

Psychological status and Academic Achievement among Children with Thalassaemia

Ziyad Jameel Kasim Dahman¹, Yas Rakkadh Osman Luhaib²

1. MSc. Nineveh Health Department / Sinjar General Hospital

2. MSc. Community Health Nursing /Nineveh Health Department / Qayyarah Sector

Abstracts: Objectives: The aim of study is to assess emotional status and academic achievement for thalassaemia children. And to find out the association between some demographic data and emotional and academic functioning.

Methodology: A cross-sectional study of (101) children thalassaemia aged (3-12) years who were treated in Mosul City, Iraq, at Al-Hadbaa Specialist Hospital between November 1, 2023, and January 5, 2024. emotional and academic performance were assessed by utilizing the version 4.0 of the Pediatric Quality of Life (PedsQL) questionnaire.

Results: The study's findings indicated that half of the study sample was female and that most of participants were in the age range of 9 to 12. The majority of patients (65.3%) have a family history of thalassaemia. The patient group with the highest percentage (59.4%) underwent three weekly blood transfusions. Academic and emotional achievement had respective general means of 1.87 and 1.86.

Conclusion: According to the current study, children with thalassaemia function moderately well academically and emotionally.

Recommendations: The study suggested offering thalassaemia education programs to parents in order to enhance their comprehension of thalassaemia management. programs that increase students' and teachers' awareness of this illness and urge educators to provide these kids with additional attention. In order to raise public awareness about thalassaemia, the media ought to focus on the disease.

Keywords: emotional, School performance, Children, Thalassaemia.

Corresponding Author: Ziyad Jameel Kasim Dahman ,MSc. Nineveh Health Department / Sinjar General Hospital

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Introduction:

Thalassemia is a group of hereditary blood illnesses caused by mutations in one or more of the genes that make up hemoglobin's globin chains (1). The creation of fragile aberrant red blood cells as a result of this synthetic abnormality hemolyzes easily and leads to chronic anemia (2). There are two main types of thalassemia: alpha thalassemia occurs when a gene or genes related to the alpha globin protein are missing or changed (mutated) and beta thalassemia occurs when similar gene defects affect production of the beta globin protein. Nearly all racial and geographic groups in the world have recorded cases of thalassemia. However, it appears to be more common in those from tropical and subtropical regions (3). The regions with greater rates of thalassemia are South East Asia, particularly Thailand and South China, Turkey, Iran, India, and the Mediterranean Sea. Its prevalence ranges from 5 to 15% in Greece and Italy (4). Worldwide, thalassemia results in over 56,000 pregnancies each year. Among them, 30,000 have β -thalassemia, 3,500 have alpha-thalassemia or hypertension (5). The severity of thalassemia is categorized as trait, minor, intermedia, and major. While certain kinds of thalassemia may cause mild or moderate symptoms, others might result in serious complications (6). Depending on the nature and severity of the illness, thalassemia can exhibit a range of clinical symptoms. Thalassemia commonly manifests as weakness, exhaustion, pale skin, bone abnormalities, slow growth, enlarged spleen and liver, dark urine, delayed puberty, and, in extreme situations, cardiac issues and deformed facial bones (7). A combination of physical examinations, laboratory testing, and medical history assessment is usually used to diagnose thalassemia (8). There are numerous laboratory tests available to identify and diagnose thalassemia, including: Amniotic fluid genetic testing, iron studies, hemoglobin electrophoresis, DNA analysis, and complete blood count (CBC) (9). Treatment for thalassemia varies depending on the kind and severity of the disease. Some need no treatment at all, or only sporadic care. Others need continuous treatment. When thalassemia is mild, there is little to no need for therapy because the signs and symptoms are usually insignificant. Patients with moderate to severe thalassemia need chelation therapy and regular blood transfusions (10). Without transfusions, patients with beta thalassemia major typically pass away before adolescence (11). Stem cell transplant (bone marrow transplant), is a treatment option for certain people, such as children born with severe thalassemia. It has the potential to eliminate the necessity for constant blood transfusions. By substituting healthy stem cells capable of producing normal hemoglobin for the damaged bone marrow. Gene therapy is the most recent development in the treatment of severe thalassemia (12). Children with thalassemia can live longer and have a better overall quality of life with treatment that helps reduce symptoms including weakness, exhaustion, and shortness of breath (13). Complications of thalassemia are based on your thalassemia type, severity, and required course of therapy (14). Moderate to severe thalassemia can cause iron excess, infection, bone abnormalities, enlarged spleen, decreased growth, and cardiac issues. Iron overload is among the most dangerous complications of thalassemia (15). The psychological effects of beta-thalassemia major and its consequences are profound, resulting in mental distress, despondency, and challenges with social integration (16). The main emotional damage caused by thalassemia is that the patient feels different from other people, which leads to feelings of anger, grief, poor sleep, fear, anxiety, and depression (17). This is the most frequent psychological issue that thalassemia patients face (18). Children with emotional and behavioral issues have trouble focusing and concentrating, have trouble remembering things, and act badly in school. These issues make it difficult for them to learn (19). Children with thalassemia have a variety of social challenges, including diminished social engagement, discord within the family, and dropping out of school. The main reasons why students leave school are either a lack of knowledge about the condition or incorrect responses and perspectives from parents (20). Due to its physical and psychological consequences on kids, thalassemia can have a variety of effects on academic achievement. Thalassemia patients may find it difficult to keep up friendships or deal with possible stigma because of their illness, which can have an adverse effect on their general well-being and social interactions at school (21). Frequent medical visits, blood transfusions, and other issues may prevent students from attending class, which could result in learning gaps (22). The best ways to manage thalassemia and lessen its effects on health and well-being are through early diagnosis, routine monitoring, and adherence to treatment guidelines (23).

Methodology:

was carried out on children with thalassemia who arrived at Al-Hadbaa Specialist Hospital in Mosul, Iraq, between November 1, 2023, and January 5, 2024. Each patient was selected at random, and parental signed and informed agreement was required before any patient could be involved in the study. Ages ranging from 3 to 12 years old, with or without a chronic illness, were the inclusion criteria. Children under the age of two or those above the age of twelve were excluded. The study was granted permission to be carried out at the hospital. Data were gathered using the Pediatric Quality of Life Inventory (PedsQL) version 4.0. The researcher developed the PedsQL questionnaire. The questionnaire was filled out either during an interview or by the children themselves if they were older than seven years old. For

younger children, parents filled out the questionnaire. There were two sections in the questionnaire. Sociodemographic information is presented in the first part. The second part was to examine the patients' quality of life. In this section, a five-point Likert scale is used to assess QoL (1= never, 2= almost , 3= sometimes, 4= often, 5 = always). The instruments and their contents were presented to a panel of fifteen (14) experts from various domains in order to validate the study's validity and content. Internal consistency of the instrument was assessed using Cronbach's alpha test, yielding a value of ($r = 0.873$). The data were analyzed using the Statistical Package of Social Sciences (SPSS) version 26.

Results

Table (1) Distribution of demographical variables of the study sample .

	Variables	F	%
Age	(3-5)	31	30.69
	(6-8)	29	28.71
	(9-12)	41	40.59
Total		101	100
Gender	Male	50	49.5
	Female	51	50.5
Total		101	100
Residence	Urban	71	70.3
	Rural	30	29.7
Total		101	100
Education	Student	68	67.3
	Non-student	33	32.7
Total		101	100
Family history of thalassemia	Positive	66	65.3
	Negative	35	34.7
Total		101	100
Is there a consanguinity between parents	Yes	71	70.3
	No	30	29.7
Total		101	100
Frequency of blood transfusion	Once a week	0	0
	Every 2 weeks	17	16.8
	Every 3 weeks	60	59.4
	Once a month	24	23.8
Total		101	100
Splenectomy undergone	Positive	9	8.9
	Negative	92	91.1
Total		101	100

Table 1 demonstrates that the age group of 9–12 years represented (40.59%) of the total number of children. The majority of the sample (50.5%) reported more girls than males, according to the data. It demonstrates that the largest proportion of participants (70.3%) lived in urban areas, and the study's findings about education showed that students made up 67.3% of the sample. The largest percentage of those who tested positive for thalassemia in their family history was 65.3%. According to the table, 70.3% of participants were born to consanguineous parents. When it came to blood transfusions, 59.4% of people received one once every three weeks. The table reveals that the majority of children (91%) had negative outcomes from their splenectomy.

Table(2) Classification of socio-economic classes according to Kuppuswamy's Score

class	Total score	F	%
Upper class	26-29	0	0
Upper middle class	16-25	4	4

Lower middle class	11-15	33	32.7
Upper lower class	5-10	63	62.4
Lower class	<5	1	1

Based on Kuppaswamy's scale, the study sample's socioeconomic classification is upper lower class, with a percentage of 62.4%. Table (2).

Table (3): Patients' responses to emotional domain questions:

Items	Rating	F	%	Mean	SD	RANK
Feeling afraid	Never	56	55.4	1.9208	1.23841	3
	Rarely	15	14.9			
	Sometimes	19	18.8			
	Often	4	4			
	Always	7	6.9			
Feeling sad	Never	30	29.7	2.2475	1.013963	2
	Rarely	26	25.7			
	Sometimes	37	63.6			
	Often	6	5.9			
	Always	2	2			
Having sleeping troubles	Never	73	72.3	1.4752	0.92297	4
	Rarely	16	15.8			
	Sometimes	6	5.9			
	Often	4	4			
	Always	2	2			
Having any concerns about what would happen in the future	Never	42	41.6	2.2574	1.23817	1
	Rarely	13	12.9			
	Sometimes	27	26.7			
	Often	16	15.8			
	Always	3	3			
Do you feel worried while waiting for the medical examination and analysis ?	Never	76	75.2	1.4653	0.93343	5
	Rarely	11	10.9			
	Sometimes	7	6.9			
	Often	6	5.9			
	Always	1	1			
General mean				1.8733		

Table 3. It appears the highest level statement was "Having any concerns about what would happen in the future" while the lowest level statement was (Do you feel worried while waiting for the medical examination and analysis)

Table (4): Patients' responses to school domain questions

Items	Rating	F	%	Mean	Sd.	RANK
You have difficulty in paying attention in class	Never	26	38.2	1.9706	0.91375	3
	Rarely	21	30.9			
	Sometimes	18	26.5			
	Often	3	4.4			
	Always	0	0			
Do you have a problem with school work ?	Never	47	69.1	1.4559	0.78100	5
	Rarely	13	19.1			
	Sometimes	6	8.8			

	Often	2	2.9			
	Always	0	0			
Missing school due to illness	Never	32	47.1	2.0000	1.13295	2
	Rarely	12	17.6			
	Sometimes	19	27.9			
	Often	2	2.9			
	Always	3	4.4			
Missing school due to going to doctor or hospital admission	Never	1	1.5	2.2941	0.62435	1
	Rarely	50	73.5			
	Sometimes	14	20.6			
	Often	2	2.9			
	Always	1	1.5			
Attaining less scholastic achievement level than before	Never	44	64.7	1.5882	0.90166	4
	Rarely	11	16.2			
	Sometimes	10	14.7			
	Often	3	4.4			
	Always	0	0			
General mean				1.8618		

According to Table 4's data, the item "missing school due to going to the doctor or hospital admission" has the highest level, while the question "do you have a problem with school work?" has the lowest level .

Table (5) statistics relationship between quality of life ,emotional domain and socio-demographic variables

Correlation type	socio-demographic variables	Correlation indicators	emotional domain
Spearman's rho	Age	Correlation Coefficient	.063
		P-value	.533
	Gender	Correlation Coefficient	-.053
		P-value	.598
	Residence	Correlation Coefficient	-.051
		P-value	.610
	Education	Correlation Coefficient	-.147
		P-value	.143
	Family history of thalassemia	Correlation Coefficient	.009
		P-value	.929
	Is there a consanguinity between parents	Correlation Coefficient	-.009
		P-value	.932
	Frequency of blood transfusion	Correlation Coefficient	-.686
		P-value	.034
	Splenoectomy undergone	Correlation Coefficient	.014
		P-value	.891
	Father's educational Level	Correlation Coefficient	-.116
		P-value	.246
	Mother's educational Level	Correlation Coefficient	-.034
		P-value	.735
	Profession as head of a family	Correlation Coefficient	-.593
		P-value	.045
	Monthly household income	Correlation Coefficient	-.110
		P-value	.272

According to Table (5), there is an inverse relationship between a child's emotional functioning and the frequency of blood transfusions, with a correlation coefficient of (-0.686). P-value less than 0.05 indicates that this correlation is significant

The emotional development of the child is inversely connected with the occupation of the family's head , as indicated by the correlation coefficient's value of (-0.593). At a P-value of less than 0.05, this association is significant.

Discussion

About table (1), Most of the participants (40.59%) fell into the 9–12 age range, according to the statistics. In terms of gender, women made up the largest percentage of samples (50.5). These data are in line with a prior study that revealed most patients belonged to the age group of 10 to 12 and were mostly female(24) . The majority of patients (70.3%) in the residency were from urban areas. These results are consistent with a study that found the majority of respondents were from urban areas(25). In terms of education, the bulk of the study sample (67.3%) consisted of students; this finding is consistent with another study that also indicated that most participants are students(26). The largest percentage (65.3%) of individuals had a positive family history of thalassemia, and the majority (59.4%) needed blood transfusions every three weeks. These results corroborate those of another study, which found that most participants had a history of thalassemia and that the largest proportion received blood transfusions every three weeks(27). The majority of participants (91.1%) gave negative feedback regarding their splenectomy. This outcome is consistent with research showing that the largest proportion of patients did not have a splenectomy(28) .In terms of socioeconomic position, table (2) showed that, in accordance with Kuppuswamy's scale, the majority of participants (62.4%) belonged to the upper lower class. The results of this study are consistent with those of another study, which indicated that most of the participants had lower socioeconomic status(29).According to the results, the phrase "do you feel worried while waiting for the medical examination and analysis" ranks lowest in emotional functioning, while "having any concerns about what would happen in the future" comes in first. Patients with thalassemia experience a range of emotional problems, including sadness, anxiety, and fear of the future. A tiny portion of participants experienced anxiety while they awaited medical exams; this could have been related to their fear of uncomfortable procedures like injections. These results corroborate a study that found children with thalassemia experience worry, sadness, and fear of the future(30) . Another study that found children with thalassemia experience emotional illnesses in addition to behavioral problems such fear, anxiety, loneliness, and insomnia, provided additional support for the current study(31) . According to the table, patients' emotional performance generally reflects a moderate quality of life (mean of 1.87)In relation to table (4), The first statement on the list, according to the results, is "missing school due to going to the doctor or hospital admission," while the last statement is "do you have a problem with school work. "It means that thalassemia may significantly affect kids' academic performance by causing disruptions in their schooling. Monthly blood transfusions, regular hospital stays for examinations, and the treatment of illnesses that require frequent absences from school may all contribute to this. These findings are consistent with a research that revealed frequent absences from school owing to hospital stays for treatment and monthly blood transfusions are two ways that thalassemia impacts children's ability to function in school(32) . Another study that found thalassemia significantly impairs children's academic performance and interferes with their schooling provided additional evidence for the current study(33).Table (5) indicates the frequency of blood transfusions and the emotional domain of the patient are inversely correlated. This implies that the child's emotional performance declines as the number of blood draws increases. Another study that found that receiving more blood transfusions has an impact on a patient's emotional functioning corroborated these findings(34-38). Additionally, the data indicated an adverse relationship between the emotional domain and the role of head of household. This implies that a child's emotional functioning will decrease with increasing father responsibilities. These findings were supported by a study that demonstrated how parents' employment status impacts their kids' thalassemic quality of life (39,40).

Conclusion:

The current study found that the majority of the sample (9–12 years old) lived in urban areas and made up the largest percentage of the sample. The bulk of children (67.3%) who had a history of thalassemia were students. For both physical functioning and academic achievement, the scores for emotional functioning and academic achievement were moderate. The study's findings indicated significant differences between a few sociodemographic characteristics and the emotional functioning of thalassemia-affected children

Recommendations:

The study suggested offering parental education sessions to help them better understand how to manage their child's thalassemia. In order to help thalassemic children cope with the sickness by minimizing self-defeating thoughts and fostering positive self-image, the current study suggested that psychological and social support should be provided. Programs to inform educators and students about this illness and encourage them to give these children extra attention were also suggested by the study.

References:

1. De Simone G, Quattrocchi A, Mancini B, di Masi A, Nervi C, Ascenzi P. Thalassemias: From gene to therapy. *Molecular Aspects of Medicine*. 2022 Apr 1;84:101028.
2. Kattamis A, Kwiatkowski JL, Aydinok Y. Thalassaemia. *The lancet*. 2022 Jun 18;399(10343):2310-24.
3. Begum R, Suryanarayana G, Rama BS, Swapna N. An overview of thalassemia: A review work. *Artificial Intelligence, Blockchain, Computing and Security Volume 1*. 2024:796-804.
4. Musallam KM, Lombard L, Kistler KD, Arregui M, Gilroy KS, Chamberlain C, Zagadailov E, Ruiz K, Taher AT. Epidemiology of clinically significant forms of alpha-and beta-thalassemia: A global map of evidence and gaps. *American journal of hematology*. 2023 Sep;98(9):1436-51.
5. Ceylan G, Özlü C. Current Status of Thalassemia Minor Studies. *BSJ Health Sci*. 2022;5(3):558-64.
6. Sudha S. The Use of RBC Indices to Differentiate between Iron Deficiency Anaemia and Beta Thalassemia Trait and To Find out the Proportion of Beta Thalassemia Trait among the Patients with Microcytic Hypochromic Anaemia (Doctoral dissertation, Madras Medical College, Chennai).
7. Iqbal AM, Sajjad M. Review article on thalassemia. *Medico Research Chronicles*. 2021 Jan 25;8(1):42-6.
8. Kaur G, Chatterjee T, Ahuja A, Sen A. Challenges in diagnosis of thalassemia syndromes. *Medical Journal Armed Forces India*. 2024 Mar 15.
9. Nair B, Mysorekar C, Srivastava R, Kale S. Towards thalassemia detection using optoelectronic measurements assisted with machine-learning algorithms: a non-invasive, pain-free and blood-free approach towards diagnostics. In 2024 IEEE Applied Sensing Conference (APSCON) 2024 Jan 22 (pp. 1-4). IEEE.
10. Patterson S, Singleton A, Branscomb J, Nsonwu V, Spratling R. Transfusion complications in thalassemia: patient knowledge and perspectives. *Frontiers in medicine*. 2022 Mar 1;9:772886.
11. Tarım HŞ, Öz F. Thalassemia major and associated psychosocial problems: a narrative review. *Iranian Journal of Public Health*. 2022 Jan;51(1):12.
12. Iftikhar R, Anwer F, Neupane K, Rafae A, Mahmood SK, Ghafoor T, Shahbaz N, Khan MA, Khattak TA, Shamshad GU, Rehman J. Allogeneic hematopoietic stem cell transplantation in aplastic anemia: current indications and transplant strategies. *Blood reviews*. 2021 May 1;47:100772.
13. Shah R, Badawy SM. Health-related quality of life with standard and curative therapies in thalassemia: A narrative literature review. *Annals of the New York Academy of Sciences*. 2024 Jan 25.
14. Motta I, Mancarella M, Marcon A, Vicenzi M, Cappellini MD. Management of age-associated medical complications in patients with β -thalassemia. *Expert review of hematology*. 2020 Jan 2;13(1):85-94.
15. Chiew JY, Thiruchelvam J, Rahmat MA, William SP, Shafien ZI, Banerjee KG. The key complications of beta thalassemia major: a review and update. *Int J Res Med Sci*. 2021 Jun;9:1846-52.
16. Tedone F, Lamendola P, Lopatriello S, Cafiero D, Piovani D, Forni GL. Quality of life and burden of disease in Italian patients with transfusion-dependent beta-thalassemia. *Journal of Clinical Medicine*. 2021 Dec 21;11(1):15.
17. Dhawan M, NT S, Kakkar S. Body image issues and self-concept dilemmas in adolescents living with thalassemia. *Psychology, Health & Medicine*. 2022 Mar 16;27(3):598-612.
18. Sarhan AL, Modallal S, Mahamid FA, Berte DZ. Depression symptoms and associated factors among thalassemia patients in the Palestinian Territories: a cross-sectional study. *Middle East Current Psychiatry*. 2022 Dec;29:1-8.
19. Tawarina I, Diba F. Emotional and Behavioral Aspects of Children with Thalassemia in Banda Aceh, Indonesia. *Age*. 2022;17(25):26-35.

20. Mariam I. The effect of family support, transfusion compliance and self-efficacy on the quality of life of children with thalassemia. *KnE Life Sciences*. 2022 Feb 7:102-12.
21. Arumsari DK, Cahyadi A, Andarsini MR, Efendi F, Wardhani AN, Larasati MC, Ugrasena ID. Psychosocial aspects in children with transfusion-dependent thalassemia. *Vulnerable Children and Youth Studies*. 2024 Jan 2;19(1):124-39.
22. Hokland P, Daar S, Khair W, Sheth S, Taher AT, Torti L, Hantawee pant C, Rund D. Thalassaemia—A global view. *British Journal of Haematology*. 2023 Apr;201(2):199-214.
23. Farmakis D, Porter J, Taher A, Cappellini MD, Angastiniotis M, Eleftheriou A. 2021 Thalassaemia international federation guidelines for the management of transfusion-dependent thalassemia. *Hemasphere*. 2022 Aug 1;6(8):e732.
24. Hadeel AI, Mea'ad KH, Ahmed BA. Health-related quality of life in children and adolescents with β -thalassemia major on different iron chelators in Basra, Iraq. *Journal of pediatric hematology/oncology*. 2016 Oct 1;38(7):503-11.
25. Kahtan H, Salma KJ, Al Ebrahimi AA. Psychosocial Aspects of School Age Children with Thalassemia Major in Al-Najaf Al-Ashraf. *kufa Journal for Nursing sciences*. 2016 Apr 25;6(1):26-34.
26. 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 Aug 1;25(4):211-4
27. Ayoub MD, Radi SA, Azab AM, Abulaban AA, Balkhoyor AH, Bedair SE, Aljaouni SK, Kari JA. Quality of life among children with beta-thalassemia major treated in Western Saudi Arabia. *Saudi Med J*. 2013 Dec 1;34(12):1281-6
28. Hossain MJ, Islam MW, Munni UR, Gulshan R, Mukta SA, Miah MS, Sultana S, Karmakar M, Ferdous J, Islam MA. Health-related quality of life among thalassemia patients in Bangladesh using the SF-36 questionnaire. *Scientific Reports*. 2023 May 12;13(1):7734.
29. Tuysuz G, Tayfun F. Health-related quality of life and its predictors among transfusion-dependent thalassemia patients. *Journal of pediatric hematology/oncology*. 2017 Jul 1;39(5):332-6.
30. Aljeesh YI. Quality of life among thalassemia children patients in the Gaza strip. *Am J Nurs Sci*. 2016;5:106.
31. Rasheed R, Nagpal M. Psychosocial issues in Parents and Patients with Thalassemia. *Dinkum Journal of Medical Innovations*. 2023;2(05):188-93.
32. Siddiqui SH, Ishtiaq R, Sajid F, Sajid R. Quality of life in patients with thalassemia major in a developing country. *JCPSP: Journal of the College of Physicians and Surgeons--Pakistan*. 2014;24(7):477.
33. Mahmoud MM, Helaly NM, Mohammed AA, Kamal MY. Quality Of Life of Children with Thalassemia in Alexandria. *Alexandria Scientific Nursing Journal*. 2019 Jul 1;21(1):69-80.
34. Ahmed MM, Ibrahim RM, Younis NM. Assessment of Sleep Habits among Nursing Students in Mosul City/Iraq. *Journal of Current Medical Research and Opinion*. 2024 May 1;7(05):2420-9.
35. Ahmed MM, Ali Hussein A, Youns NM. Knowledge, attitude, and practice (KAP) of voluntary blood donation among nurses in Mosul Teaching Hospital. *Mosul Journal of Nursing*. 2017 Jul 1;5(1):24-32.
36. Younis NM, Ibrahim RM, Ahmed MM. Apply Health Beliefs Model Towards of Substance Abuse. *Journal of Current Medical Research and Opinion*. 2024 May 4;7(05):2460-7.
37. Ahmed MM, Ibrahim RM, Younis NM. Assessment of Nursing Students' Attitudes Toward Obese Individuals. *Journal of Current Medical Research and Opinion*. 2024 May 4;7(05):2468-76.
38. Ahmed MM, Ibrahim RM, Younis NM. Nursing Students' Attitudes about Organ Donation in University of Mosul/Iraq. *Journal of Current Medical Research and Opinion*. 2024 May 1;7(05):2430-7.
39. Mikael NA, Al-Allawi NA. Factors affecting quality of life in children and adolescents with thalassemia in Iraqi Kurdistan. *Saudi medical journal*. 2018 Aug;39(8):799.
40. Adly RK, Mohamed AA, Abuelela IS, Mohammed MD. Family Management and Its Relation to Health-related Quality of Life among Thalassemic Children. *Minia Scientific Nursing Journal*. 2023 Dec 30;14(1):49-58.