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Received: 25.8.2008 **Accepted: 28.10.2008**

Original Article

Associates of poor physical and mental health-related quality of life in beta thalassemia-major/intermedia

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Abstract

BACKGROUND: Using two logistic regression models, we determined the associates of poor physical and mental health related quality of life (HRQoL) among beta thalassemia patients.

METHODS: In this cross-sectional study which was conducted during 2006 and 2007 in outpatient adult thalassemia clinic, Blood Transfusion Organization, Tehran, Iran, Short Form 36 (SF-36) was used for measuring HRQoL in 179 patients with beta thalassemia (major/intermedia). We determined scores higher than third quartiles of obtained PCS and MCS scores as the cutoff points of good HRQoL. Poor HRQoL was defined scores lower than first quartiles of obtained PCS and MCS scores. Two distinct logistic regression models were used to derive associated variables including demographic, clinical, and psychological factors.

RESULTS: The regression models suggested that poor physical HRQoL was positively associated with somatic comorbidities (OR = 1.472, CI = 1.021-2.197, p = 0.048) and depression score (OR = 8.568, CI = 2.325-31.573, p = 0.001). The variables that were associated with poor mental HRQoL were anxiety score (OR = 9.409, CI = 1.022-89.194, p = 0.049) and depression score (OR = 20.813, CI = 4.320-100.266, p < 0.001).

CONCLUSIONS: Depression is associated with both poor physical and mental HRQoL among patients with major/intermedia beta thalassemia, however somatic comorbidities and anxiety are associated with poor physical and mental HRQoL, respectively.

KEYWORDS: Thalassemia, Health Related Quality of Life, Anxiety, Depression, Somatic Comorbidities.

JRMS 2009; 14(5): 349-355

Beta thalassemia is the most common form of hemolytic anemia,[1] and every year approximately 60,000 thalassaemic babies are born worldwide.[2] With the availability of better transfusion regimen, iron chelation therapy, proper management of complications and good supportive care, it is now possible for a thalassemic patient to have a near normal life span with a good health related quality of life (HRQoL).[1] As a result, attention has shifted to the well being of the patients with thalassemia.[3]

Health-related quality of life (HRQoL) refer to the physical and mental aspects of health, seen as different areas that are influenced by human's experiences, beliefs, expectations, and perceptions.[4] Due to its problems related to career, finding partners, establishing a family (due to infertility), and waning social support,[5] patients with transfusion dependent thalassemia tend to have impaired HRQoL. Transfusion-independent thalassemia patients also suffer serious impairment in QoL.[6] HRQoL should now be considered an important index

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of effective health care in thalassemia, however there is very little published work on evaluation of QoL in thalassemia.[7]

In the present study, we sought to determine the associated factors of poor HRQoL among patients with intermedia/major beta thalassemia.

Methods

In this cross-sectional study, 200 consecutive patients with intermedia/major beta thalassemia with a minimum age of 18 years old from both genders were invited. Exclusion criteria were association with mental retardation or handicap. The patients were recruited between 2006 and 2007 from the outpatient adult thalassemia clinic, Blood Transfusion Organization, Tehran, Iran. The study was approved by the Ethical Committee on Human Research of Baqiyatallah University of Medical Sciences and prior to taking part written informed consent was obtained from all participants.

A detailed, structured interview was conducted for each patient and trained research assistants helped them completing the checklist and health questionnaires. The checklist contained demographic data (age, gender, marital status, living place, weight, height, monthly family income and patients' educational status).

Somatic Comorbidities

Somatic comorbidities were assessed by using Ifudu score. The Ifudu comorbidity scale is a numerical index for monitoring the patients with chronic illnesses and assessing the medical comorbidity. Except hematologic problems (excluding anemia) and psychological disorders which were not considered in this study, this scale evaluates: 1) ischemic heart disese, 2) non-ischemic heart disease, 3) lung disease, 4) neurologic, 5) muskuloskeletal, 6) rheumatoid condition, 7) ophthalmological, 8) urogenital, 9) infectious, 10) biliary conditions and 11) limb amputation. This modified version of Ifudu have a score between 0 and 33, because each item is scored from 0 (comorbidity absent) to 3 (severe comorbidity). The higher is the index, the greater is the comorbidity.[8]

Hospital Anxiety and Depression Score (HADS)

Symptoms of anxiety and depression were assessed using the translated version of Hospital Anxiety Depression Scale (HADS). HADS has been previously validated for the Iranian population.[9] The HADS contains 14 items and two subscales: anxiety and depression. Each item is scored from 0 to 3, giving maximal scores of 21 for anxiety and depression.[10] Scores that are higher than or equal to 11 on either subscale are considered a significant case of psychological morbidity (clinical caseness).[11]

Health Related Quality of Life

HRQoL of patients was measured using the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36).[12] The SF-36 is a generic multidimensional measure of HRQoL that contains eight subscales representing physical functioning, social functioning, role limitations due to physical health problems, role limitations due to emotional problems, mental health, vitality, bodily pain and general health perceptions. Higher scores of each subscale (0-100) indicating better HRQoL. The physical and mental components of eight scales were combined into physical component summary (PCS) and mental component summary (MCS) scores.[13] A total SF-36 score has been also introduced and used previously.[14,15] The SF-36 has proved reliable and valid in Iranian general population [16] and also Iranian thalassemic patients.[17]

Statistical Analysis

In this study, we used PCS and MCS scores separately at the dependent variable; total SF-36 and subscales scores were not included. The SF-36 questionnaires were completed by the patients, but in some cases an interviewer assistant was needed. To define what SF-36 scores signified a poor HRQoL, we needed two

cutoff points for SF-36 scores to define poor and good HRQoL. We defined scores higher than third quartiles of obtained PCS and MCS scores as the cutoff points for good HRQoL. Poor HRQoL was defined scores lower than first quartiles of obtained PCS and MCS scores.

HRQoL Prediction

Using the cutoff values calculated in the previous step, the SF-36 scores of the patients were converted to a binominal outcome variable (poor/good HRQoL). Forward (likelihood ratio) logistic regression model was used to quantify associations between the assumed predictor variables and this binominal outcome variable in either of physical and mental components. A logistic regression model involves some independent (predictor) variables (nominal or continuous) that may be used to predict a dependent (outcome) binominal variable. The input variables to both models (assumed predictors of HRQoL) included age (year), gender (female = 0, male = 1), marital status (married = 0, single = 1), level of education (above high school diploma = 0, below high school diploma = 1), living place (village = 0, city =1), monthly family income (below 300 US$ = 0, above 300 US$ = 1), duration of disease (month), thalassemia type, HCV (negative = 0, positive = 1), desferal received (no = 0, yes = 1), Body Mass Index (BMI) (< 30 = 0, ≥ 30 = 1), somatic comorbidities (0-33), anxiety (score 0-21) and depression (score 0-21). The significance level for each variable's entry to the model was set at 0.05.

All statistical analyses were performed using SPSS version 13.0 for Windows. Descriptive indices including frequency, percentage, mean, standard deviation (SD), median, and the first and third quartiles (Q1 and Q3) were used to express data. The input variables were compared between two groups (good/poor physical or mental HRQoL) using the Chi square test for categorical variables and the student t test or the Mann-Whitney U test for continuous variables, as appropriate. P values less than 0.05 were considered significant.

Results

From the 200 invited patients, 172 agreed to participate.

The mean (SD) scores of different subscales and summary scores of SF-36 among all patients are presented in table 1. From the 172 patients, 47 patients had poor and 46 patients had good physical HRQoL; 45 patients had poor and 46 patients had good mental HRQoL.

Table 1. Mean and standard deviation of SF-36 subscale and summary scores

	Mean	Standard deviation
Physical function	76.8	23.6
Social functioning	75.0	23.4
Role limitations due to physical health problems	73.3	26.6
Role limitations due to emotional problems	73.3	24.5
Mental health	56.7	17.4
Vitality	72.1	25.6
Bodily pain	56.4	17.0
General health perceptions	59.2	21.1
Physical component summary score	69.4	17.8
Mental component summary score	61.3	16.4
Total score	67.6	16.7

The patients with poor and good physical and mental HRQoL are compared by means of gender, somatic comorbidities and thalassemia type and desferal recieve, in table 2.

Table 2. Comparison of different chronic conditions among patients with good and poor HRQoL

	PCS Mean ± SD			MCS Mean ± SD		
	Poor	Good	Sig.	Poor	Good	Sig.
Age	27.0 ± 8.6	23.5± 4.6	0.016	26.3 ± 6.8	23.8 ± 6.8	0.075
Comorbidity index	16.7 ± 4.4	15.0 ± 1.9	0.019	16.3 ± 4.2	14.4 ± 1.9	0.006
Anxiety score	10.0 ± 3.9	5.8 ± 3.3	< 0.001	11.2 ± 3.2	4.6 ± 2.7	0.000
Depression score	8.4 ± 4.4	2.8 ± 2.1	< 0.001	9.3 ± 3.7	2.6 ± 2.1	0.000

Table 3. The summary of regression analysis of physical and mental HRQoL scores

	PCS %			MCS %		
	Poor	**Good**	**Sig.**	**Poor**	**Good**	**Sig.**
Sociodemographic data						
Level of education (cademic degree)	14.9%	23.9%	0.698	17.8%	22.9%	0.553
Female	61.7%	50%	0.256	55.6%	51.6%	0.666
Clinical data						
Major thalassemia	75.5%	76.2%	0.733	78.9%	74.1%	0.516
Desferal	83.7%	81.3%	0.549	87.8%	87.50%	0.628
Somatic comorbidities*						
Ischemic heart disese	6.4%	0%	0.125	6.7%	0%	0.109
Non-ischemic heart disease	4.3%	2.2%	0.508	4.4%	0%	0.231
Lung disease	8.5%	2.2%	0.187	4.4%	0.%	0.231
Neurologic	8.5%	0.%	0.061	4.4%	0.%	0.231
Muskuloskeletal	21.3%	0.%	0.001	17.8	0.%	0.002
Rheumatoid condition	29.8%	0%	< 0.001	28.9%	2.1%	< 0.001
Ophtalmological	19.1%	0%	0.001	15.6%	2.1%	0.024

* Urogenital, infectious, biliary conditions and limb amputation were not seen in patients.

Regressors of Poor Physical HRQoL

The regression models suggested that poor physical HRQoL was positively associated with somatic comorbidities (OR = 1.472, CI = 1.021-2.197, p = 0.048) and depression score (OR = 8.568, CI = 2.325-31.573, p = 0.001).

Regressors of Poor Mental HRQoL

The variables associated poor mental HRQoL were anxiety score (OR = 9.409, CI = 1.022-89.194, p = 0.049) and depression score (OR = 20.813, CI = 4.320-100.266, p < 0.001). (Table 3, Table 4).

Discussion

According to our study, among patients with intermedia/major beta thalassemia, depression symptoms are associated with HRQoL, in both physical and mental aspects. High somatic comorbidities and anxiety are also linked with decreased HRQoL in physical and mental aspects of HRQoL, respectively.

The only previous study in this field has been conducted on 39 children with thalassemia and has shown that psychological status is a significant predictor of impaired HRQoL. The authors suggested the recognition and management of the psychological problems accompany poor HRQoL in thalassemia.[5]

The finding of this study about negative impact of anxiety and depression on HRQoL in thalassemic patients is consistent with previous studies in other chroinc conditions.[18-23] It has been demonstrated that individuals with comorbid medical illness and anxiety have significantly greater impairment with HRQoL than patients without anxiety.[24,25]

Table 4. The summary of multiple logistic regression analysis for poor physical and mental HRQoL

		Sig.	**Exp(B)**	**95.0% C.I. for EXP(B)**	
Poor physical HRQoL				**Lower**	**Upper**
	Somatic comorbidities	.048	1.472	1.021	2.197
	Depression score	0.001	8.568	2.325	31.573
Poor mental HRQoL					
	Depression score	< 0.001	20.813	4.320	100.266
	Anxiety score	.049	9.405	1.022	89.194

Regarding the possible mechanism of the link between anxiety and depression with HRQoL, we can point to the evidences which have documented their negative impact on functioning in a number of areas, including work functioning, social functioning, and health.[26,27] HRQoL among depressed adults is more impaired than those with diabetes, hypertension and chronic lung disease.[28] Anxiety is also associated with negative outcomes, including decreased work productivity,[29] impaired work, family and social functioning,[30] physical disability,[31,32] and even mortality.[33]

Thalassemia has a great negative impact on the well being of the patients. Preserving good HRQoL is one of the major targets in clinical management of thalaeemic patients, and the importance of assessing HRQoL in thalassemic patients has been highlighted in different studies.[6,7,34] It is believed that these assessments can provide complementary clinical information, which can significantly help the hematologists about the patient's health status.

Very limited research has been conducted in the field of HRQoL in thalassemia. As a result, the impact of thalassemia major and thalassemia intermedia and their associated complications on HRQoL is largely unknown.[6] However thalassemic patients begin blood transfusions, and most use desferrioxamine, but iron-related complications, including life-threatening ones such as heart disease, affect patients and limit patients life.[35] The most commonly reported affected domains in thalassemia patients were feelings such as anxiety, depression, and concern of overall health status or indications of recent deterioration in health. In contrast with previous beliefs, transfusion-independent thalassemia patients also suffer serious impairment in QoL. Presented data suggest that all patients with thalassemia undergo QoL assessment so that interventions focused on affected domains can be implemented.[6]

A previous study reported a higher total neuroticism, anxiety, phobia, somatic anxiety, obsession, and depression in thalassemic patients than controls. The interview with parents of thalassemic adolescents exposed various behavioral problems in these adolescents. Thalassemic adolescents were having higher scores in neuroticism. Some behavioral problems are also found to exist along with neurotic manifestations. There remains a need to improve the management of thalassemia in terms of psychological aspects in order to improve the mental health of this group.[36]

Some studies demonstrate that 80% of thalassemia major patients at least suffer from one psychiatry disorder.[37] Depression has been listed as a major cause of morbidity in beta-thalassemia.[38] Rate of depression in thalassemic patients is higher than the controls, and it has been suggested that all patients with thalassemia major and intermedia should undergo depression assessment so that suitable interventions can be implemented.[39] High rate of depression have been also reported in other documents.[40,41]

Conclusions

Those who get affected will face many stresses in their whole life, including frequent blood samplings for laboratory tests, multiple transfusions and frequent subcutaneous injections of iron chelator drugs, which altogether will make the patient susceptible to psychological burden namely depression and anxiety.[39-41] Moreover, restrictions in social activities, fear, pain and worries about diagnostic procedures, which always induce stress, are other predisposing factors for anxiety and depression in these population.[42]

According to the literature, the depression needs attention in thalassemia, because, thalassemia and depression are linked.[43] Other psychological aspects of the disease also needs attention, because the psychological burden is not limited to depression, however self-image, quality of life and the way of coping with the thalassemic patients may be impaired. Self-image is found to be low with feeling of insufficiency and being exposed to vulnerability in most of patients. Personality characterized in-

cludes somatization (SOM), depression (DEP) and obsessive-compulsive traits. The principal coping strategy used seems to be escape-avoidance.[44]

Literature has suggested that all patients with thalassemia undergo QoL assessment so that interventions focused on affected domains can be implemented.[6] In this approach, current study shed more light regarding the anxiety and depression and somatic comorbidities in patients with intermedia/major beta thalassemia, on this limiting chronic condition.

Conflict of Interests

Authors have no conflict of interests.

Authors' Contributions

AA participated in most of the experiments and provided assistance in the design of the study. BH carried out the design and coordinated the study. SMA carried out the design and coordinated the study**.** MML participated in design and data analysis. SA carried out the design and edited the manuscript. He also participated in data analysis. All authors have read and approved the content of the manuscript.

References

1. Dubey AP, Parakh A, Dublish S. Current trends in the management of beta thalassemia. Indian J Pediatr 2008:75(7):739-43.
2. Weatherall DJ, Clegg JB. Inherited haemoglobin disorders: an increasing global health problem. Bull World Health Organ 2001;79(8):704-12.
3. Musallam K, Cappellini MD, Taher A. Challenges associated with prolonged survival of patients with thalassemia: transitioning from childhood to adulthood. Pediatrics 2008;121(5):e1426-9.
4. Testa MA, Simonson DC. Assessment of quality-of-life outcomes. N Engl J Med 1996:334(13):835-40.
5. Shaligram D, Girimaji SC, Chaturvedi SK. Psychological problems and quality of life in children with thalassemia. Indian J Pediatr 2007;74(8):727-30.
6. Pakbaz Z, Treadwell M, Yamashita R, Quirolo K, Foote D, Quill L, et al. Quality of life in patients with thalassemia intermedia compared to thalassemia major. Ann N Y Acad Sci 2005;1054:457-61.
7. Telfer P, Constantinidou G, Andreou P, Christou S, Modell B, Angastiniotis M. Quality of life in thalassemia. Ann N Y Acad Sci 2005;1054:273-82.
8. Ifudu O, Paul HR, Homel P, Friedman EA. Predictive value of functional status for mortality in patients on maintenance hemodialysis. Am J Nephrol 1998:18(2):109-16.
9. Montazeri A, Vahdaninia M, Ebrahimi M, Jarvandi S. The Hospital Anxiety and Depression Scale (HADS): translation and validation study of the Iranian version. Health Qual Life Outcomes 2003;1:14.
10. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. Acta Psychiatr Scand 1983;67(6):361-70.
11. Puhan MA, Frey M, Büchi S, Schünemann HJ. The minimal important difference of The Hospital Anxiety and Depression Scale in patients with chronic obstructive pulmonary disease. Health Qual Life Outcomes 2008;6:46.
12. Ware JE , Jr, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. Med Care 1992;30(6):473-83.
13. Ware JE, Jr, Kosinski M, Bayliss MS, McHorney CA, Rogers WH, Raczek A. Comparison of methods for the scoring and statistical analysis of SF-36 health profile and summary measures: summary of results from the Medical Outcomes Study. Med Care 1995;33(4 Suppl):AS264-79.
14. Tavallaii SA, Fathi-Ashtiani A, Nasiri M, Assari S, Maleki P, Einollahi B. Correlation between sexual function and postrenal transplant quality of life: does gender matter? J Sex Med 2007;4(6):1610-8.
15. Khedmat H, Karami GR, Pourfarziani V, Assari S, Rezailashkajani M, Naghizadeh MM. A logistic regression model for predicting health-related quality of life in kidney transplant recipients. Transplant Proc 2007;39(4):917-22.
16. Montazeri A, Goshtasebi A, Vahdaninia M, Gandek B. The Short Form Health Survey (SF-36): translation and validation study of the Iranian version. Qual Life Res 2005;14(3):875-82.
17. Jafari H, Lahsaeizadeh S, Jafari P, Karimi M. Quality of life in thalassemia major: reliability and validity of the Persian version of the SF-36 questionnaire. J Postgrad Med 2008;54(4):273-5.

18. Smith EM, Gomm SA, Dickens CM. Assessing the independent contribution to quality of life from anxiety and depression in patients with advanced cancer. Palliat Med 2003;17(6):509-13.
19. Redeker NS, Lev EL, Ruggiero J. Insomnia, fatigue, anxiety, depression, and quality of life of cancer patients undergoing chemotherapy. Sch Inq Nurs Pract 2000;14(4):275-90, 291-8.
20. Sareen J, Jacobi F, Cox BJ, Belik SL, Clara I, Stein MB. Disability and poor quality of life associated with comorbid anxiety disorders and physical conditions. Arch Intern Med 2006;166(19):2109-16.
21. Kullowatz A, Kanniess F, Dahme B, Magnussen H, Ritz T. Association of depression and anxiety with health care use and quality of life in asthma patients. Respir Med 2007;101(3):638-44.
22. Arapaslan B, Soykan A, Soykan S, Kumbasar H. Cross-sectional assessment of psychiatric disorder in renal transplantation patients in Turkey: a preliminary study. Transplant Proc 2004;36(5):1419-21.
23. Kollner V, Einsle F, Schade I, Maulhardt T, Gulielmos V, Joraschky P. The influence of anxiety, depression and post traumatic stress disorder on quality of life after thoracic organ transplantation. Z Psychosom Med Psychother 2003;49(3):262-74.
24. Janssens AC, van Doorn PA, de Boer JB, Kalkers NF, van der Meche FG, Passchier J, et al. Anxiety and depression influence the relation between disability status and quality of life in multiple sclerosis. Mult Scler 2003;9(4):397-403.
25. Sherbourne CD, Wells KB, Meredith LS, Jackson CA, Camp P. Comorbid anxiety disorder and the functioning and well-being of chronically ill patients of general medical providers. Arch Gen Psychiatry 1996;53(10):889-95.
26. Mendlowicz MV, Stein MB. Quality of life in individuals with anxiety disorders. Am J Psychiatry 2000;157(5):669-82.
27. Wells KB, Stewart A, Hays RD, Burnam MA, Rogers W, Daniels M, et al. The functioning and well-being of depressed patients. Results from the Medical Outcomes Study. JAMA 1989;262(7):914-9.
28. Wells KB, Sherbourne CD. Functioning and utility of current health of patients with depression or chronic medical conditions in managed, primary care practices. Arch Gen Psychiatry 1999;56(10):897-904.
29. Kessler RC, Frank RG. The impact of psychiatric disorders on work loss days. Psychol Med 1997;27(4):861-73.
30. Olfson M, Shea S, Feder A, Fuentes M, Nomura Y, Gameroff M, et al. Prevalence of anxiety, depression and substance use disorders in an urban general medicine practice. Arch Fam Med 2000;9(9):876-83.
31. Brenes GA, Guralnik JM, Williamson JD, Fried LP, Simpson C, Simonsick EM, et al. The influence of anxiety on the progression of disability. J Am Geriatr Soc 2005;53(1):34-9.
32. Brenes GA, Penninx BW, Judd PH, Rockwell E, Sewell DD, Wetherell JL. Anxiety, depression and disability across the lifespan. Aging Ment Health 2008;12(1):158-63.
33. Brenes GA, Kritchevsky SB, Mehta KM, Yaffe K, Simonsick EM, Ayonayon HN, et al. Scared to death: results from the Health, Aging, and Body Composition study. Am J Geriatr Psychiatry 2007;15(3):262-5.
34. Sachdeva, A, Yadav SP, Berry AM, Kaul D, Khanna VK. Assessment of quality of life in thalassemia major. Int J Hematol 2002;76(1 Suppl):4.
35. Caro JJ, Ward A, Green TC, Huybrechts K, Arana A, Wait S, et al. Impact of thalassemia major on patients and their families. Acta Haematol 2002;107(3):150-7.
36. Moorjani JD, Issac C. Neurotic manifestations in adolescents with thalassemia major. Indian J Pediatr 2006;73(7):603-7.
37. Aydin B, Yapavk I, Akarsu D, Okten N, Ulgen M. Psychosocial aspects and psychiatric disorders in children with thalassemia major. Acta Paediatr Jpn 1997;39(3):354-7.
38. Borras L, Constant EL. Depression and beta thalassemia: a genetic link? Acta Neuropsychiatrica 2007;19(2):134.
39. Gaffari Saravi V, Zarghami M, Tirgari A, Ebrahimi E. Relationship between thalassemia and depression. Res J Biol Sci 2007;2(3):280-4.
40. Gholizadeh, L. Evaluating and comparison of psyco-social problems of adolescents with thalassemia major coming to medical centers with healthy adolescents from guidance and high schools. First International Congress of Thalassemia Complications In Adolescents; 2002 May 1-3; Imam Khomeini Hospital, Tehran, Iran.
41. Asadollahi G, Ghanei M, A'zami M, Pezeshki M. Survey of the prevalence rate of behavioral disorders among thalassemic patients in Esfahan. Med J Islamic Republic Iran 1996;10(1):27-30.
42. Bennett DS. Depression among children with chronic medical problem: a meta-analysis. J Pediatr Psychol 1994;19(2):149-69.
43. Marvasti VE, Dastoori P, Karimi M. Is beta-thalassemia trait a risk factor for developing depression in young adults? Ann Hematol 2006;85(12):873-4.
44. Messina G, Colombo E, Cassinerio E, Ferri F, Curti R, Altamura C, Cappellini MD. Psychosocial aspects and psychiatric disorders in young adult with thalassemia major. Intern Emerg Med 2008; 3(4):339-43.