cramps

- Nephrologist
- Primary care provider
- Nurse
- Dialysis technician
- Have not discussed
- Physiotherapist
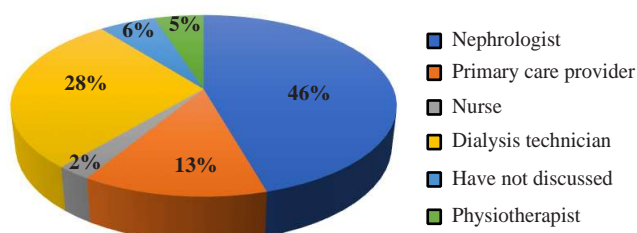
Table 2 shows the mean of four domains of WHO QOL-BREF

WHO QOL-BREF DOMAINS	Mean± Std. Deviation
Physical	59.95±19.19
Psychological	58.60±17.04
Social	83.26±23.75
Environmental	33.06±10.51

DISCUSSION:

Current research focuses on prevalence of intradialytic muscle cramps, and quality of life of dialysis patients. Sample size was 361. The mean age of the participants was 49.62±15.9.

In this study male patients were found to be predominantly in greater number than female patients. According to the previous study, the number of male patients with ESRD is higher than the female patients.[1,9]

The results of this study showed that 78% of hemodialysis patients experienced muscle cramps. In previous study by Ghimire et al, it was pointed out that muscle cramps occur in 33 to 86 percent of patients during hemodialysis.[15] Furthermore, Parmakovska et al stated that 62.5% of the patients had experienced muscle cramps at least once a week. Cramps are felt most often in the lower extremities.[16] Qureshi et al concluded in a previous study that 39% of the patients suffered with complications of cramps during dialysis.[11]

The result of current study showed that male participants

reported more muscle cramps as compared to females. Parmakovska et al stated that 54% of male go through cramps during dialysis and 46% of females experienced muscle cramps. Ghimire et al concluded that males are more prone to muscle cramps.[15]

The mean severity of the intradialytic muscle cramps in the current study was reported to be 7.08±1.94. Parmakovska et al found the mean severity score of the muscle cramps to be 5.78 ± 1.73.[16]

Findings of this study highlight the fact that patients experienced more muscle cramps during second half of hemodialysis. These findings are consistent with Ghimire's findings that cramps are caused by changes in extracellular fluid volume and plasma osmolality near the end of a dialysis session, as well as an increase in tonic electromyographic activity near the end of hemodialysis.[15] Punj et al concluded that muscle cramps occur towards the end of dialysis session.[17] The present study findings point out that 55% respondents reported that dialysis had to be stopped because of severity of cramps This result was also supported by earlier study which estimated that 33 to 86% of patients experience muscle cramps during haemodialysis, which results in early termination of haemodialysis session.[18] Another study highlighted that 79% participants claimed that the dialysis session sometimes been interrupted because of the cramps.[5]

In this study, the muscle cramps were mostly reported in leg region. The previous study showed most of patients on hemodialysis had moderate level of leg muscle cramps(53%).[19] Another study stated that Almost 80% of patient undergoing Hemodialysis will experience leg muscle cramps, 36.6% were feel the muscle cramps at Sole.[20]

Major consultations regarding muscle cramps were made to nephrologists and dialysis technician in the study. Only 5% participants consulted a physical therapist for their muscle cramps, the lack of awareness of physical therapy has been observed. In earlier study Participants reported other barriers to exercise such as lack of exercise facilities at home or near their home and lack of encouragement by hemodialysis staff to exercise.[21] In this regard, Tentori et al. showed that offering exercise programs by dialysis facilities increases 38% of the likelihood of engaging patients in the exercise program.[22] Wang et al. conducted a study in the United States and found the lack of exercise equipment (86.2%) and lack of support of the health care team working in hemodialysis centers (93.1%) as barriers to exercise.[23]

Most of the respondents of the current study reported low QOL in all domains except social domain. The participants had highest score in social domain because of interpersonal relationship and social support. The domain with lowest score was environmental domain it may be because of lack of financial resources, freedom, physical safety and insecurity, opportunities for recreation and leisure activities, physical environment (Pollution, Noise, Traffic and climate) and

transport. However In a previous study by Anees et al patients had poor QOL in physical health, psychological health, and social relationship domains than their caregivers.[9] Willik et al stated that Patients experienced a high symptom burden and a decreased physical HRQOL,[24] Nazar et al concluded that that patients with CKD receiving dialysis have a low quality of life.[25] The study's drawback was that it was only conducted in two cities (Rawalpindi and Islamabad). Because of the non-probability convenient sampling technique, the results may not be generalizable. Data may be under or over-reported because it is self-reported. It is recommended that Dialysis units should consult physical therapists for prevention of intradialytic muscle cramps. There is a need to raise knowledge about exercises and physical activity among hemodialysis patients. Interventional trials should be conducted to assess the efficacy of physical therapy in the treatment of intradialytic muscular cramps.

CONCLUSION:

The findings of the current study showed that muscle cramps in patients undergoing hemodialysis is common. The most reported muscle cramps region were legs. Patients undergoing hemodialysis have a low quality of life except social domain.

Authors Contribution:
Somiya Naz: conception and design, or acquisition of data, or analysis and interpretation of data; Drafting the article or revising it critically; Final approval & Agreement to be accountable for all aspects of the work
Mubashar Nazar: Acquisition of data, Drafting the article or revising it critically; Final approval & Agreement to be accountable for all aspects of the work
Waqas Khalid: Acquisition of data, analysis and interpretation of data; Final approval & Agreement to be accountable for all aspects of the work
Laraib Akhtar Malik: Acquisition of data, Final approval & Agreement to be accountable for all aspects of the work
Abeera Tahir: Acquisition of data, Final approval & Agreement to be accountable for all aspects of the work
Muhammad Mujtaba ur Rehman: Acquisition of data, Final approval & Agreement to be accountable for all aspects of the work

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Social and Family Influence on Initiation of Smokeless Tobacco Addiction

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ABSTRACT

Objective: This study aims to assess the family and social influence on the initiation of tobacco chewing among tobacco addicts visiting Dr. K.M Pfau civil hospital, Karachi.

Methodology: A cross-sectional study was conducted at Dr. K.M Pfau civil hospital Karachi. Two groups were compared, 65 tobacco chewers who were classified as group 1, 65 more people of similar age and gender who abstained from all tobacco use were classified as group 2. Data was collected using a questionnaire about tobacco chewing addiction in parents, siblings and friends from both groups. The data was analyzed using SPSS.

Results: In group 1, there were 65 tobacco chewers and in group 2, there were 65 healthy controls of alike age and gender who had no addiction. In group 1, 40% individuals had tobacco chewer parents, 14% individual's siblings were tobacco chewers and 18% had both tobacco chewer parents and siblings. In group 2, 11% individuals had parents who were tobacco chewers, 18% had tobacco chewer siblings and 71% of the individual did not have a tobacco chewing habit in the family. This shows tobacco chewing habits are more common in people with parents and siblings having these habits rather than people who have no addiction in the family.

Conclusion: Compared to non-user families, subjects of tobacco-using families had a greater prevalence of tobacco use. These findings provide guidance for creating effective tobacco reduction plans that reduce tobacco use.

Keywords: Smokeless Tobacco, Tobacco Use Initiation, Social Influence, Family Influence, Addiction

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INTRODUCTION:

Tobacco is derived from plants of Genus Nicotiana. It is one of the most commonly used substance of addiction in world. The major component of tobacco is nicotine which is extracted from the leaves of these plants. Nicotine, the addictive compound in tobacco, mimics a natural brain chemical called acetylcholine. It floods the reward system with dopamine, creating a temporary feeling of pleasure. This "reward" reinforces nicotine use, despite its harmful effects on the body, like raising blood pressure and heart rate. People get addicted to it, which leads to its repeated consumption.[1] One of the main avoidable causes of early mortality, disability and illness worldwide is tobacco consumption. There is a strong relationship between smokeless tobacco use and oral potentially malignant diseases There are more than 30 carcinogens present in smokeless tobacco.[2] Its use also proves to be a substantial contributor to the incidence of malignancies of the upper aerodigestive tract.[3] The mutagenic impacts of tobacco are subject to the frequency and duration of its utilization and their effects are sped up with simultaneous usage of two or more agents.[4]

More than 90% of oral carcinomas are pronounced to be related to the usage of tobacco products.[5] In one research, the loss of life from tobacco is assessed to reach more than 8 million each year by 2030 and 1 billion individuals can die because of tobacco in the 21st century.[6] The Global

Adult Tobacco Survey (GATS) 2014 reported that 23.9 million citizens of Pakistan use any form of tobacco. 31.8% of men while 5.8% of women are tobacco consumers.[7] A worrying situation has arisen globally due to the rising usage of smokeless tobacco. Pakistan is the second most common country after India where smokeless tobacco is consumed.[8] Numerous research revealed that there is a considerable connection between sibling and parental tobacco addiction and the beginning of smoking in adolescents. Children's principles, mindsets, etiquette and habits are shaped by their families, who also have the most immediate and long-lasting influence on their education and psycho-intellectual development. Data has shown that the likelihood of addiction in individuals is high in those who saw their parents and siblings using it.[9]

In Pakistan, various forms of tobacco are used. Its consumption varies from region to region. Studies have also shown that individuals who grew up around tobacco addicted parents are more likely to start taking tobacco at a younger age than those who weren't.[10] One of the reasons for adopting this habit is a lack of knowledge about the hazards and diseases caused by tobacco.[11] Therefore, it is important to determine the factors responsible for the initiation of tobacco chewing habits so that strategies can be created to control its usage at an early stage. There is currently not much information available on how the home's atmosphere affects tobacco addiction in Karachi. Consequently, we have made an effort to ascertain the customs and trends of tobacco use in both tobacco-using and non-using families. We also determine the influence of parents and siblings on children's tobacco use of both tobacco users and non-users in this city.

METHODOLOGY:

A cross-sectional study was conducted at Dr. K.M Pfau Civil Hospital Karachi. In this study, two groups were compared. It included 65 patients visiting the OPD complex of Dr. K.M. Pfau Civil Hospital Karachi who were tobacco chewers and were classified as group 1. 65 more people of similar age and gender who abstained from all tobacco use were requested to participate and were classified as group 2. This sample size was calculated by taking reference from a similar previous study.[7] All participants belonged to similar socioeconomic status as patients visiting government sector hospital are usually from middle to low socioeconomic backgrounds. Approval was granted from Institutional Review Board of Dow University of Health sciences with reference number: IRB-3046/DUHS/approval/2023/32. The study was conducted from 1st January 2023 to 2nd June 2023. After taking written and informed consent, data were collected from the participants using a questionnaire about tobacco chewing addiction in parents, siblings and friends from both groups. Reasons were inquired for initiating this habit. The questions were adjusted to gather information on sociodemographic elements from eligible individuals. The questionnaire was in English as well as Urdu. The questions

were directly asked from the participants by the interviewer and confidentiality was ensured. The data was analyzed using Statistical Package for Social Sciences (SPSS) version 24. The data was expressed as percentages. Frequencies of both groups were compared using the CHI square test. P-values less than 0.05 was considered statistically significant for all analyses.

Inclusion Criteria: Patients visiting OPD of the civil hospital for any reason and are addicted to tobacco for group 1

Patients who are not addicted to any form of tobacco for group 2. Age between 30 to 75 years. Gave written and informed consent to participate in the study. Both genders. Exclusion Criteria: Critically or severely ill patients Pregnant females Children.

RESULTS:

In group 1, there were 65 tobacco chewers and in group 2, there were 65 healthy controls of alike age and gender who had no addiction. Each group had 51 males (78.5%) and 14 females (21.5%). The patients were between the ages of 30 to 75 years with a mean age of 43.25 years. The basic sociodemographic characteristics are shown in Table 1, 26 (40%) individuals had tobacco chewer parents, 9 (14%) individual's siblings were tobacco chewers and 12 (18%) had both tobacco chewer parents and siblings. 18 (28%) individuals had no tobacco chewing habit in their family. In group 2, 7 (11%) individuals had parents who were tobacco chewers, 12 (18%) had tobacco chewer siblings and 46 (71%) of the individual did not have a tobacco chewing habit in the family. This shows tobacco chewing habits are more common in people with parents and siblings having these habits rather than people who have no addiction in the family (p value <0.001). (Table 2) Group 1 individuals had 36 (55%) friends addicted to tobacco but only 29 (45%) had no friends who chewed tobacco. Group 2 individuals had 12 (18%) tobacco chewer friends, while 53 (82%) did not have any friends who chewed tobacco. Hence, people who have friends who chewed tobacco are more likely to become addicted to tobacco (p value <0.001). (Table 2). The maximum number of individuals, 38 (58.5%), started this habit between the ages of 16 and 30. 15 (23.1%) started this habit at 15 years and below. 10 (15.4%) started chewing tobacco between 31 to 45 years and 2 (3%) started this habit after 45 years. This shows majority of the people take up this addiction in adolescence. (Table 1)

Group 1 was asked why this habit was initiated, and 22 (33.8%) replied that they liked the taste.19 (29.2%) picked this habit due to pressure from friends and family. 15 (23.1%) said that this addiction helps them relax mentally and physically, and 9 (13.8%) said it helps them concentrate on work. (Table 2)

DISCUSSION:

Pakistanis consume tobacco at a rate that is among the highest in the world and is one of the top fifteen nations in

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the world for the high incidence of diseases linked to tobacco use. Recent estimates show that among persons 15 years of age and older, 5.5% of women and 27.0% of men are reported daily tobacco product users.[12,13] Our study showed that tobacco chewing habit is higher in individuals with tobacco chewing parents and siblings than nonusers. According to research, addiction to tobacco appears to "run in the family" and children who grow up in households where tobacco use is a habit may emulate it in their conduct as adults based on what they have seen and experienced at home. The risk of addiction may also be influenced by variables including gender, race, developmental stage, and social milieu. Thus, an individual's susceptibility or aversion to such addictions is influenced by both nature and upbringing.[14] Research showed that a history of substance use in the home, poor parental supervision, parental acceptance of its use and family disputes are the predictors of permanent tobacco product use.[15] Its associations with socialization, family customs, and cultural legacy sustain its use over generations.[16] In one study it was mentioned that children being asked to purchase and bring tobacco products from stores for the family members at home and leniency for handing over such products to the child when asked for, play a role in the initiation of tobacco by the child.[12] Policies should be introduced to concentrate on educating children as well as their families about the hazards of tobacco and thereby preventing its usage.[17] Research demonstrates that parental disapproval of smoking reduces the likelihood of adolescents taking up smoking. Initiatives at the family and community levels should concentrate on strengthening parental and older sibling opposition to tobacco use while reducing potential intergenerational influences. Parents and other adult family members should set positive examples by making responsible choices.[18]

There have been intricate relations between sociocultural elements and tobacco use that affect patterns of usage as well as the acceptance or rejection of tobacco by various segments of society. Our study reveals that addiction to tobacco is more prevalent among those with friends addicted to tobacco. It is stated in a study that peers and friends have a great impact on the commencement of tobacco. In several Southeast Asian nations, the social structure makes use of smoke-free tobacco to facilitate various forms of gathering and interaction. Smokeless tobacco usage persists as a cultural practice. It is also utilized in various American and European nations as a less dangerous alternative to cigarettes. Most often, the main reason for adopting this habit is intra-group communication. They usually deliberate smoke-free tobacco as the norm and continue its practice in social meetings.[19]

Our analysis revealed that most individuals began chewing

Table 1: Sciodemographic Characteristics

Characteristics	Categories	Group 1(n=65)		Group 2(n=65)		P value
		Frequency	Percentage	Frequency	Percentage	
Age	30-45 years	43	66.2%	43	66.2%	-
	46-60 years	19	29.2%	19	29.2%	
	60-75 years	3	4.6%	3	4.6%	
Gender	Male	51	78.5%	51	78.5%	
	Female	14	21.5%	14	21.5%	
Education	Uneducated	8	12%	3	5%	0.18
	Primary	17	26%	11	17%	
	Secondary	16	25%	20	31%	
	Metric	24	37%	31	48%	
Occupation	Unemployed	23	35%	8	35%	0.002
	Employed	42	65%	57	65%	
Habitat	Urban	50	77%	56	86%	-
	rural	15	23%	9	14%	

Table 2: Social Factors influencing Tobacco use

Parameters	Group 1 n=65		Group 2 n=65		P value
	Frequency	Percentage	Frequency	Percentage	
Individuals having tobacco user parents	26	40%	7	11%	<0.001
Individuals having tobacco user siblings	9	14%	12	18%	<0.001
Individuals having tobacco user parents and siblings	12	18%	0	0%	<0.001
Individuals having no tobacco user in the family	18	28%	46	71%	<0.001
Individuals with tobacco addicted friends	36	55%	12	18%	<0.001
Individuals with no tobacco addicted friends	29	45%	53	82%	<0.001

tobacco during their teenage years. Adolescence is the developmental period that is particularly susceptible to peer and social pressure as well as parental influence. Youth's initiation of tobacco is predicted by the use of family members and friends.[20] Much earlier research has demonstrated that as adolescents get older, there is a significant increase in tobacco consumption. This is consistent with the prevalence of tobacco product usage being two or three times higher at age 15 than at age 13. The rising rate of tobacco use among teenagers as they become older may be partially attributed to trying new adventures during adolescence and a need for unique experiences as they grow from kids to adults.[21,22] Even though Pakistan forbids the sale of smokeless tobacco to minors, its increased popularity is concerning.[23] The increasing drug usage rate with age underscores the importance of implementing effective tobacco control measures and providing comprehensive education in schools and colleges.

WHO Framework Convention on Tobacco Control (WHO FCTC) is created by World Health Organization. It is concerned about the expansion in the overall production and utilization of smoked and smokeless tobacco items. The international FCTC aims to safeguard current and future generations against the deleterious effects of tobacco use and exposure to smoke on health, society, the environment, and the economy by establishing a set of global guidelines outlining the risks associated with tobacco use and prohibiting its use in all forms.[24] It addresses the social and economic drifts of an effective tobacco demand reduction plan.[25] It was discovered that, compared to nations that had not joined the FCTC, the prevalence of teenage tobacco addiction tended to decline more among ratified nations. National implementation and enforcement of the regulatory measures that the FCTC mandates or that the WHO MPOWER package recommends can lead to a decline in the demand for tobacco products, including among teenagers.[16]

Tobacco control laws should be enforced by legislative action and health promotion initiatives. The prohibition of tobacco advertisement, the increase in tobacco costs, banning these products in the workplace and the provision of free cessation aids are all tobacco control strategies. Consequently, healthcare strategies directed at families as a whole are likely to be more effective in devising tobacco control plans. It is important to gather information on the attitudes, convictions, and views of the community on SLT in order to support the creation of successful, culturally aware cessation programs. It is not only crucial to enforce such schemes that are designed for the lessening of smokeless tobacco but to analyze the effects of such policies to comprehend the burden and trajectory of smokeless tobacco use.

The study's primary limitations lie in its restricted scope and data collection methods. The small sample size drawn solely from patients limits generalizability, and excluding healthy controls hinders establishing a clear contrast. Additionally,

focusing solely on family history overlooks potential environmental and socio-economic factors influencing tobacco use. Furthermore, its emphasis on smokeless tobacco within a single Karachi hospital restricts generalizability to the broader Pakistani population and various tobacco types. Notably, excluding smoking from the analysis underestimates the total burden of tobacco use, potentially misrepresenting its impact. These limitations underscore the need for comprehensive studies encompassing larger, diverse populations, various tobacco types, and diverse data collection methods, including the inclusion of healthy controls and environmental/socio-economic factors, to fully grasp the complex dynamics of tobacco use and inform effective reduction strategies.

CONCLUSION:

The current study not only affirms higher tobacco use among siblings and parents in tobacco-user families compared to non-user families, but also highlights a significantly higher prevalence among children. However, these findings represent a specific demographic at a single facility. Further research encompassing diverse ethnicities, larger populations, and broader geographic regions is crucial to refine effective tobacco reduction strategies. While this study offers valuable insights, our fight against tobacco dependence demands continued investigation and comprehensive interventions.

Authors Contribution:
Munira Tahir: Conception, design, analysis and interpretation, drafting the manuscript, revising it critically
Tariq zahid khan: Conception and design, revising it critically
Zeba Ahmed: Conception and design, revising it critically
Tehmina Junaid: Acquisition of data analysis and interpretation
Rajesh Vasandani: Acquisition of data analysis and interpretation
Mohammad Hussain Rizvi: Acquisition of data analysis and interpretation

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Evaluation of Brain MRI in Cerebral Palsy Patients in the Children's Hospital Lahore

Saba Fatima, Amber Goraya, Hina Azhar, Abid Ali Qureshi

ABSTRACT:

Objective: Evaluation of brain MRI findings in Cerebral Palsy patients and categorization according to MRICS.

Study design and settings: Descriptive case series and Department of Pediatric Radiology, UCHS and The Children's Hospital Lahore.

Methodology: 57 patients fulfilling inclusion criteria of clinical diagnosis of Cerebral Palsy were included in the study over a period of 3 months from 1st January 2021 to 31st March 2021. 4 patients were not included because of no to poor sedation. After written informed consent, MRI brain was conducted on these patients. The scans were then interpreted by Pediatric Radiologists and were further categorized using MRICS. Statistical analysis was done using SPSS 24.

Results: There were 53 patients with age range from 2-13 years with 33 males and 20 females. Predominant white matter injury (58.5%) was most common and Predominant gray matter injury (11%) was next common. Maldevelopment was the rarest pattern only found in 3.8% patients. Normal MRI were noted with no imaging evidence of brain injury in 5 patients. On further categorization of the MRI patterns, Periventricular leukomalacia was most frequent pattern followed by Multicystic encephalomalacia.

Conclusion: Considering less frequency of normal MRI brain, this study concluded that MRI brain is helpful in diagnosing Cerebral Palsy and MRICS is a good qualitative method of categorization of brain injury patterns.

Key Words: Cerebral Palsy, Encephalomalacia, Leucomalacia, MRICS, Neuroimaging.

INTRODUCTION:

Cerebral palsy is a group of developmental disorders of movement and posture which result in activity limitation. It is a common cause of motor disability in children and is caused by non progressive disturbances to developing/ immature brain.[1] It has a prevalence of approximately 1 in 500 live births and incidence of 2-2.5 per 1000 live births with estimated 17 million people being affected globally.[2,3] Underlying etiologies for cerebral palsy is complex with

multiple types of antenatal, natal and post-natal risk factors associated with it. Congenital brain malformations, vascular injuries, maternal infections and metabolic disorders are among common antenatal causes of Cerebral Palsy. Problems during labor and delivery as well as in immediate post birth period contribute to perinatal risk of developing CP. Post neonatal acquired cerebral palsy is commonly caused by infections and trauma. [4]

Along with detailed history and physical examination, neuroimaging with MRI brain is an important part of clinical evaluation of CP patients. It has been proved that MRI brain demonstrates abnormalities in almost more than 80% of the patients [5,6] Neuroimaging helps in assessment of neuroanatomical basis for function in cerebral palsy along with underlying pathogenic pattern and normal structure function relationship. The resulting impairments relate to the timing of brain injury and development of typical brain lesions which can be assessed using MRI brain.[7] MRI Classification System (MRICS) was devised as a reliable tool in assessment of CP by Surveillance of Cerebral Palsy in Europe (SCPE) in 2016.[8] This system is based on occurrence of pathogenic patterns according to different brain development periods as different causes can lead to same imaging manifestations. Therefore, MRICS used a standardized approach for description of pathogenic and imaging patterns in relation to timing of injury rather than

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using etiology as classification basis. It consists of mainly five groups: maldevelopments, white matter injury, grey matter injury, miscellaneous and normal findings.[8] Several studies have been done in past to describe various MRI patterns of pathologic process in brain. 213 children were assessed by MRI in 2011and documented cerebral abnormalities in 87% of study population. Periventricular white matter injury was found to be the most common imaging pattern followed by grey matter injury and maldevelopments.[9] Likewise another study in India also concluded that 89% study population had abnormal MRI. Periventricular white matter injury was concluded as the commonest finding in CP followed by focal vascular lesions and brain malformations.[10] However ,a Turkish hospital based study revealed cerebral atrophy to be the most common pattern followed by periventricular leukomalacia with the least common imaging manifestation being congenital brain malformation.[11]

Considering non availability of any research related to imaging evaluation of CP patients in Pakistan, the rationale of this study is to describe and analyze various patterns of MRI brain according to MRICS which may help in clinical correlation and planning of rehabilitation services for these patients. Extent of brain injury will also help in determining prognosis and counselling their parents regarding the future outcomes. Moreover, identification of normal MRI findings will also help in establishing strong evidence for non requirement of neuroimaging and thus may reduce the burden of un necessary investigations in children with cerebral palsy.

METHODOLOGY:

After approval from the ethical review committee of Children's Hospital and Institute of Child Health (ERC no 2021-260-CHICH), total 57 patients were enrolled in Department of Pediatric Radiology, The Children Hospital and Institute of Child Health, Lahore. These patients were selected based on fulfilling the inclusion criteria (aged 2 to 18 years with clinical diagnosis of CP) and excluding those with congenital syndromes and degenerative brain disease Sample size was calculated using formula n= Z^2 p (1-p)/ e^2 and sample was drawn using non probability consecutive sampling.

4 patients could not be sedated properly (which is the requirement for brain MRI) and hence were not included for study. An informed written consent was taken from each patient/parent and the study was conducted in duration of 3 months from 1st January 2021 to 31st March 2021. MRI brain was performed on 1.5 T machine (Philips Medical Systems Nederland B.V.) using standard protocols. The standard brain MRI protocol included T1W (TE 15, TR 581), T2W (TE 110, TR 5212) and FLAIR (TE 120, TR 12000, TI 25) sequences in sagittal, axial and coronal planes. These scans were then reported by 3 pediatric Radiologists

who were blinded to clinical details of the patiets . The scans were interpreted and classified into 5 major categories according to MRICS.[8] Further subtypes were also documented according to same system (Table 1).

Statistical Analysis: The collected data was entered and analyzed by using SPSS version 24.0. Mean and standard deviation was calculated for numerical variables like age. Frequency and percentages were calculated for categorical variables like gender, various MRI patterns of brain injury according to MRICS along with their subcategories.

RESULTS:

This study was conducted on 53 patients ranging in age from 2-13 years with median age of 5.5 years ± 2.7 years (Table 2). There were 20 females (37.7%) and 33 males (62.3%). The most frequent imaging pattern according to MRICS was predominant WM injury found in 58.5% of patients followed by predominant GM injury found in 17% of patients. (Fig 1).

A. MALDEVELOPMENTS: It was the least found pattern with only 2 patients having migration anomalies (A.1). These patients showed Pachygyria as broadened thickened gyri on MRI brain scans. No cases were found of other maldevelopments (A.2) like holoprosencephaly, corpus callosum agenesis or Dandy Walker malformation.

B. PREDOMINANT WHITE MATTER INJURY: It was the most commonly found pattern in this study in 31 patients. All patients showed PVL--Periventricular Leukomalacia (B.1). It was documented as signal changes in periventricular white matter more marked in posterior and peritrigonal regions. These signal changes appeared as T2W and FLAIR hyperintense areas (Fig 2). There were no patients found of IVH--Intraventricular Hemorrhage (B.2) or a combination of both PVL and IVH (B.3).

C. PREDOMINANT GRAY MATTER INJURY: 9 patients displayed predominant gray matter injury pattern. 11% patients had involvement of basal ganglia and thalamic nuclei (C.1.). Involved areas of brain demonstrated hyperintense signals on both T2W and FLAIR images. Further encephalomalaciac changes (C.2.) in form of multiple areas of fluid/CSF signal intensity were also noted in this group in 17% of study population (Fig 3). No patient had arterial infarctions on brain MRI (C.3.).

D. MISCELLANEOUS: There were only 6 patients who showed isolated miscellaneous pattern of brain injury as the predominant MRICS finding. Majority of the patients showed miscellaneous findings in association with other predominant injury patterns. Cerebral atrophy was the commonest miscellaneous pattern found in study population in 13% patients with diffuse brain atrophy found in 9% of patients. Less commonly found patterns were isolated cerebellar atrophy, ventriculomegaly and brain stem lesions each found in 1 patient only.

E. NORMAL: There were 5 patients who did not show any abnormal imaging pattern.

SUBCATEGOTRIES OF MRICS: Upon further sub categorization, Periventricular Leukomalacia (PVL) was

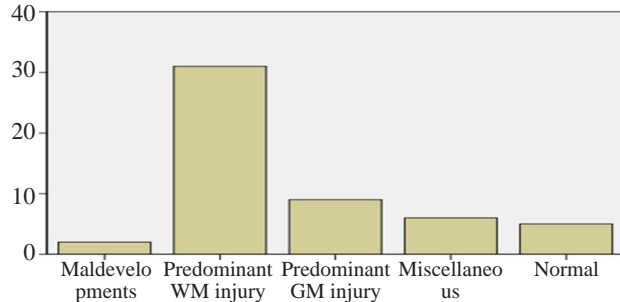Fig 1. Frequency of various MRICS patterns

Figure 2. T2W and FLAIR images showing bilateral periventricular white matter hyperintensities ---Predominant White Matter Injury
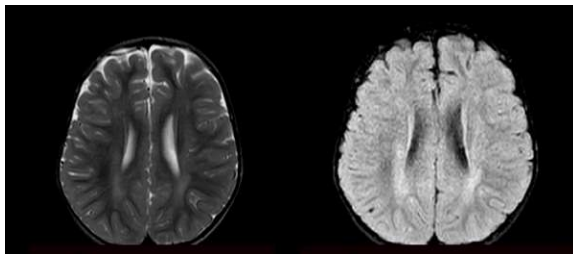
Figure 3. T2W and FLAIR images showing multicystic Encephalomalacia in bilateral frontoparietal lobes with brain atrophy
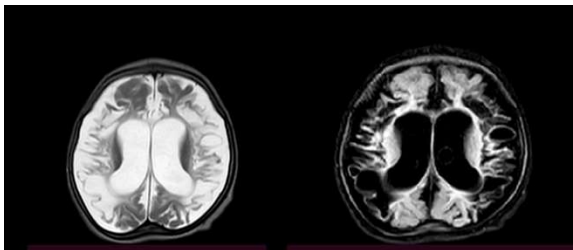
the commonest imaging finding followed by multicystic encephalomalaciac changes found in 67 and 17% patients respectively.

DISCUSSION:

Cerebral palsy covers a group of developmental disorders of movement and posture with resultant limited activity, caused by non progressive disturbances to developing/immature brain.[1] There are various types of causative and risk factors associated with development of Cerebral Palsy which can lead to variable patterns of brain injury. These patterns are more strongly correlated to the timing of brain injury rather than the etiological factor. [4]

Neuroimaging with MRI brain helps in identifying underlying pathogenic patterns in more than 80% of the patients. [5,6] Injury to the developing brain results in various imaging patterns on MRI which were qualitatively classified by Surveillance of Cerebral Palsy in Europe (SCPE) in 2016 as MRI Classification System (MRICS). MRICS used a standardized approach for imaging classification based upon timing of brain insult or injury which is more specific than the causative factor. [6] Usefulness of MRICS was studied in a Hungarian cohort of 257 patients which documented positive MRI findings in 86.4% of patients with normal scans in 13.6% patients.[6] Our study also showed positive MRI findings in 90.6 % of patients with only 9.4 % normal scans in agreement with results of studies performed in Turkey and Europe.[11,12] The Turkish cohort study proved that MRI brain scans were positive for 92.7% study population with only 7.3% normal MRI scans[11] while European cross sectional study concluded positive MRI scans in 88.3% patients and 11.7% normal scans.[12]

Various MRICS patterns are known to cause cerebral palsy with varying degrees of severity. In this study, predominant white matter injury was the most common pattern found in 58.5 % patients, followed by gray matter injury in 17% and miscellaneous patterns in 11%. These frequencies are in

Table 1. MRI classification system proposed by the SCPE network[8]

A. Maldevelopments A.1. Disorders of cortical formation (proliferation and/or migration and/or organization A.2. Other maldevelopments (examples: holoprosencephaly, Dandy–Walker malformation, corpus callosum agenesis,cerebellar hypoplasia)
B. Predominant white matter injury B.1. PVL (mild/severe) B.2. Sequelae of IVH or periventricular haemorrhagic infarction B.3. Combination of PVL and IVH sequelae
C. Predominant grey matter injury C.1. Basal ganglia/thalamus lesions (mild/moderate/severe) C.2. Cortico-subcortical lesions only (watershed lesions in parasagittal distribution/multicystic encephalomalacia) not covered under C3 C.3. Arterial infarctions (middle cerebral artery/other)
D. Miscellaneous (examples: cerebellar atrophy, cerebral atrophy, delayed myelination, ventriculomegaly not covered under B, haemorrhage not covered under B, brainstem lesions, calcifications)
E. Normal

Table 2. Distribution of study population according to age

Age	Frequency	Percentage
2.00	1	1.9
2.50	1	1.9
3.00	13	24.5
4.00	6	11.3
4.50	1	1.9
5.00	8	15.1
5.10	1	1.9
6.00	7	13.2
6.10	1	1.9
7.00	5	9.4
8.00	3	5.7
9.00	1	1.9
11.00	1	1.9
12.00	1	1.9
13.00	3	5.7
Total	53	100.0

contrast to previous studies where maldevelopments also contributed to a significant number of brain injury patterns. Surveillance of cerebral palsy in Europe (SCPE) who devised MRICS analyzed MRI scans of 3818 children from 18 European countries. SCPE concluded white matter injury to be most frequent MRICS pattern in 49% patients followed by predominant gray matter injury and maldevelopments in 21 and 11 % of cases respectively.[12] A Hungarian cohort study used MRICS and proved white matter injury in 35.4% patients followed by maldevelopments and gray matter injuries in 18% each while 12.5% patients showed miscellaneous pattern of brain injury.[13] A large cohort group study performed in Sweden proved white matter injury pattern to be found in 48.7%, gray matter injury pattern in 21%, maldevelopments in 11 % with miscellaneous lesions in only 8.5%.[14] Results of this study were in contradiction to previous data in terms of frequency of maldevelopments as the study population only demonstrated changes in 3.8 % of patients.

Further subcategories of major injury patterns were also documented using MRICS. The most common predominant white matter injury was Periventricular leukomalacia found in 36 patients (67.9%) in accordance with previous data in literature. Predominant gray matter injury was the second most common pattern according to MRICS. Two further subcategories were identified with cortical/ subcortical/ multicystic encephalomalacia being more common in 17% and thalamic/basal ganglia lesions in 11% of study population. Miscellaneous pattern of brain injury was found in 11% of population which was in accordance with previous results. Further categorization of miscellaneous lesions was also documented and it proved cerebral atrophy to be found in 13% of the patients showing positive miscellaneous findings.

Cerebellar atrophy, delayed myelination, brainstem lesions and ventriculomegaly in sub categorization were very rare and found in 1 patient each.

Two cohort studies performed in Australia proved that periventricular white matter injury is the most common MRI pattern in CP patients found in 45% and 31% patients. These were followed by gray matter injury (14%), Brain malformations (12%) and miscellaneous patterns(7%). [15,16] A Turkish cohort showed PVL as the commonest finding in 33% patients followed by cerebral atrophy (12.9%), migration anomaly (9.7%), cerebellar involvement (3.2%) and basal ganglion involvement in 4 cases (6.4%). [17] Our study results were in accordance with this published data except brain malformations which were found to be rare in our study population. A south African study concluded basal ganglion lesions as most frequent in 27.6% study population however PVL and cystic encephalomacia were found in only 3.6 and 7.8% patients respectively. [18] A Pakistani cross sectional analysis revealed cerebral atrophy as the commonest imaging manifestation found in 40.5% patients while PVL was only found in 5.4% population.[19] Our study results were contradictory to these literature observations in terms of frequency of all brain imaging patterns. Two Bengali studies performed in tertiary care hospitals showed decreased frequency of PVL in MRI patterns as compared to other abnormalities found in only 20 and 25% of patients in contrast to our study. Multicystic encephalomalacia and basal ganglia lesions are found in 19.3 and 11.4% cases in one of these studies while the frequency of cortical and deep gray matter lesions was found to be 48.5% in other study which was not in accordance with our results. Among the miscellaneous patterns, cerebral atrophy was noted in 34% and ventriculomegaly in 14.8% study population of these studies which were more frequent than our study results. However, brain maldevelopments were found in only 5% of the poplation in these studies which supported our study results of 3.8%.[20,21]

FUTURE PERSPECTIVES FOR CP: In our study, there were 9.4% of patients who had clinical diagnosis of cerebral palsy however their MRI brain scans were normal according to MRICS categorization. Such patients with atypical clinical presentations should be considered for further genetic evaluation. Genetic work up must be done in a systematic approach in order to increase the diagnostic yield with special importance given to treatable causes as well as reducing the cost of these genetic tests. This will help in identifying possible treatment options, possibilities of inheritance and also for family planning if considered appropriate.[22]

STRENGTH AND LIMITATIONS OF STUDY: the main strength of this study is that it used a standardized method of categorization of imaging findings using MRICS.

The limitations of the study included that the data set was relatively small and there were no clinical correlates included

for this study which could help in further assessment of these patients.

CONCLUSION:

Cerebral Palsy being investigated by MRI brain helps in assessment of brain injury pattern successfully. By using MRICS, this study concluded predominant WM injury as the most frequent pattern of brain injury in accordance with previous international literature. Likewise other categories of MRICS had similar frequencies except Maldevelopments which were found to be more common internationally as compared to this study population. Having a very low population with normal MRI brain, this study is strongly conclusive for use of MRI brain in clinical evaluation of CP patients.

Authors Contribution:
Saba Fatima: Concerned with concept, data collection, analysis and article writing
Amber Goraya: Concerned with concept, data collection, analysis and article writing
Hina Azhar: Concerned with review of article
Abid Ali Qureshi: Concerned with review of article

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Factors Associated with Congestive Heart Failure among Patients Presenting with Acute Cardiac Emergencies in Northern Lahore

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ABSTRACT:

Objective: This study sought to assess the prevalence of congestive heart failure (CHF) and identify the key risk factors associated with its occurrence in patients, already have existing cardiac conditions in Lahore, Pakistan.

Study Design and setting: A cross sectional study was conducted at Shalamar Hospital, Lahore.

Methodology: The study was conducted from October 2021 to March 2022 on a sample of 891 patients who were admitted in the coronary care unit from the emergency room and OPD and underwent cardiac catheterization. Convenience sampling was employed due to the unavailability of a large pool of patients. The questionnaire utilized socio-demographic variables, assessed the classification of congestive heart failure in relation to various comorbidities including thyroid diseases, diabetes mellitus, hypertension, chronic liver disease, peripheral vascular disease and hyperlipidemia as well as the risk factors associated with CHF.

Results: The rate of CHF prevalence was found to be 12.68%. CHF was found to have a statistically significant relationship with smoking, ambulatory ability, and a history of organ transplantation. According to the New York Heart Association, a significant proportion of patients were classified as Class II, whereas the Canadian Cardiovascular Society reported that approximately 42.20% of patients had Class II angina.

Conclusion: The prevalence of CHF was discovered to be extremely high. The most common comorbid ailment was discovered as hypertension, followed by diabetes. Many patients reported being able to perform daily activities but becoming fatigued during effort. When changing healthcare policies, it is critical to include preventive measures and interventions.

Keywords: Angina Pectoris, Coronary Artery Disease, Coronary Care Units, Congestive Heart Failure

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INTRODUCTION:

Heart failure sometimes also known as congestive heart failure (CHF), is a heterogeneous syndrome defined as a medical condition when the ability of the heart to pump or fill with blood is compromised or it can also be defined as an abnormality of cardiac function that leads to an inappropriate cardiac output leading to inability to meet the metabolic needs of the our bodies. The left ventricular ejection fraction (LVEF) is used to classify CHF. This includes HFrEF (symptomatic HF with LVEF $</= 40\%$), HFmrEF (symptomatic HF with LVEF 41-49%), HFpEF (symptomatic HF with LVEF $>/= 50\%$), and HFimpEF (symptomatic HF with improved LVEF 40%, a $>/= 10$ point increase from baseline LVEF, and a second measurement of LVEF $> 40\%$).[1] Congestive heart failure (CHF) is likely to be a burden on economy and healthcare system of a country. Literature search has shown that CHF is found predominantly in high-income countries also different studies done on epidemiology of disease revealed its disease burden, public health policy formulation and research and healthcare system facility related to CHF. The prevalence of CHF has been increasing in low and middle-income countries due to

the lack of knowledge, lack of sensitivity in understanding presenting symptoms, inappropriate diagnosis and checkups, advancing age and high prevalence of other risk factor such as elevated blood pressure.[2,3] The Global Burden of illness study used modelling approaches to generate comprehensive estimates of illness burden for 204 nations from 1990 to 2020. It has also been declared as emerging epidemic 25 years ago.[4]

In United States (U.S), about 50% of the CHF patients live less than five years from the time of first diagnosis.[5] Burden of heart disease accounts around 60% in South Asia. A recent study reported that South Asians may be at increased risk of heart disease especially young people in most ethnicities.[6] Pakistan is a developing country with limited healthcare resources and facilities. According to a study conducted by Sheikh SA in 2006, the prevalence of congestive heart failure (CHF) in Pakistan is 2.8 million people, despite the fact that no earlier published demographics of this patient population exist. Congestive Heart Failure was more prevalent in males (93%) with an average age of 54 years and ischemic Cardiomyopathy was the most common reason of hospital admissions and outpatient visits for CHF.[7]

According to national surveys, the continual growth in the incidence and prevalence of congestive heart failure (CHF) can be attributed mostly to people aged 70 and up.[8,9] The socio-demographic profile is directly related to the prevalence of congestive heart failure (CHF). Moreover, congestive heart failure (CHF) is an under recognized medical condition which has a huge burden on health care.[10] Quality of life is yet an important parameter to manage the increased risk of CHF.[11]

In Pakistan, there is a dearth of research on congestive heart failure (CHF), including its prevalence, aetiology, and treatment adherence. The current study's goal was to determine the prevalence of congestive heart failure (CHF) and identify risk variables related with its development in patients with proven cardiac illness.

METHODOLOGY:

A cross-sectional study was conducted at Shalamar Hospital, Lahore of 6 months duration from October 2021 to March 2022. Data was collected from patients who were admitted to the Coronary Care Unit (CCU) at Shalamar Hospital after visiting the Emergency Room (ER) or Outpatient Department (OPD) and undergoing cardiac catheterization. The minimum sample size calculated by using WHO sample size calculator was 840 by taking 95% confidence interval, 3% absolute precision and 26.9% as prevalence of CHF.[12] The data was collected using non-probability convenient sampling technique. Consecutive critical patients who were registered to get angiography in Shalamar hospital were included in the study.

The study included both males and females between the ages of 18 and 80 who underwent cardiac catheterization

for particular indications according to American College of Cardiology (ACC) guidelines. These operations included angiography, angioplasty with a balloon or a stent, permanent pacemaker installation, peripheral angiography, and angioplasty. Adult patients admitted to the Shalamar Institute's Coronary Care Unit (CCU) with unstable symptoms such as chest pain and dyspnea who were regarded suitable for coronary angiography were also included. Patients with a serum creatinine level greater than 3 mg/dL, those with congenital cardiac anomalies, those with a haemoglobin (Hb) level less than 7 gm/dL, those with blood dyscrasias and a platelet count less than 50,000, and those with an International Normalised Ratio (INR) greater than 2 were excluded from the study.

Clinical examination, chest X-ray, ejection fraction, diastolic metrics, and echocardiography (ECHO) were used to identify CHF patients. They were divided into four classes based on the New York Heart Association (NYHA) classification: Class I (asymptomatic), Class II (normal activities with exertion fatigue), Class III (difficulty in everyday activities), and Class IV (shortness of breath at rest).[13]

The data was collected using a self-designed questionnaire. Data was collected on socio-demographic variables (gender, smoking history, family history of coronary artery disease (CAD), symptoms worsening in the past 6 months, inability to walk), as well as CCS angina class, previous myocardial infarction, steroid usage, past procedures such as (Coronary artery bypass graft (CABG), Percutaneous coronary intervention (PCI), valve replacement), and the presence of various co-morbidities (thyroid disease, diabetes, hypertension, chronic liver disease, ventricular arrhythmia, peripheral vascular disease, organ transplant history, cerebrovascular disease, renal insufficiency, hyperlipidemia)

The Central Park Medical College and Teaching Hospital's institutional review board (IRB) (ERC number: CPMC/IRB-No/1302) approved the study. Prior to data collection, Informed consent was taken from either the patient or their attendant. The data analyst directly entered the questionnaire information into SPSS while ensuring patient confidentiality by using allocated serial numbers rather than personal identities. The chi-square and Fisher's exact tests were used to investigate the link between congenital heart failure and categorical factors. The crude and adjusted odds ratios for defining variables related with congestive heart failure (CHF) were calculated using logistic regression. IBM SPSS version 26 was used for data analysis.

RESULTS:

Data was collected from 891 coronary angiography patients, with a mean age of 56.08 11.03 years. Among the participants, 581 (65.20%) were males and 310 (34.80%) were females. The prevalence of congestive heart failure (CHF) was 12.68%. Approximately 423 (47.47%) patients reported worsening of symptoms in the past 6 weeks. Of the total

patients, 632 (70.93%) were able to walk 1 to 2 blocks, and 571 (64.09%) could climb one flight of stairs. Congestive heart failure (CHF) showed statistically significant associations with smoking, ability to walk, and history of organ transplant. Among patients with CHF, the most common comorbidity was malignant ventricular arrhythmia, with a prevalence rate of 88 (77.88%), followed by diabetes with 68 prevalence (60.18%) and hyperlipidemia with 66 prevalence (58.41%) (Table 1).

Binary logistic regression analysis was employed to assess the significance of associated factors and comorbidities that were found to be significant in the association test. The binary logistic model for congestive heart failure (CHF) and its risk factors demonstrated statistical significance according to the Hosmer and Lemeshow test (2 = 14.83, p-value = 0.04). The reference category for all factors was "No". A negative coefficient indicated that the odds of CHF were 0.77 (1-0.23) times higher in patients with a family history of coronary artery disease (CAD). Similarly, malignant ventricular arrhythmia was found to be statistically significant for CHF, with the odds of CHF being 0.98 (1-0.02) times higher in patients with this condition. The factor "ability to walk 1 to 2 blocks" was also significant for CHF. A positive coefficient indicated that patients unable to walk 1 to 2 blocks had 2.82 times higher odds of having CHF (Table 2).

Approximately one-fourth of the patients had a history of previous myocardial infarction (MI), while 8.08% had undergone prior percutaneous coronary intervention (PCI). Only 1.12% of the patients had a history of coronary artery bypass graft (CABG) (Table 3).

No cases of congestive heart failure (CHF) were identified among individuals with chronic liver disease (Figure 1). In the overall population, the prevalence of hypertension was 62.40% (n = 556), with 9.53% (n = 53) of those individuals having congestive heart failure (CHF). Likewise, the prevalence of diabetes was 52.08% (n = 464), with 14.66% (n = 68) of those individuals having CHF (Figure 1). Patients were categorized according to the New York Heart Association (NYHA) classification. Class I represented individuals without symptoms, Class II included patients able to perform normal activities but experiencing exertional fatigue, Class III comprised patients facing difficulties in completing daily activities, and Class IV involved individuals experiencing shortness of breath at rest. The majority of patients fell into Class II, followed by Class III, while the fewest number of patients fell into Class IV (Figure 2a). Furthermore, approximately 42.20% of the patients were categorized as CCS angina Class II (Figure 2b).

DISCUSSION:

Our study revealed that the prevalence of congestive heart failure (CHF) among patients who underwent cardiac catheterization in the critical care unit (CCU) was 12.68%.

This rate significantly differs from the findings of another study, which reported an overall prevalence of coronary artery disease (CAD) as the primary outcome. The prevalence of CAD was estimated to be 26.9% (95% CI: 22.3%-32.0%), and it was observed to be higher in women (30%, 95% CI: 23.4%-37.5%) compared to men (23.7%, 95% CI: 17.8%-30.9%), although this difference did not reach statistical significance (p = .20).[12]

The prevalence of congestive heart failure (CHF) was 10.65% among women and 13.77% among men in our study. Surprisingly, our findings did not match the overall prevalence rates of congestive heart failure (CHF), reported as 30.0% in women and 23.7% in men. These results indicated a higher risk of CHF among female patients.[12]

Our study's NYHA classification results revealed that congestive heart failure (CHF) patients were distributed across different classes: Class I (25%), Class II (34.40%), Class III (30.30%), and Class IV (9.70%). Notably, Class II had the highest proportion, while Class IV had the lowest proportion. These findings contrast with another study in which all patients were initially classified as NYHA functional class IV. The predominant cause of congestive heart failure (CHF) in that study was coronary artery disease (CAD), accounting for 73% of cases.[13]

In our study, congestive heart failure (CHF) prevalence among patients admitted to the critical care unit (CCU) from the emergency room (ER) or outpatient department (OPD) undergoing cardiac catheterization was 12.68%. The global prevalence of CHF, based on data from the Global Health Data Exchange registry, was reported as 64.34 million cases. Age was found to significantly impact congestive heart failure (CHF) incidence, with the rate doubling in men for every 10-year increase in age after 65 years.[14] Another study conducted in Pakistan estimated congestive heart failure (CHF) prevalence to be 2.8 million cases.[15]

Our observations revealed that hypertension, malignant ventricular arrhythmia, hyperlipidemia, and renal insufficiency were factors associated with congestive heart failure (CHF). Specifically, hypertension and hyperlipidemia were commonly identified as risk factors among patients with CHF. Previous research has also highlighted hypertension and hyperlipidemia as potential risk factors for cardiovascular diseases (CVDs). Another study reported that myocardial infarction (MI) and coronary artery disease (CAD) were the primary contributors to most CHF cases, with coronary artery disease and diabetes being the predominant risk factors.[17]

The current study revealed a significant association between congestive heart failure (CHF) and a family history of coronary artery disease (CAD) and hypertension (p < 0.05). However, no significant association was found between congestive heart failure (CHF) and diabetes (p = 0.07). Hypertension emerged as the second most prominent risk

Table 1: Correlation of CHF with Socio-Demographic Factors and Comorbidities (n=891)

Variables	Category	CHF No	CHF Yes	Total	x^2 (p-value)
Gender	Male	501	80	581	1.78(0.21)
	Female	277	33	310	
Smoker	No	523	47	570	28.12 (0.00*)
	Yes	255	66	321	
Family History of CAD	No	468	34	502	36.26 (0.00*)
	Yes	310	79	389	
Able to walk 1 to 2 blocks	No	187	72	259	75.35 (0.00*)
	Yes	591	41	632	
Worsening of the symptoms in past 6-weeks	No	415	53	468	1.64 (0.23)
	Yes	363	60	423	
History of organ transplant	No	744	58	802	324.89 (0.00*)
	Yes	06	51	57	
Chronic Liver Disease	No	760	113	873	2.67 (0.26)
	Mild	07	-	07	
	Moderate	11	-	11	
Malignant Ventricular Arrhythmia	No	761	25	786	543.77 (0.00)*
	Yes	17	88	105	
Renal Insufficiency	No	775	54	829	409.35 (0.00)*
	Yes	03	59	62	
Thyroid Disease	No	765	60	825	292.32 (0.00)*
	Yes	13	53	66	
Diabetes	No	382	45	427	3.40 (0.07)
	Yes	396	68	464	
Hypertension	No	275	60	335	13.25 (0.00)*
	Yes	503	53	556	
Hyperlipidemia	No	592	47	639	57.90 (0.00)*
	Yes	186	66	252	
Peripheral Vascular Disease	No	778	112	890	6.89 (0.13)
	Yes	0	01	01	
Total		778	113	891	

*p-value <= 0.05 i.e. statistically significant

Table 2: Binary Logistic Regression for risk factors of CHF (n=891)

Factors	B	p-value	OR	95% C. I Lower	95% C. I Upper
Smoking	-0.31	0.40	0.73	0.35	1.52
Family History of CAD	-0.75	0.04*	0.47	0.23	0.99
Able to Walk 1 to 2 Blocks	1.04	0.00*	2.82	1.38	5.74
Malignant Ventricular Arrythmia	-4.29	0.00*	0.02	0.01	0.03
Renal Insufficiency	-34.10	0.99	0.00	0.00	0.01
Hypertension	-0.51	0.20	0.60	0.27	1.32
Hyperlipidemia	-0.44	0.26	0.65	0.30	1.39

*p-value <= 0.05 i.e. statistically significant

Table 3: Frequency of selected cardiac risk factors with CHF
(n=891)

Factors	Yes	No	Total
Previous MI	218 (24.47%)	673 (75.53%)	891 (100%)
Past CABG	10 (1.12%)	881 (98.88%)	891 (100%)
Past valve replacement	61 (6.85%)	830 (93.15%)	891 (100%)
Past PCI	72 (8.08%)	819 (91.92%)	891 (100%)

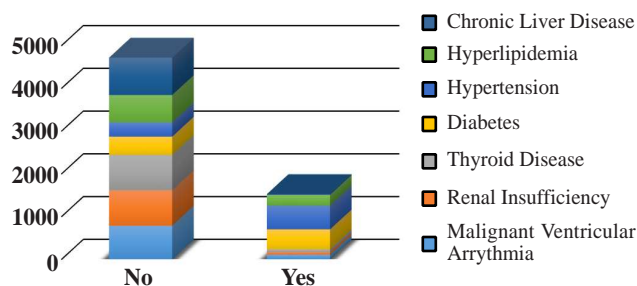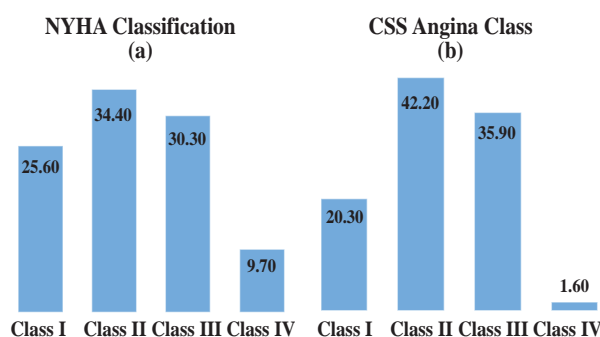Figure 1: Prevalence of CHF across various comorbidities

Figure 2: Distribution of Patients across NYHA Classification
(left) and CSS Angina Class (right)

factor for decompensated congestive heart failure (CHF).[18] Common causes of decompensated congestive heart failure (CHF) included inappropriate drug treatment, reduced physical activity, and dietary sodium restriction. Another study conducted in Peshawar, Pakistan, reported diabetes and hypertension as the dominant comorbid conditions, with hypertension alone following closely.[19]

In the current study, NYHA class II was the most common classification (34.4%) seen, followed by class III (30.3%). Similarly, another study reported that 54.9% of congestive heart failure (CHF) patients were categorized as class II, and 31.3% fell into class III.[19] These findings align with another study indicating better outcomes for NYHA class I and class II compared to class III and class IV, potentially due to inadequate self-care and physical activity among patients. Therefore, it is recommended to provide enhanced attention and improved care for patients classified as NYHA class III and class IV.[20] Another observation revealed that approximately 31% of participants fell into NYHA class II

of congestive heart failure (CHF), with 16% classified as NYHA class IV.[21] A recent study discovered that NYHA classes II, III, and IV given social support, and independently influenced self-care confidence showed improvement compared to class I.[22]

CONCLUSION:

Our study revealed a higher overall prevalence of congestive heart failure (CHF). Hypertension emerged as the most prevalent comorbid condition, followed by diabetes. Family history of coronary artery disease (CAD) was also identified as an associated risk factor for congestive heart failure (CHF). Additionally, a significant proportion of patients had a history of myocardial infarction (MI). According to the New York Heart Association (NYHA) classification, patients falling in class II were able to perform normal activities but experienced exertional fatigue, while others encountered difficulties in completing daily tasks. In order to improve healthcare policies and enhance our understanding of disease epidemiology and risk factors, preventive measures and interventions should be prioritized, and resources should be allocated accordingly.

Authors Contribution:
Kamran Baber: Conceived idea, literature search, data collection, manuscript writing
Ammad Javed: Literature search, data collection, review
Umair Asim: Literature search, data collection and methodology
Tahseen Kazmi: Statistical analysis and writing of result and discussion, review
Saira Farhat: Statistical analysis, methodology and results
Shehnaz Khan: Review of manuscript, proof reading and discussion

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Surgical Management of Cerbellopontine Angle Tumors - Experience from a Tertiary Care Hospital of Peshawar

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ABSTRACT

Objectives: to determine the surgical outcome (clinical improvement and surgical excision) of CP angle tumors and its management in a hospital based study.

Study design and setting: This descriptive case series study was carried out in the Department of Neurosurgery Prime Teaching hospital Peshawar from Jan 2018 to 30th August 2022.

Methodology: All patients with CP angle disorders were included in the study irrespective of age and gender. Patients with pineal tumor and posterior fossa abscess were excluded.

Results: A total of 48 patients were enrolled with 26(54.2%) males and 22(45.8%) females. The mean age with standard deviation of patients was 42+ 9 years. The frequency of CP angle disorders were; Vestibular Schwannoma (Acoustic Neuroma) 31(64.6%), CP Angle Meningioma 8 (16.7%), Vestibular Schwannoma with Hydrocephalus 6(12.5%) and Epidermoid cyst 3(6.3%). 39(81.3%) of the patients were managed through Microsurgical Retrosigmoid Craniectomy, 6(12.5%) via Ventriculo-Peritoneal Shunt and 3(6.3%) were conservatively managed. Eight patients were expired during the follow up. The mean size of tumor was 3.2cm. There was no statistically significant association of gender and age with outcome/mortality in CP angle pathologies *(p-0.195, 0.219 respectively)*. In 11 cases post-operative complications were recorded. 6(12.5%) cases were reported with facial Nerve palsy.

Conclusion: Vestibular Schwannoma (Acoustic Neuroma), CP Angle Meningioma, and Vestibular Schwannoma with Hydrocephalus are most common CP Angle pathologies in our set upThere is no statistically significant association of morbidity and mortality of CP angle tumors with age and gender. Facial nerve palsy was well managed with facial hypoglossal anastomosis and torsorraphy.

Key words: CP angle tumors, Vestibular Schwannoma, CP angle meningioma, Craniectomy, VP-shunting, mortality.

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INTRODUCTION:

Cerebellopontine angle is a triangular space which is bounded antero-medially by pons, laterally by petrous part of temporal bone and posterior-medially by cerebellum. Approximately 10% of the total intracranial tumors are reported in CP angle region.[1] Vestibular shwanoma or acoustic neuroma is the most common cerebellopontine (CP) angle tumor and accounts for more than 90% of the total CP angle pathologies[2]. Other lesion/tumors of the CP angle are Meningioma, facial Nerve shwanoma and primary cholestoma[3.]

Mostly these tumors are benign tumor and undergo asymptomatic phase for longer time and whether or not to operate on these tumors depends largely on the size of tumor, compression symptoms , age of patients, willingness for surgery and extension of the tumor in the CP angle. However the management of CP angle tumor is primarily surgical though surgical resection except for the tumors which are less than 2.5cm in size with no neurological deficit[4]. For such type of tumors with size less than 2cm, aged patients or unwilling for surgery patients the wait and see policy with microsurgical resection or radiosurgery using gamma knife techniques are the best choice. Ventriculoperoitoneal

shunt alone can reduce the compression symtoms[5.] But the goals of all the interventions is complete tumor resection with preservation of hearing, facial nerve injury, corneal injury and other peri-operative complaications[6].

The decision on plan of management of CP angle tumor is a team work is more challenging in order to avoid the intra-operative and post-operative complications/insult to cranial nerves and other vital anatomical structures.

The Most commonly reported complications post-operatively in CP angle tumpors are facial nerve palsies, exposure karatitis , Corneal opacities etc. Bells Phenomenon is commonly seen after an insult/trauma to facial Nerve during the CP angle tumor surgeries. . The abducent nerve (VI) is affected by large vestibular shwannoma followed by an increased intracranial pressure with damge to CN-VI intra-operatively or due to trauma causing exposure keratitis[8,16]. Studies haves reported to have managed such cases conservatively while 40-45% of the comlications required surgeries to manage, [9,16]

Vestibular Schwannoma with Hydrocephalus are managed with Ventriculo-Peritoneal Shunt. Obstructive hydrocephalus with acoustic neuroma as result of   compression of 4th ventricle by the CP anlgle tumor. This hydrocephalus usually subsides in majority of the cases with removal of the tumor and decompression but some cases require permanent cerebrospinal fluid diversion with VP shunting due to persistent raised pressure [10,20]

Meningioma occupying the CP-angle region may present with different origins. Such like meningioma surrounding the vital tissues make it difficult for the neurosurgeon to determine whether the surgical excision is favored or to go for conservative management using gamma knife radio-surgery depending on the neuro-deficit and size of the tumor[7].

Patients with CP angle tumors with upper age limites i.e above 60 year of age or those not willing for surgery or in cases the tumor size was less than 2cm with no neurological deficit are usually managed through modern technologies of gamma knife surgery[7.]

Present study was therefore designed with the objectives to determine the surgical outcome of CP angle tumors and its management under the impact of age and gender in a hospital based study

METHODOLOGY:

This descriptive case series study was carried out in the Department of Neurosurgery Prime Teaching hospital Peshawar from Jan 2018 to 30th August 2022. All patients with cerebellopontine (CP) angle disorders were included in the study irrespective of age and gender.

The study was approved by the Ethical review committee of the institution Prime Teaching Hospital 11/ERC/PTH Dated 20-6-2022. All the patients underwent complete neurological examination before and after the surgery. Pre-

operative pure tone audiometry was done for all patients with acoustic neuroma to assess the hearing loss degree.

The tumor size was assessed using MRI brain with and without contrast to find out lesion on the CP angle to decide for surgery. The size of tumor was taken in centime in largest vertical diameter. Hydrocephalus was assessed pre and post –op cases by neuroimaging study.

All patients were operated through sub-occipetal reteromastoid craniectomy using microsurgical techniques. All the patients underwent the microsurgical reterosgmoide craniectomy in lateral position with head flexed anteriorly and rotated contralaterally with lateral flexion. Decompression was done under multimodality monitoring in standard manner. Tumor were removed completely with preservation of neurovascular structures and functions. Facial never functions were assessed post-operatively using House–Brackmann scale and characterized good, fair and poor performance with HB I-VI. Hydrocephalus was assessed with the ratio of maximal width of frontal horn with inner table of cranium at the same level. Obstructive HCP was defined by a disproportionally small fourth ventricle in relation to the lateral and third ventricles. Indication of VP-shunting was based on tumor swelling with hydrocephalus, papilloedema and worsening of facial functioning.

The data was entered in SPSS version 25. The quantitative variables were measured with mean and standard deviation. The categorical variables were presented in frequency with percentages. The relationship of age and gender with outcome and CP angle pathology was assessed using chi-square test. A p-values of less than 0.05 was taken as significant.

RESULTS:

A total of 48 patients were enrolled the mean age with standard deviation of patients was 42+ 9 years. The age range was from minimum of 15 years to a maximum of 69 years . There were 26(54.2%) males and 22(45.8%) females (Table 1a).

The frequency of CP angle disorders were; Vestibular Schwannoma (Acoustic Neuroma) 31(64.6%), CP Angle Meningioma 8 (16.7%), Vestibular Schwannoma with Hydrocephalus 6(12.5%) and Epidermoid cyst 3(6.3%). (Table 1b)

Thirty nine(81.3%) of the patients were managed through microsurgical Retrosigmoid Craniectomy, 6(12.5%) via Ventriculo-Peritoneal Shunt and 3(6.3%) were conservatively managed (Table 1c). Eight patients were expired during the follow up period (Table 1d).

There was no statistically significant association of gender and age with outcome/mortality in CP angle pathologies *(p-0.195, p=0.219)* besides that a higher proportion of deaths were recorded in male gender without reaching a statistical significance.(Table 2a &b)

In 11 cases post-operative complications were recorded.

6(12.5%) cases developed facial Nerve palsies that was managed successfully with facial hypoglossal anastomosis. Two cases (4.2%) developed post-op exposure karatitis that was successfully managed with torsorrhaphy and two cases had Brainstem contusion with hemeperisis. (Table 3)

One of such case underwent per-cutaneous endoscopic gastrostomy (PEG procedure) in gastroenterology unit of the same hospital because as per protocol of the unit and gastoentrology guidelines, for the nutritional support . Three(6.3%) of the cases were managed conservatively, one case was at 69 year of age and was not willing for surgery and in 2(4%) cases the tumor size was less than 2cm with no neurological deficit and were advised gamma knife surgery. Similarly due to limited cases we could not reached a significance level to determine the association of different CP angle Pathologies with mortality *(p-0.334)*.

We could not find a significant association of different CP angle Pathologies with mortality *(p-0.334)* in present study.

The treatment of CP angle tumor with size more than 3cm were only operated while the patients with less than 3cm were referred for radio-surgery (gamma knife surgery).

Figure 1 & 2 shows pre-op and post op CP angle tumors (Meningioma and Vestibular Shwanoma)

Table 1. Descriptive Statistics of Gender, CP Angle Pathologies and management

a. Gender distribution		
Gender	Frequency	Percent
Male	26	54.2
Female	22	45.8
Total	48	100.0
b. Frequency of CP Angle Pathologies		
CP Angle Pathologies	Frequency	Percent
Vestibular Schwannoma	31	64.6
CP Angle Meningioma	8	16.7
Vestibular Schwannoma with Hydrocephalus	6	12.5
Epidermoid cyst	3	6.3
Total	48	100.0
c. Management/Procedure of CP Angle Pathologies		
Microsurgical retrosigmoid Craniectomy	**39**	**81.3**
Ventriculo-Peritoneal Shunting	**6**	**12.5**
Conservative Management / referral for Gamma knife Radiosurgery	**3**	**6.3**
Total	**48**	**100**
d. Outcome of patients with CP Angle Pathologies		
Discharged	40	83.3
Expired	8	16.7
Total	48	100.0

Table 2a. Association of gender with Outcome in CP angle pathologies

		Outcome		Total	Sig
		Discharged	Expired		
gender	Male	20	6	26	0.195
	Female	20	2	22	
Total		40	8	48	

Table 2b. Association of age with Outcome in CP angle pathologies

		Outcome		Total	Sig
		Discharged	Expired		
age categories	age<18y	1	0	1	0.219
	19-35 y	6	1	9	
	36-55 y	29	5	32	
	>55 y	4	2	6	
Total		40	40	8	48

Table 3a. Complications of Surgeries to explore CP Angle

Complications	Frequency	Percent
Facial Nerve Palsy	6	12.5
Exposure karatitis/corneal opacity	2	4.2
Respiratory stress followed with tracheostomy	1	2.1
Brainstem contusion with hemeperisis (post-traumatic)	2	4.2
No complication	37	77.1
Total	48	100

Table 3b. Management of CP Angle tumors

Management	Frequency	Percent
Facial hypoglossal anastomosis	5	10.4
Torsorrhapy	2	4.2
Per-cutaneous endoscopic gastrostomy (PEG)	1	2.1
Re-exploration	2	4.2
Total	10	20.8
Total patients	48	100

Figure 1: Pre-operatory images of Meningioma and Vestibular shwanoma

Figure 2: Post-op vestibular shwanoma

DISCUSSION:

There has been a considerable achievements in the field of neurosurgery for the management of the CP angle tumors specially the nestibular shwannoma. Complete excision of tumor without mortality was reported in 1964-65 era using operating microscope, with safe anesthesia and refined microsurgical instruments and techniques with shifting from the complete resection of tumor to the preservation of facial and cochlear nerve functions during the surgical procedure by Rand and cruze[8].

In present study we also observed that Vestibular Schwannoma (Acoustic Neuroma) 31(64.6%), CP Angle Meningioma 8 (16.7%), Vestibular Schwannoma with Hydrocephalus 6(12.5%). Our findings are in concordance with the findings of other studies [9-11]. These are typically benign tumors that arise from the divisions of the VIII cranial nerve or vestibule-cochlear nerve. As these tumors arise in size these interfere with the surrounding structures and causing disturbance of vital functions like swallowing, hearing, balance, facial movements and sensational issues,[10,11]. We noted 6(12.5%) cases developed facial Nerve palsies that was managed successfully with facial hypoglossal anastomosis in 4 (8%) cases the facial palsy was not due to surgical reason rather it was a post-traumatic effect. Harati A et al[10] reported 12% of the study cases had facial nerve dysfunction, including moderate palsy (HB Grade II-III) in 4 patients and hemifacial spasm in 2 individuals that was matching with our findings. Rutong YU et al[1] Reported facial hypoesthesia-numbness in (20.56%) cases. Management and preservation of facial nerve is challenge for the neurosurgeon. We managed in 4 (8%) cases successfully with facial hypoglossal anastomosis while in 2 patients the symptoms subsided gradually with time. This is widely acceptable procedure for the FN repair in CP angle tumors and has been documented a lot[12-14]. Two cases (4.2%) developed post-op exposure karatitis that was successfully managed with torsorrhaphy. Corneal opacities or Bells Phenomenon is commonly seen after an insult/trauma to facial Nerve during the CP angle tumor surgeries. . The abducent nerve (VI) is affected by large vestibular

shwannoma followed by an increased intracranial pressure with damge to CN-VI intra-operatively or due to trauma causing exposure keratitis[16]. Studies haves reported to have managed 45% of such cases conservatively with use of eye lubricant and eye shield only while 40-45% required surgeries to manage[17].

We recorded CP Angle Meningioma 8 (16.7%) cases with Two cases had Brainstem contusion with hemeperisis (post-traumatic). One of such case underwent per-cutaneous endoscopic gastrostomy (PEG procedure) in gastroenterology unit of the same hospital. In operating such cases careful attention is paid to preserve the arachnoid plane at tumor brainstem interface which helps complete resection of meningioma and minimal brainstem and vessel injuries[18].

He X[6] reported 83% of their patients with total resection One death occurred due to pulmonary inflammation. Out of all CP angle tumors Meningioma are the second most common tumors, which are bening in nature and usually remain asymptomatic for longer time until develop compression of the nerves or vital organs[19].

Six (12.5%) acses with Vestibular Schwannoma with Hydrocephalus were managed with Ventriculo-Peritoneal Shunt. Obstructive hydrocephalus with acoustic neuroma occur when there is compression of 4th ventricle by the tumor. This hydrocephalus usually subsides in majority of the cases with removal of the tumor and decompression but some cases require permanent cerebrospinal fluid diversion with VP shunting due to persistent raised pressure[20]. However in majority of the cases the tumor resection only solved the issue without insertion of the VP shunt. Some of the author suggest to monitor the ventrical size post-operatively to avoid permanent shunt insersion[21,22]. Three(6.3%) of the cases were managed conservatively, one case was at 69 year of age and was not willing for surgery and in 2(4%) cases the tumor size was less than 2cm with no neurological deficit and were advised gamma knife surgery.

There were some limitations of the study. Smaller sample size restricts us to predict the application of this study on larger population. Studies executed with larger sample size can estimate the true population impact. Therefore it is suggested that future studies should cover large population

CONCLUSION:

We conclude thatVestibular Schwannoma (Acoustic Neuroma), CP Angle Meningioma, and Vestibular Schwannoma with Hydrocephalus are most common CP Angle pathologies. There is no significant association of mortality with CP angle tumors in age and gender groups. Facial nerve palsy is the major post operative complication of CP angle exploration followed by karatitis. The complication were sucessfully managed with facial hypoglossal anastomosis and torsorraphy.

Authors Contribution:
Mumtaz Ali: Conception, design, analysis and interpretation of data writing the manuscript and review
Akram Ullah: Conception, design, analysis
Ramzan Hussain: Writing the manuscript and review
Hamzullah Khan: Conception, design analysis and interpretation of data, writing the manuscript and review
Sajid Khan: Writing the manuscript and critical review

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Diagnostic Accuracy of Chest X-Ray for the Diagnosis of Interstitial Lung Disease Keeping High Resolution Computed Tomography (HRCT) as Gold Standard

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ABSTRACT

Objective: To determine diagnostic accuracy of chest x-ray for the diagnosis of interstitial lung disease keeping high resolution computed tomography as gold standard.

Study design and setting: Comparative cross sectional study, Department of Radiology PNS Shifa Karachi

Methodology: Study done over the period of 1 year and two months. 160 Patients were included by using non-probability consecutive sampling all underwent CXR and HRCT chest. Sample size was calculated using sensitivity and specificity calculator for sample size with expected sensitivity of 80%[7], expected specificity of 82.98%[7] and expected prevalence of 76%[7]

Results: In this 160 patients were included by using non probability sampling. Among all 116(72.50%) were males while 44 (27.50%) were females. Sensitivity (SE),specificity, positive predictive value (PPV) negative predictive value(NPV) and diagnostic accuracy of CXR vs HRCT in cases of ILD was 88.89%, 87.50%, 88.89%, 87.50% and 88.24% respectively.

Conclusion: Chest x-ray has high diagnostic accuracy and simultaneously readily available and cost effective modality, therefore it can be effectively used as alternative to HRCT.

Key words: Chest x-ray, interstitial lung disease, high resolution computed tomography

INTRODUCTION:

In the realm of diagnostic imaging, evaluation of interstitial lung disease stands as pivotal challenge Interstitial lung disease is a group of heterogenous disorders affecting the epithelial cells of the alveoli, basement membrane, endothelial cells of the pulmonary capillaries, perivascular and lymphoid cells.[1] Diseases of connective tissue is a group of interstitial lung disorder which can invade the surrounding vessels and parenchyma posing a great threat to the life of patients.[1] Smoking remains a high risk factor in causing respiratory illness damaging the airways, pleura and parenchyma which requires a multidisciplinary approach to prompt diagnosis and effective treatment.[3] ILD is seen in all age groups, developmental or genetic causes may result in pulmonary manifestations leading to ILD in the pediatric age group.[4] Amidst the various imaging modalities available, the chest X-ray emerges as fundamental tool widely employed in initial assessment. Chest Xray was a useful tool previously for the diagnosis of pulmonary pathology until the use of Computed tomography which helped to view the gross structure of the lung. Using high-resolution tomographic technique pathologies of the pulmonary system were detected at an earlier stage with prompt commencement of treatment and better outcomes.

Pathologies of the pulmonary interstitium can affect the lung parenchyma in multiple ways resulting in different patterns on histopathology assessment. These patterns can range from simple reticular to nodular or reticulonodular

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pattern involving different segments of the lungs. This involvement can manifest in several ways clinically and radiologically making the diagnosis a complicated deal.[4] Computed tomography has played an inferior role as compared to high resolution computed tomography. When CT was used it was able to diagnose and assess the distribution and severity of the disease however when CT negative patients with suspicion of having a disease underwent HRCT, it could identify the disease, site, and extent of the lesion. This helped to narrow down the diagnosis and advocated commencement of earlier treatment. Furthermore, this helped in biopsy procedures and was useful to assess the response to treatment.[5] This signifies the superior role of HRCT as compared to simple CT in diagnosis, treatment and monitoring response to treatment in patients suffering from interstitial lung disease.

Vizioli L, et al showed the sensitivity of 48% and specificity of 91% of chest X-ray with a superior role of HRCT in diagnosing pathologies of interstitium as compared to CXR.[6]

There is paucity of data on this subject in our local population. The review of different studies have showed variability in results; therefore, their results cannot be generalized on all populations. If my study results come in favor of Chest X-ray as a good diagnostic tool than it will be very useful to utilize this tool in settings where HRCT is not available as in peripheral health care centers.

METHODOLOGY:

This was a cross sectional study, which was done at the Department of Radiology, PNS Shifa Karachi in a period of one year and two months. Sample size was calculated using sensitivity and specificity calculator for sample size with expected sensitivity of 80%[7], expected specificity of 82.98%[7], expected prevalence of 76%[7]. With an interval of confidence as 95%, expected precision of sensitivity and specificity of 10% each the total sample size calculated was 160.

Inclusion criteria: Individuals of age 20-70 years, male or female with the presence of dyspnea on physical examination, cough 3-6 weeks on medical history, fatigue 4-6 weeks, weight loss (=4.5 kilograms or 5% of normal body weight = 3 months without knowing the reason) were included in the study group.

Exclusion criteria: Patients with pregnancy on medical record, history of pulmonary tuberculosis, history of pneumonia in last 3 months, patients with CCF/ IHD were excluded from the study groups.

Consent and IRC: Approval was obtained from the hospital ethics' committee and research department. (ERC/2022/Radio/25). All patients fulfilling the inclusion criteria and presenting to the department of radiology PNS Shifa Karachi were enrolled. Patients were counselled and procedure was explained to them, including the effects of radiation, followed by a written informed consent duly

signed by them. Base line demographic information of patients (age, gender, duration of complain) were taken.

Chest X ray and HRCT was done for each patient. HRCT was conducted as per our institutional protocol using a magnified resolution for better vision of the underlying lesion. From the apex till the base of the lungs narrow slice each of 1mm was taken to visualize all parts of the lung. Images with high spatial resolution were taken with a resulting scan taken at full inspiration and a better view of the lung segments while patients remained supine. CXR and HRCT were reported by two different radiologists each having more than 10 years of experience. Radiologists reporting HRCT was blind to findings of CXR and vice versa. Using Performa, the findings of both the chest x-ray and HRCT were recorded.

Subjects were divided into two groups:20 to 45 and 46-70 yrs. Subjects were also divide into two groups according to duration of symptom < = 6wks and >6wks

Using Statistical software (SPSS-23) the recorded data was analyzed. Quantitative variables and were analyzed by using mean values and standard deviation while qualitative variables were analyzed by frequencies and percentages of the variables. For computing the diagnostic accuracy of CXR and HRCT variables were used to calculate sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy. Using Receiver operator characteristic curve ratio of likelihood was calculated.

RESULTS:

A total of 160 patients were included in the study with age ranging from were 20-to 70 years. Mean age of subjects was 46.91 ± 10.16yrs. Sixty eight patient were between 20-

		HRCT	
		+ve	-ve
X-Ray	+ve	True positive (a)	False positive (b)
	-ve	False negative (c)	True negative (d)

45 years of age and ninety two were above 46 years. Males were greater than females with a ratio of 2.6:1 with a total no of 116 (72.50%) males. Value of mean for the duration of symptoms seen in these patients was 6.89 ± 1.76 weeks. Mean weight of patients was 77.41 ± 8.99 kg.

All patients underwent CXR and HRCT. All CXR were analyzed for features suggestive of ILD; 84 patients were reported positive. Out of these 84 patients, only 71 patients were confirmed as ILD on HRCT while 13 had negative results.

Total number of patients with negative results on CXR was 76. Among these 62 were confirmed as negative on HRCT as well.However, 14 cases had at least 1 finding consistent with interstitial lung disease (as shown in Table 1). Using these values, the diagnostic accuracy of CXR was calculated

when HRCT was kept as gold standard with a result of significant p-value <0.05(Table 1).

Stratification of diagnostic accuracy with respect to duration of symptoms is shown in Table 2 and Table 3.

Stratification of diagnostic accuracy according to age also done. For age group 20-45years a sensitivity of 88.89%, specificity of 87.50%, positive predictive value of 88.89%, negative predictive value of 87.50%, diagnostic Accuracy of 88.24% was calculated.

For age group 46 -70years a sensitivity of 86.97%, specificity of 79.49%, positive predictive value of 85.19%, negative predictive value of 81.58%, diagnostic Accuracy of 83.70% was calculated.

DISCUSSION:

Interstitial lung diseases are complex diseases that affects the pulmonary system by invading the anatomical structure of the lungs damaging the parenchyma along with the vessels and the areas of the gas exchange, compromising the respiratory mechanics.[2] The widespread involvement of the lungs is expressed in a variety of ways clinically, anatomically,

Table-1: Diagnostic accuracy of chest X-ray

	HRCT positive	HRCT negative	P-value
Chest X-ray (positive)	71 (TP)	13(FP)	<0.05
Chest X-ray (negative)	14 (FN)	62 (TN)	

Table 2: Results based on duration of symptoms <6 weeks (n=68)

	HRCT positive	HRCT negative	P-value
Chest X-ray (positive)	32 (TP)	05 (FP)	<0.05
Chest X-ray (negative)	05 (FN)	26 (TN)	

Table 3: Results based on duration of symptoms >6 weeks (n=92)

	HRCT positive	HRCT negative	P-value
Chest X-ray (positive)	46	07	<0.05
Chest X-ray (negative)	06	33	

and physiologically with distinct and multiple presentation on radiological imaging. The usual triggers are infections, drugs, environmental toxins, or idiopathic causes. The causative agent greatly affects the prognosis of the disease leading to either resolution or further damage to the lungs.[4] Diagnosis of the condition at an early stage using a high degree of suspicion, detailed history, and a sequence of investigations with concomitant imaging is the mainstay of earlier recognition and prompt treatment of the disease.[5]

Radiological picture in such diseases play a pivotal role in diagnosing and detecting the stage of the disease. Chest X-ray is noninvasive cost effective technique and easily available

as compared to high resolution computed tomography which is expensive and available at a few setups only. Exposure to radiations using HRCT can affect the general health of these patients as compared to chest Xray.[6]

CXR is a low-cost procedure and available at the peripheral set-ups playing an important role in the diagnosis of ILD and excluding other pathologies of the lungs. However comparing the diagnostic accuracy of both the procedures reveal a superior role of HRCT as compared to CXR and is considered a gold standard technique in the assessment of ILD.[8]

In our study, 160 patients underwent CXR and HRCT. Patients with positive CXR findings were analyzed out of which 84 patients came out positive. Among these 84 patients only 71 patients were found positive on HRCT while the rest 13 had negative results on HRCT. Total number of patients with negative results on CXR were 76, out of which only 62 were negative on HRCT as well and the rest 14 were positive on HRCT. Comparable results were seen in the study conducted by Gupta S et al in which HRCT detected 100% patients with Interstitial Lung disease.[5]

The study conducted by Troy LK et al also revealed that HRCT could detect the disease earlier in the course, thus decreasing the mortality and morbidity.[9] Furthermore, quantitative indices in HRCT can be useful to evaluate the prognosis of the disease which was demonstrated by Torrisi, Sebastiano Emanuele et al in their study.[14] Chest Digital Tomosynthesis was another modality that detected Pulmonary pathology more accurately as compared to CXR in the study done by Kruamak et al.[18]

The availability of chest x-ray as compared to HRCT makes the former a diagnostic modality of choice in most of the hospitals however the gold standard is HRCT for accurate diagnosis and staging of the disease.

CONCLUSION:

Our study concludes a high diagnostic accuracy of Chest Xray and since this technique is cost effective and readily available at the low resource peripheral set-up, it can be used as an alternative to the expensive modality of HRCT for the diagnosis of interstitial lung disease. Cases with a high index of suspicion however can undergo HRCT for a confirmatory diagnosis.

Authors Contribution:
Nosheen Sadiq: Conception, design, analysis and interpretation of data
Ammara Iftikhar: Conception, design, analysis and interpretation of data
Muhammad Usman Khan: Conception, design, analysis and interpretation of data
Hussain Rashid Ehsan: Conception, design, analysis and interpretation of data
Naveed Hussain: Conception, design, analysis and interpretation of data

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Comparative Study of Lateral Internal Sphincterotomy versus Local 0.4% Glyceryl Trinitrate Ointment for the Treatment of Chronic Anal Fissure

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ABSTRACT

Objectives: To compare the outcomes of "Lateral Internal Sphincterotomy (LIS)" versus local "0.4% Glyceryl Trinitrate (GTN)" ointment for the treatment of chronic anal fissure.

Study Design and Setting: Randomized controlled trial, Combined Military Hospital (CMH) / Pak Emirates Military Hospital (PEMH), Rawalpindi from October 2022 to March 2023.

Methodology: A total of 100 patients [50 in GTN group and 50 in LIS group] who underwent treatment for chronic anal fissure were included in study. Patients in both groups were followed up at eight weeks after the surgery to assess for the outcomes including anal pain healing and recurrence of fissure. Data was analyzed by SPSS 22.00.

Results: In our study, mean age was 30.48 ± 5.82 years. 61 (61.00%) were male while 39 (39.00%) were female. Mean duration of having anal fissure was 10.69 ± 2.59 weeks. Mean post-therapy pain VAS at week 8 follow up in "GTN" group was 0.64 ± 1.06 while in "LIS" group it was 0.16 ± 0.37, ($p = 0.003$). Complete healing of chronic anal fissure was achieved in 35 (70.00%) in "GTN" group while in "LIS" group healing was achieved in 42 (84.00%), ($p = 0.096$). Recurrence occurred in 2 (4.00%) of patients in "GTN" group and none in "LIS" group, ($p = 0.153$).

Conclusion: "Lateral Internal Sphincterotomy (LIS)" is a better treatment option for management of chronic anal fissure.

Keywords: Chronic anal fissure, Glyceryl trinitrate, Healing, Lateral internal sphincterotomy.

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INTRODUCTION:

An "anal fissure" is a superficial split in the skin that is located distally towards the "dentate line" and is a common reason for patients to seek treatment in the urgent care[1]. In the majority of instances, anal fissures are the result of trauma due to passage of very hard feces and constipation[2]. Other potential conditions that can lead to development of anal fissure include use of diet low in fiber, tuberculosis (TB), inflammatory bowel disease (IBD), history of having surgery of anal region, anal malignancy, to name a few. These are quite common in both youngsters and adults and individuals who have a background of persistent constipation are more likely to experience this problem on a more regular basis. It can either present acutely or can become chronic[3].

Anal fissures can appear in people of all age groups; yet, these are most commonly seen in children and people in the middle years of their lives with no major difference in prevalence between the sexes [4]. Anal fissures have the potential to reoccur, get infected and even progress into formation of abscesses if they are not treated adequately. Since patients withhold defecation because of the pain caused by the spasm of the anal canal that is caused by the elevated sphincteric tone, this can also lead to impaction of stool[5]. In addition to this, these factors can also contribute to a general decline in one's quality of life [6].

The majority of fissures can be healed with conservative therapy, but in cases where they become chronic, the goal of treatment is often predicated on lowering the anal pressures which is achieved by utilization of various surgical and non-surgical interventions[6]. Among non-surgical interventions used for managing chronic anal fissures most common agents are calcium channel blockers, nitrates and botulinum toxin or "botox"[7]. These help by reducing the sphincteric tone and improving the anal canal spasm. Amongst surgical intervention, most useful technique is "lateral internal sphincterotomy (LIS)"[8]. When it comes to choice of therapy between nitrates particularly "glyceryl trinitrate (GTN)" and "lateral internal sphincterotomy (LIS)", literature shows high degree of variability. A study in this regard reported that when post-operative pain and healing rate was compared between "glyceryl trinitrate (GTN)" and "lateral internal sphincterotomy (LIS)" it was found that mean pain score and healing rate in GTN group was 1.64 ± 2.43 and 72%, respectively while in LIS group mean pain score was less (0.24 ± 1.20) and healing rate was high (100%), making LIS a better treatment option for chronic anal fissure [9]. On the other hand, another study reported in favor of GTN being better than LIS with higher percentage of pain relief (95% vs 86.7%) and healing (88.3% vs 83.3%) in GTN group as compared to LIS group[10].

Based on such highly opposing results regarding the outcomes of GTN vs LIS for the management of chronic anal fissure, in terms of pain relief and healing rate, it is still unclear that which of these treatment options can provide best outcome making conductance of further research in this regard highly imperative. Therefore, this study was conducted with the purpose of finding out the best possible treatment option for the patients presenting at our health care facility with chronic anal fissure by comparing non-surgical option of "glyceryl trinitrate (GTN)" with the surgical one i.e., "lateral internal sphincterotomy (LIS)". This will not only help gaining evidence regarding the best possible treatment modality but also will help improving patient care and their outcome.

METHODOLOGY:

This "randomized controlled trial" was conducted at "Combined Military Hospital (CMH)/Pak-Emirates Military Hospital (PEMH), Rawalpindi" which after obtaining the approval from the Ethical Review Board (ERB) of the aforementioned institution (ERB No.376) was started from October 2022 and continued till March 2023. To calculate the appropriate sample size for this study WHO sample size calculator using formula for "sample size estimation for two population proportions" was used by assuming 5% level of significance, 80% power of the test, anticipated frequency of healing of chronic anal fissure achieved in GTN group of 51.11% and anticipated frequency of healing of chronic anal fissure achieved in LIS group of 77.78%[11]. Based on these, calculated sample size was 100 [50 in each group].

Inclusion criteria: All adult patients (having age of eighteen years or more), either of male or female gender, presenting with chronic anal fissure (for more than six weeks)[12] were included in the study.

Exclusion criteria: Patients who had a history of tuberculosis (TB), inflammatory bowel disease (IBD), history of having surgery of anal region, anal malignancy and pre-existing fecal incontinence were excluded from the study. Patients were selected through "non-probability consecutive sampling technique". Once the study pool was selected patients were interviewed to document their baseline demographic features including their age (in years), gender, duration of having anal fissure (in weeks) and pain at the anal region (based on visual analogue scale scored from 1 to 10; 1 being least while 10 being severe pain). Patients were then randomly divided into two equal groups. In group A, patients underwent management with "topical 0.4% glycerl trinitrate (GTN) ointment" applied thrice daily for a period of eight weeks while in group B, patients were scheduled to undergo "lateral internal sphincterotomy (LIS)". LIS was performed by consultant surgeon, with a minimum experience of five years, under spinal anesthesia keeping patient at "lithotomy" position[13]. First step was making an incision in circumferential fashion at the anal verge, of about 1-2 cm at 5'o'clock position. With the help of diathermy, surgeon divided the lower part of the anal sphincter below the "dentate line" of size that was equal to the fissure length. After that surgical wound was left open and patients was advised to regularly take "sitz bath" for eight weeks. Additionally, patients were advised to consume diet rich in fibrous content. Patients in both the groups were given oral analgesics (tab. Tramadol 50mg) to be used regularly for 7 days. In case of any pain during the eight weeks post-surgery period, patients were advised to visit surgical outdoor department where additional simple analgesic (tab Paracetamol 1000mg) was given on as per need basis. To assess outcomes in study participants, patients were advised to re-visit our outdoor department for follow up consultation at week 8 after surgery and of GTN therapy to assess for anal pain, healing and recurrence of fissure. Fissure was labeled to "heal" if there was "complete absence of pain (VAS 0) and no visual lesion at the anoderm". In addition, occurrence of treatment related complications including headache, anal incontinence and anal bleeding were also assessed."To analyze the data we used Statistical Package for Social Sciences (SPSS) software version 22:00. To represent quantitative data (age, duration of anal fissure, pre- and post-intervention pain at anal site) we used mean +/- standard deviation (SD) and median (IQR). For representation of qualitative data (gender and healing of anal fissure) we used percentages and frequencies. Normality of data was checked using Shapiro-Wilk test. To analyze quantitative data we used sample t-test and for qualitative data Chi-square test was utilized. A p-value of = 0.05 was considered to be statistically significant".

RESULTS:

Study sample was 100 patients [50 in GTN group and 50 in LIS group]. In this study, it was found out that value of mean age of study pool was 30.48 ± 5.82 years. There were 61 (61.00%) male participants while remaining 39 (39.00%) participants were female. Mean duration of having anal fissure was 10.69 ± 2.59 weeks. The baseline characteristics between study groups were then compared. It was found that mean age of the study participants who were in "GTN" group was 31.02 ± 6.09 years while in "LIS" group mean age was 29.94 ± 5.54 years, (p = 0.356). In "GTN" group (n = 50), 32 (64.00%) were male and 18 (36.00%) were female while in "LIS" group (n = 50), 29 (58.00%) were male and 21 (42.00%) were female, (p= 0.539). Mean duration of having anal fissure in our study participants who were in "GTN" group was 10.68 ± 2.64 weeks while in "LIS" group mean duration of having anal fissure was 10.70 ± 2.56 weeks, (p = 0.969). Mean baseline pain VAS score in "GTN" group was 5.16 ± 0.79 while in "LIS" group 4.92 ± 1.05, (p = 0.199). This data is represented below in table I. In this study, it was found that mean post-therapy pain VAS at week 8 follow up in "GTN" group was 0.64 ± 1.06 while in "LIS" group it was 0.16 ± 0.37, (p = 0.003). Additionally, complete healing of chronic anal fissure was achieved in 35 (70.00%) in "GTN" group while in "LIS" group healing was achieved in 42 (84.00%), (p = 0.096). Recurrence occurred in 2 (4.00%) of patients in "GTN" group and none in "LIS" group, (p = 0.153). This is tabulated below in table II. In addition to these outcomes, patients were also assessed for treatment related complications. Main complication that was encountered by patients in "GTN" group was "headache" which occurred in 4 (8.00%) of the patients and none of the patients had "anal incontinence" or "bleeding" after 8 weeks of therapy. On the other hand, in "LIS" group, "anal incontinence" occurred only in 1 (2.00%) patients and none reported any "headache" or "bleeding".

DISCUSSION:

Some authors argue that a fissure needs to be present for 6-8 weeks before being considered chronic, however there is a proportion of patients in which spontaneous healing may also occur [14]. Anal fissure patients have an anal sphincter pressure that is elevated to approximately 121 mm Hg (much higher than the normal tone at which pressure is 69mmHg), which produces a diminished supply of blood that reaches the diseased area, which in turn results in ischemia and poor healing. Fiber rich nutrition, botulinum toxin injection, "sitz baths", topical diltiazem ointment and topical glyceryl-trinitrate are all non-surgical options for treating chronic anal fissure while "lateral internal sphincterotomy" is a surgical procedure used to treat "chronic anal fissure" [15]. In this study, latter two management options were primarily compared.

In this study, it found that majority of patients who presented with this chronic condition were young male patients with a frequency of 61%. This was congruent with the finding of Lee et al.[16], Butt et al.[17] and Qureshi et al.[10] who reported a high frequency of "chronic anal fissure" among younger male population at 57.7%, 53.33% and 53.3%, respectively. In this study, upon performing comparison of baseline characteristics of study groups including age, gender distribution, duration of disease and baseline pain scores, it was found that there was absence of any significant difference between "GTN" and "LIS" group. However, post-treatment follow up after 8 weeks status yielded somewhat different results. Upon comparing post-treatment parameters we found that both the relief of pain as well as healing rate was much higher in "LIS" group while recurrence only occurred in "GTN" group. In terms of pain relief, we found that pain score was significantly lower in association with "lateral internal sphincterotomy (LIS)" indicating that better pain relief was achieved with LIS. Similar results were observed in a study conducted by Jan et al. [18] who reported that higher percentage of patients in "LIS" group had pain relief (90%) as compared to those in "GTN" group (80%).

Table 1: Baseline characteristics (n = 100)

Sr. No	Characteristics		Value	
1	Mean age		30.48 ± 5.82 years	
2	**Gender**			
	Male		61 (61.00%)	
	Female		39 (39.00%)	
3	Mean duration of having anal fissure		10.69 ± 2.59 weeks	
Comparison of baseline characteristics				
	"GTN" group (n = 50)		**"LIS" group (n = 50)**	p-value
Mean age	31.02 ± 6.09 years		29.94 ± 5.54 years	0.356
Gender	Male	Female	Male	Female	0.539
	32 (64.00%)	18 (36.00%)	29 (58.00%)	21 (42.00%)	
Mean duration of anal fissure	10.68 ± 2.64 weeks		10.70 ± 2.56 weeks	0.969
Mean baseline VAS	5.16 ± 0.79		4.92 ± 1.05	0.199

Table 2: Comparison of outcomes between groups (n = 100)

Parameter	"GTN" group (n = 50)	"LIS" group (n = 50)	p-value
Post-therapy VAS at week 8 follow up	0.64 ± 1.06	0.16 ± 0.37	0.003
Healing of chronic anal fissure	35 (70.00%)	42 (84.00%)	0.096
Recurrence of chronic anal fissure	2 (4.00%)	0 (0.00%)	0.153

Contrarily, Qureshi et al. [10] found that higher percentage of patients in "GTN" group had relief from pain (95%) as compared to those in "LIS" group (86.7%).

In terms of healing, it was observed that frequency of healing was also higher in patients who had "lateral internal sphincterotomy (LIS)" but its difference from GTN users was not statistically significant. This finding was linear with what was reported by Qureshi et al.[10] who reported similar results as of this study and found no significant difference between the two treatment groups (p = 0.321). However, incongruent with the findings, Hassan et al. [11] reported that "LIS" group had significantly higher healing rate than "GTN" group [77.78% vs 51.11%; (p = 0.013)]. Similarly, Butt et al. [17] reported 100% healing rate with "LIS" as compared to 73.33% healing rate with "GTN" (p < 0.05). Additionally, Jan et al.[18] also reported that not only higher healing rates of chronic anal fissure were achieved by treatment through "lateral internal sphincterotomy (LIS)", the difference in the healing rates from the use of "topical GTN ointment" was also statistically significant [85% vs 74%; (p = 0.0001). Also, Paul et al. [19] also found that "LIS" provided much higher healing rates as compared to "GTN" (86.8% and 66.6%, respectively). In terms of recurrence, two patients in the "GTN" group had recurrence while none in "LIS" group had recurrence during study period. This was not congruent with the findings of Qureshi et al.[10] who reported that no patient in either "LIS" or "GTN" group had recurrence of anal fissure.

Based on these findings, although "lateral internal sphincterotomy (LIS)" is a better treatment option yet "0.2% GTN" can still be used as a safer alternative to surgical treatment with comparable rates of pain relief as well as healing of "chronic anal fissure". Additionally, it is recommend that further studies should be carried out in this regard to achieve and formulate a standardized plan of managing "chronic anal fissures".

CONCLUSION

In conclusion, "Lateral Internal Sphincterotomy (LIS)" is a better treatment option for management of chronic anal fissure as compared to topical "0.4% Glyceryl Trinitrate (GTN) ointment" as not only it provides significantly better relief from the pain associated with the chronic anal fissure but also higher rates of healing as well as lesser rates of recurrence. Therefore, for treatment of chronic anal fissure, "Lateral Internal Sphincterotomy (LIS)" should be preferred over medical management.

Authors Contribution:
Utban Ali Shah: Sampling, manuscript writing, data review
Tabish Iqbal: Data collection, data analysis
Khurram Sarafaraz: Conception of idea, data review
Muhammad Idress: Result analysis
Momina Javed: Statistical review
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Development and Validation of Self-Evaluation Tool to Assess Teaching- Strategies (SETT) of Medical Teachers: A Modified Delphi Study

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ABSTRACT

Objective: The objective was to develop and validate a tool for self-evaluation of teaching strategies for medical teachers (SETT).

Study Design & Setting: A mixed method study was conducted at Riphah International University, Islamabad, Pakistan

Methodology: A mixed method study was conducted at Riphah International University, Islamabad, Pakistan from January 15, 2019, to July 15, 2019. Modified Delphi technique was used to establish the content validity of preliminary instrument with 28 items. The response process validity was explored through cognitive interviews. Confirmatory factor analysis was done to confirm the factor model and the reliability of the tool was calculated using Cronbach's alpha.

Results: A 28-items preliminary draft instrument was reduced to 14-items final instrument after administering content validity, cognitive pretesting, and confirmatory factor analysis. Content Validity Scale was 0.97. Confirmatory factor analysis yielded a model with a good fit and an acceptable internal consistency. These statistical values signify that the tool developed has a good validity and good reliability which means that the tool rightly measured what it was supposed to measure and is reliable to evaluate the required question every time.

Conclusions: A self-evaluation tool of teaching- strategies (SETT) questionnaire is a valid and reliable instrument to evaluate teaching strategies of medical teachers.

Keywords: Quality of teaching, reliability, Teaching strategies, validity

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INTRODUCTION:

Medical education is a dynamic and continuously evolving field. Faculty evaluation is necessary to recognize the effective faculty members in teaching. It is helpful in many ways like the acknowledged qualities and strategies can be conveyed to other teaching faculty with less effective teaching skills,[1] teachers can be better assessed for promotion[2] and effective teaching will clearly improve the students learning and progress.[3] However, most of the medical teachers recieve no structured training necessary for improving their teaching strategies.[4] Many faculty members start teaching profession with no previous experience as there is no set criteria in place to evaluate their teaching effectiveness before appointment in medical institutes.[5] It is evident from literature that medical teachers improve their teaching skills through experiential learning and student's feedback.[6]

From previous studies, the success and efficiency of the teacher has always been linked with the student's progress and perceptions.[7] Medical Teachers over the years have been engaging in effective self-evaluation of their teaching strategies through a reflective and systematic approach. They have been reviewing their lesson plans, considering the learning objectives, instructional methods, and assessment tools employed. This innate introspection has enabled teachers

to assess if their strategies align with desired outcomes. However, limited literature exists which solely gauges the teaching strategies used by medical teachers. In the recent years, the drift has moved towards teacher's perceptions, self-appraisal or comprehensive self-evaluation of the medical teacher .Since teachers have a key role in the learning of students, it is very important to recognise and categorize the strategies that make them more efficient, effective and successful.[8]

The responsibility of medical colleges as institutes and the challenges faced by teachers to be accountable for the knowledge, attitudes, skills, and aptitudes of their graduates was the inspiration to conduct a study to develop a self-evaluation tool to assess the effective teaching strategies of medical teachers. The self-evaluation tool will be helpful in highlighting the strengths and weaknesses regarding performance and cultivate unused skills and abilities of medical teachers. In order to produce effective teachers, we need to recognize teaching strategies that improve learning of students. This self-evaluation will create an opportunity for medical teachers to fairly and accurately deliberate and document their performance.[9]

There is lack of standardized teaching evaluation methods for medical teachers in various medical schools. Each institute need to establish appropriate standards for effective teaching aligned with institutes vision and mission. Without standardized evaluation processes our colleges cannot accurately evaluate medical teachers.

Various researchers have added literature regarding the effective teaching strategies of school or university teachers, but it is mostly based on specific subjects like science, physics, limited studies have explored the effective teaching strategies of medical teachers.[10] Therefore, a new validated inventory is required, which will be useful for medical teachers to evaluate their teaching strategies.

The purpose of current study was to develop and validate a tool for self-evaluation of teaching strategies of medical teachers. Medical institutes may utilize this tool, for analysing the teaching strategies of their faculty and identifying the areas of self-improvement. All this development and enhancement in their teaching style may later on reflect in their students learning.

METHODOLOGY:

A mixed method study with sequential quantitative and qualitative components was conducted from January 15, 2019, to July 15, 2019 at Riphah International University, Islamabad, Pakistan. The current study involved expert medical educationists from national and international institutions. Non-probability (Purposive) sampling technique was used to meet the criteria for the 18-item inventory. Ethical approval was obtained from the ethics review board of Riphah International University, Rawalpindi (Riphah/ERC/19/0350).

The study process included by highlighting effective teaching strategies used by experienced medical teachers were identified from literature search. A preliminary draft questionnaire of 28 items was prepared for further modifications through the Delphi technique.

A 2 round modified Delphi technique was used in which 17 medical education experts were involved. An inclusion criterion was set for this panel of experts. Medical teachers having a Masters degree /PhD in medical education specifically and working in undergraduate medical institutes for a minimum of 5 years were selected as experts. All other medical teachers who were not qualified as medical educationists and had less than 5 years of teaching experience were excluded from the current expert panel. Selected experts were invited to participate through email. In round one, the panelists were asked to grade 'relevance' of items, on a five point Likert scale. Percentage responses and median scores for each item were calculated. Items with 75 percent or more response rate as extremely important or very important on Likert scale were included as per criteria defined for consensus. Items with median scores of 3.25 point or more were included for the second round as the items with median score of less than 3.25 indicates "poor" relevance/importance to the tool and therefore removed from the instrument.[11]

For round 2, items were added or amended based on results and the questionnaire was resent to the panellists. Panel agreement of > 75% on each statement was considered the criterion for inclusion of items in the subsequent round. Content Validity Index for the individual items (I-CVI) and of the scale (S-CVI) was computed after round 2.

Five faculty members with teaching experience of more than 3 years were randomly selected through convenience sampling for cognitive pretesting. Data was collected through individual interviews with concurrent verbal probing.[12] Four cognitive validity criteria used were 'item interpretation, clear explanation, consistent answer choice, and overall item cognitive validity' across the five participants to identify cognitive issues in the questionnaire

The final 18 item questionnaire was filled by 274 randomly selected participants, in order to determine the reliability of the final developed SETT tool. Confirmatory Factor Analysis was done to establish construct validity of the instrument by using AMOS software.

RESULTS:

The results in this section have significant statistical values which indicate good validity and reliability of this instrument. This will in turn help the instrument to become more usable and dependability of the tool will increase. Items and domains were developed during phase 1. For teaching methods 8 items, practical sessions 2 items, group discussions 2 items, questioning 2 items and for activating methods 4 items were extracted. Panellists evaluated items in each domain based on a scale of relevance using 5-point Likert scale from

'extremely important to not at all important' (5=extremely important, 4= very important, 3= moderately important, 2= slightly important, 1= not at all important).

In Round 1, 12 out of 17 (n=70%) panelists filled the preliminary questionnaire with 28 items. As suggested by the panellists, similar items were merged, new items were added, and unclear items were rephrased or excluded to develop a round 2 questionnaire. After Round 1, 4 items were removed (Item 2, 5,9 & 13), 3 were rephrased (Item 15, 16 & 28) and 1 new item (no 20) was added making a total of 25 items for the round 2 questionnaire. After round 2, 7 items (no 2, 6, 18, 20, 22, 23,24) were removed in the final questionnaire. The final tool consisted of 18 items under four suggested domains against a 4 point likert scale of always to never.

Table 1: Data analysis Round-2

Round-2: Lit of Items	No of Agree	I-CVI	Action
Teaching Methods			
1. I use different teaching and learning strategies to augment student's understanding	10	1.00	Accept
2. I recognize different learning styles of my students and teach them accordingly	7	0.70	Remove
3. I frequently ask relevant questions to engage learners during lectures	10	1.00	Accept
4. I define learning objectives of my lectures	10	1.00	Accept
5. I present my subject content in an organized and structured manner	10	1.00	Accept
6. I utilize demonstrations to stimulate sense of inquiry in students	7	0.70	Remove
7. I use appropriate audio- visual aids	10	1.00	Accept
8. I actively involve students in my lectures which keep them attentive and motivated to learn	10	1.00	Accept
9. I follow the timetable/ academic calendar methodically to cover the curriculum content	10	1.00	Accept
10. I utilize textbook, reference books and other online resources to make students lectures	9	0.90	Accept
Practical Sessions			
11. I provide opportunity to students for hands on activities	10	1.00	Accept
12. I give feedback on their performance	10	1.00	Accept
Group Discussions			
13. I plan structured academic activities that are relevant to students learning, based on problem solving techniques	10	1.00	Accept
14. I encourage learners to take responsibility of their own learning	10	1.00	Accept
Questioning			
15. I ask questions that stimulates students in-depth thinking	10	1.00	Accept
16. Before starting lectures, evaluates students' level of prior knowledge	9	0.90	Accept
Activating Methods			
17. I give examples to relate the knowledge with their practical applications from everyday life	8	0.80	Accept
18. I encourage students to apply what they have learned	7	0.70	Remove
19. I encourage students to think critically	9	0.90	Accept
20. I encourage peer-assisted learning	7	0.70	Remove
21. I regularly check during teaching whether students have understood the subject content	10	1.00	Accept
22. I teach students how to simplify the complex problems	7	0.70	Remove
23. I ask students to reflect on the teaching strategies	6	0.60	Remove
24. I give timely and constructive feedback to students	10	1.00	Remove*
25. I use students and faculty members feedback to improve my teaching strategies	9	0.90	Accept

Table 2: Final Questionnaire, 18 items - Experts' Responses Proportion, S-CVI/Avg & S-CVI/UA

	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10
Experts' Response Scoring	79	75	83	72	76	84	86	90	87	73
Expert Proportion	0.88	0.83	0.92	0.80	0.84	0.93	0.96	1.00	0.97	0.81
Maximum Score	90									
Mean Expert Proportion	0.90									
S-CVI / Average	0.97									
No of Universal Agreements	13 (only EI & VI are considered)									
S-CVI / Universal Agreement	0.72									

Content validity analysis:

For the final 18 item questionnaire the Content validity index (CVI) on the individual item I-CVI was calculated and also of the whole scale (S-CVI), which was based on the experts' responses in second round. There are two methods for calculating the scale level CVI (S-CVI); the average calculation method (S-CVI/Avg) and the universal agreement method (S-CVI/UA). I-CVI of items after round two are shown in table 1. The Average S-CVI/Avg was calculated to be 0.90 while the S-CVI/UA was 0.56 for the Round-two 25-item questionnaire. After deletion of some items with I-CVI less than 0.75, the final 18 items questionnaire was prepared, and the S-CVI/Avg of those final selected items was 0.97 and S-CVI/UA was 0.72 as shown below in table 2:

Cognitive pre-testing:

Cognitive pretesting of the tool did not identify any significant problems in cognition, resulting in minor rephrasing of one item.

Reliability of the instrument:

The response rate was 86% (n=274/315). Internal consistency was calculated using SPSS version 21. The value of Cronbach's alpha was 0.87, indicating good internal consistency of the tool. Good internal consistency signifies that a tool is reliable to be used and will give repeated results under all conditions.

Construct validity of the instrument:

CFA was conducted to understand the internal construct of the tool through SPSS and AMOS software. Convergent validity or the construct validity refers that all the factors supposed to measure the single construct. First 2 constructs (teaching methods and practical session) were merged, third and fourth constructs (group discussion and questioning) was also merged which makes 10 items in teaching methods, 4 items in group discussion and 4 items in activating methods. Convergent validity was tested by assessing factor loadings of the items that should exceed 0.5. The second, fourth and sixth item of teaching methodology were loaded less than 0.5 and thus they were excluded. The variable initially had ten items and after removing three items it was left with seven items. Moreover, the third item of second construct, i.e., group discussion, was loaded less than 0.5 and thus after removing it the construct remained with three items. The items of activating methods had loadings in acceptable range. All the constructs of this tool had good factor loading values which signified that this tool is readily acceptable and easily understandable by the chosen respondent group.

Fit Indices of the final tool were computed and their comparisons with recommended values are shown in table below in table 3:

The final model designed pertinent to all the factors and their relevant items is illustrated below in Figure 1: Reliability of all the constructs are acceptable and given in table 4:

Table 3: Fit Indices of final tool in comparison with recommended values

| Fit Indices		Recommended Cut-off value	Measurement Model
Absolute fit measures	**observed normed x² (CMIN/df)**	>= 5 The smaller, the better	3.136
	goodness of fit index (GFI)	< = 0.08 Near to 1	0.898
	root mean square error of approximation (RMSEA)	> = 0.1 > = 0.08	0.08
Incremental Fit measures	**normed fit index (NFI)**	< = 0.08 Near to 1	0.884
	Relative Fit Index (RFI)	Near to 1 (Higher the better)	0.851
	Incremental Fit Index (IFI)	Near to 1 (Higher the better)	0.918
	Tucker-Lewis Index (TLI)	Near to 1 (Higher the better)	0.894
	comparative fit index (CFI)	Near to 1 (Higher the better)	0.917
	Adjusted Goodness Of Fit (AGFI)	< = 0.08 Near to 1	0.849
Parsimonious fit measures	**Parsimonious Normed Fit Index (PNFI)**	The higher the better	0.690

Figure 1: Model of Confirmatory Factor Analysis
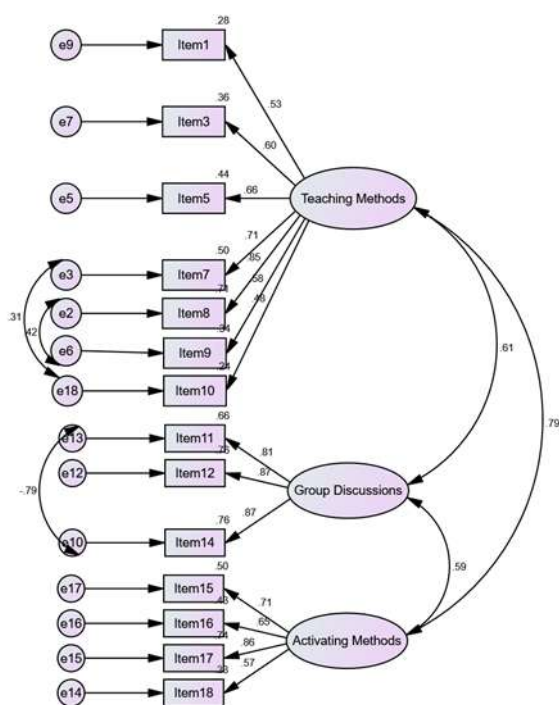
Table: 4 Reliability Analysis

Constructs	No. of Items	Cronbach Alpha
Teaching Methods	7	0.828
Group Discussion	3	0.850
Activating Methods	4	0.771

DISCUSSION:

The aim of this study was to improve the teaching skills of medical teachers. The instrument for medical faculty to evaluate the effectiveness of their teaching strategies was developed and validated through diverse methodology by conducting modified Delphi technique, content validity, pilot testing, reliability and confirmatory factor analysis. The results of current study suggest that teaching strategies of medical teachers can be evaluated using a self-administered, 14 items questionnaire, grouped into three domains: teaching methods, group discussions and activating methods.

Delphi technique shows accuracy superior to any other expert judgment methods like group discussions, conferences and other interactive group sessions.[13] We used Modified Delphi technique to establish the content validity of the instrument as it is considered the most practical and rigorous method to achieve consensus among geographically dispersed experts.[14] The experts for the study were defined as qualified (Master's or PhD degree) medical educationists with minimum 5 years teaching experience working in various private and government institutes from all over Pakistan as

well as from other countries. The appropriate selection and expertise of participants included in the panel is very important as the quality of results and validity of the process of Delphi study are directly associated with it. It has been suggested that six to ten experts are sufficient, however for more stronger consensus; up to twenty experts are recommended to maintain the quality and clarity of construct.[15]

Purposive sampling was done to ensure representation from diverse group of experts. In the present study, twelve experts responded in Round 1 and ten in Round 2. The recommended group size of experts is 10-15.[16] Delphi studies use descriptive statistics or certain level of agreement of experts to measure consensus among panel of experts. These include mean, median, mode, standard deviation and percentage agreement.[17] We used a pre specified median score of = 3.25 and a consensus of experts of = 80% for all statements (Chien & Sandford, 2007). However, in various studies range of agreement level ranges from 51-80% of expert panel.[18,19]

The concept of self-evaluation and its involvement with teaching has been mentioned in literature previously. An earlier study relating self-evaluation and teaching skills of medical faculty was conducted by Pololi in 2005. This was a longitudinal study where participants from clinical faculty were enrolled in a yearlong faculty development program. The program comprised of monthly sessions and review report was taken through interviews from participants after every session. Faculty informed an improvement in self-awareness, enthusiasm for teaching and improved personal interaction with the colleagues. Whereas the present study is mixed method in which an instrument was developed in eight phases. It is a self-reported questionnaire that assesses self-evaluation through three domains.[20] These include teaching methods, group discussions and activating methods. The study by Pololi, took participants from clinical faculty where their self-evaluation of teaching skills was not assessed before beginning the program. In the present study, medical faculty from both basic and clinical sciences were included.

To determine the content validity, it is recommended to calculate I-CVIs and S-CVI of an instrument. Regarding I-CVI, values range of each item ranging from 0 to 1, where the items having I-CVI > 0.79 is taken as relevant, those between 0.70 and 0.79, were revised, and those with I-CVI below 0.70 were eliminated. There are two methods to calculating S-CVI, one is the Universal Agreement (UA) among experts (S-CVI/UA), and the second, the Average CVI (S-CVI/Ave), the latter being a less conservative method. Usually the S-CVI/UA = 0.8 and S-CVI/Ave = 0.9 are considered as excellent content validity. In our study all the values were in acceptable range.

Cognitive pretesting was done to achieve the 'cognitive validity' of the instrument. Interviews from 5 to 30

respondents are considered sufficient We conducted structured interviews from five faculty members using the 'Concurrent verbal probing method' as it minimizes the recall bias.

In this study, the construct validity of the developed tool was established by confirmatory factor analysis. As suggested in literature the cutoff value for good factor loading of an item is 0.5 and is followed in this study. The absolute and incremental fit values of 14-factor model demonstrated an overall acceptable fit[1] This tool has been validated over a rigorous process. Many tools are developed but construct and content validation is not carried out which has lead to poorly constructed and unvalidated tools available in the literature.

It is essential to measure reliability of an instrument as it evaluates the internal consistency and inter-rater reliability across the parts of a measuring instrument. Reliability is measured using Cronbach's Alpha. Minimum requirement of sample size to calculate Cronbach's Alpha is thirty. However larger sample size produces more reliable results. The sample size in our study was 274. The internal consistency of the final constructs was calculated using Cronbach's alpha for reliability. The reliability coefficient (alpha) can range from 0.00 to 1.00, where 0.00 shows that scale is full of error and 1.00 is representing an error free scale. A reliability coefficient (alpha) of 0.70 or higher is considered acceptable reliability. The reliability of present instrument with 14-items is acceptable.

Future research should be conducted to evaluate the impact of present study in improving the teaching strategies of medical faculty. The validation of the instrument in variable contexts is also suggested. The instrument can be applied on non-medical faculty or teachers with suggested amendments in their context.

CONCLUSION:

The final developed instrument is a 14 item, 4 point Likert scale. It has good validity and reliability and can be used to evaluate the teaching strategies of teachers in undergraduate medical institutes. The strength of this study lies in the Delphi process with 2 iterations between expert medical educationists, leading to better validity of the instrument as established through the content validity index and confirmatory factor analysis.

This study will be helpful in faculty development programs to achieve the requirement of improving the teaching strategies of medical faculty.

Authors Contribution:
Sidra Aamer: Conception of concept, data analysis, literature review
Rehan Ahmed Khan: Data interpretation, data collection
Beenish Abbas: Data collection
Fizza Sahar Anwar: Proof reading and discussion
Rozina Nazir: Data collection
Manya Tahir: Drafting

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Patients' Perspectives towards Bedside Teaching of Medical Students: an Analytical Cross Sectional Study in Tertiary Care Hospitals

Samreen Misbah, Maryam Shakeel, Aleena Mazhar, Hamza Jamshaid, Asad Tariq, Sagheer Ahmad

ABSTRACT:

Objective: To determine patients' perspectives about medical students' involvement in bedside teachings and its effect on the quality of consultation.

Study Design and setting: An analytical cross-sectional study conducted in Combined Military and Pak Emirates Military Hospital Rawalpindi from 1-September-2019, to 1-April-2020.

Methodology: Data were collected by convenience sampling using self-structured questionnaire. With a response rate of 91%, sample of 294 from medicine and surgery departments were included who had or not consultations in presence of students, excluding patients with decreased mental functioning. Kruskal-wallis and Mann-Whitney-U tests were applied to compare mean scores considering statistically significant difference at <0.05.

Results: Among participants (mean age 30.8 ± 8.51) almost 138(47%) patients thought benefitted interaction with students, 191(65%) expressed disagreement to discomfort during history, which decreased towards discussing sensitive information and examination in absence of senior. Among seven domains of questionnaire, positive attitude towards students and preference of local language received the highest mean score, discomfort during the examination and students' acceptability received the lowest. A significant difference was found among participants with higher education regarding permission for students' presence (p-value 0.009).

Conclusion: Majority of participants considered students' interaction beneficial, but shared discomfort feeling during examination. Students' involvement was considered imperative for their training, thinking that they are serving the community. Participants with high education reflected upon permission prior to encounter and those with less education shared that all discussion in their presence must be in understandable language.

Keywords: Cross-Sectional Studies, hospitals, humans, medical, students, surveys and questionnaires

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INTRODUCTION:

After preclinical phase, undergraduate medical students go through the most relevant part of the curriculum of teaching in the presence of patients which helps shaping medical students into medical professionals.[1] Patient's role in this teaching has been explained by Sir William Osler as "it is a safe rule to have no teaching without a patient for a text, and the best teaching is that taught by the patient himself."[2] Bedside teaching (BST) is considered as an essential teaching tool by medical students themselves as well as medical teachers, provided patients are fully involved.[3] The evolving role of medical students is the need of the time in busy places of teaching hospitals as they are the future health care professionals. Mostly medical students are accepted by the patients where they accompany and observe senior doctors performing examination or procedures but are not in direct contact. Hence it is important to take benefit of such patients for teaching students, especially in conflicting situations where patients resist medical students' encounter.[4]

Students' involvement with patients during history taking and physical examination is time consuming as well as stress causing resulting in gradual increase of refusal from history

taking to examination to performing procedures, which however decrease in the presence of senior clinicians. Nevertheless, female patients show less acceptance towards both gender but a better response towards female medical students.[5] The active encounter of patients with students under supervision is essential to develop skills of students and also increasing patients' perception of lively contribution in improving their own health condition. Despite, that there is no replacement of this first-hand experience with patient, studies have shown a decline in BST, resulting in poor clinical skills.[6,7] Many factors are considered accountable for this insufficient training including time constraints by teachers, students and patients. As teaching hospitals are becoming more specialized they have become less appropriate for medical education. For clinical teaching, patients with more physical signs are selected and patients with less attractive signs and symptom are excluded. Increased awareness of rights among patients had made them hesitant to be discussed about their illness among a large group of students or in front of other patients.[4]

Albeit, evidence based literature highlights the perspectives of students and consultants considering BST as an important instructional tool one must not overlook the central importance of patients around which all activities go.[8] Patients' judgment is crucial for the continuation of this essential tool of teaching and learning.[9] This study intended to evaluate insights of patients and their understanding towards the involvement of students in their health care, since limited data are available in our setup. Hence, this study aim to obtain principled view of patients about effect of students' presence on the quality of consultation.

METHODOLOGY:

In this institution, undergraduate medical students during their five years of education receive clinical training from third year where they come encounter with patients during BST. This project was conducted by fourth year medical students in supervision of principal investigator to assess the perspective of patients. An analytical cross sectional, questionnaire based study was conducted from 1-September-2019, to 1-April-2020 in Combined Military Hospital (CMH) and Pak Emirates Military Hospital (PEMH) Rawalpindi. The ethical approval was obtained from institutional review board of Army Medical College (ERC/ID/56). The non-probability convenience sampling technique was used to calculate a sample of 323 according to World Health Organization (WHO) table of minimum sample size, at anticipated population proportion (P) of 30%(0.30)[9], absolute precision (d) at 15% to 25% (0.05) and confidence level of 95%. Finally from sample of 294, with response rate 91%, data were collected after informed consent. Patients form both genders, from 20 to 60 years of age were included from outpatient and indoor of medicine and surgery departments to share their perspectives. Indoor patients admitted for more

than one day, who had or no such consultations in presence of students were included. However, patients waiting for their turn in outpatient departments (OPD), reluctant to participate, and those with decreased mental functioning were excluded. Data were self-reported where patients were educated, but for less educated participants, questionnaire was filled by the researcher during face-to-face interview. It took almost ten to fifteen minutes to fill one questionnaire. It was not a funded project and confidentiality of the data was assured and maintained throughout the project.

Using a self-structured questionnaire based on literature with items adapted from a Sri Lankan research after author's permission, data were collected.[9] Questionnaire was modified and translated into Urdu to obtain perspectives of patients, based on 19 questions in seven different domains. The items were rated on three-point Likert scale, ranging from 1 (Disagree) to 3 (Agree) with a neutral (no decision) option. Neutral option was added to avoid reduction of number of respondents as participants have to give opinion about a complex subject. Ratings were considered after reverse coding for negatively worded items.

To explore the questionnaire and to cluster items meaningfully, principle component analysis (PCA) was conducted on SPSS. Kaiser-Meyer-Olkin (KMO) value of 0.642 confirmed sampling adequacy. By exploratory factor analysis (EFA) and rotated component matrix, seven components and related questions identified; benefit from interaction with students (2 items), discomfort feeling with students during history taking (5 items), discomfort feeling with students during examination (2 items), unacceptability for students (3 items), patients' preference of language for discussing illness (2 items), positive attitude towards students (3 items), information about students' presence and its permission (2 items).

IBM SPSS Statistics version 26 was used for data analysis. Univariate statistical analysis done for continuous variables and summarized as mean value, standard deviation (S.D), median, interquartile range (IQR), frequency and percentages for positive responses. Normality of data was checked, Mann Whitney U and Kruskal Wallis tests were applied to compare means between different categories, considering statistically significant difference at <0.05.

RESULTS

Out of total 323 participants, about 294 patients completed the survey with a response rate of 91%. With mean age of 30.8±8.5, almost 182(61.9%) were male and 112(38.1%) were female. Mostly participants were educated with secondary education 166(56.5%), mostly were married, 232(78.9%), and most of the participants 171(58.2%) were government employee. Mostly patients, 192(65%) who were included in study were in hospital due to some medical reason. Demographic characteristics of patients are presented in Table 1. Participants' frequency according to reason of

admission in different age groups and gender is given, Table 2. About 139(47%) of patients talked about benefit from interaction, 193(65%) expressed disagreement for discomfort feeling during history taking. This disagreement score decreased towards discussing family problems and sensitive information, and only 84(28%) disagreed that consultation time was increased. Almost 120(40%) participants shared disagreement towards discomfort during examination in students' presence, which even decrease to 100(34%) in absence of senior doctor. Regarding acceptability for the students, almost 129(43%) disagreed about privacy with senior doctor while 138(47%) shared their inconvenience for students performing clinical procedures. For discussing illness, about 237(80%) preferred Urdu or local language. Almost 269(91.5%) of participants shared that students' presence is imperative and they are providing service to community by training them. About 167(58%) of the participants shared their viewpoint about informed students' presence. Independent of survey domains 204(69%) of patients shared preference of interaction with students of same gender, (Table 3). Among seven domains, positive attitude towards students and preference of language received the highest mean and discomfort with students during the examination and acceptability for students received the lowest Fig.1. Mann Whitney U test compared means between both genders and their perceptions about benefit from interaction with students. A significant difference was found where males had the high mean rank (U-value 8738; p-value 0.03). Also a significant difference among both genders was found for their perception about discomfort with students during examination where male participants show more disagreement (females showing low mean rank; U-value 8608; p-value 0.018). For different educational groups, a significant difference was found among participants with primary education (with higher mean ranks) and graduation in their perspectives about preferred use of language for discussing illness (test statistics 49.34; p-value 0.006; adjusted statistic by Bonferroni correction for multiple test). A significant difference was also found among participants with graduation (with higher mean ranks) and primary and secondary education regarding their perspectives about permission and information about students' presence during consultation (test statistics 43.63, p-value 0.03; test statistics 34.58 p-value 0.009 respectively).

DISCUSSION:

Perspective of patients and their involvement during bed side teachings is of paramount importance for continuation of this important learning tool for undergraduate medical students. The present study was conducted to understand patients' reassurance and limitations in this aspect. A majority of male participants in this study considered the students' interaction beneficial, yet a large number of them was indecisive; as compared to studies where very few participants

Table 1: Demographic characteristics of the patients in the survey

Variables		N (%)
Gender	Male	182(61.9)
	Female	112(38.1)
Education	Uneducated	12(4.1)
	Primary	37(12.6)
	Secondary	166(56.4)
	Graduation	79(26.9)
Marital status	Married	232(78.9)
	Unmarried	62(21.1)
Employment status	Unemployed	111(37.7)
	Government	171(58.2)
	Private	12(4.1)
Reason for Admission (Department)	Surgery	103(35)
	Medicine	191(65)
Number of consultations in the presence of students	None	117(39.9)
	1-3	126(42.8)
	>3	51(17.3)
Number of students present during the consultation	0	116(39.5)
	1-5	99(33.7)
	6-10	65(22.1)
	>10	14(4.7)

Table 2: Age groups and Gender wise distribution of patients as per reason of admission

Age Groups	Reason of Admission		Gender		
			Male	Female	Total
20-30 years (167; 56.8%)	Reason of Admission	Medicine	86	19	105
		Surgical	12	50	62
	Total		98	69	167
31-40 years (83; 28.2%)	Reason of Admission	Medicine	49	12	61
		Surgical	6	16	22
	Total		55	28	83
41-50 years (36; 12.2%)	Reason of Admission	Medicine	19	3	22
		Surgical	5	9	14
	Total		24	12	36
51-60 years (8; 2.72%)	Reason of Admission	Medicine	3	1	4
		Surgical	2	2	4
	Total		5	3	8
Grand Total	Reason of Admission	Medicine	157	35	192
		Surgical	25	77	102
	Total		182	112	294

expressed positive feelings to the presence of medical students.[9] Similarly, data from a study highlighted patients' perceptions of perceived benefits of having more information about their illness, at the same time they were not able to share with their consultants what they want to say.[10]

Majority of participants in this study expressed discomfort feeling during history taking, which was increased while

Table 3: Patients' perceptions towards bedside teaching of undergraduate medical students

Domain	Item	Mean (SD)	Median (IQR)	Positive responses n(%)
Benefit from interaction with students	I benefit from interacting with students	2.3 (0.73)	2 (1)	139 (47.3)
	Students are able to understand my health needs	2.3 (0.74)	2 (1)	140 (47.6)
Discomfort feeling with students during history taking	*I felt discomfort in explaining health problems to senior doctor in the presence of students	2.39 (0.87)	3 (2)	193 (65.6)
	*I felt discomfort in discussing physical illness with students	2.3 (0.91)	3 (2)	181 (61.6)
	*I felt discomfort in discussing family problems with students	2.1 (0.94)	3 (2)	158 (53.7)
	*I felt discomfort in discussing sensitive information with students	2 (0.95)	2 (2)	143 (48.6)
Discomfort feeling with students during examination	*Consultation's duration was prolonged in student presence	1.7 (0.86)	1 (2)	84 (28.6)
	*I felt inconvenience while examination by senior doctor in the presence of students with taking off clothes	1.89 (0.95)	1 (2)	120 (40.8)
	*I felt inconvenience while examination by students in the absence of senior doctor with taking off clothes	1.77 (0.92)	1 (2)	100 (34)
	*I would prefer privacy with specialist/ senior doctor	1.89 (0.97)	1 (2)	126 (42.9)
	*I felt inconvenience with increase in examination duration	2 (0.93)	2 (2)	131 (44.6)
	*I felt discomfort when students perform clinical procedures	2 (0.97)	2 (2)	138 (46.9)
Patients' preference of language for discussing illness	*I would prefer doctor discussing about my problem in English	2.35 (0.88)	3 (2)	186 (63.3)
	I would prefer discussion of my illness in Urdu or local language	2.68 (0.67)	3 (0)	237 (80.6)
Positive attitude towards students	I think students' presence is important for their training	2.7 (0.66)	3 (0)	247 (84)
	I think I provide a service to community by training students	2.8 (0.47)	3 (0)	269 (91.5)
	I think student's presence has positive effect on quality of consultation	2.2 (0.82)	3 (1)	151 (51.4)
Information about students' presence and its permission	It would be better if I was informed about the presence of students	2.27 (0.88)	3 (2)	167 (56.8)
	It would be better if option was given whether to have students or not	2.3 (0.88)	3 (2)	172 (58.5)
Acceptability for students	I would prefer interaction with students of same gender	2.4 (0.87)	3 (2)	204 (69.4)

Score 1 (Disagree) to 3 (Agree); Positive responses (Agree)
*Reverse Coding; Score 3 (Disagree) to 1 (Agree); Positive responses (Disagree)

Figure 1: Mean Scores of participants for all domains with Standard Deviation Error Bars
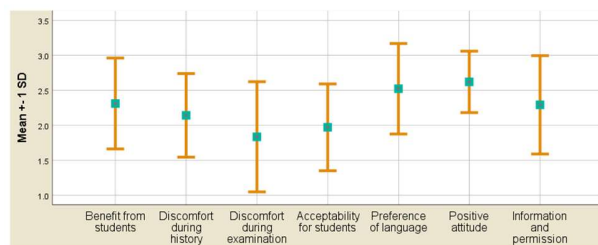
sharing sensitive information or even more during examination by students in the absence of senior. Same findings were revealed where participants show willingness for history, examination and less invasive procedures but not for more invasive procedures by medical students.[9-11] The participants were doubtful for clinical examination with proper exposure in the students' presence which even increased with students alone. It is similar to a study where more patients preferred only the senior doctor to examine suggesting acceptance of students during history as compared to during examination.[11,12]

Majority of educated participants in this study believe that they are providing service to the community and students' presence during senior's consultation is important for their training. Nevertheless, they insisted upon prior permission and informed students' presence. Similar findings were shared by a study, where participants asserted upon information and permission.[13,14] These results are in contrast to a study conducted in Saudi Arabia where patients were confident about their right to refuse medical students.[15,16] Majority of the participants disagree with the need of privacy stating that they gain more information due to students' interaction. Similar researches have highlighted positive attitude and suggested collaboration with patients to make them better teaching opportunity.[17] There is a need of procedure for informed consent from patients and to educate them to have quality teaching experience for both stakeholders.[8,18]

Most of our study participants preferred interaction with students of same gender, confirming similarity with other studies showing more acceptance by female patients and old age participants.[9,19,20] Many participants from primary educational group suggested Urdu or local language for discussion as they want to know more about their illness, which is masked when there is use of medical language.[21] Majority of study participants thought that duration of consultation was prolonged and they felt inconvenience, similarly indicated by other researchers that it is the responsibility of consultant to supervise the patients' comfort in context of desirable number of students examining them.[22,23] Long term outcome needs further exploration of factors in addition to perceptions of students, clinicians and patients.[24]

Main strength of the study was that involvement of medical students during BST was evaluated with a special emphasis on patients' perspective. Few limitations of the study include that data were obtained from tertiary/ teaching hospitals therefore generalizability of results will be with caution. For a detailed analysis of the concept future researchers can conduct qualitative research. Patients' involvement is considered an important factor in sustainable continuation of BST demanding collaboration with patients to make them better opportunity for teaching and training. There must also be a procedure for informed consent from patients for a quality teaching experience for both stakeholders. Patients' comfort must be considered to avoid their inconvenience due to increase in time during examination. Further exploration of factors for continuation of this valuable tool of learning while evaluating medical education need of students is required.

CONCLUSION

Majority of participants considered the students' presence and their interaction beneficial for them. Both genders shared that they felt discomfort while examination by students. They considered students' involvement in BST imperative for their training and believed that they are serving the community by training students. Highly educated participants reflected that they should have an adequate information and permission should be taken prior to encounter. Patients want to know about their illness in detail so participants especially less educated shared that all discussion in front of them must be in local or understandable language.

Authors Contribution:
Samreen Misbah: Concept and design, literature search
Maryam Shakeel: Concept and design, literature search
Aleena Mazhar: Designing of questionnaire, data analysis and interpretation
Hamza Jamshaid: Designing of questionnaire, data analysis and interpretation
Asad Tariq: Drafting the manuscript and critical revisions for publication
Sagheer Ahmad: Drafting the manuscript and critical revisions for publication

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Impact of Perceived Injustice on the Severity of Menstrual Pain among High School Students: A Cross Sectional Study in Karachi.

Beenish Hameed, Areeba Shamim, Muhammad Tufail, Rameen Sheikh, Rachna Jeewnani, Fareeha Shahid

ABSTRACT:

Objective: The purpose of this research was to determine the relation between perceived injustice and severity of menstruation pain among high school students of Karachi.

Methodology: It was a cross-sectional study design conducted from March until August 2021, among high school students of Karachi (public and private) selected randomly. The calculated study sample was 426. The Bahria University Health Sciences Campus Ethical Review Committee approved ERC# 39/2021. Online self-surveys collected data. The study recruited 426 14–18-year-old high school girls who had past menarche and had no psychological disorders. mentally ill, hormonally treated, or uncooperative participants were excluded.

Results: Out of 426 survey participants, the average age was 17.2 ± 1.3 years. Participants scored an average of 14.0 ± 9.3 on the Injustice Experience Questionnaire (IEQ) out of 48 points. Menstrual pain intensity ranged from 6.8 ± 2.7 to 5.5 ± 2.5 points, with an average of 5.5 ± 2.5 points and a degree of interference of 5.9 ± 2.3 points. The IEQ was substantially connected to menstrual pain interference-related impairment, with a standardized regression coefficient (â) of 0.33 (95% CI). The standardized regression coefficients (â) for maximal and average pain intensity were 0.22 and 0.23, respectively. The variance inflation factor analysis showed no multicollinearity issues, with values ranging from 1.03 to 1.06.

Conclusion: In conclusion, the study illuminates high school girls' emotions and perceptions. Many respondents described feeling misunderstood, having life changes, seeing conditions as unjust, and worrying about their future goals.

Key Words: Adolescents, Menstrual cramps, Pelvic pain, dysmenorrhea, Menstrual discomfort, Menstrual agony

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INTRODUCTION:

Pain-related injustice is an emerging concept in youth and its intense outcome with various pain conditions. Thoughts and feelings of injustice can arise when an individual's belief in a just and fair world are challenged or breach. Review of literature shows that youth perceptions towards injustice and biased circumstances are very challenging and awful, they are responsible for depression and decrease in life satisfaction, poorer emotional, social and school functioning.[1] However, because the "topic" is forbidden in society, most women find it unpleasant to bring it up. Women have a number of common myths and ingrained notions about menstruation. Due to the societal taboo against discussing menses, young girls are more likely than adult women to encounter misperceptions and conventional views. They also lack access to proper knowledge about menses from classmates, families, and the general public.

Menstrual discomfort (dysmenorrhea) has two types: Lower abdominal cramps, nausea, vomiting, diarrhea, headache, weakness, and fainting are "primary" or "secondary" symptoms of dysmenorrhea. Secondary dysmenorrhea is caused by ovarian cysts, pelvic inflammatory illness, or pelvic adhesions. Primary dysmenorrhea was identified in 85.6% of late adolescents in many studies.[2] A key and

sensitive age group, high school girls aged 14-18, through multiple pubertal changes, marking one of the most essential moments in one's life and character development. Thus, high incidence in this group can lower academic performance and increase absenteeism during dysmenorrhea, restricting activities and disrupting life and relationships.[3]

Research has shown that perceptions of injustice are likely to arise when an individual is exposed to situations that are characterized by a violation of basic human rights[4]. With limited information regarding menstruation, young females and adolescents tend to show a negative attitude and perception regarding menstruation with a sense of injustice.[5] High school students may experience this in various aspects of their lives, including academic pressures, social dynamics, or family situations. Research has shown that stress can exacerbate menstrual pain. Perceived injustice acts as a stressor, triggering the body's stress response, which can increase the intensity of menstrual cramps. When high school students perceive injustice, it can lead to negative emotional states such as anger, frustration, and helplessness. These emotions can further intensify the perception of pain during menstruation. Chronic stress related to perceived injustice may also disrupt the hormonal balance, potentially worsening menstrual symptoms. Students who perceive injustice may employ different coping mechanisms, some of which can negatively impact their menstrual health. For example, engaging in unhealthy behaviors like overeating, smoking, or excessive caffeine consumption may exacerbate menstrual pain.

Previous studies also mentioned the strong evidence of perceiving injustice during menstrual pain.[6] The impact of perceived injustice is notable in that it predicts poorer physical and psychosocial outcomes above and beyond demographic or injury-related factors. An understanding of the link between perceived injustice and distress in youth may provide researchers and clinicians in this field with valuable insight into an important and thus far unexplored determinant of mental health outcomes in this age group.[7,8]. The Impact of perceived injustice on the severity of menstrual pain among high school students is a multifaceted issue that requires attention from educators, healthcare providers, and policymakers. Recognizing the interplay between psychological factors and physical symptoms is essential for creating a supportive environment that enables students to manage their menstrual health effectively. By addressing perceived injustice and providing appropriate resources, we can improve the overall well-being of high school students and alleviate the burden of menstrual pain in their lives. The way a girl views menstruation and the changes that accompany it might influence how she reacts to the menarche occurrence .Women who are more knowledgeable and perceptive about their periods are more likely to practice safe menstrual hygiene. Women's and the fetus's health are greatly impacted by the

hygiene-related activities they follow during their menstrual cycle. Reproductive tract infections (RTI) and GUT infections are more likely to occur in people who practice poor menstrual hygiene . The unborn child of the expectant mother may also get the virus]. In order to reduce societal misconceptions regarding menstruation, a thorough effort must be made starting in adolescence. This might potentially alleviate millions of women's suffering. Therefore, the current study was aimed to determine the relation between perceived injustice and severity of menstruation pain among high school students of Karachi.

Unfortunately, literature gap on this study is a dilemma in Pakistan. Behavioral interventions and counseling can play a remarkable role in improving the quality of life. Our research aims to focus on finding a positive link between perceived injustice and menstrual pain outcome.

METHODOLOGY:

It was a cross-sectional study conducted from March until August 2021, with a total duration of six months after approval by the ethical review committee of Bahria University Medical and Dental College Karachi (ERC 39/2021), and written informed consent was taken from all subjects prior to their participation.

We investigated 426 females. Data wascollected from different high schools in Karachi. simple Random sampling technique was used to collect the data.

The sample size was calculated from "Epi Info", the population size was kept at 1 million, design effect being 1 with confidence limit= 5 and anticipated frequency=50%. With a confidence level of 95%, the sample size calculated was equal to 384.

Females of age group 14-19 years who are high school students and have passed the age of menarche were included in this study. Females taking any hormone therapy were excluded from the study.

Data collection was carried out using an online self-administered questionnaire using: Injustice Experience Questionnaire-Chronic IEQ-CHR. Respondents described their intensity of menstrual pain by using an NRS from 0 (no pain) to 10 (worst pain imaginable).[9] Data analysis was done using SPSS Version 23. Mean Standard deviations were calculated for continuous variable. One way ANOVA and Chi square test applied to see the significance. P-value < 0.05 considered to be statistically significant.

RESULTS:

In the demographic analysis, a total of 426 respondents, with an average age of 17.2 ± 1.3 years, participated in the survey. The characteristics of the study population are detailed in Table 1. In Table 2; We compare the different levels of IEQ with grades and find the mean and standard deviations. In Table 3: Nomeric Rating Scale(NRS) classified by mildpain, moderate pain, severe pain and very severe

pain. We observed how many students of different grades perceive the type of pain. By using chi square test. p value is statistically significant

DISCUSSION:

The issue of menstruation is a topic that many teenage girls in both industrialized and developing countries hold conventional ideas about, and it is particularly problematic for adolescent females in high school. This conclusion is confirmed by the study's findings. Menstrual pain or dysmenorrhea is characterized by severe pain and cramps during the menstrual period. The prevalence of dysmenorrhea is greater as compared to any other gynecological complaint. Many studies found a high prevalence (85.6%) of primary dysmenorrhea among late adolescents. Usually, menstruation is a universal phenomenon that only affects females who are of reproductive age. One of the most significant changes that females experience throughout their adolescent years is the commencement of menstruation, which typically happens between the ages of 11 and 15 with a mean age of 13. Girls should enroll in high schools and universities at this time of year.

Results in our study showed that 46.9% (n=426) of respondents always feel the pain while 32.4% (n=426) often feel the pain during their menstrual period. The most common symptoms of dysmenorrhea may include cramping and pain in the lower abdomen. Results in our study showed that 35.7% (n=426) of respondents experience pain in pelvic/hip region, 33.3% (n=426) in lower back, 8.5% (n=426) in back of the legs, 7.3% in abdomen, while 2.3% (n=426) experience full-body ache. When asked about the associated symptoms, 34.6% (n=426) experience headache, 28.4% (n=426) experience nausea, 8% (n=426) experience mood swings, 2% (n=426) experience fatigue while 12.9% (n=426) experience other symptoms.

The narrative around menstruation is that it is shameful and taboo and those who menstruate are impure, dirty, and even dangerous. Many religions and cultures impose restrictions on menstruating women to perform religious rituals and certain chores, on top of that, common myths and misconceptions like "menstruating girls should be socially excluded", "they should not shower", "they should not exercise", "they should not touch newborn or plants or pure things" only add to the narrative that menstruation is a dirty, impure and dangerous phenomenon.[10]

While some religions and cultures have abandoned extreme beliefs and practices about menstruating women, even in this modern world women face serious setbacks in their careers and workplaces because they are perceived as emotional, irrational, fragile, and incompetent due to hormonal fluctuations. According to a New York Times opinion column "the mind of a woman is always threatened with danger from the reverberations of her physiological emergencies that is menstruation".[11]

Table 1: showing various means and SD of variables of cases rerolled (n=426)

	Mean	Standard Deviation
Age, year	17.3	1.3
BMI (Body Mass Index)	19.2	4.4
Age of menarche	12.8	1.2
IEQ Score (Injustice Experience Questionnaire)	14.0	9.4
Average Menstrual Pain severity	5.5	2.5
Maximum Menstrual Pain severity	6.9	2.7
Deteriorate due to menstrual pain	5.9	2.3

Table 2: IEQ with Grades

IEQ Score	N	Mean	Std. Deviation	P-value
O Level	2	8.50	4.95	
A Level	17	12.24	9.74	
Grade 9	26	16.58	9.67	0.044
Grade 10	9	10.44	7.35	
Grade 11	29	13.62	9.88	
Grade 12	117	13.62	9.63	
Total	200	13.70	9.56	

p-value less than 0.05 is statistically significant by using oneway Anova

Table 3: NRS with Grades

		Grade						P-value
		O Level	A Level	Grade 9	Grade 10	Grade 11	Grade 12	
NRS	Mild Pain	0	0	1	0	0	2	
		0.0%	0.0%	3.8%	0.0%	0.0%	1.7%	
	Moderate Pain	0	1	2	0	0	9	
		0.0%	5.9%	7.7%	0.0%	0.0%	7.7%	
	Severe	0	3	3	2	3	12	0.001
		0.0%	17.6%	11.5%	22.2%	10.3%	10.3%	
	Very Severe	2	13	20	7	26	94	
		100.0%	76.5%	76.9%	77.8%	89.7%	80.3%	
Total		2	17	26	9	29	117	
		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

*Chi-square test

Young girls who feel discriminated against internalize this story and develop unfavorable attitudes, beliefs, and a sense of unfairness and injustice about menstruation. A 2016 Journal of Midwives study found that a large Pakistani menstruation adolescent population stated that family members limited socialization.[12] A 2020 BMC Women Health study found 40% of respondents missed school due to menstruation.[13]

Our study showed that only 23.5% (n=426) family members felt empathy regarding the difficulty they experienced related to menstruation, while 27.7% (n=426) responded that male members never empathize, shown in Table 3. When asked whether they felt frustrated or angry regarding menstruation, 44.6% (n=426) responded "always" while 29.1% (n=426) responded "often". Young girls who have such opinions tend to experience severity of premenstrual symptoms, last year a study also reported the same evidence.[14]

Verbal expressions such as "it all seems so unfair," "my life will never be the same," "most people don't understand how severe my condition is," and "I am troubled by fears that I may never achieve my dreams" collectively reveal elements of emotional distress and perceived inequity.[15] The reported mean IEQ-score of 14.0 ± 9.3 out of 48 points further substantiates these feelings of unfairness. The mean IEQ-score was 14.0 + 9.3 (out of 48 points). The mean maximum menstrual pain intensity was 6.8+2.7 (out of 10 points), that of average menstrual pain intensity was 5.5+2.5 (out of 10 points), and that for impairment due to menstrual pain was 5.9+2.3 (out of 10 points).[16] Analysis of data highlights that while the participants' perception of injustice is associated with the level of impairment due to menstrual pain, it is not directly linked to the severity of the pain itself. Other factors, not specifically measured by the IEQ, seem to have a stronger influence on the intensity of menstrual pain.[17]

Figure 1 shows that 73.7% (n=426) of high school females felt angry or upset about menstruation. Anger influences the association between perceived injustice and pain severity.[18] In terms of access to clean materials, privacy issues for changing pads, places to dispose of sanitary napkins, sociocultural constraints, lack of psychological and social support, inadequate knowledge about managing menstrual pain, lack of counseling services, inadequate information on menstruation and its management, lack of preparation prior to menarche, menstrual distress, burden, and stigma, adolescent girls face significant psychosocial problems during menstruation.

Teenage females between the ages of 15 and 19 reported feeling ill, depressed, and agitated throughout their menstrual cycles, according to earlier research. Throughout class, they struggled to focus and pay attention. Teenage females were irritated, unhappy, anxious, and melancholy before to their periods, and these issues worsen during the menstrual cycle. According to the majority of research, girls were prohibited from participating in physical education classes and from engaging in play, traveling, going to social events, weddings, festivals, worship. Activity restrictions differ by culture and location. Girls were even forbidden from entering their own homes in several communities in southern India, where they were expected to wait and relax at the front door when they were menstruating. Girls were viewed as filthy and unclean when they had periods. There is a correlation among menstrual practices, activity limitations, and educational attainment.

Menstruation-related sociocultural behaviors are influenced by girls' beliefs, familial environments, education, and attitudes. Premenstrual symptoms were more common in urban girls than in rural ones, and menstrual-related absences from school were more common in rural girls. Compared to girls in rural areas, girls in urban areas had better menstrual habits. Compared to rural females, more urban girls use sanitary pads. Girls in rural and urban areas differ in their knowledge of menarche and menstruation, the sort of absorbent they use, how to dispose of it, and how to clean their external genitalia.

The majority of girls, both in rural and urban areas, believe they don't need to see a doctor for help with menstruation issues and don't require professional advice on menstrual hygiene. Instead, their moms typically provide them with advice on menstrual hygiene.

Thus, cognitive-behavioral anger management may help women with perceived unfairness manage menstruation discomfort. Another important aspect is that a young girl who feels discriminated against may form perceptions of unfairness[19]. Gynecological care is rare in our nation because menstruation is stigmatized. Under these conditions, environmental and social interventions may be the best menstrual pain treatment. We cannot expect young girls to manage menstruation pain without de-stigmatizing the topic and closing the information gap.[20]

Girls who live alone, have mothers with lesser educational attainment, and menarche at a younger age are anticipated to need special care.

CONCLUSION:

In conclusion, the study sheds light on the emotional experiences and perceptions of high school girls. A significant proportion of respondents reported feeling misunderstood, experiencing alterations in their lives, perceiving situations as unfair, and grappling with fears about their future aspirations. These findings highlight the importance of understanding and addressing the emotional well-being of young girls, as these emotions could impact various aspects of their lives. Further research and support strategies might be warranted to assist these individuals in navigating their feelings and concerns effectively.

Authors Contribution:
Beenish Hameed: Data entry, data analysis
Areeba Shamim: Data collection
Muhammad Tufail: Literature search
Rameen Sheikh: Data analysis
Rachna: Data collection
Fareeha Shahid: Substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data

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Oral Potentially Malignant Disorders: A Comprehensive Review of Diagnostic Approaches and Management Strategies

Angabeen Anjum, Nauman Sheikh

ABSTRACT:

Oral potentially malignant disorders (OPMDs) encompass a group of conditions that have an increased risk of progressing to oral cancer. Timely diagnosis and effective management of these disorders play a crucial role in preventing malignant transformation and improving patient outcomes. This review article provides a comprehensive overview of the diagnostic approaches and management strategies for OPMDs. It discusses the current understanding of OPMDs, highlights the various diagnostic methods available, and explores the evolving landscape of management options. The aim of this review is to enhance the knowledge and awareness of healthcare professionals involved in oral pathology and promote effective decision-making in the diagnosis and management of OPMDs.

A thorough understanding of diagnostic approaches and management strategies for oral potentially malignant disorders is essential for dental and medical professionals involved in oral pathology. This review article provides a comprehensive overview of the topic, highlighting the importance of early detection, risk assessment, and interdisciplinary collaboration.

Keywords: Erythroplakia, Leukoplakia, Oral lichen planus, Oral potentially malignant disorders, Oral submucous fibrosis, Tobacco

INTRODUCTION:

Oral potentially malignant disorders (OPMDs) are a diverse group of oral conditions that have an increased risk of transforming into oral cancer if left untreated. These disorders present a significant public health concern globally.[1] Timely diagnosis and effective management of OPMDs are crucial in reducing the risk of malignant transformation and improving patient outcomes.[2]

In March 2020, experts gathered to discuss oral potentially malignant disorders (OPMDs), which are important precursors to oral cancer. This terminology was introduced in 2007 and has been widely adopted by healthcare professionals and researchers globally, leading to better reporting. The concept of "precancer" was introduced in 1805, suggesting that certain benign diseases could progress to invasive malignancy. The term "OPMD" replaces older terms like "precancer" and "premalignant." Not everyone with an OPMD will develop cancer, and cancer might not arise exactly where the OPMD was found. The presence of OPMDs is one of many factors that increase the risk of cancer. This understanding has evolved over time, leading to better classification and management of these disorders.[3]

Defining OPMDs is complex due to the varied nature of these disorders. They encompass a range of oral lesions and conditions that exhibit dysplastic changes or demonstrate a high potential for developing into oral cancer. Examples of OPMDs include leukoplakia, erythroplakia, oral submucous fibrosis, and oral lichen planus, among others.[4] These disorders often share common features, such as persistent or non-healing oral lesions, changes in mucosal texture, or the presence of erythematous or white patches.[3]

Early detection of OPMDs is of paramount importance for several reasons. Firstly, it allows for timely intervention and appropriate management strategies to be implemented, potentially preventing the progression to oral cancer. Secondly, identifying high-risk individuals with OPMDs enables targeted surveillance and follow-up, ensuring regular monitoring and timely intervention if needed. Lastly, early detection also provides an opportunity for patient education and behavioral modifications, such as tobacco cessation and lifestyle changes, which can significantly reduce the risk of malignant transformation.[5]

Globally, oral squamous cell carcinoma (OSCC) is the most common type of oral cancer. Pakistan has a high incidence of oral cancer cases. According to Shaukat Khanum Memorial Cancer Hospital and Research Centre (SKMCH&RC), lip and oral cavity carcinomas ranked as the 3rd most common

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malignant tumors from 1994 to 2018. OSCC is often diagnosed at a late stage with low survival rates. It frequently develops from oral potentially malignant disorders (OPMDs), chronic mucosal issues that have a higher risk of turning into cancer.[6]

Histopathological evaluation is a cornerstone in diagnosing OPMDs, as it helps to assess the degree of dysplasia and identify any potentially malignant changes in the oral tissue. Non-invasive techniques, such as tissue fluorescence visualization and brush biopsies, have also shown promise in aiding early detection. Additionally, molecular biomarkers are being investigated to determine their potential role in predicting the risk of malignant transformation.[7]

Imaging modalities, such as cone-beam computed tomography (CBCT) and optical coherence tomography (OCT), have gained prominence in assessing the extent and characteristics of OPMDs, providing valuable information for treatment planning. These advancements in diagnostic approaches contribute to more accurate and timely identification of OPMDs, facilitating appropriate management strategies.[8]

The management of OPMDs involves a multidimensional approach, including accurate diagnosis, risk assessment, and appropriate therapeutic strategies.[9] It requires collaboration between oral pathologists, oral medicine specialists, head and neck surgeons, and oncologists to ensure comprehensive care for patients with OPMDs. The goal is to determine the optimal management strategy for each individual based on the specific characteristics of their OPMD, the presence of dysplasia, and other risk factors.[10]

The management of OPMDs involves a combination of monitoring, non-surgical interventions, and, in some cases, surgical approaches. Close surveillance of patients with OPMDs is crucial to detect any changes or signs of malignant transformation. Non-surgical interventions, such as topical treatments or systemic therapies, may be employed to manage certain OPMDs or reduce their progression.[2]

Through this review, we seek to enhance the knowledge and understanding of healthcare professionals involved in oral pathology, ultimately contributing to the improvement of patient care and outcomes in the management of oral potentially malignant disorders.

In conclusion, oral potentially malignant disorders are a significant concern in public health, and their early detection and effective management are paramount to reduce the risk of malignant transformation. This review aims to provide healthcare professionals involved in oral pathology with comprehensive insights into the definition, classification, diagnostic approaches, and management strategies for OPMDs. By advancing our understanding and knowledge of these disorders, we can ultimately enhance patient care and outcomes in the management of oral potentially malignant disorders.

Risk Factors:

Multiple risk factors have been associated with the development and progression of OPMDs. These risk factors can be categorized into modifiable and non-modifiable factors. Modifiable risk factors are those that individuals can actively address and modify to reduce their risk. Non-modifiable risk factors, on the other hand, are inherent characteristics that individuals cannot change.[11]

1. Tobacco Use: Tobacco use, including smoking and smokeless tobacco, is one of the most significant risk factors for OPMDs. Both active and passive smoking have been strongly associated with an increased risk of developing OPMDs. Smokeless tobacco products, such as betel quid and areca nut, are particularly prevalent in certain regions and contribute significantly to the development of OPMDs.[12]

2. Alcohol Consumption: Excessive and chronic alcohol consumption has been identified as another important risk factor for OPMDs. Alcohol acts synergistically with tobacco use, further increasing the risk of developing these disorders. Heavy alcohol consumption, especially when combined with tobacco use, has a substantial impact on the development of oral cancers.[13]

3. Betel Quid Chewing: Betel quid, a mixture of betel leaf, areca nut, slaked lime, and various additives, is widely used in certain cultures, particularly in South Asia. Betel quid chewing has been strongly associated with an increased risk of developing OPMDs, including leukoplakia, submucous fibrosis, and oral cancer. The combination of areca nut and tobacco in betel quid significantly amplifies the risk.[14]

4. Chronic Irritation and Trauma: Chronic irritation and trauma to the oral mucosa have been linked to the development of OPMDs. Sharp edges of broken teeth, ill-fitting dentures, and other sources of chronic friction or irritation can contribute to the formation and persistence of OPMDs. Additionally, repeated trauma from sharp or abrasive foods, toothbrushing habits, and other oral habits can also play a role.[15]

5. Human Papillomavirus (HPV) Infection: Certain high-risk strains of HPV, particularly HPV-16 and HPV-18, have been associated with an increased risk of OPMDs, particularly in the oropharyngeal region. HPV-associated OPMDs often present with distinct clinical and histological features. HPV vaccination has shown promise in reducing the risk of HPV-related OPMDs.[16]

6. Genetic Predisposition: Genetic factors play a role in the susceptibility to OPMDs. Certain genetic variations and polymorphisms have been identified as potential risk factors. Understanding the genetic basis of OPMDs can contribute to risk assessment and personalized management approaches.[17]

Clinical Presentation of OPMDs:

The clinical presentation of oral potentially malignant

disorders (OPMDs) can vary depending on the specific disorder and individual characteristics.[18]

Common Clinical Features and Variations among Different OPMDs:

1. Leukoplakia: Leukoplakia is one of the most common OPMDs and is characterized by white or grayish patches on the oral mucosa that cannot be easily scraped off. These patches may appear flat or raised and have various textures, ranging from smooth to rough or fissured. Leukoplakia can occur on any oral surface but is commonly found on the buccal mucosa, tongue, and floor of the mouth.[19]

2. Erythroplakia: Erythroplakia is a less common but highly significant OPMD characterized by red, velvety patches on the oral mucosa. Unlike leukoplakia, erythroplakia cannot be attributed to any specific etiological factor and has a higher potential for malignant transformation. Erythroplakic lesions often appear as smooth, well-demarcated patches and are commonly found on the floor of the mouth, tongue, or soft palate.[20]

3. Oral Submucous Fibrosis (OSF): OSF is a chronic, progressive OPMD characterized by the development of fibrous bands in the oral mucosa, resulting in restricted mouth opening and a mottled, marble-like appearance of the oral mucosa.[21] .Individuals with OSF may experience burning sensation, difficulty in chewing, and compromised oral hygiene. OSF is strongly associated with betel quid chewing and can lead to malignant transformation.[22]

4. Oral Lichen Planus (OLP): OLP is a chronic inflammatory OPMD that presents with characteristic lace-like white lines (Wickham's striae) on the oral mucosa. These lines may be accompanied by erythematous areas, erosions, and ulcerations. OLP can affect multiple sites in the oral cavity, including the buccal mucosa, gingiva, tongue, and palate. It is often associated with symptoms such as pain, sensitivity to certain foods, and oral discomfort.[23]

5. Actinic Cheilitis: Actinic cheilitis is an OPMD that primarily affects the lower lip and is commonly associated with chronic sun exposure. It is characterized by dryness, cracking, and scaling of the lip vermilion. In advanced cases, ulcerations, white plaques, or induration may be observed. Actinic cheilitis has the potential for malignant transformation and requires careful evaluation and management.[24]

Visual Examination and Clinical Assessment:

Visual examination of the oral cavity is a fundamental step in the diagnosis and evaluation of OPMDs.

A thorough inspection of the oral mucosa, tongue, lips, gingiva, and other oral structures should be performed. The clinician observes for any abnormal findings such as white or red patches, ulcerations, irregularities in mucosal texture, changes in color, or any other suspicious lesions.[12]

In addition to visual examination, clinical assessment plays a crucial role in OPMD evaluation. This involves palpation of the oral tissues to detect any induration, nodules, or masses. Clinical assessment helps determine the extent of involvement, assesses tissue consistency, and identifies areas of concern that may require further investigation or intervention.[25]

It is important to note that the clinical presentation of OPMDs can overlap, and some lesions may exhibit more than one clinical feature. Therefore, a definitive diagnosis often requires histopathological examination through biopsy or other diagnostic procedures.[26]

Prompt referral to an oral pathologist or specialist is recommended for a definitive diagnosis and appropriate management.

Diagnostic Approaches:

Ø **Histopathological Evaluation**:

Histopathological evaluation plays a crucial role in the diagnosis and assessment of oral potentially malignant disorders (OPMDs). Biopsies, obtained from suspicious lesions, are subjected to histopathological analysis to determine the presence of dysplastic changes or malignant transformation. .Histopathological examination provides valuable information about the cellular characteristics, tissue architecture, and degree of dysplasia, aiding in the diagnosis, prognosis, and treatment planning for patients with OPMDs.[27] Various grading systems, such as the World Health Organization (WHO) grading system, are utilized to classify the level of dysplasia and predict the risk of malignant transformation.[28]

Ø **Non-Invasive Diagnostic Techniques:**

Non-invasive diagnostic techniques have gained attention in the evaluation of OPMDs, offering advantages such as simplicity, patient comfort, and the potential for repeated assessments. However, their diagnostic accuracy may be limited compared to histopathological evaluation.[29] Oral brush cytology is a non-invasive technique that involves collecting cells from the surface of the oral mucosa for cytological analysis. While it provides a convenient method for initial screening, it has limitations in terms of sensitivity and specificity.[30]

Salivary biomarkers have also been investigated for their potential in OPMD detection. These biomarkers include genetic, epigenetic, and protein-based markers that can be measured in saliva samples.[31] Optical techniques such as autofluorescence, chemiluminescence, and narrow-band imaging have shown promise in enhancing the visualization of suspicious lesions and aiding in their diagnosis.[32]

Ø **Molecular Biomarkers:**

Molecular biomarkers are emerging as valuable tools in the diagnosis and risk assessment of OPMDs.[33] Genetic and epigenetic alterations associated with OPMDs have been

extensively studied. These alterations include mutations, deletions, and aberrant methylation patterns in specific genes involved in cell cycle regulation, DNA repair, and tumor suppression.[12]

Molecular markers, such as p53, Ki-67, and cyclin D1, have shown potential as indicators of dysplasia and malignant transformation in OPMDs. The identification and validation of molecular biomarkers have the potential to improve diagnostic accuracy, risk stratification, and personalized management approaches for patients with OPMDs.[34]

Ø   **Imaging Modalities:**

Imaging modalities play a valuable role in the diagnosis, staging, and treatment planning of OPMDs. Radiographic techniques, such as panoramic radiography and cone-beam computed tomography (CBCT), provide valuable information about the bony structures and assist in assessing the extent of the lesion, particularly in cases involving bone invasion or adjacent structures.[35]

Advanced imaging techniques, such as magnetic resonance imaging (MRI) and positron emission tomography (PET), offer enhanced visualization of soft tissues, enabling the detection of deep-seated or occult lesions and evaluation of regional lymph nodes. These imaging modalities aid in the comprehensive assessment of OPMDs and assist in determining the extent of the disease, facilitating appropriate treatment decisions.[36]

Management strategies

Follow-up and Surveillance Protocols:

Follow-up and surveillance protocols are crucial for individuals diagnosed with oral potentially malignant disorders (OPMDs). Risk stratification based on clinical and histopathological features helps determine the appropriate follow-up intervals and investigations. High-risk OPMDs require more frequent monitoring compared to low-risk lesions. Regular follow-up visits enable clinicians to assess

Figure 1: Diagnostic approaches for oral potentially malignant disorders

the response to treatment, detect any recurrence or malignant transformation, and provide necessary interventions in a timely manner.[37] Recommended investigations may include visual examination, palpation, cytological or histopathological analysis, imaging studies, and assessment of salivary or molecular biomarkers.[38]

Non-Surgical Management:

Non-surgical management options are available for certain OPMDs, particularly those with low or moderate risk of malignant transformation. Topical medications and chemo preventive agents, such as retinoids, non-steroidal anti-inflammatory drugs (NSAIDs), and antioxidant supplements, may be prescribed to reduce inflammation, promote tissue healing, and prevent disease progression.[2]

Laser therapy and photodynamic therapy are minimally invasive treatment modalities that can be utilized for specific cases of OPMDs. Laser therapy selectively targets and ablates abnormal tissues, while photodynamic therapy involves the administration of photosensitizing agents followed by light activation to destroy dysplastic or malignant cells.[39,40]

Surgical Management:

Surgical management plays a significant role in the treatment of OPMDs, particularly for high-risk lesions or cases with confirmed dysplasia or malignancy.[41] Excisional and incisional biopsy techniques are employed for diagnostic purposes and removal of suspicious or dysplastic lesions. Surgical interventions, such as wide local excision, resection of involved lymph nodes, or neck dissection, may be necessary for cases with invasive carcinoma or high-risk OPMDs. The extent of surgical intervention depends on factors such as tumor size, location, depth of invasion, and regional lymph node involvement.[2]

Multidisciplinary Approaches:

Managing OPMDs often requires a multidisciplinary approach involving collaboration among oral pathologists, oral medicine specialists, oral and maxillofacial surgeons, radiation oncologists, and other healthcare professionals. This interdisciplinary collaboration ensures comprehensive evaluation, accurate diagnosis, and appropriate treatment planning. Integration of expertise from different disciplines facilitates the identification of high-risk cases, optimal selection of treatment modalities, and personalized management strategies for individuals with OPMDs. Regular tumor boards or multidisciplinary meetings can provide a platform for discussion, consensus building, and coordination of care.[42]

Importance of Patient Awareness and Behavior Modification:

Patient awareness is crucial in the prevention, early detection, and management of OPMDs. Educating patients about the risks associated with OPMDs, including the potential for
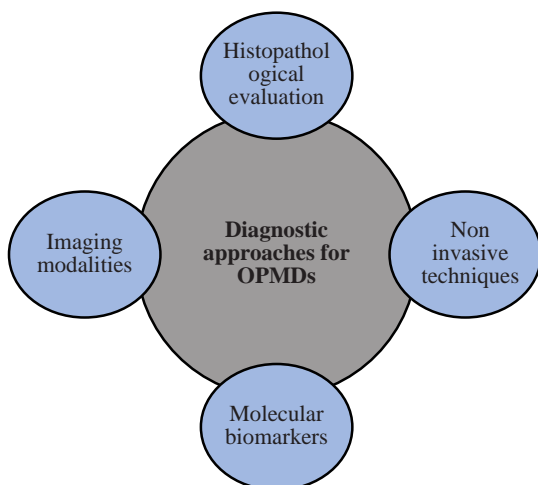
malignant transformation, empowers them to make informed decisions about their health. It helps individuals understand the importance of regular self-examination, reporting any suspicious changes to their healthcare providers, and adhering to recommended follow-up and surveillance protocols. Patient awareness also promotes a proactive approach towards lifestyle modifications and behavior change, leading to better treatment outcomes and reduced risk of disease progression.[43]

In summary, managing OPMDs requires a comprehensive approach that includes follow-up protocols, non-surgical and surgical interventions, multidisciplinary collaboration, patient education, and potentially incorporating lifestyle modification. The goal is to provide tailored care that addresses the individual's condition, risk factors, and treatment preferences.

Figure 2: Management strategies of OPMDs
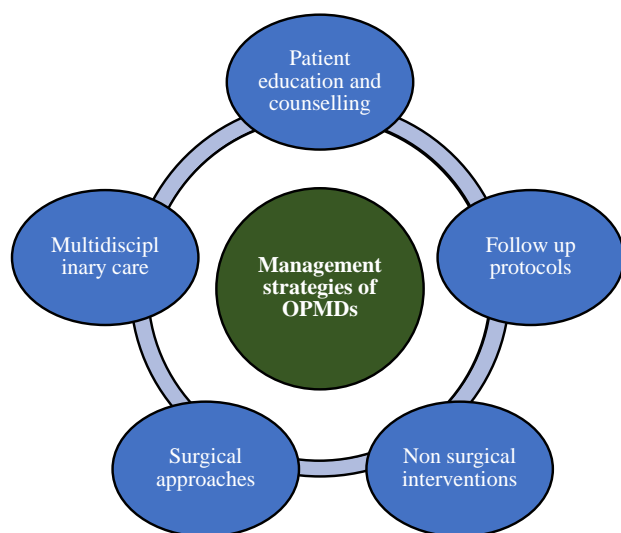
Future Directions and Research:

The field of oral potentially malignant disorders (OPMDs) continues to evolve, and several exciting areas of research hold promise for improving diagnostic approaches and management strategies. Two important areas of future directions and research are: novel diagnostic tools and emerging technologies, and advancements in personalized medicine and targeted therapies.[44]

CONCLUSION:

In conclusion, the comprehensive management of OPMDs requires early detection, risk assessment, and multidisciplinary care. Timely diagnosis through various diagnostic approaches, including histopathological evaluation, non-invasive techniques, molecular biomarkers, and imaging modalities, is crucial for accurate assessment and treatment planning. Patient education and counseling, along with targeted interventions, contribute to better treatment outcomes and overall patient well-being. By implementing these strategies, healthcare professionals can make significant strides in the effective management of oral potentially malignant disorders.

Authors Contribution:
Angabeen Anjum: Manuscript conception and its preparation.
Nauman Sheikh: Intellectual input and critical review of manuscript

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A Case of Marfan Syndrome Presenting as Tension Pneumothorax in A Tertiary Care Setup

Tehreem Ahmad, Hina Asghar, Areeba Hasan

ABSTRACT

Marfan Syndrome is a rare connective tissue condition that affects several systems, including musculoskeletal, cardiovascular and ocular systems. Although less frequent, pulmonary involvement can nevertheless lead to emphysema, bullae, apical blebs, and a higher risk of spontaneous pneumothorax. Another option is pectus excavatum, carinatum, or scoliosis-related restrictive lung disease. We will discuss a case of 18 year old girl, with marfanoid habitus, non-smoker with history of ATT taken on radiological grounds, with complains of shortness of breath on and off and presenting with sudden onset worsening of shortness of breath and dry cough for 3 weeks. Chest x-ray showed tension pneumothorax. After emergency management echo was done and it showed MVP with MR. Patient was diagnosed as a case of Marfan Syndrome following Ghent criteria. The case indicates that pneumothorax though rare can be first presentation of Marfan Syndrome.

Keywords: Marfan, pneumothorax, mitral valve prolapse, mitral regurgitation

INTRODUCTION:

Marfan syndrome is a rare but well-defined hereditary disorder of connective tissue system. Symptoms of Marfan syndrome(MFS) can be mild to severe in intensity and may vary because the condition can affect different parts of the human body. Prominent features of the syndrome include abnormalities of the skeletal, cardiovascular, and ocular systems that are manifested as either a congenital anomaly (microphakia, coarctation of the aorta) or a degenerative lesion of elastic tissue (aortic dissection, ectopic lens, hernia)[1] Lesser known areas of involvement are renal, dermatologic and pulmonary systems. This is one of the most prevalent hereditary connective tissue condition with autosomal dominant trait and no sex preference. Mutations occur in the FBN1 gene, which is found on chromosome 15q-21.1. The FBN1 gene codes for the matrix protein fibrillin-1, which is found in both elastic and non-elastic connective tissues.[2] Many individuals demonstrated distinct lung bullae changes that were most likely brought on by degenerating elastic fibres.[3] The diagnosis of MFS depends essentially

on the fulfilment of clinical diagnostic criteria as shown by the revised Ghent score. We report a case of MFS in which the patient's first presentation was an outcome of respiratory system.

CASE

A 19 year old unmarried girl with thin built and above average height from Larkana presented to Ojha institute of Chest Disease, Dow University Health Sciences, Karachi in May 2021 with acute worsening of shortness of breath for 3 to 4 hours. She already had cough and shortness of breath for last 2 years and had been started on Anti-tuberculous therapy on radiological and clinical grounds. Despite treatment patient didn't improve. After 3 months of treatment patient stopped taking ATT herself and after a couple of weeks she developed worsening of her symptoms before presenting to OICD. On examination of the patient, she was in respiratory distress with a respiratory rate of 27/min and blood pressures of 90/60. Her saturations were 90% at room air. Examination of the chest revealed Pectus carinatum on inspection and hyper resonant percussion note on right side with diminished breath sounds on auscultation.

Urgent Chest radiograph was done and it revealed large right sided pneumothorax. Emergency chest intubation was performed and after stabilization of the patient detailed examination was done.

General physical examination revealed high arched palate, long arms with thin and long fingers and a hyper extendible thumb. Patient's chest CT scan with contrast showed bilateral apical blebs and right sided small pneumothorax as it was post intubation. Diagnostic bronchoscopy was done and all infective work-up including AFB smear, Xpert MTB and Fungal smear/culture all were negative. Eye examination

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was unremarkable. Her Echocardiography was ordered and it revealed mitral valve regurgitation (MR) along with mitral valve prolapse(MVP). Following Ghent Criteria Marfan Syndrome was diagnosed.

Thoracic Surgeon was taken on board to do Surgical Pleurodesis or if necessary surgical repair of the lung involvement. Patient was advised to follow Rheumatologist. Also she was referred to cardiologist for her regular follow up to look after her cardiac issues.

DISCUSSION:

Marfan syndrome affects roughly 1 in 10,000 to 15,000 people, according to estimates.[4] Marfan syndrome is a

Right Sided Pneumothorax

Hyperextension of Joints

High Arched Palate

Elongated Limbs And Digits

HRCT Chest: Apical Blebs

systemic disease and may involve multiple systems simultaneously, although occasionally the diagnosis of Marfan's syndrome can be delayed due to a lack of identifiable symptoms.[5] A few studies previously demonstrated respiratory complications in Marfan syndrome[6], and it wasn't until recently that Karpman et al. further studied the link between pneumothorax and Marfan syndrome. The prevalence of pneumothorax in Marfan syndrome ranged between 4.8% and 11%.[7] Although the frequency of apical blebs is relatively small in individuals with Marfan, the risk of pneumothorax is considerably increased in those with radiologically evident blebs or bullae.[7] Early recognition can help patient and the caregiver to provide the treatment accordingly. On account of first pneumothorax surgical treatment should be offered.[8] This patient presented with large pneumothorax which could be fatal and she was being treated as a case of Pulmonary Tuberculosis for the last 1 and a half year. Her CT scan revealed apical bleb which places her at higher risk of developing subsequent pneumothoraces. Our patient also had cardiac involvement and regular cardiac follow up is crucial as most of the times mortality is related to cardiac complications.

The revised Ghent criterion is used to make the diagnosis of Marfan Syndrome. The Ghent criteria, which encompass a set of major and minor findings across various body systems, have proven to function well because confirmation of the diagnosis can be obtained in over 95% of patients with advancing molecular techniques.[9]

Although effective therapy options, like routine cardiac monitoring and elective surgical surgery, have decreased the likelihood of life-threatening cardiovascular events, the vascular complications of MFS remain and they offer the biggest concern.[10] The quality of life can also be significantly impacted by the musculoskeletal manifestations of MFS, which have received less attention to date but are crucial for diagnosis.[10] Musculoskeletal system features include deformities in the limbs, craniofacial features, chest wall deformities and kyphoscoliosis. They can often cause significant changes in pulmonary physiology and mechanics of breathing thus affecting quality of life.

CONCLUSION:

Marfan Syndrome affects persons in a variety of ways and the symptoms thus vary amongst individuals. Treatment varies depending upon the area of the body affected and may include medications, other treatments, and surgery to manage the condition and its complications. Advancement in treatments and surgeries allow people with Marfan syndrome to live long and productive lives. A multidisciplinary approach including a respiratory physician, thoracic surgeon, cardiologist and rheumatologist is required to manage a case of Marfan Syndrome. This might be helpful by providing patient the care they need by the expert team and then subsequently improving the quality of life of patient.
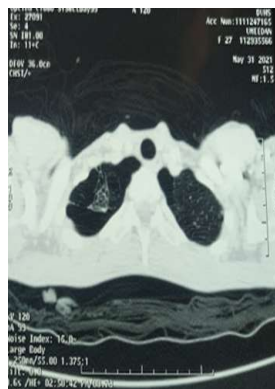
In this regard, counseling of the patients and their caregivers about the disease and its expected outcomes is important so that the condition is managed properly and at right time to avoid any future mishaps.

Authors Contribution:
Tehreem Ahmad: Idea, data curation, writing of final manuscript
Hina Asghar: Data curation and visualization
Areeba Hasan: Writing of initial draft

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Hyponatremia in Tuberculosis Meningitis: Navigating the Diagnostic Challenges of Cerebral Salt Wasting – A Case Report

Yousra Nasir Siddiqui

ABSTRACT

A 10 year old female presented with fever, headache and vomiting since four days. Her laboratory workup revealed low serum sodium, serum osmolality. CT scan of the brain was unremarkable, while on CSF examination, protein, and total leukocyte count (predominantly lymphocytes) were increased. CSF cultures were negative, however, GeneXpert detected rifampicin resistant mycobacterium tuberculosis. Due to her high urine output and hyponatremia with sodium of 128 mEq/l, fluid restriction was attempted in order to rule out the diagnosis of SIADH, but the patient was unresponsive to it. Thus, the patient was diagnosed with tuberculous meningitis after further workup, followed by cerebral salt wasting. She was started on anti-tuberculous therapy (ATT), 3% hypertonic saline and flucrocortisone, to which she was responsive, and eventually discharged.

Keywords: SIADH; tuberculous meningitis; cerebral salt wasting; hyponatremia; fludrocortisone.

INTRODUCTION:

Tuberculosis (TB) represents a worldwide disease epidemic, with an approximate occurrence of 9.6 million new cases in 2014.[1] Tuberculous meningitis (TBM) arises in 1–5% of individuals with TB and is typified by an progressive granulomatous inflammation affecting the basal meninges.[1] Hyponatremia in TBM results from diverse factors such as anorexia, nausea, vomiting, inadequate sodium intake, diarrhea, specific medications, and associated comorbidities.[2] CSW and SIADH both manifest with hyponatremia, but accurate differentiation is vital as their treatments are conflicting.[3] There are numerous case reports on syndrome of inappropriate antidiuretic hormone (SIADH) and cerebral salt wasting (CSW) in TBM.[2-6] CSW can contribute to hyponatremia in patients affected by neurological conditions.[7] CSW and SIADH share comparable features and laboratory indicators, yet distinct treatment approaches, emphasizing the significance of accurate diagnosis and effective management. Diagnosis of CSW involves identifying evidence of hypovolemia, hyponatremia with reduced plasma osmolality, inappropriately increased urine osmolality, elevated urine sodium concentration indicating a negative sodium balance, and low serum uric acid concentration due to urate excretion in urine.[7] Distinguishing between CSW and SIADH is crucial, as treatment for one condition could worsen the other.[3] Here, we present a case of a pediatric patient with TBM that displayed a positive response to fludrocortisone therapy for Cerebral Salt Wasting.

Case report:

A 10 year old girl presented to us via the emergency department with fever, headache and vomiting since 4 days. On admission, her blood workup revealed a serum sodium of 128 mEq/l, serum potassium of 3.1 mEq/l, while the rest of the electrolytes were within range. CT scan of brain was done, which was unremarkable. Following her lumbar puncture, cerebrospinal fluid (CSF) analysis revealed protein of 141 mg/dL, total leukocyte count of 95/mm3, with 73% lymphocytes, and rbc of 3600/mm, raising the suspicion of tuberculous meningitis. CSF culture revealed no growth while the CSF AFB smear, and CSF gram stain were negative. HbA1C levels, serum cortisol levels and thyroid profile were done and were within normal ranges.

Although she remained vitally stable, she was monitored for any instability, hemodynamic or otherwise. GeneXpert was sent, which was positive for mycobacterium tuberculosis with rifampicin resistance. Upon further inquiry, it was discovered that family history for tuberculosis was positive in her older brother. She was started on multi drug resistant (MDR) anti-tuberculous therapy.

During the course of her admission, her serum sodium levels initially remained low despite treatment with 3% hypertonic saline with a high urine output of 6ml/kg/hr. Her spot urinary sodium was 103 mEq/l, and urine osmolality was 252 mOsm/kg, while her serum osmolality was 266 mOsm/kg. Uric acid levels were 2.6 mg/dl. Fluid restriction was done to rule out the diagnosis of Syndrome of Inappropriate Secretion of ADH, and the patient did not respond to this treatment plan. Based on the above findings, both clinical

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and laboratory, the child was diagnosed with tuberculous meningitis and cerebral salt wasting.

The child was managed for electrolyte imbalances with 3% hypertonic saline, as well as treated with mineralocorticoids and started on anti-tuberculous therapy (ATT). Her serum sodium levels increased to a normal level within 7 days, and her clinical condition improved significantly, and she was discharged to regular follow-ups.

The presented case of a 10-year-old girl showed typical symptoms of tuberculous meningitis—fever, headache, and vomiting. However, what sets this case apart is the atypical finding in her blood work; low serum sodium (128 mEq/l) and potassium (3.1 mEq/l); prompting concern for cerebral salt wasting, a rare complication of tuberculous meningitis. Notably, encountering such electrolyte imbalances in pediatric cases with this condition is infrequent, adding complexity to the diagnosis of the etiology of hyponatremia, especially differentiating it from SIADH, and consequently, treatment of this particular case.

DISCUSSION:

In patients with neurological impairment, hyponatremia (serum levels below 135mEq/L, with normal ranges between 136-148mEq/L) may stem from SIADH or CSW, among other potential causes.[5]

Neurological patients can experience hyponatremia due to factors like diuretic use, hypotonic solutions, and comorbidities such as diarrhea. Swift identification and addressing of these factors are crucial. However, our patient did not exhibit these characteristics.[4]

Serum sodium regulates osmolality via ADH and natriuretic peptides. Hyponatremia, below 120mEq/L, or rapid decline causes neurological issues. Tuberculosis meningitis can lead to hyponatremia, often due to cerebral salt wasting (CSW) rather than SIADH. Distinguishing between them is crucial for proper treatment, based on evidence of hypovolemia or euvolemia/hypervolemia.[2]

CSWS requires fluid and sodium replacement, whereas SIADH demands fluid restriction. Both are linked to neurological conditions, sharing features like hyponatremia, urinary Na+ >40 meq/l, and hyperuricemia. SIADH, common in TBM, involves ADH excess and volume retention. CSW, a hypovolemic hyponatremia, triggered by brain natriuretic peptide, increases water and Na+ release, resulting in elevated urinary Na+.[4, 8]

As the case unfolds with the classic presentation of tuberculous meningitis, it emphasizes the importance of thorough investigation even in the absence of typical imaging abnormalities. The identification of rifampicin resistance highlights the evolving challenges in tuberculosis management. Furthermore, the rare occurrence of cerebral salt wasting added complexity, necessitating a nuanced approach to fluid management. Despite the initial resistance

to fluid restriction, the combination of anti-tuberculous therapy, 3% hypertonic saline, and mineralocorticoids proved effective, showcasing the intricacies of managing multifaceted complications in pediatric cases.

Distinguishing between SIADH and CSWS hinges on key measures like volume status, osmolarity, urinary sodium and urinary output. SIADH diagnosis entails hyponatremia, low serum osmolality, high urinary osmolality (>100mOsm/Kg), urinary sodium >20mMol/L, and excluding specific causes. For CSW, essential criteria include polyuria, hyponatremia, and excluding secondary causes. Supportive criteria encompass clinical signs of hypovolemia, negative fluid balance, elevated hematocrit/hemoglobin/serum albumin/BUN, and urinary sodium >40 mEq/L or urine osmolality >300 mOsm/L. Elevated osmolarity doesn't favor SIADH diagnosis.[2]

Cerebral salt wasting syndrome is characterized by specific diagnostic hallmarks: the presence of a brain lesion and the renal excretion of sodium and chloride without any discernible triggers.

Syed Ahmad et all in their study of a patient with tuberculous meningitis with cerebral salt wasting noted serum and urine osmolarity, along with urinary sodium and serum uric acid.[6] These aspects were also examined in our study.

YM Tunio et all in their study support the theory that a considerable proportion of patients with tuberculous bacterial meningitis experience hyponatremia. Failing to diagnose and appropriately address hyponatremia through correct protocols and methodologies can result in severe outcomes, including significant neurological complications.[9]

Constant monitoring of serum sodium levels is crucial during hyponatremia correction to avoid hypernatremia. Caution is needed to prevent overcorrection, which could lead to central pontine myelinolysis. Fludrocortisone at doses of 0.1 to 1mg/day can treat CSWS by stimulating sodium and water reabsorption, expanding intravascular volume. Derived from the natural glucocorticoid, fludrocortisone maintains salt and water balance, addressing adrenocortical insufficiency while stabilizing blood pressure.[10]

CONCLUSION:

This case prompts consideration of atypical presentations in tuberculous meningitis, reinforcing the need for a comprehensive diagnostic approach. The successful management of cerebral salt wasting underlines the significance of adapting treatment strategies to address unique complications, ultimately contributing to the positive outcome observed in this patient.

In conclusion, this case underscores the diagnostic challenges in pediatric tuberculous meningitis and the unexpected manifestation of cerebral salt wasting. The integration of GeneXpert testing for rifampicin resistance adds a layer of complexity to tuberculosis management. The successful

resolution through a tailored approach involving anti-tuberculous therapy, hypertonic saline, and mineralocorticoids highlights the importance of adaptability in pediatric care. This report contributes valuable insights into the multifaceted nature of tuberculous meningitis presentations, encouraging vigilance for uncommon complications in clinical practice.

Authors Contribution:
Yousra Nasir Siddiqui: Selecting and writing the entire case report

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Endodontic Intervention for Managing External Inflammatory Root Resorption in Mandibular First Molar

Nehal Amir, Ayesha Nazakat

ABSTRACT:

External inflammatory resorption (EIR) is the pathological destruction of external radicular structures with a multifactorial etiology. Prompt diagnosis and meticulous intervention are obligatory to retain the salvageability of the tooth and to circumvent the premature loss of permanent dentition. Infected pulpal tissues and microbial toxins are the mainstay of the persistent inflammatory response in the periodontal tissues. This provokes odontoclastic activity, precipitating radicular loss. In this report, a 17-year-old male patient reported severe pain in the mandibular right first molar. After a thorough history and examination, the case was diagnosed as inflammatory root resorption. Nonsurgical endodontic therapy was performed under rubber dam isolation. After adequate chemomechanical preparation, intracanal, non-setting calcium hydroxide was utilized to arrest the resorptive process. This case enlightens the fact that mechanical debridement alone cannot achieve the prime goal of endodontic intervention. Chemical disinfection using intracanal medicaments can magnify the outcomes by eradicating the nidus of infection.

Keywords: Calcium hydroxide, Periapical tissues, Root resorption

INTRODUCTION:

Pathological root resorption is implicated in the non-microbial disfigurement of the mineralized dental tissues by odontoclasts. Roots are principally guarded by a delicate anti-resorptive barrier comprising an unmineralized organic zone of pre-cementum and pre-dentin shielding the external and internal radicular walls respectively. This is attributed chiefly to the insufficiency of the clastic cells to adhere to unmineralized substrate. [1, 2] By expeditious detection and meticulous intervention, the resorptive process can be halted thus augmenting the longevity of the tooth. The resorptive process embracing the internal radicular wall is termed internal root resorption (IRR) while external root resorption (ERR) encompasses the external root surface. External resorption is more common than internal resorption and can be sub-categorized as external surface resorption, external inflammatory resorption, external replacement resorption, invasive cervical resorption, and transient apical breakdown.[3,4] External inflammatory resorption is fundamentally related to infected root canals. There is either damage to the external radicular surface during traumatic events or the establishment

of an avenue of bacteria and their toxins between the root canal and the peri-radicular tissues. If the infected endodontic system is not treated timely, then the result will be sustained activity of clastic cells with persistent inflammation and destruction of dental hard tissues. [5]

Case Report:

A 17-years old male patient, resident of Rawalpindi, presented to the Outpatient Department of Operative Dentistry and Endodontics, School of Dentistry, Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad on 5th June 2023 with the complaint of pain in his lower right back tooth since 1-week. The patient had been experiencing moderate-intensity pain for the past 2 months with severe exacerbation since 1-week. Pain was continuous and throbbing in nature, and was aggravated during mastication. The patient had a similar episode of pain 6 months back for which he took oral analgesics (Ibuprofen 400mg three times daily) for 5 days after which the pain subsided. The patient was otherwise healthy and medical history was insignificant. Extraoral findings were non-contributory. On intraoral assessment, a deep carious lesion was found in tooth # 46. No mobility, swelling, or sinus tract was associated. The tooth was tender to percussion and non-responsive to vitality testing. On radiographic evaluation, external root resorption was evident involving distal root with areas of periapical radiolucency encompassing both mesial and distal roots. The case was diagnosed as External inflammatory root resorption associated with necrotic pulp and chronic apical periodontitis. Nonsurgical endodontic therapy was opted as the treatment modality of choice. The treatment plan was discussed with

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the patient and informed consent was taken.

The endodontic intervention was initiated under rubber dam isolation after adequate anesthesia using 2% Lidocaine with 1:100,000 Epinephrine. After the access opening was done, the pulp chamber floor was explored and four canal orifices were located: Mesiobuccal (MB), Mesiolingual (ML), Distobuccal (DB), and Distolingual (DL). Using Digital Periapical Radiography, working lengths were taken (25mm for MB, and ML canals and 18mm for DB canal, and 17mm for DL canal). Canals were subjected to Chemomechanical preparation using the Protaper Universal file system (Dentsply Sirona, USA) under copious irrigation with 5.25% Sodium hypochlorite (*Figure* 1). After cleaning and shaping, canals were dried using absorbent paper points, and intracanal non-setting calcium hydroxide medication UltraCal XS paste (Ultradent, USA) was placed. The tooth was temporarily restored and the patient was recalled after 2 weeks. On the second visit, the patient reported multiple episodes of pain during the interappointment phase and the tooth was still tender to percussion. Intracanal medication was placed again for 2 weeks.

On the third visit, the patient was asymptomatic and the tooth was ready for obturation. Intervention was accomplished under rubber dam isolation and calcium hydroxide paste was efficiently removed by sonic activation of endodontic irrigant. Protaper Universal Master Apical file F3 was inserted in all four canals and the final radiograph was taken before obturation as illustrated in *figure* 1. After drying the canals, obturation was done using Protaper Universal gutta percha points and Sealapex- root canal sealer (Kerr Manufacturers) (*Figure* 2). The access cavity was restored using Glass ionomer cement and the patient was recalled for subsequent follow-ups at 2 weeks and 1 month interval (*Figure* 3).

DISCUSSION:

External inflammatory resorption is an untoward phenomenon prevailing injury to the external radicular wall and adjacent periodontium. The majority of cases are interrelated with chronic apical periodontitis and dental traumatic injuries. Initially, the resorptive process is self-limiting targeting only the damaged radicular substrate. The successive progression

Figure 1 Intra-Operative Radiographs A) Working Length estimation B) Radiograph of Master Apical Files in canals
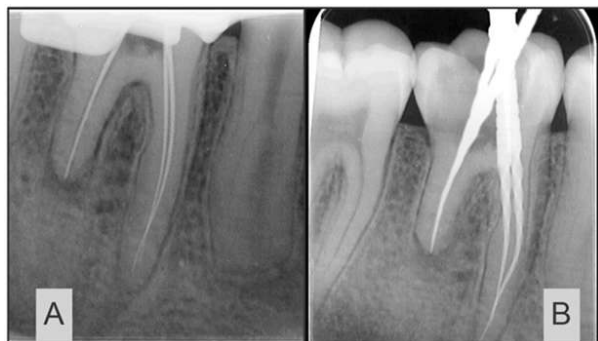

Figure 2 Intra-Operative Photographs A) Photograph depicting the access cavity following chemomechanical preparation immediately before obturation B) Post-Obturation Photograph of Access cavity
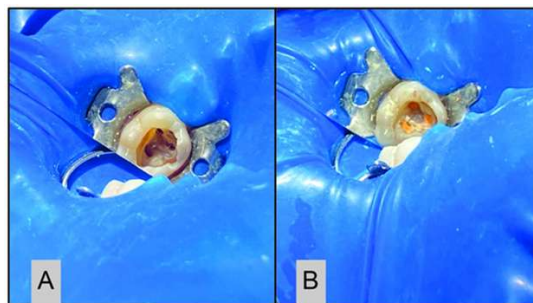

Figure 3 Post-Operative Radiographs at follow-up periods A) At 2 weeks follow-up B) At 1 month Follow-up

of the lesion is associated with the loss of pulpal vitality and infection of necrotic tissue. [6] The "Resorption Triad" is distinguished by (1) the destruction of anti-resorptive barriers (2) a persistent provoking factor (3) a sustained vascular supply for the odontoclasts. [5] It is chiefly divided into two phases: injury and stimulation. Injurious episodes are linked to dental trauma, pulp necrosis, apical periodontitis, pressure from an impacted tooth and neoplasm, bleaching procedures, and orthodontic tooth movements. The most common stimulant for resorptive events is pulpal infection generating an inflammatory response in the periodontium. [7] Consequently, it is crucial to exclude the etiological factor for successful management of resorption.

 In this case, the resorption was fundamentally due to pulpal necrosis, hence, nonsurgical endodontic therapy was accomplished. However, complete eradication of endodontic microbiota is not practically feasible by chemomechanical preparation alone. Therefore, intracanal medication was utilized to achieve disinfection. Owing to its outstanding antimicrobial potential and high alkalinity, Calcium hydroxide medication was used in this case. It enables the dissolution of necrotic remnants, inhibition of the resorptive process, and induction of repair by hard tissue formation.[8]

EIR can occur either along the length of the root (Lateral root resorption) or at the root apex (Apical root resorption). [5]This was the case of External Inflammatory Apical

resorption in which the apical constriction of the distal root was destroyed due to the resorptive process. Scouting files could easily cross the apex. Henceforth, working length was established in distal canals using a larger size file (25k) to achieve an apical stop for subsequent instrumentation and obturation.

Follow-up of patients at recall visits is obligatory to monitor favorable periapical tissue healing. In the current case, obturation was done after complete assurance that the resorptive process had been arrested and the patient was asymptomatic with no tenderness to percussion. The patient was also reassessed at 2 weeks and 1 month period. He was comfortable and had no symptoms. The success of endodontic therapy is dependent not only on the alleviation of symptoms but also on the survival of the tooth under functional loading. By considering this goal, the patient was advised a full-coverage restoration. According to the literature support, full-coverage cast restorations enhance the longevity of endodontically-treated teeth. [9] The patient was referred to the Prosthodontic department for permanent restorative intervention. The management protocol implemented in this case is supported by the literature that signifies the role of immediate pulp extirpation and intracanal calcium hydroxide medication in root resorption cases.[10] Furthermore, the antimicrobial potential of calcium hydroxide can be significantly enhanced by reinforcing it with nanoparticles.[11] This can prove to be a milestone in the management of inflammatory root resorption.

CONCLUSION:

Inflammatory root resorption is a common sequela of necrotic pulp with chronic apical periodontitis. The accuracy in diagnosis and timely intervention is fundamental to arresting the resorptive process, and to augment the prognosis and longevity of the tooth.

Authors Contribution:
Nehal Amir: Conception, Principal Investigator (Clinician), Literature review, Manuscript writing and critical revision
Ayesha Nazakat: Contributed to assistant during the treatment, contributed to manuscript writing and editing

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Developing Culture of Mentorship

Shazia Fakhir Durrani, Ammara Hameed

Dear Editor,

The idea of 'mentoring' developed 3000 years ago, with the character of 'Mentor' in Homer's Greek poem, Odyssey. Odysseus delegated his juvenile son Telemachus under care of his old and wise friend, Mentor, when he had to leave his young son for 10 years to fight in the Trojan War.[1]

Mentoring is important for development of the medical profession. It is bidirectional and benefits both mentor and mentee.

Mentorship is a lifelong relationship and the purpose is to develop trust, guidance and mutual benefits for both mentors and mentees. Good mentoring leads to better professionals, improved patient care, and creates a brighter future for medical profession. Mentoring is not only a leadership competency; it is an exceptional act of professionalism through organizational management. Significance of mentorship in medicine and healthcare system cannot be underestimated.[2] Mentorship not only benefits the mentees, it has positive influence on mentors as well. It is bidirectional process. Having a mentor gives the opportunity to seek proper guidance in your professional pathway. Moreover, it provides one sense of enablement, more time for intellectual activities like publications. There is better ability to perform and lastly a mentee gets access to mentor's network, so it leads to increased networking opportunities.

Mentors benefit from mentoring relationship as well. With mentoring, come enhanced leadership skills, improved communication and teaching techniques and ability to manage things better and achieve excellence. A mentor develops a broader network through junior doctors. It provides one with chances for introspection and appreciation of new perspectives. Last but not the least it gives a sense of achievement, joy and purpose.

Mentoring typically involves four key phases: initiation, cultivation, separation and redefinition.

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Although in most mentoring relationships, the benefits outweigh the risks, but not all are successful or effective. Mentoring fails if there is a conflict of interest, lack of commitment and communication, inexperienced mentor and clash of personalities.[3] The consequences of an unsuccessful mentoring relationship can lead to inadequate collegiality. In case when too much support is provided, there may be a risk of dependency on the mentor. If the mentee is no longer learning from the mentor, it may be advisable to end the mentorship.[4] In this new era of artificial intelligence and globalization, as a lot of work of medical education has moved online, the mentors must be well versed with the practices of virtual environment. Explicit skills and deliberate practice is required in developing connections, communication, collaboration and productivity on virtual platforms that are different from physical teamwork.[5]

Many organizations and platforms have been developed to encourage the far- flung mentorship. It provides the physicians- the mentor or the mentee, a chance to develop long distance relationship with physicians from different ethnicity, background and regions but with similar research and educational interests. This would lay a foundation stone for development of long lasting collaboration in medical research and education among different regions around the globe. So, the idea of long distance mentoring should be explored and encouraged.

Authors Contribution:
Shazia Fakhir Durrani: Conception of design, writing, proof reading
Ammara Hameed: Conception of design, writing, proof reading

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Cancer in South Africa [editorial]. S Afr Med J 1994;84:15

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