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Comparison of Self-efficacy of Dental house officers regarding content and Extent of Education in Rehabilitative Endodontics in Public and Private dental institutes

Kiran Fatima Mehboob Ali Bana, Farnaz Ilyas, Taqdees Maryam

Abstract:

Objective: To compare whether the self-efficacy score of dental house officers was associated with the extent of education content received in public & private dental institutes**.**

Study design and Setting: It was a comparative analytical study, conducted at various public and private dental colleges of Karachi from March 2022 to December 2022.

Methodology: The validated endodontic general self-efficacy scale (ESES) related to the content of endodontic education was used. Data was analyzed on SPSS version 23. The mean rank of ESES items and performance of Root Canal Treatment (RCT) was assessed through Mann-Whitney U test. P value < 0.05 was taken as statistically significant.

Result: Total of n=344 subjects were included for data analysis. A total n=88 (25.6%) were male and n=256 (74.4%) were female house officers. The mean age was 23.21+ 1.10 SD. A total n=222 (64.5%) dental house officers were from public and n=122 (35.5%) from private institutes. Novice dentists from public institutes had greater SES scores related to patient exposure (from items 1 to 7). Private institutes had better ESES related to problem-solving skills items (from 8-10). Performance in retreatment cases was greater in the public institute and influenced the mean ESES.

Conclusion: The Self Efficacy Score was greater among dental interns of public dental undergraduate institutes related to work in real patient setting and in private institute due integrated problem-solving teaching strategies. Hence, ESES score was associated with extent of education content received related to clinical experience in real patient setting and retreatment cases of endodontics in Public Institutes.

Key Words: Dental interns, Education, Endodontic, House Officers, Self-Efficacy.

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INTRODUCTION:

The transition from undergraduate training in the dental profession to becoming an independent dentist is challenging.[1] The challenges include a lack of clinical experience due to limited patient exposure or resources. Insufficient experience in root canal treatment (RCT) performance is one of the greatest challenges during undergraduate training. Novice dentists are competent enough while performing root canal treatment on anterior teeth. This is a general perception that the majority of dentists find it difficult to perform good quality RCT on posterior teeth after graduation and feel a lack of confidence and self-efficacy.[2,3] Consequently, undergraduate dental training has a great impact on independent practice, as dentists after graduation no matter if they have dealt with the problems during training.

Self-efficacy is a personal judgment of the execution of any course of action, and clinical decision-making is based upon the experience as reported by Taha NA et al in 2019.[4] Self-efficacy is defined as an emotional state of confidence and feeling competent while performing any evidence-based skill. According to Bandura 1982,[5] the criterion for self-efficacy is competence, and it has a direct positive effect on performance. In rehabilitative endodontic, this theory entails four kinds of self-efficacy sources; the first is mastery skills learnt by experience in clinical setting, the second type is during the observation which built the urge of success such as assisting endodontic treatment with peers, fellows, class mates or postgraduates, the third kind of self-efficacy is through the verbal encouragement of instructor which give belief to trainee to perform best and finally emotional state of an individual which reduces anxiety and stress to perform clinical skills. Better learning outcomes can be achieved in endodontic education through integrating

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all four sources of self-efficacy.

It is reported by Zimmerman 2000[6] that individuals having greater self-efficacy can perform more challenging tasks under stressful situations with more determination compared to individuals with low self-efficacy. It is hypothesized by Baaij et al in 2021[3] that the self-efficacy of fresh dental graduates was influenced by the clinical experience while performing RCT and self-efficacy is gradually improved from the first year till the time of graduation among those who had less confidence while entering in first year of the undergraduate program. Thereby, research by Kamali et al (2024)[7] and Baaj et al. (2024)[8] suggests that it is unrealistic to expect that all dental students possess elevated self-efficacy or feel fully confident and competent upon completion of their academic programs to commence practice autonomously.

A study by Javed MQ in 2021 revealed that 98% of 4th and 5th-year dental students are more confident during the procedure of root canal treatment on maxillary anterior teeth.[9] Therefore, the rationale was to find the self-efficacy score among novice dentists specifically performing endodontic rehabilitation procedures, particularly within the geographic region of Sindh, Pakistan. This highlights a significant challenge in assessing the self-efficacy score of dental undergraduates with respect to root canal treatment which is one of the competencies. The dental curricula prescribed by the Higher Education Commission (2013)[10] and the Pakistan Medical & Dental Council (2019) [11]articulated a comprehensive range of pre requisite competencies for dental graduates intending to engage in independent oral rehabilitation practice. In light of these considerations, this study aimed **t**o compare whether the self-efficacy score of dental house officers was associated with the extent of education content received in public & private dental institutes of Sind, Pakistan

METHODOLOGY:

This comparative analytical study was conducted at various public and private dental colleges of Karachi from March-2022 till December-2022. The ethical approval was obtained from Bahria Dental College Ref# ERC 03/2021. The administrative approval was obtained from other public and private dental institutes where data collection was carried out and target population was dental house officers, who completed their house job posting in the endodontic rehabilitation department in year 2022. Sample size was determined using the standard formula $N = Z^2 \times P(1-P) / d^2$. Assuming an unknown prevalence as 50% to ensure maximum sample size. With a 95% confidence level and 5% margin of error, the required sample size was calculated to be 384 participants. A non-probability convenience sampling technique was used to recruit dental house officers from various dental institutions in Karachi. The ESES tool is a validated tool adapted from Baaij et al (2020)[3] that assessed the content and extent of endodontic rehabilitation training received during their undergraduate dental training was distributed among dental house officers. Participants were informed that all responses would be handled anonymously, and only those who provided informed consent were included in the study.

The ESES comprised of ten items (Table 1), each rated on a 4-point Likert scale ranging from 1 = Not at all true, 2 = Hardly true, 3 = Moderately true, to 4 = Exactly true. Higher total scores indicated greater self-efficacy in endodontics. The first section of the questionnaire also collected demographic data, including age, gender, and affiliated institution.

Data analysis was performed using SPSS version 23. The Shapiro-Wilk test was performed to check the normality of data. Frequencies and percentages were computed for categorical variables. Associations between variables were examined using Fisher's exact test. Since the data did not follow a normal distribution, non-parametric tests were employed. The Mann-Whitney U test was used to compare mean ranks of ESES scores and root canal treatment (RCT) performance between public and private dental institutions. A p-value of = 0.05 was considered statistically significant.

RESULTS:

A total of n=344 questionnaires completed in all aspects from 384 distributed questionnaires; hence, the response rate was 89.58%. A total of n=88 (25.6%) were male and n=256 (74.4%) were female house officers. The mean age was 23.24+ 1.10 SD with a minimum 20 years and a maximum of 28 years. A total of n=222 (64.5%) dental house officers were from public institutes and n=122 (35.5%) were from private dental institutes.

The Mann-Whitney U test was applied to compare the mean rank of ESES among public and private institutions. The test gives a rank to the scores of the respondents from both groups, and then the mean rank was calculated for each group separately. A higher rank indicates that participants of that group have a higher SES score than the other group. In public institutes, the mean rank of (ESES score was higher in the first seven items compared to private dental institutes, and there was a statistically significant difference found in three items 1,2 and 6 at a p-value of 0.0001. It was revealed that dental house officers from public institutes had better ESES score related to patient exposure as compare to private institutes. Private institutes had better ESES related to problem solving skills as depicted from 8, 9 and 10 items of ESES and revealed statistically significant difference in items 9 and 10 at a p-value of 0.0001-table-1.

Student satisfaction with the content and extent of endodontic education was observed by the more or less teaching strategies used, as presented in (Table-2). The dental interns from private & public institutes were equally satisfied with the extent & content of endodontics delivered but a statistically

significant difference was found for a smaller number of lectures at p-value > 0.05 as depicted from table-2. Those who responded "Yes" were less satisfied, and those who responded with a "No" were more satisfied. Sessions related to clinical seminars, simulated clinical training & feedback received from peers were more conducted in private institute as presented in figure-1.

While comparing the mean rank of clinical performance of root canal treatment (RCT) and the mean of combined ESES score was measured between 10-40 was assessed with the help of mann Whitney U Test. The dental interns from private institutes had performed more number of RCT on anterior, premolars & molars as 200.47, 221.09, and 209.79 respectively as compare to public institutes with statistically significant difference at p-value of 0.0001. On the other hand, performance in retreatment cases was greater in public institute; table-3.

DISCUSSION:

To compare the endodontic self-efficacy score of dental house officers was related with extent of education content

Table-1: Mean Rank of Endodontic Self-Efficacy Score of Two Independent Cohorts of dental House Officers of Public and Private Institutes Baaij A et al[3]

Domains	Endodontic Self-Efficacy Scale (ESES)	Public N=222		Private N=122		P-Value*
		Mean	Mean rank	Mean	Mean rank	
Patient Exposure	With hard work, difficult endodontic problems can be manageable for me.	2.54	187.87	2.13	144.52	0.000
	If a patient disagrees with me, I can navigate the situation to achieve the outcome I desire.	2.72	215.07	1.53	95.04	0.000
	I find it straightforward to stay focused on my endodontic objectives and achieve my goals.	2.70	174.06	2.65	169.66	0.676
	I am confident in my ability to handle unexpected situations effectively during endodontic treatments.	2.53	175.25	2.45	167.49	0.462
	My resourcefulness enables me to manage unforeseen situations in endodontic treatments effectively.	2.44	173.50	2.41	170.68	0.789
	With the right amount of effort, I can resolve most endodontic challenges.	2.68	189.02	2.27	142.45	0.000
	I stay calm when encountering challenges in an endodontic case, trusting in my ability to cope effectively.	2.65	175.28	2.59	167.44	0.459
Problem Solving Skills	When faced with an endodontic issue, I can typically identify multiple solutions.	2.54	168.24	2.64	180.25	0.251
	If I encounter trouble during an endodontic procedure, I can usually come up with a solution.	2.68	147.71	3.25	217.61	0.000
	I am generally able to manage whatever challenges arise during endodontic treatments.	2.59	158.91	2.91	197.23	0.000

Figure-1: Student's Satisfaction with extent of Education in Public and Private Institutes.

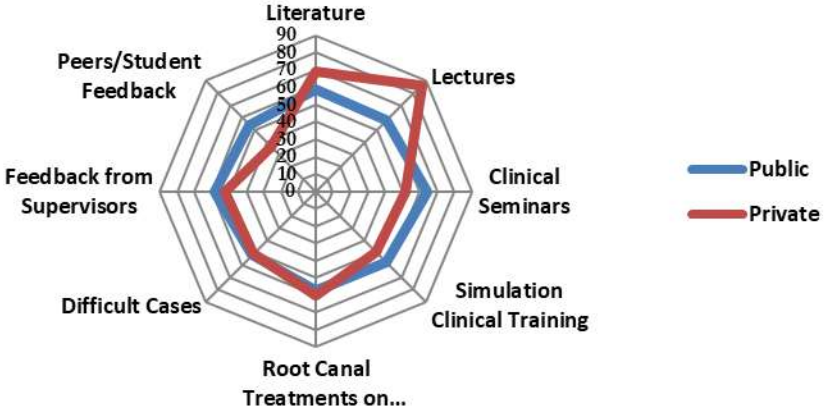

Table -2: Student satisfaction with the content and extent of Endodontic education during among public and private Institutes

I had Less		Institutes		P-Value*
		Public N=222(%)	Private N=122(%)	
Literature	Yes	91 (41)	38 (31)	0.045
	No	131(59)	84(69)	
Lectures	Yes	93(42)	16(13.3)	0.000
	No	129(58)	106(86.6)	
Clinical seminars/Tutorials	Yes	79(35.58)	59(48.3)	0.014
	No	143(64.4)	63(51.6)	
Preclinical Training	Yes	93(42)	62(50.8)	0.070
	No	129(58)	60(49.1)	
Root canal treatments on real patient setting	Yes	94(42.3)	49(40)	0.391
	No	128(57.6)	73(60)	
Difficult cases of root canal treatments on clinical setting	Yes	107 (48)	60(49.1)	0.475
	No	115(51.8)	62(50.8)	
Feedback on my performance from my supervisor.	Yes	94(42.3)	59(48.3)	0.168
	No	128(57.6)	63(51.6)	
Feedback on my performance from my peers	Yes	101(45.4)	78(64)	0.001
	No	121(54.5)	44(36)	

Grouping Variable: Public and Private institutes *Fisher's exact Test

Table-3: Mean Rank of clinical performance among Public and Private Institutes

Dependent Variables	Public N=222		Private N=122		P-Value*
	Mean	Mean rank	Mean	Mean rank	
Mean rank of SES	26.13	181.90	24.70	155.40	0.18
RCT on Anterior	2.61	157.13	3.44	200.47	0.0001
RCT on Premolars	2.05	145.80	3.92	221.09	0.0001
RCT on Molars	1.85	152.01	2.88	209.79	0.0001
Total treated teeth	6.50	150.71	10.24	212.15	0.0001
Total Number of retreatments performed	0.47	175.44	0.33	167.14	0.269

*Mann-Whitney U- Asymp. Sig. (2-tailed) Grouping Variable: two independent groups

in two different settings of public & private dental institutes was the aim of the study. Result of current study affirmed that novice dentists from public institutes had better SES related to patient exposure (from item 1 to 7) as compare to private institutes. Private institutes had better SES related to problem solving skills items as depicted from 8, 9 and 10 items of SES table-1. This result is consistent with the observation of Baaij et al 2020[3] which revealed high self-efficacy among novice dentists due to RCT performance in real patient setting. Hence in public sector there is more patient turn over, thus students experienced greater clinical experience on real clinical setting during undergraduate training. Therefore, dentists who trained in public sector are much more confident during real clinical performance as compare to their counter parts in private institutes.

According to the study conducted in 2018 in Pakistan among the house officers revealed greater confidence while performing some of the steps of RCT while less confidence was observed for placing rubber dam, management of flare ups and use of electronic apex locator comparing two dental institutes.[12] However, frequent turnover of patients in public sector and various patient centered learning strategies used to teach endodontic content such as case based learning and problem-based learning in private dental institutes has an overall impact on ESES in this study-table-2. Hansen MG et al in 2023 in pilot study observed that simulation-based learning can significantly increase pediatric dental residents' confidence levels when handling sedation-related emergencies.[13] Such findings advocate for incorporating more simulation exercises within dental curricula.

Regarding clinical performance of RCT; the dental interns from private institutes had performed more number of RCT on anterior, premolars & molars as 200.47, 221.09, and 209.79 respectively as compare to public institutes at p-

value of 0.0001 table-3 and revealed statistically significant difference. On the other hand, performance in retreatment cases was greater in public institute and has an influence on mean SES score. This is comparable from the study of Chambers D in 2012[14] and proposed that learning curve entails constant repetition of procedures to develop clinical skills is vital and ultimately improve confidence. On the contrary, Baaij et al 2020[3] reported that self-efficacy might be reduced while treating dif?cult cases (molars and retreatments). One plausible explanation could be the nature of exposure and the diversity of experiences that dental house officers experienced in public institutes are subjected to enhance self-efficacy. Public sector dental hospitals and clinics often cater larger and more varied patient population, offering a broad spectrum of real-life cases. This environment provided more hands-on experiences, which is critical to enhance self-efficacy. There are various factors which can be contribute to self-efficacy among novice dental doctors such as practical experience, hands on training, mentorship, supportive learning environment, reflective practice, continuous learning and the role of innate personality traits. Hence, provision of quality care especially as an emerging dentist is highly dependent upon the self-efficacy and confidence while performing oral rehabilitation treatment. It is vital to improve the endodontic education at undergraduate level as to enhance confidence of performing complex root canal procedures in future dentist. [15]

Furthermore, the endodontic procedure is perceived as a difficult procedure.[16] The academic and training framework in public institutions may emphasize more integrated approach to learning. This might include a stronger emphasis on practical skills training, interdisciplinary collaboration, and community engagement projects. Such experiences contribute to a well-rounded professional development, reinforcing the belief in one's capabilities; creating supportive learning environment to address short comings during clinical performance may enhance confidence and self-efficacy.[17] Additionally, the mentoring approach in public institutes might differ significantly from that in private institutions. Mentor-mentee relationships in such settings often extend beyond academic guidance, encompassing emotional support and professional networking, leading to significant competency. It's also worth considering that the selection processes and the competitive environment in public institutions might inherently attract or foster individuals with higher self-efficacy. The rigorous nature of admissions and continual evaluations could mean that only those with a strong belief in their capabilities and resilience navigate through successfully, potentially skewing the average self-efficacy levels higher.

Understanding that self-efficacy is not merely a product of integrative educational content, but also quality of experiences and nature of support systems, is pivotal.[18] By doing so, private institutions can aim to nurture dental house officers who are not only knowledgeable but also confident in their abilities to navigate the complexities of the dental profession. It is utmost important to address the limitation of the study such as assessment of support system, mentor mentee relation and feedback from peers and supervisors on effect of self-efficacy during endodontic procedures have not been studied in this study. Feedback is recognized as a critical component in enhancing trainees' confidence and performance.[19]

It is suggested that for healthcare professional such as dental professional, lifelong learning is crucial to keep them updated regarding current standards of care and to improve self-efficacy as addressed by Haug SR et al in 2021.[20] Competency based learning is vital in undergraduate dental training curriculum by incorporating hands on workshops; problem based learning, treating patients under supervision to enhance their self-efficacy and self-confidence for endodontic procedures.[21]

CONCLUSION:

Self Self-efficacy score was higher among the dental interns of public dental undergraduate institutes related to greater number of patient turnover and in private institutes due integrated problem-solving teaching strategies. Hence, ESES score was associated with the extent of education content received related to clinical experience in real patient settings and retreatment cases of endodontics in Public Institutes.

Ethics Statement: This study followed the guidelines of the Declaration of Helsinki. The ethical approval was obtained from the Institutional Review Board of Bahria University Medical and Dental College, reference # 03/2021. Informed consent was obtained from the house officers participated in the study and the rationale of the study was well explained.

Conflicts of Interest: Nil

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Authors Contribution:
Kiran Fatima Mehboob Ali Bana: Conception, design, analysis and/or interpretation of data.
Farnaz Ilyas: Data collection, write up
Shama Asghar: Intellectual input, data collection

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