Original Article **Open Access**

Health-related Quality of Life in Pediatric and Adolescent Patients with Transfusion Dependent ß-Thalassemia

Hina Qayyum, Shamama Hasan, Samra Akram, Amarah Ghani, Areeba Sohail, Annowish Nasir

ABSTRACT

Objective: To evaluate the impact of disease on physical, educational, psychological and social wellbeing of transfusion dependent thalassemia major patients.

Study Design and Setting: A case control study conducted in Thalassemia Centre of Pediatric Ward, PNS Shifa Hospital Karachi for a duration of six months from March 2019 till August 2019.

Methodology: Seventy cases of thalassemia major patients were enrolled along with a control group of hundred patients. The enrolled cases were registered thalassemia patients of pediatric hematology clinic. The controls are healthy, age and sex matched participants and their history was taken to compare with the diseased participants. Peds QL4.0 generic core scale proforma was filled to assess health related quality of life (HRQoL) in these patients.

Results: Mean age of patients was 8.56 ± 4.526 and 7.94 ± 4.528 for controls. The greatest level of difficulty was seen in thalassemia patients in physical functioning, health activities and emotional functioning domains with a score of 9.4 ± 6.85, 9.186 ± 5.724 and 6.4 ± 3.5 respectively. The total score in terms of increasing difficulty was 51.84 ± 21.26 in patients while it was 15.06 ± 10.26 in control group with a significant difference (p = 0.05). There was also significant association of splenectomy with health-related scores.

Conclusion: This study reiterated the impact of blood transfusion, iron chelation and other clinical dependencies of thalassemia major patients on their quality of life. The questionnaire data provided valuable information regarding impact on daily life activities and its difference in comparison to controls.

Keywords: Thalassemia major, Transfusion-dependent, Quality of life

How to cite this Article:
Qayyum H, Hasan Sm Ajran S, Ghani A, Sohail A, Nasir A. Health-related Quality of Life in Pediatric and Adolescent Patients with Transfusion Dependent ß-Thalassemia. J Bahria Uni Med Dental Coll. 2023;13(4):255-60 DOI: https://doi.org/10.51985 /JBUMDC202248

Hina Qayyum *(Corresponding Author)*
Assistant Professor, Department of Paediatrics
HBS Medical and Dental College Islamabad
Email: hinaqaayum@gmail.com

Shamama Hasan
Assistant Professor, Department of Pediatric Gastroenterology
Pak Emirates Military Hospital/National University Of Medical Sciences (NUMS) Rawalpindi
Email: shamamahasan2014@gmail.com

Samra Akram
Resident, Department of General Surgery
Punjab Rangers Teaching Hospital Lahore
Email: samra.winx98@gmail.com

Amarah Ghani
Resident, Department of General Surgery
Indus Hospital Karachi
Email: amarahghanishaikh@gmail.com

Areeba Sohail
Registrar, Department of Emergency Medicine
Al-Sabah Hospital, Kuwait
Email: Areebahsohail@yahoo.com

Annowish Nasir
Medical Officer
Agha Khan Hospital Karachi
Email:annowish.nasir@gmail.com

Received: 11-04-2022
Accepted: 01-09-2023

INTRODUCTION:

Thalassemia is one of the most common genetic disorders of hemoglobin production worldwide. There are various conventional therapies used for the treatment of patients with thalassemia major. However, there are certain limitations and drawbacks of these treatment modalities. A better understanding of underlying pathophysiology of thalassemia has led to the development of newer treatment options which are mainly focused on correction of imbalance between different types of globin chains, decreasing ineffective erythropoiesis and reducing iron overload by using iron chelation. This will ultimately result in a better outcome in transfusion dependent thalassemia patients in terms of their life expectancy, symptom control and better adherence to treatment plan.[1] Management of thalassemia major patients still revolve around regular and life-long blood transfusion therapy.[2] There are many challenges faced by these patients such as limited access to regular and safe blood transfusions, inadequate voluntary blood donors as well as lack of national blood policies, poor thalassemia awareness at community and institutional level. Transfusion related infections are also very commonly seen in these patients. All these factors result in decreased health related quality of life in thalassemia patients. These factors are particularly challenging in resource

poor countries where mortality and morbidity is significantly higher due to complications of disease as well as treatment. This includes cardiac complications like cardiomyopathy, liver problems like chronic hepatitis. Endocrine problems involving pancreas can result in diabetes mellitus, thyroid gland involvement result in hypothyroidism, gonadal involvement cause pubertal delay, spleen enlargement result in mechanical discomfort and increased demand for trànsfusion and stunted growth.[3]

Thalassemia is the most prevalent genetic blood disorder in the world according to World Health Organization (WHO), found in more than 60 countries with a carrier population of up to 150 million.[4] It is highly prevalent among children in South Asia, Mediterranean region and Middle East. In Pakistan, thalassemia is highly prevalent with a â thalassemia gene frequency of 5% to 8% and almost 500 new cases are diagnosed each year.[5,6]

The quality of life of a thalassemia major patient depends upon various factors i.e., the number of transfusions they need, their age, quality of treatment they are getting, social skills, growth pattern, and other socioeconomic factors. Yasmeen H also highlighted the impact of these factors on life quality of thalassemia major patients in Pakistan.[7] With the passage of time, when the age of the patient increases, health complications also start increasing and adversely affect their life.[8] These challenges and difficulties include social issues, school performance of children, psychological issues, difficulty in expressing their feelings and due to physical illness, they remain unable to perform well at academics.[9]

Health related quality of life (HRQoL) measurement is a multi-dimensional concept that focuses on the impact of disease and its treatment on the health and well-being of individuals. Varni et al constructed the multidimensional PedsQL 4.0 questionnaire to measure the essential core domains for paediatric HRQoL: Physical functioning, Emotional functioning, and social functioning, as delineated by the World Health Organization (WHO), as well as School functioning.[10]

This study aims to evaluate the complications faced by thalassemia major patients in their daily life and the impact of clinical management within different age groups of patients. Assessment of level of difficulty will help us highlight the importance of comprehensive management planning by involving school representatives, family and physicians to help these patients lead a better life.

METHODOLOGY

After receiving the ethical approval from the Ethical Review Committee, Bahria University Medical and Dental College Karachi (ERC 58/2018), the consent of included patients and controls was taken. The cases were recruited through consecutive sampling over the specified period of time. This case control study was performed at Thalassemia Centre of Pediatric Ward at PNS Shifa Hospital, Karachi. The study duration was six months from March 2019 to August 2019. A total of 70 cases of thalassemia major patients and 100 controls of same age and sex were included. Thalassemia major children fulfilling the following criteria were included: having an age range between 2 and 18 years, receiving a blood transfusion on a monthly or near-monthly basis. Patients suffering from any acute infection and those thalassemia patients who had any chronic condition not related to thalassemia or its complications, were excluded to avoid its impact on results. For all enrolled patients, full data was taken about their disease history including transfusion requirement and splenectomy. HRQoL was assessed with the PedsQoL 4.0 Generic Core Scales. This instrument has 23-items that are designed to measure the core dimensions of health as delineated by WHO. The PedsQoL 4.0 encompasses the essential core domains for pediatric HRQoL measurement: 1) Physical functioning (8 items), 2) Emotional functioning (5items), 3) Social functioning (5 items) and 4) School functioning (5 items). It consists of developmentally appropriate forms for ages 2–4, 5–7, and 8–12 and 13–18 years. The reliability, validity, responsiveness, and practicality of the PedsQoL Generic Core Scales have been assessed in both physically healthy pediatric populations and in pediatric acute and chronic health conditions. The internal consistency reliability of the PedsQoL 4.0 Generic Core Scale approached 0.90 for self-report. The validity of the PedsQoL Generic Core Scales has been demonstrated through known group comparisons and correlations with other measures of disease burden. User agreement was signed with MAPI Research Institute, Lyon, France prior to using the questionnaires.

The obtained data was computed and analyzed by SPSS (Statistical Package for the Social Sciences) program version 19.0. General characteristics of the patients were presented in terms of percentage, mean, and standard deviation and median for data not normally distributed. For QoL, both total HRQoL score and physical, emotional, social, school achievement and psychological scores were presented in terms of mean and standard deviation. One way ANOVA, and t-test were used to examine the relationship between HRQoL and each demographic/clinical data.

RESULTS:

Total 170 individuals were enrolled in this study, among which 70 were cases (diseased children) and 100 controls (healthy children, age and sex matched). Among cases, 36 (51.4%) were male and 34(48.6%) were female. While in controls, 48 (48%) were male and 52 (52%) females. Mean age was 8.56 ± 4.526 for cases and 7.94 ± 4.528 for controls. Mean physical functioning score, emotional functioning score, social functioning score, school functioning score, health & activities score, feelings score, getting along with others and school scores were 9.4 ± 6.85, 6.4 ± 3.5, 4.5 ± 3.63, 6.086 ± 4.149, 9.186 ± 5.724, 6.314 ±3.304, 4.457

±3.63, 5.50 ± 4.42 for cases and 3.01 ± 4.734, 2.14 ± 1.77,1.25 ± 1.77, 2.06 ± 2.019, 1.27 ± 2.107, 1.54 ± 1.935, 1.27 ± 2.201, 2.52 ± 3.23 for controls respectively (Figure 1) and have significant effect with p = 0.05. The total score was 51.84 ± 21.26 in patients while it was 15.06 ± 10.26 in control group with a significant difference (p = 0.05).

There were no significant differences between gender of children and all health quality scores (p= 0.05). There was significant effect of school functioning and school scores among (2-4) and (5-7) age groups with p = 0.05 (Figure 2). The impact of thalassemia on various health domains was studied within different levels of education and economic groups, but no significant relationship was found (p-value<0.05) (Table 1)

Similarly, all health scores were analyzed with type of Thalassemia (none, major, intermediate and minor), it was observed that all scores were significant (p = 0.05) in none and major groups and insignificant (p= 0.05) in intermediate and minor except emotional and physical scores. There were insignificant association of blood groups and number of transfusions with quality-of-life scores except social score, health activity, feelings and getting along score for =3 transfusions and also significant association of splenectomy with health-related scores. (Table 2)

Figure 1: QOL score in thalassemia children and healthy controls

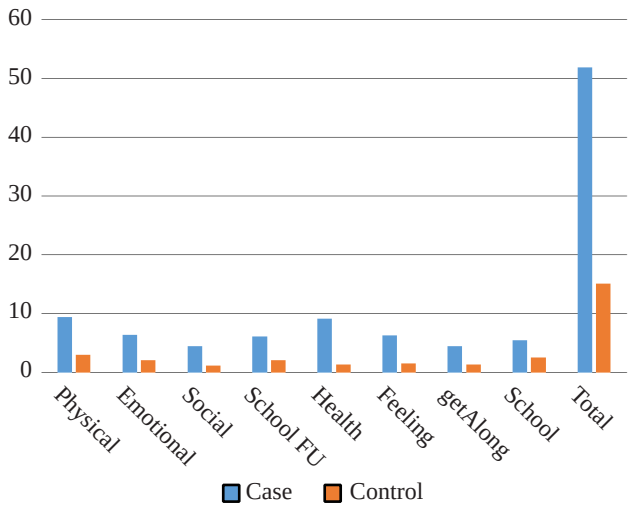
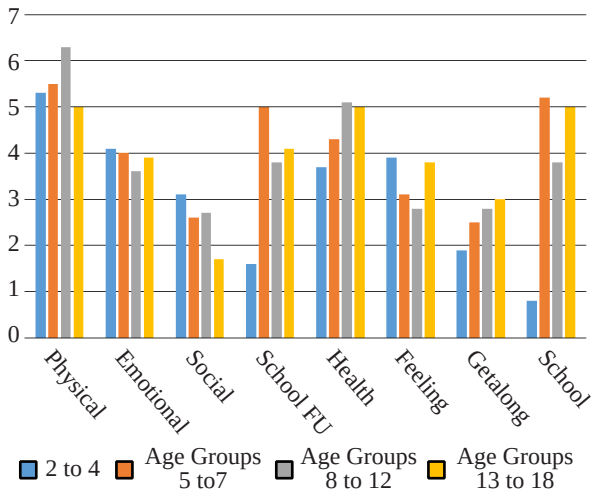


Figure 2: Comparison between different scores regarding age groups



DISCUSSION:

Thalassemia major is characterized by the lack of production of hemoglobin chains. It is also categorized under hemoglobinopathies. The management therapy i.e., blood transfusion leads to many side effects like cardiac disease, iron overload and endocrinopathies. With the passage of time, the consumption of blood starts increasing because of over destruction of blood cells in the spleen and increased needs of the body.[11] Repeated blood transfusions in these patients might result in transfusion related infections. A high prevalence of transfusion related infections like hepatitis B and C was observed in a study conducted in Balochistan, Pakistan.[12] Consequently, the quality of life of patients is compromised severely. A systematic review by Greco F found a low HRQoL in transfusion dependent patients in their physical, emotional and social functioning.[13]

The quality of life of thalassemia major patients was assessed on different parameters and they showed a higher level of difficulty in comparison to controls. A total of seventy interviews/surveys were conducted among the cases from age 2-18. The study found out that the complications of the disease are directly affecting the quality of life of patients and they feel limited in terms of expression.[14,15] The thalassemia major patients mostly remain out of schools and academic activities due to the complications of the disease and it was noticed from the survey that the majority of patients were out of school or didn't pursue their education.[16] A possible explanation can be the level of difficulty they face while getting along with other students and socializing with them. This possible reason was backed by the results obtained from the survey of the level of social skills and getting along.[17] A study by Abdel Hakeem GL found physical performance of thalassemia patients to be most affected in all the domains by using Peds QoL 4.0 scale.[18]

Mean age of our study population was 8.56 ± 4.526 for cases and 7.94 ± 4.528 for controls. Patients with splenectomy were found to be having great difficulty in their physical activities, social interaction and emotional status. They have to remain on antibiotic prophylaxis and follow precautions to remain infection free. Spleen is responsible for filtering blood, maintenance of immunity, and fighting against infections, so there are many risks associated with spleen removal in these individuals.[19]

Table 1: Comparison between different QOL scores regarding demographic data

	Parameters	Physical Score		Emotional Score		Social		School Function		Health & Activities		Feelings		Get Along		School	
		Mean ± SD	p value	Mean ± SD	p value	Mean ± SD	p value	Mean ± SD	p value	Mean ± SD	p value	Mean ± SD	p value	Mean ± SD	p value	Mean ± SD	p value
Gender	Male	5.393±6.17	0.624	4.08 ±3.22	.469	2.68 ±3.04	0.711	4.12 ± 3.80	0.158	4.702 ±5.603	0.691	3.89 ± 3.44	0.154	2.688 ± 3.22	0.706	4.20 ± 4.49	0.146
	Female	5.884±6.826		3.71 ±3.47		2.50 ±3.23		3.32 ± 3.49		4.36 ±5.60		3.13 ± 3.53		2.49 ± 3.331		3.30 ± 3.51	
Age Groups	2-4	5.324 ± 6.654	0.891	4.05 ±3.79	0.946	3.08 ±3.63	0.519	1.62 ± 2.84	0.0001	3.68 ±5.68	0.638	2.81 ±3.64	0.202	1.97±2.85	0.436	0.81±1.35	0.001
	5-7	5.521 ±6.432		4.0 ± 3.46		2.604 ± 3.14		5.02 ±4.37		4.27 ±5.81		3.8 ±3.63		2.54 ±3.64		5.19 ± 4.95	
	8-12	6.31 ±7.15	0.381	3.65±3.21	0.663	2.73±2.88	0.119	3.8±2.9	0.710	5.05± 5.45	0.986	3.71±3.39	0.752	2.78±3.09	0.733	3.78±3.14	0.138
	13-18	5.0 ±5.25		3.97 ±2.99		1.70±2.88		4.1±3.6		5.03±5.47		3.47±3.32		3.03±3.49		5.0±4.29	
Education	Class <1	6.42±8.17	0.717	3.83±3.43	0.78	2.83±3.36	0.87	6.4±4.06	0.323	4.25±6.41	0.87	3.0±2.34	0.40	1.67±2.23	0.35	5.5±2.9	0.98
	Class1-4	5.64±6.29		4.13±3.26		2.68±3.02		5.2±3.74		4.55±5.47		3.89±3.47		2.68±3.54		5.47±4.73	
	Class 5-10	4.3±5.5	0.92	2.8±2.3	0.14	1.5±2.2	0.16	3.8±2.7	0.67	3.7±4.6	0.73	2.7±2.8	0.14	2.0±2.8	0.06	4.6±3.8	0.66
	Class >10	4.5±5.2		4.4±4.1		2.9±4.1		4.3±4.6		4.4±5.7		4.4±3.5		4.1±3.5		5.3±3.6	
	No Schooling	6.6±7.1	0.42	4.4±3.9	0.98	3.2±3.5	0.79	1.6±2.9	0.31	5.2±6.3	0.73	3.7±4.1	0.68	2.9±3.5	0.35	0.89±1.5	0.001
Income	=30,000	6.3±6.6	0.204	4.0±3.5	0.68	2.9±3.4	0.245	3.7±3.6	0.86	4.4±5.5	0.83	3.6±3.5	0.66	2.6±3.4	0.97	3.6±4.3	0.66
	>30,000	5.1±6.4		3.8±3.2		2.3±2.9		3.8±3.7		4.6±5.7		3.4±3.5		2.6±3.2		3.9±3.8	

Table 2: Comparison between different QOL scores regarding type of thalassemia, blood group, transfusion requirement and status of splenectomy

Physical Score	Type of Thalassemia				Blood Groups						No of Transfusions					
	none	major	intermediate	minor	A +ve	B +ve	AB +ve	O +ve	B -ve	O -ve	None	1-3	4-6	>7	Yes	No
	3.01±4.7	9.5±6.9	13.0±5.6	2.3±1.2	5.3±6.3	6.1±7.2	6.7±6.6	4.9±5.6	2.5±0.71	14.5±2.12	3.01±4.7	2.3±1.15	13.9±6.5	9.2±6.7	12.2±7.9	5.4±6.3
p value	0.00		0.025		0.52		0.390		0.17		0.806		0.066		0.012	
Emotional Score	2.1±1.8	6.4±3.6	8.0±1.8	3.3±2.5	3.6±3.2	3.7±3.4	6.3±2.9	4±3.6	2.5±0.71	6.5±4.9	2.1±1.8	3.33±2.5	7.9±4.6	6.4±3.3	8.2±2.9	3.7±3.3
p value	0.00		0.035		0.89		0.70		0.375		0.257		0.251		0.001	
Social	1.3±1.8	4.4±3.7	6.8±1.3	4.0±3.5	2.3±2.8	2.7±3.06	4.2±3.6	2.2±3.5	2.0±2.8	5.0±7.1	1.25±1.8	4.0±3.5	8.3±2.5	4.02±3.5	6.2±3.3	2.5±3.1
p value	0.00		0.194		0.45		0.120		0.633		0.011		0.02		0.004	
School Function	2.06±2.0	6.3±4.2	5.3±3.8	3.3±2.3	2.9±3.3	3.91±3.7	5.3±5.3	4.1±3.6	5.0±1.4	7±4.2	2.1±2.1	3.3±2.3	6.4±4.1	6.2±4.2	4.7±4.8	3.7±3.6
p value	0.00		0.477		0.123		0.410		0.592		0.286		0.906		0.519	
Health & Activities	1.3±2.1	9.1±5.9	9.8±2.9	11.0±3.0	4.6±6.0	3.9±5.2	6.5±5.97	4.4±5.04	1.0±1.41	14.5±4.9	1.3±2.1	11±3.0	11.9±3.8	8.7±5.9	13.2±3.5	4.2±5.4
p value	0.00		0.6		0.51		0.260		0.066		0.00		0.152		0.00	
Feelings	1.5±1.9	6.3±3.4	6.0±1.6	6.3±0.57	3.2±3.5	3.4±3.5	4.5±4.6	3.8±3.04	2.5±0.71	8.0±5.6	1.5±1.9	6.3±0.58	7.4±1.5	6.2±3.5	6.8±3.7	3.4±3.4
p value	0.00		0.75		0.841		0.558		0.306		0.00		0.347		0.017	
Get Along	1.3±2.2	4.3±3.8	4.8±1.9	6.7±0.57	2.6±3.3	2.5±3.0	5.0±3.8	1.8±2.8	0±0	7.0±9.8	1.3±2.2	6.67±0.57	5.8±0.46	4.2±3.9	6.2±3.4	2.5±3.2
p value	0.00		0.16		0.827		0.005		0.423		0.00		0.257		0.006	
School	2.5±3.2	5.6±4.6	4.5±3.0	4.7±3.2	2.9±3.2	4.0±4.4	6.0±6.3	3.8±3.4	5.0±1.41	10±8.4	2.5±3.24	4.7±3.2	6.0±4.1	5.5±4.6	3.7±3.5	3.8±4.1
p value	0.00		0.95		0.100		0.141		0.497		0.26		0.758		0.961	

Patients with thalassemia major remain dependent on blood transfusions for life and also develop transfusion related complications.[20] There are multiple admissions for transfusion and increasing chelation requirement. This affects their physical functioning as well as educational process. Along with this, the emotional state was also found to be imbalanced in cases as compared to controls. The individuals with thalassemia find it difficult to express themselves.[21]

Thalassemia major patients have poor social skills than controls. They were found to have higher difficulty levels in getting along with the peers. The possible explanation for this can be their struggle with the disease and disturbed mental health.[22] Therefore, it is recommended to formulate a standard management program for thalassemia major patients. The thalassemia centers across the country should be developed and multidisciplinary teams should take care of the patients. This must include, in addition to the team of medical and surgical specialists, members from psychology, learning disability, dieticians as well as social services.

CONCLUSION:

This study shows that thalassemia major patients face many difficulties due to their lifelong dependency on transfusions. This burden of disease greatly impacts their life. Results of the study clearly show major differences in health-related quality of life between thalassemia patients and healthy individuals. Their life is affected uniformly in all domains of life such as social, physical, educational as well as emotional. Therefore, this study highlights the importance of more integrated planning for health services in our region.

Authors Contribution:
Hina Qayyum: Drafting the work, conception and design, critical revision
Shamama Hasan: Revising the work critically, final approval of version
Samra Akram: Acquisition and interpretation of data
Amarah Ghani: Acquisition and analysis of data
Areeba Sohail: Interpretation of data
Annowish Nasir: Drafting the work

REFERENCES:

1. Unissa R, Monica B, Konakanchi S, Darak R, Keerthana SL, Kumar SA. Thalassemia: A Review. Asian Journal of Pharmaceutical Research 2018;8(3):195-202. DOI: 10.5958/2231-5691.2018.00034.5
2. Mettananda S, Pathiraja H, Peiris R, Wickramarathne N, Bandara D and de Silva U, et al. Blood transfusion therapy for â-thalassemia major and hemoglobin E â-thalassemia: Adequacy, trends, and determinants in Sri Lanka. Pediatric Blood & Cancer 2019;66(5):10. https://doi.org/10.1002/pbc.27643
3. Lal A, Wong TE, Andrews J, Balasa VV, Chung JH and Forester CM, et al. Transfusion practices and complications in thalassemia. Transfusion 2018; 58(12):2826-35. https://doi.org/10.1111/trf.14875
4. Shah FT, Sayani F, Trompeter S, Drasar E, Piga A. Challenges of blood transfusions in â-thalassemia. Blood reviews 2019 ;37. DOI: 10.1016/j.blre.2019.100588.
5. Bou-Fakhredin R, Tabbikha R, Daadaa H, Taher AT. Emerging therapies in â-thalassemia: toward a new era in management. Expert Opinion on Emerging Drugs. 2020 ;25(2):113-22. DOI: 10.1080/14728214.2020.1752180.
6. Ismail DK, El-Tagui MH, Hussein ZA, Eid MA, Aly SM. Evaluation of health-related quality of life and muscular strength in children with beta thalassemia major. Egypt J Med Hum Genet 2018. https://doi.org/10.1016/j.ejmhg.2018.04.005.
7. Ansari SH, Parveen S, Siddiqui S, Perveen K, Ahmed G, Kaleem B et al. Managing thalassemia in the developing world: an evidence-based approach for prevention, transfusion independency, and curative treatment with hematopoietic stem cell transplantation. Blood Adv. 2018;2(1):42-45 doi: 10.1182/bloodadvances.2018GS112057
8. Saleem N, Anwar A, Shahid N, Saleem R, Saleem Z, Asghar H et al. Perception of Parents of Thalassemic Child to Thalassemia in Pakistan. Cureus 2021; 13(8): e17615. doi:10.7759/cureus.17615
9. Yasmeen H, Hasnain S. Quality of Life of Pakistani Children with â-Thalassemia Major, Hemoglobin 2018; 42:5-6: 320-25. DOI: 10.1080/03630269.2018.1553183
10. Arian M, Mirmohammadkhani M, Ghorbani R, Soleimani M. Health-related quality of life (HRQoL) in beta-thalassemia major (â-TM) patients assessed by 36-item short form health survey (SF-36): a meta-analysis. Quality of Life Research. 2019; 28(2):321-34. DOI:10.1007/s11136-018-1986-1.
11. Kumar N, Turbitt E, Biesecker BB, Miller IM, Cham B and Smith KC et al. Managing the need to tell: Triggers and strategic disclosure of thalassemia major in Singapore. American Journal of Medical Genetics Part A. 2019; 179(5):762-9. https://doi.org/10.1002/ajmg.a.61107
12. Varni JW, Burwinkle TM, Katz ER, Meeske K, Dickinson P. The PedsQLin pediatric cancer: reliability and validity of the pediatric quality of life inventory generic core scales, multidimensional fatigue scale, and cancer module. Cancer. 2002;94(7):2090–2106. doi: 10.1002/cncr.10428.
13. Greco F, Marino F. Social impact and quality of life of patients with â-Thalassemia: A systematic review. EMJ Hematol. 2022; DOI/10.33590/emjhematol/22-0004.
14. Ahmed S, Ayub M, Naeem M, Nazir FH, Hussain A, Ghilzai D et al. Thalassemia Patients from Baluchistan in Pakistan Are Infected with Multiple Hepatitis B or C Virus Strains. Am J Trop Med Hyg. 2021;104(4):1569-1576. doi: 10.4269/ajtmh.20-0740. PMID: 33534738; PMCID: PMC8045631.
15. Atmakusuma TD, Saragih EY, Rajabto W. Achievement of Pre-and Post-Transfusion Hemoglobin Levels in Adult Transfusion-Dependent Beta Thalassemia: Associated Factors and Relationship to Reduction of Spleen Enlargement. International Journal of General Medicine. 2021;14: 7515-21. DOI: 10.2147/IJGM.S338114
16. Tawarina I, Diba F. Emotional and Behavioral Aspects of Children with Thalassemia in Banda Aceh, Indonesia 2020;17(25):26-35. DOI: 10.5220/0008397202550260
17. Mahmoud MM, Helaly NM, Mohammed AA, Kamal MY. Quality Of Life of Children with Thalassemia in Alexandria. Alexandria Scientific Nursing Journal. 2019;21(1):69-80. DOI: 10.21608/asalexu.2019.206578

18. Mansoor S, Othman Z, Othman A, Husain M. A descriptive study on quality of life among adolescents with beta-thalassemia major in the Maldives. International Medical Journal. 2018;25(4):211-4. DOI:10.5281/zenodo.2588035

19. Zamanzadeh V, Valizadeh L, Ghahramanian A, Narenjbaghi SH. Personal social factors influential on the self-efficacy of the patients with thalassemia: A qualitative study. Journal of Nursing and Midwifery Sciences. 2021;8(2):120-7.DOI: 10.4103/JNMS.JNMS_124_20

20. Abdel Hakeem GL, Mousa SO, Moustafa AN, Mahgoob MH, Hassan EE. Health-related quality of life in pediatric and adolescent patients with transfusion dependent ß-thalassemia in upper Egypt (single center study). Health and Quality of Life Outcomes 2018; 16:59O

21. Ramprakash S, Raghuram CP, Marwah P, Soni R, Trivedi D and Khalid S et al. Splenomegaly May Increase the Risk of Rejection in Low-Risk Matched Related Donor Transplant for Thalassemia, This Risk Can Be Partially Overcome by Additional Immunosuppression during Conditioning. Biology of Blood and Marrow Transplantation. 2020;26(10):1886-93. Doi:org/10.1016/j.bbmt.2020.06.013

22. Tedone F, Lamendola P, Lopatriello S, Cafiero D, Piovani D and Forni G.L. Quality of Life and Burden of Disease in Italian Patients with Transfusion-Dependent Beta-Thalassemia. Journal of Clinical Medicine 2022; 11(1). DOI: 10.3390 /jcm11010015

23. Cappellini MD, Kattamis A, Viprakasit V, Sutcharitchan P, Pariseau J and Laadem A et al. Quality of life in patients with beta-thalassemia: a prospective study of transfusion-dependent and non-transfusion-dependent patients in Greece, Italy, Lebanon, and Thailand. Am J Hematol. 2019; 94(10): E261-E264. DOI: 10.1002/ajh.25584.

24. Az-zahra WF, Mardhiyah A, Nurhidayah I. The Depression Categories of Adolescent with Beta-Thalassemia Major. Journal of Nursing Care. 2019; 2(1). doi.org/10.24198/jnc. v2i1.20162