Open Access Maced J Med Sci **electronic publication ahead of print,**
published on December 16, 2018 as https://doi.org/10.3889/oamjms.2018.367

ID Design Press, Skopje, Republic of Macedonia
Open Access Macedonian Journal of Medical Sciences.
https://doi.org/10.3889/oamjms.2018.367
eISSN: 1857-9655
Clinical Science

Adaptive Functioning and Psychosocial Problems in Children with Beta Thalassemia Major

Fatma A. Elzaree[1*], Manal A. Shehata[1], Maged A. El Wakeel[1], Inas R. El-Alameey[1], Mones M. AbuShady[1], Suzette I. Helal[2]

[1]Department of Child Health, National Research Centre, Cairo, Egypt; [2]Department of Children with Special Needs, Medical Research Division, National Research Centre, Cairo, Egypt

Citation: Elzaree FA, Shehata MA, El Wakeel MA, El-Alameey IR, AbuShady MM, Helal SI. Adaptive Functioning and Psychosocial problems in Children with Beta Thalassemia Major. Open Access Maced J Med Sci. https://doi.org/10.3889/oamjms.2018.367

Keywords: β-Thalassemia major; Children; Adaptive Functioning; Psychosocial problems

***Correspondence:** Fatma A Elzaree. Department of Child Health, National Research Centre, Cairo, Egypt. E-mail: fatmaalzaree@yahoo.com

Received: 23-Oct-2018; **Revised:** 07-Nov-2018; **Accepted:** 08-Nov-2018; **Online first:** 16-Dec-2018

Funding: The study was a part of a project supported financially by National Research Centre Egypt (Grant No. 11010145)

Competing Interests: The authors have declared that no competing interests exist

Abstract

BACKGROUND: Beta thalassemia major is considered one of the serious health problems and the commonest hemoglobinopathy in Egypt that creates a burden not only on health system but also on the affected families and children who become vulnerable to emotional, social, psychological and behavioural problems.

AIM: This study was designed to assess the psychosocial burden and the adaptive functioning in children with beta-thalassemia major.

SUBJECTS AND METHODS: A group of 50 children with thalassemia major and 50 normal children matched for age and sex were included in a case-control study. Vineland Adaptive Functioning Scale was used to assess the adaptive functions; while the Pediatric Symptom Checklist (PSCL) was used to assess psychosocial morbidity.

RESULTS: A group of 50 children aged 5-17 years old with thalassemia major, their mean age was 11.05 ± 3.8, showed a statistically significant lower total adaptive behaviour score and communication subscale score. All the mean values of adaptive behaviour for cases and controls were within the average values. Results from the PSCL revealed no significant difference between mean scores of children with thalassemia and controls. A score of attention domain was markedly higher in children with thalassemia. Internalising behaviour was the most dominant as it was detected in 10% of the patient group.

CONCLUSION: Thalassemic patients had a relatively mild affection for adaptive and psychosocial functioning that can be explained by social and medical support they receive, which may increase their competence and psychological wellbeing.

Introduction

β-Thalassemia major is considered the commonest hemoglobinopathy in the Mediterranean area particularly Egypt with an estimated carrier rate of 9-10.2% [1]. Registered cases of homozygous β-thalassemia in big centres of Egypt in 2006 up to Sept 2007 (n = 9912) [2]. From about 10,000 registered β-thalassemia cases and more than 20,000 non-registered cases; 95%of them are β-thalassemia major, and 5% are thalassemia intermediate or haemoglobin H disease [3]. β-thalassemia is a chronic condition, which put the huge psychosocial burden on the patient and his family [4], [5]. It is also considered a major health problem for the Public Health System of any country due to high expenses of treatment involving regular blood transfusions, iron chelation, frequent hospitalization and general medical follow up; that creates a burden not only on the health system but also on the affected families and their children, who become more liable to emotional, social, psychological and behavioural problems [6], [7]. The chronic illness usually affects the progress of growth and development. The chronic illness, treatment requirements, frequent hospitalisation and surgery, when necessary, all increase worries about physical appearance, interfere with the process of gaining independence and healthy relationships with parents and friends. Also, developmental issues complicate the children and adolescents' capability of being

responsible for managing their illness [8]. The drawbacks of the disease in many aspects of life become strongly evident during the school age and adolescence when children ask for independence [9] [10]. It has been related with psychosocial aspect and a significant negative effect on areas of school functioning because of the likelihood of physical deformity, growth retardation and delayed puberty besides the difficulty of management (such as regular transfusion and time-consuming iron chelation treatment) [11], [12].

This study was designed to assess the psychosocial burden and the adaptive functioning in children with β-thalassemia major. It is hypothesised that these patients will have higher psychosocial problems that may affect the adaptive functioning.

Subjects and Methods

A case-control study was done on 50 transfusion dependent β-thalassemia children compared with 50 normal children as controls, matched for age and sex recruited from the outpatient haematology clinic of El-Demerdash pediatric hospital-Ain Shams University and Child Health Clinic and Pediatric Neurology Clinic in Centre of Medical Excellence in National Research centre. Vineland Adaptive Functioning Scale was used to assess the adaptive functions; while the Pediatric Symptom Checklist (PSCL) was used to assess psychosocial morbidity. Written informed consent was taken from all patients' parents before enrollment in the study and after full explanation of their role in the study. The consent was approved by The Ethical Committee of The National Research Center and Ain Shams University under the registration number (16358).

All children in the patient and control groups were subjected to the following measures:

1. Vineland Adaptive Behavior Scales: Children's behaviours and ability to function adequately in the environment are measured using the Vineland Adaptive Behavior Scales, Arabic version [13], [14]. It is frequently used to measure, social profile and social-emotional skills. This test includes four items: Communication, Socialization, Daily Living Skills and Motor Skills (used for children below 6 years). The Vineland scale uses a semi-structured interview technique and can be administered by a trained interviewer to the guardian. The items that guide the interviewer on the survey form are shown in developmental sequence. The interviewer begins with items that correspond to mental or chronological age and establishes a basal and ceiling score before concluding the interview. Every item is calculated to know whether the individual performs the activity described: 2 = yes, the behaviour is usually performed; 1 = sometimes or partially; and 0 = no, the behaviour is never performed. The mean total score, according to the Arabic version, was classified as low adaptive behaviour (≤ 69), below average (70-84), average (85-115), above average (116-130), and high adaptive behaviour (≥ 131).

2. The Pediatric Symptom Checklist-17 (PSC-17): is a psychosocial screen designed to facilitate the recognition of cognitive, emotional, and behavioural problems so that proper interventions can be started as early as possible. The PSC-17 is composed of 17 items that are rated as "Never," "Sometimes," or "Often" present. A value of 0 is assigned to "Never", 1 to "Sometimes," and 2 to "Often". The total score is calculated by adding together the score for each of the 17 items. Items that are left unanswered are omitted (i.e., score equals 0). If four or more items are left unanswered, the questionnaire is considered invalid. A PSC-17 score of 15 or higher suggests the presence of major behavioural or emotional problems. To identify which type of mental health problems are present, fix the 3-factor scores on the PSC: γ The PSC-17 Internalizing Subscale (Cutoff 5 or more items), the Attention Subscale (Cutoff 7 or more items), and the Externalizing Subscale (Cutoff 7 or more items) [15].

Data were analysed using Statistical Program for Social Science (SPSS) version 20.0.

Quantitative data were described as mean± standard deviation (SD). Qualitative data were described as frequency and percentage.

Non-parametric data was represented by median and range. Data were analysed to test statistically significant difference between groups.

1. For quantitative data (mean ± SD), student t-test was used to make a comparison between 2 groups.

2. For qualitative data (frequency and proportion), the chi-square test was used.

3. The correlation coefficient was done to test the association between variables.

P is significant if ≤ 0.05 at a confidence interval of 95%.

Results

The study included 50 thalassemic patients, 25 males and 25females, with age range 5-17 years, their mean age was 11.05 ± 3.8, 30% of cases had mongoloid facies and 46% had hemosiderosis. The control group included 50 subjects age and sex matched. Most of the subjects were from the middle

social class. Socio-demographic and clinical criteria of the participants are shown in Table 1.

Table 1: Demographic and Clinical Characteristics Data of thalassemic patients and Control Children

Parameter	Patients Frequency of Mean ± SD	Controls Frequency of Mean ± SD	P
Sex			
Male	25 (50%)	25 (50%)	1.00
Female	25 (50%)	25 (50%)	
Patient Education			
Uneducated	4 (8%)	2 (4%)	
Read and Write	8 (16%)	8 (16%)	0.69
Educated	38 (76%)	40 (80%)	
Social Standard			0.002*
Low class	17 (34%)	14 (28%)	
Middle Class	33 (66%)	25 (50%)	
High class	---	11 (22%)	
School Performance			
Poor	18 (36%)	14 (28%)	0.203
Average	22 (44%)	18 (36%)	
Above average	10 (20%)	18 (36%)	
Current schooling			
Yes	14 (28%)	50 (100%)	0.000*
No	36 (72%)	0	
Previous bone fracture			
No	26 (52%)	42 (84%)	0.001*
Yes	24 (48%)	8 (16%)	
Bone Aches			0.001*
No	10 (20%)	44 (88%)	
Yes	40 (80%)	6 (12%)	
Growth Retardation			
No	29 (58%)	44 (88%)	0.001*
Yes	21 (42%)	6 (12%)	
Chelation Therapy			
No	2 (4%)	---	---
Yes	48 (96%)		
Ferritin level	3612.4 ± 2410.2	142.4 ± 69.6	0.000*
Hemoglobin	7.79 ± 1.28	12.43 ± 1.05	0.000*

*Highly significant test p < 0.01.

Comparison of adaptive behaviour scores between cases and controls are shown in Table 2. There is a statistically significant difference between the two groups in the total adaptive behaviour score and the communication subscale score. All the mean values of adaptive behaviour for cases and controls were within the average degrees, 38% and 24% of thalassemic patients had below average scores in communication and daily living skills respectively, while only 8% had below average social skills.

Results from the PSCL revealed no significant difference between mean scores of children with thalassemia and controls (p = 0.06). A score of attention domain was significantly higher in children with thalassemia (p = 0.000). Internalising behaviour was the most prevalent as it was detected in 10% of the patient group.

Table 2: Comparison between cases and controls as regard to adaptive behaviour mean scores and PSCL variables

	Group	N	Mean	Std. Deviation	T-test	P
Communication	Patients	50	86.10	22.81	-3.878	-.000*
	Controls	50	100.28	12.17		
Daily life activity	Patients	50	96.60	14.34	-1.771	0.080
	Controls	50	100.82	8.85		
Social	Patients	50	103.12	13.75	0.529	0.598
	Controls	50	101.90	8.74		
Total Adaptive behavior Score	Patients	50	95.24	12.04	-2.693	0.008*
	Controls	50	101.02	9.25		
Attention PSCL	Patients	50	3.22	2.10	3.68	0.000*
	Controls	50	2.02	0.93		
Internalization PSCL	Patients	50	1.72	1.99	1.529	0.13
	Controls	50	1.26	0.77		
Externalization PSCL	Patients	50	1.58	1.77	-1.33	0.18
	Controls	50	1.98	0.96		
Total PSCL	Patients	50	6.54	4.41	1.88	0.06
	Controls	50	5.26	1.9		

*Highly significant test p<0.01; PSCL: Pediatric symptoms checklist.

Table 3 is showing the correlation between adaptive behaviour scores and some studied clinical variables. Total adaptive behaviour score showed a significant positive correlation with the age of disease onset, while the social score had a positive association with patient education, school performance and age of disease onset. Daily life activity score had a significant positive association with age, the frequency of bone fractures and growth retardation.

Table 3: Correlation between adaptive behaviour scores and clinical variables (showing Correlation Coefficient)

	Communication	Daily Life Activity	Social	Total
Age	-0.114	0.294*	-0.115	0.006
Sex	-0.017	0.141	0.024	0.057
Patient Education	0.103	0.150	0.287*	0.226
Social Standard	0.192	-0.017	0.177	0.185
School Performance	0.173	-0.083	0.342*	0.202
Age of Onset	0.193	0.211	0.280*	0.318 *
Duration of Illness	-0.171	0.172	-0.222	-0.122
Duration of Chelation Therapy	-0.186	0.165	-0.235	-0.140
Growth Retardation	-0.025	0.355*	-0.183	0.054
Frequency of Bone Fracture	0.138	0.332*	-0.050	0.202
The frequency of Blood Transfusion /year	-0.170	-0.115	0.219	-0.074
Ferritin level	-0.013	0.148	0.078	0.082

*Significant at p < 0.05. level.

Correlation between psychological variables and clinical variables are presented in Table 4. There was a significant positive association between internalising behaviour and the age, duration of illness and duration of chelation therapy.

Table 4: Correlation between psychological variables and clinical variables (showing Correlation Coefficient)

	Internalization	Externalization	Attention	Total
Age	0.401*	-0.057	0.131	0.217
Sex	-0.163	0.034	0.125	-0.005
Patient Education	0.208	-0.087	0.149	0.132
Social Standard	0.005	-0.172	-0.188	-0.153
School Performance	-0.087	0.057	-0.029	-0.036
Age of Onset	0.067	0.105	0.110	0.123
Duration of Illness	0.347*	-0.078	0.078	0.160
Bone Aches	0.005	0.080	0.029	0.050
Duration of Chelation Therapy	0.340*	-0.100	0.064	0.142
Growth Retardation	-0.189	-0.096	0.144	-0.059
Mongoloid Facies	0.205	0.057	0.140	0.179
Frequency of Blood Transfusion /year	-0.007	-0.073	-0.059	-0.061
Ferritin level	-0.102	-0.163	-0.092	-0.151

*Significant at p < 0.05. level.

Discussion

This study investigated adaptive functioning and psychosocial burdens in children having β-thalassemia. Adaptive functioning includes age-appropriate behaviours that individuals need to complete every-day tasks efficiently and independently. These behaviours can include self-care activities, social skills, functional communication,

functional academics, and the use of community facilities [16]. Children complaining of chronic disease have a greater demand when needing to complete daily life tasks, which includes managing their illness [8].

In this study, the Vineland Adaptive Behavior Scale was used to evaluate the adaptive functioning in thalassemic patients in comparison with age and sex-matched normal children. The communication skills were the most affected, as 38% of diseased children had below average score, there was a significant difference in the mean score of communication among cases and controls. Also, a statistically significant difference was found between patients and controls in the whole adaptive behaviour score. However, all the mean values of adaptive behaviour items for cases and controls were within the average degrees of the general population.

In contrary to our findings, [17] reported that the thalassemic scores in the Vineland subscales were considered within the low-performance range. Moreover, they found a statistically significant difference between cases and controls regarding the domains of communication skills, daily activity skills and social skills. However, their results did not show a significant difference between cases and controls in the total adaptive behaviour scores.

The social interaction was the least affected domain in the current study, only 8% of cases indicated mild deficit, and it showed a significant association with patient education, school performance and age of onset of the disease. Similarly, socialisation was affected in18% of β-thalassemic children in a Syrian study; they explained their mild deficit in social interactions to be attributed to well-built family relations in the Arabic community [18]. In accordance, Hongally et al., [19] also reported that the patients believed that the disease did not affect their family or social relations. Also, Ali et al., [20] observed that thalassemic children had significantly higher scores in the social domain. A possible explanation for this could be that children with β-thalassemia receive more attention, making them feel better socially [21]. However, these findings were not similar to other studies [22], [23].

Also, neither scores of adaptive behaviour nor the PSCL correlated with ferritin levels in our study. In accordance, a study carried out by Cakaloz et al., [5] the mean score of the children behaviour checklist and the ferritin levels showed no correlation. They suggested that the social and psychological impacts of chronic illness contribute to the behavioural problems more than the ferritin level.

A recent study had supported the continuous clinical use of the PSC-17 as a screening tool for children's psychosocial functioning [24]. In a study carried out by Saini et al., [25] using PSCL, its whole mean score was observed to be higher in the thalassemia group in comparison with the controls. In contrary, our results from the PSCL revealed no significant difference between mean scores of β-thalassemia cases and controls except for the score of attention that was significantly higher in cases in comparison with controls ($p = 0.000$). In accordance, an Indonesian study in 2017 investigated attention and executive function in β-thalassemic patients, attention impairment was found in 26% of their sample children [26].

Attention is a primary cognitive function critical for perception, language, and memory, the mechanism of attention and executive impairment in beta-thalassemia children was thought to be the results of chronic hypoxia, which is known to be related chronic anaemia conditions [27]. On the contrary, previous researches indicated that β-thalassemic cases had more internalising and externalising problems as compared to healthy children [5], [28].

The results of our study found only 10% of β-thalassemic patients with internalising behaviours. In accordance, Di Palma et al., [29] explored the effect of β-thalassemia major on the psychosocial adjustment of adolescents; their data confirmed that teens and youth with thalassemia have psychosocial development problems in comparison to the same aged healthy controls. It was suggested that three main factors might play a beneficial role in the psychosocial adjustment of β-thalassemic patients. Firstly, a positive role could be achieved by the improvement in medical treatment. Secondly, the level of understanding of the problems of thalassemia in the general population is good, and this makes it better for subjects with this disease not be treated as abnormal. Thirdly, the optimistic attitude of the medical staff and their continuous and good relationship with the patients and their parents. These factors could have made the acceptance of the disease and the psychosocial adjustment of the cases and their families easier [29].

Similar to our data, Conatan et al., [30] reported that school problems were common in patients with thalassemia because of frequent hospitalisation, school absenteeism, and disease complications.

Psychological and social wellbeing is interrelated with competence and adaptation, thus improving positive mental health among children with a chronic disease means promoting adaptation in living with that illness. Several strategies are considered in improving mental health and adaptation including, encouraging ordinary life activities, increasing coping skills and encouraging use of social and family reinforcement [8].

In conclusion, in this study patient with β-thalassemia had a relatively mild affection of adaptive and psychosocial functioning, that can be explained by the strong effect of social and medical support they receive, which may increase their competence and

psychological wellbeing.

So, the study empathises the need to encourage psychosocial strategies in managing chronic illnesses.

Acknowledgements

The authors thank all the candidates who participated in the study and their parents.

References

1. Saboor M, Qudsia F, Qamar K, Moinuddin M. Levels of calcium, corrected calcium, alkaline phosphatase and inorganic phosphorus in patients with b-thalassemia major on subcutaneous deferoxamine. J Hematol Thromb Dis. 2014; (2):130.

2. El-Beshlawy A, Youssry I. Prevention of hemoglobinopathies in Egypt. Hemoglobin. 2009; 33(sup1):S14-20.

3. Egyptian Thalassemia Foundation. Bloodfacts, 2009. Retrieved from:http://cooleysanemia.org/index.php?option=com_content&view=article&id=222:thalassemia-around-the-world-egypt&catid=1:latest-news.

4. El-Gindi HD, Hassanin AI, Mostafa NO, El-Kassas GM, El Wakeel MA, El-Batal WH, et al. Oxidative DNA damage in β-thalassemic children. Med Res J. 2015; 14(2):41-6. https://doi.org/10.1097/01.MJX.0000472998.78235.d6

5. Cakaloz B, Cakaloz I, Polat A, Inan M, Oguzhanoglu NK. Psychopathology in thalassemia major. Pediatrics International. 2009; 51(6):825-8. https://doi.org/10.1111/j.1442-200X.2009.02865.x

6. Wong LP, George E, Tan JA. Public perceptions and attitudes toward thalassaemia: Influencing factors in a multi-racial population. BMC Public Health. 2011; 11(1):193. https://doi.org/10.1186/1471-2458-11-193 PMCid:PMC3076274

7. Shaligram D, Girimaji SC, Chaturvedi SK. Psychological problems and quality of life in children with thalassemia. The Indian Journal of Pediatrics. 2007; 74(8):727-30. https://doi.org/10.1007/s12098-007-0127-6

8. Huff MB, McClanahan KK, Omar HA. Chronic illness and mental health issues. 2010: 171.

9. Ismail A, Campbell MJ, Ibrahim HM, Jones GL. Health related quality of life in Malaysian children with thalassaemia. Health and Quality of life Outcomes. 2006; 4(1):39. https://doi.org/10.1186/1477-7525-4-39 PMCid:PMC1538578

10. Telfer P, Constantinidou G, Andreou P, Christou S, Modell B, Angastiniotis M. Quality of life in thalassemia. Annals of the New York Academy of Sciences. 2005; 1054(1):273-82. https://doi.org/10.1196/annals.1345.035

11. Mikelli A, Tsiantis J. Brief report: Depressive symptoms and quality of life in adolescents with b-thalassaemia. Journal of adolescence. 2004; 27(2):213-6. https://doi.org/10.1016/j.adolescence.2003.11.011

12. Monastero R, Monastero G, Ciaccio C, Padovani A, Camarda R. Cognitive deficits in beta-thalassemia major. Acta Neurologica Scandinavica. 2000; 102(3):162-8. https://doi.org/10.1034/j.1600-0404.2000.102003162.x

13. Sparrow SS, Balla DA, Cicchetti DV. Vineland-II adaptive behavior scales. AGS Publishing, 2005.

14. Alotibi B. The Vineland Adaptive Behavior Scales–the Saudi version. Arabian J Special Educ. 2004; 5.

15.Gardner W, Murphy M, Childs G et al. The PSC-17: a brief pediatric symptom checklist including psychosocial problem subscales: a report from PROS and ASPN. Ambulatory Child Health. 1999; 5:225–236.

16. Ditterline J, Banner D, Oakland T, Becton D. Adaptive behavior profiles of students with disabilities. Journal of Applied School Psychology. 2008; 24(2):191-208. https://doi.org/10.1080/15377900802089973

17.Sabry N & Salama KH. Cognitive Abilities, Mood Changes and Adaptive Functioning in Children with β Thalassaemia. Current Psychiatry. 2009; 16(3):244-54).

18. Gharaibeh H, Amarneh BH, Zamzam SZ. The psychological burden of patients with beta thalassemia major in Syria. Pediatrics international. 2009; 51(5):630-6. https://doi.org/10.1111/j.1442-200X.2009.02833.x PMid:19419527

19. Hongally C, Benakappa AD, Reena S. Study of behavioral problems in multi-transfused thalassemic children. Indian journal of psychiatry. 2012; 54(4):333. https://doi.org/10.4103/0019-5545.104819 PMid:23372235 PMCid:PMC3554964

20. Ali SS, Tarawah AM, Al-Hawsawi ZM, Zolaly MA, Turkustani W. Comprehensive patient care improves quality of life in transfusion dependent patients with β-thalassemia. Saudi medical journal. 2015; 36(5):575. https://doi.org/10.15537/smj.2015.5.10442 PMid:25935178 PMCid:PMC4436754

21. Alzahrani RA, Almutairi OM, Alghoraibi MS, Alabdulwahed MS, Abaalkhail MK, Alhawish MK, Alosaimy MT. Quality of life in transfusion-dependent thalassemia patients. Journal of Taibah University Medical Sciences. 2017; 12(5):465-70. https://doi.org/10.1016/j.jtumed.2017.05.006

22. Pruthi GK, Mohta A. Psychosocial burden and quality of life in parents of children with anorectal malformation. Journal of Indian Association of Pediatric Surgeons. 2010; 15(1):15. https://doi.org/10.4103/0971-9261.69135 PMid:21180498 PMCid:PMC2998661

23. Naderi M, reza Hormozi M, Ashrafi M, Emamdadi A. Evaluation of mental health and related factors among patients with beta-thalassemia major in South East of Iran. Iranian journal of psychiatry. 2012; 7(1):47. PMid:23056118 PMCid:PMC3395967

24. Murphy JM, Bergmann P, Chiang C, Sturner R, Howard B, Abel MR, Jellinek M. The PSC-17: subscale scores, reliability, and factor structure in a new national sample. Pediatrics. 2016; 138(3):e20160038. https://doi.org/10.1542/peds.2016-0038 PMid:27519444 PMCid:PMC5005018

25. Saini A, Chandra J, Goswami U, Singh V, Dutta AK. Case control study of psychosocial morbidity in β Thalassemia Major. The Journal of pediatrics. 2007; 150(5):516-20. https://doi.org/10.1016/j.jpeds.2007.01.025 PMid:17452227

26. Gamayani U, Gartika P, Meidha LP, Cahyani A, Aminah SA, Panigoro R. Attention and Executive Function Impairment in Children with Beta-Thalassaemia Major. Journal of Biomedical and Clinical Sciences (JBCS). 2018; 2(2):57-9.

27. Steen RG, Miles MA, Helton KJ, Strawn S, Wang W, Xiong X, Mulhern RK. Cognitive impairment in children with hemoglobin SS sickle cell disease: relationship to MR imaging findings and hematocrit. American Journal of Neuroradiology. 2003; 24(3):382-9. PMid:12637286

28. Jain M, Bagul AS, Porwal A. Psychosocial problems in thalassemic adolescents and young adults. Chronicles of young scientists. 2013; 4(1):21. https://doi.org/10.4103/2229-5186.108800

29. Palma A, Vullo C, Zani B, Facchini A. Psychosocial integration of adolescents and young adults with thalassemia major. Annals of the New York Academy of Sciences. 1998; 850(1):355-60. https://doi.org/10.1111/j.1749-6632.1998.tb10493.x PMid:9668558

30. Canatan D, Ratip S, Kaptan S, Cosan R. Psychosocial burden of β-thalassaemia major in Antalya, South Turkey. Social science & medicine. 2003; 56(4):815-9. https://doi.org/10.1016/S0277-

9536(02)00080-1