

Investigating Sleep Quality and Its Relationship with Mental Health in Patients with β -Thalassemia Major

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Abstract

Background and Objective: Beta-thalassemia major is an important health problem in Iran. A high rate of psychiatric disorders has been reported in patients with thalassemia in different surveys and may be one of the reasons that cause problems in the quality of their sleep. Although sleep quality is important for the health and quality of life (QOL) of these patients, a limited study in Iran on sleep quality and its relation to the mental health status of these patients has been conducted so far.

Materials and Methods: A total of 101 patients with thalassemia were assessed. Data were collected via a demographic information checklist, the Pittsburgh Sleep Quality Index (PSQI), and the 28-item General Health Questionnaire (GHQ-28).

Results: Participants in this study had an average age of 25.90 ± 5.63 years and 71 (70.30%) of them were women. Seventy-seven patients (76.2%) suffered from poor sleep quality while the mean and standard deviation (SD) of the patients' total general health score (31.66 ± 11.35) was good at the general health level. Among the demographic factors, there was a significant relationship between job and sleep quality. Sleep quality, subjective sleep quality, sleep delay, sleep duration, sleep disorders, use of sleeping pills, and daily functional disorders had a positive and significant relationship with general health.

Conclusion: Thalassemia reduces the quality of sleep. There is a positive and significant association between sleep quality and general health, meaning that by improving sleep quality, patients have a greater chance of improving their general health.

Keywords: Sleep quality; Mental health; Beta thalassemia major; Iran

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Introduction

Thalassemia is the most common form of hemolytic anemia and is genetically inherited from parents to children (1). According to a 2008 World Health Organization (WHO) report, more than 40000 infants develop thalassemia each year, of which 25500 are injection-dependent β -thalassemia (2). The prevalence of thalassemia in

different regions of Iran varies between 3 and 100 patients per 100000 people (3). Today, with existing therapies and new drugs to improve iron overload control and treatment initiation, this disease has become a chronic disease and the life expectancy of these patients has increased (4-7). Medications have impacted other aspects of these patients' lives, significantly affecting the overall health, mental health, and quality of life (QOL) of these patients and their families. The chronicity of the disease, the tolerance to treatment, and the expectation of premature death lead to psychoso-

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cial problems in these patients (8). The prevalence of psychiatric diseases in patients with this complication is high and some studies suggest that about 80% of patients have at least one psychiatric disorder. Among them, anxiety and depression are very common (9-11).

Studies conducted in Iran have shown that the most common mental disorders in patients with β -thalassemia major are depression and anxiety, followed by attention deficit, bipolar disorder, and irritability and anger, respectively (12). Sleep is one of the basic human needs, necessary to maintain energy, physical condition, and physical well-being. It is also considered to be one of the effective factors in mental health (13). Based on studies in the general population, there is a statistically significant association between general health and sleep disorders (14). Research suggests that sleep disorders can impair the QOL and increase the risk of depression and anxiety (15).

Previous studies have shown that sleep disorders are significantly more common in patients with thalassemia than in healthy people (16). Improving the QOL of people with thalassemia major and developing health and social guidelines for adequate planning to prevent, diagnose, and treat problems related to different aspects of these patients' lives and improve health requires adequate information about different aspects of their life. Since no research investigating sleep quality and its relation to the mental health status of patients with thalassemia major has been conducted in Iran, the present study was conducted to investigate this issue in Kerman, Iran.

Materials and Methods

The present research was a cross-sectional study performed on all patients with thalassemia major in Samen Al-Hojaj Clinic in Kerman between February 2020 and April 2021 by convenience sampling method. All participants expressed their oral consent to participate in the study. The study was implemented after approval by the Ethics Committee of Kerman University of Medical Sciences with the code of IR.KMU.AH.REC.1398.202. All 300 patients with records at the Samen Al-Hojaj Clinic who visited the clinic for a blood transfusion were assessed according to exclusion and inclusion criteria; finally, 101 patients were included in the study and completed questionnaires. People with medical or psychiatric conditions affecting sleep quality, people who had ever taken sleeping pills, substance

users, and night shift workers were excluded. The researcher visited the patients of the clinic daily for 3 months and after obtaining patients' consent, completed the relevant questionnaires.

Data collection instruments included the demographic information checklist, the Pittsburgh Sleep Quality Index (PSQI), and the 28-item General Health Questionnaire (GHQ-28). To assess the history of the diseases and demographic information, a checklist was completed. The PSQI evaluates sleep quality over 1 month. It consists of 19 self-assessment questions and 5 questions to be answered by bedmates or roommates. The latter questions are only used for clinical information. The 19 questions are categorized into 7 components, which are given a score from 0 to 3. The PSQI components are as follows: subjective sleep quality (C1), sleep latency (C2), sleep duration (C3), habitual sleep efficiency (C4), sleep dysfunction (C5), use of sleeping pills (C6), and daytime disturbances (C7). The sum of the scores for these 7 components gives an overall score ranging from 0 to 21, with the highest score indicating the worst sleep quality. A global PSQI score greater than 5 indicates high difficulty in at least 2 components or moderate difficulty in more than 3 components (17). The reliability and validity of this questionnaire were confirmed by Cronbach's α of 0.77 in Iran (18).

The GHQ-28 is a standard tool for assessing mental health. The 28-question scored form covers four domains: physical symptoms, anxiety, social dysfunction, and depression. This questionnaire is based on a Likert scale, with each answer given a score from 0 to 3 and the total score ranging from 0 to 23. Therefore, individuals who score less than 23 are considered mentally healthy. Tool reliability was reported using the test-retest method with a Cronbach's α of 0.72 to 0.93. Its validity was also assessed by correlating subtest scores with a satisfactory range of 0.72 to 0.87 (19).

These questionnaires were completed by the patients in the presence of the researcher and in cases where the patients were illiterate, it was completed by the researcher.

After collecting the data, they were analyzed by SPSS software (version 22, IBM Corporation, Armonk, NY, USA), and a P-value less than 0.05 was considered statistically significant. To describe the qualitative variables, frequency and percentage distribution indices were used and quantitative variables were described using the mean and standard deviation (SD).

Table 1. Demographic information and history of other medical diseases of study participants

Variable			Value
Demographic profile	Gender	Women	71 (70.3)
		Men	30 (29.7)
	Employment status	Self-employed	88 (87.1)
		Employed	13 (12.9)
	Marital status	Single	74 (73.3)
		Married	27 (26.7)
	Educational level	Less than diploma	30 (29.7)
		Diploma	53 (52.5)
		Associate's degree	5 (5.0)
		Bachelor's degree	13 (12.8)
	Cardiac disease	Heart failure	1 (1.0)
		Others	8 (7.9)
		No	92 (91.1)
Disease history	Liver		3 (3.0)
		Diabetes	7 (6.9)
	Hypertension		4 (4.0)
		Hypothyroid	10 (9.9)
	Iron overload	Cardiac	1 (1.0)
		Others	0 (0)
	Hepatitis	Treatment	18 (17.8)
		No	83 (82.2)
	Surgery	Splenectomy	21 (20.8)
		Others	11 (10.9)
	No	69 (68.3)	
Age (year)			25.90 ± 5.63
Duration of treatment (year)			23.19 ± 7.23

Data are presented as number and percentage or mean ± standard deviation (SD)

Independent t-tests, analysis of variance (ANOVA), and Pearson correlation tests were used to analyze the data.

Results

In the present study, 101 patients with β -thalassemia major with a mean age of 25.90 ± 5.63 years in the age range of 18 to 41 years were studied. The demographic characteristics and medical conditions of the participants are presented in table 1. The mean and SD of the total score of patients' sleep quality (6.54 ± 2.75) was at the level of poor sleep quality, so that 77 patients (76.2%) had poor sleep quality and 24 patients (23.8%) had good and moderate sleep

quality. Since the mean sleep quality of patients with thalassemia was 6.54 and this value is higher than the cut-off level of 5, based on a one-sample t-test, this difference of 1.54 units was significant at the level of 0.001.

The mean and SD of the total score of the general health of patients (31.66 ± 11.35) was at a good level of general health, so that 75 patients (74.3%) had good general health and 26 patients (25.7%) had poor general health (Table 2).

Based on the data in table 3, the only demographic variable related to sleep quality in these patients was job; therefore, sleep quality among employees has been reported to be worse than that of the self-employed (Table 3).

Table 2. Determining the quality of sleep and general health of patients

Research variable	Mean ± SD	Maximum-minimum	Kurtosis
Quality of sleep	6.54 ± 2.75	2-13	-0.478
subjective quality of sleep	2.05 ± 0.81	0-3	0.188
Delay in falling asleep	1.14 ± 0.80	0-3	0.093
Sleep time	0.65 ± 0.99	0-3	0.173
Sleep efficiency	0.11 ± 0.43	0-3	3.270
Sleep disorders	1.20 ± 0.73	0-3	-0.342
Use of sleeping pills	0.47 ± 0.86	0-3	1.820
Daily functional disorder	0.88 ± 1.07	0-3	-0.679
General health	31.66 ± 11.35	12-61	-0.811
Physical symptoms	8.09 ± 3.59	1-18	-0.596
Anxiety	6.32 ± 5.03	0-19	-0.364
Dysfunction	12.01 ± 3.04	0-20	2.529
Depression	5.22 ± 5.07	0-19	-0.537

SD: Standard deviation

Table 3. Relationship between sleep quality and general health with demographic variables

Demographic characteristics	Sleep quality (mean \pm SD)	General health (mean \pm SD)
Gender		
Women	6.26 \pm 2.84	31.30 \pm 11.41
Men	7.20 \pm 2.42	32.50 \pm 11.35
P-value	t = -1.568, P = 0.120	t = -0.480, P = 0.633
Marital status		
Single	6.51 \pm 2.65	32.45 \pm 11.88
Married	6.62 \pm 3.04	29.25 \pm 9.52
P-value	t = -0.187, P = 0.852	t = 1.290, P = 0.200
Employment status		
Self-employed	6.28 \pm 2.70	31.27 \pm 11.29
Employed	8.30 \pm 2.49	34.30 \pm 11.83
P-value	t = -2.542, P = 0.013	t = -0.899, P = 0.371
Age	P = 0.647, r = -0.046	P = 0.770, r = -0.029

t: Independent t-test; r: Pearson correlation coefficient
SD: Standard deviation

Moreover, none of these variables had a significant relationship with the general health of patients. Besides, data analysis showed that the physical effects of the disease were not significantly associated with sleep quality and general health of study participants (Table 4).

Examining the Pearson correlation coefficient between sleep quality components and general health status showed a positive and significant relationship between them ($P < 0.01$, $r = 0.557$).

There was also a positive and significant relationship between subjective sleep quality ($P < 0.01$, $r = 0.472$), delay in falling asleep ($P < 0.01$, $r = 0.337$), sleep duration ($P < 0.05$, $r = 0.212$), sleep disorders ($P < 0.01$, $r = 0.552$), use of sleeping pills ($P < 0.01$, $r = 0.448$), and

daily functional disorders ($P < 0.01$, $r = 0.606$) and general health.

Discussion

The present study was conducted to investigate sleep quality and its relationship with mental health in adult patients with β -thalassemia major. The results of statistical analysis showed that beta-thalassemia major affected the sleep quality of patients and reduced sleep quality. 76.2% of study participants had poor sleep quality. Subjective quality of sleep and delay in falling asleep were the most effective components involved in patients' poor sleep quality. Previous studies conducted on sleep quality in these patients have reported similar results (16, 20).

Table 4. Relationship between sleep quality and general health with the physical disease

Physical disease	Sleep quality (mean \pm SD)	General health (mean \pm SD)
Cardiac disease		
No	31.15 \pm 11.46	6.58 \pm 2.77
Yes	36.88 \pm 9.01	6.11 \pm 2.66
P-value	t = -1.455, P = 0.149	t = 0.493, P = 0.623
Other diseases		
Liver	7.01 \pm 2.01	27.01 \pm 10.81
Diabetes	4.28 \pm 2.49	27.57 \pm 11.97
Hypertension	6.25 \pm 2.50	37.01 \pm 17.01
Hypothyroid	6.60 \pm 1.71	30.40 \pm 14.03
P-value	F(4.96) = 1.327, P = 0.265	F(4.96) = 0.627, P = 0.645
Hepatitis		
Treatment	5.50 \pm 2.91	30.16 \pm 9.70
No	6.77 \pm 2.67	31.98 \pm 11.70
P-value	t = 1.796, P = 0.075	t = 0.615, P = 0.540
Surgery		
Splenectomy	5.90 \pm 2.66	30.71 \pm 11.87
Others	6.72 \pm 2.86	32.54 \pm 10.51
No	6.71 \pm 2.77	31.81 \pm 11.45
P-value	F(2.98) = 0.713, P = 0.493	F(2.98) = 0.111, P = 0.895

t: Independent t-test; F: Analysis of variance (ANOVA)
SD: Standard deviation

Various factors reduce the sleep quality in these patients, which can be divided into four main categories of psychological, physical, functional, and laboratory variables (21).

The high prevalence of anxiety and depression as well as the stress caused by chronic disease, treatment costs, and death expectations are among the psychological components involved in reducing the sleep quality in these patients (22, 23). One of the influential physical factors is the higher prevalence of adenoid hypertrophy due to lymphoid hyperplasia, which increases the risk of obstructive sleep apnea (OSA) in these patients (24). Moreover, thalassemia causes growth retardation and physical changes in people with the disease. The daily function of these patients is affected by the chronic disease as well as treatment complications, and reduced physical activity and daily drowsiness can cause disturbances in their sleep at night. One of the most important laboratory causes of decreased sleep quality in patients with thalassemia is hemoglobin (Hb) level problems that increase the prevalence of restless legs syndrome (RLS) in them. In general, since several factors are involved in reducing sleep quality, these patients need comprehensive monitoring and regular follow-up in this regard. The only demographic factor affecting patients' sleep quality was occupational conditions, so that self-employed patients reported better sleep quality than employees. Factors such as workplace stress, time constraints, work shift, and the pressure of interaction with colleagues and officials in governmental jobs are more than in non-governmental jobs, and the role of these factors in reducing sleep quality has been proven (25).

The majority of participants in the present study (74.3%) had good general health. Some studies have reported 14% to 24% of general health disorders in patients with thalassemia (26), while other studies have reported the prevalence of these disorders above 70% (11, 27). The study conducted in the south of Iran showed that the prevalence of general health disorders in these patients was 50% (4). In another study conducted in northern Iran, general health disorders were obtained in 64.9% of these patients (26). However, studies conducted in different countries and different parts of Iran indicate differences in the study results. Because few continuous and reliable studies have been conducted in this area, the ability to draw etiological conclusions and identify an

association between thalassemia and other general health outcomes is limited (5). Differences in demographic characteristics, including age, gender, educational level, marital status, and employment status, are important factors that determine the level of general health, self-care behavior, and life expectancy in patients with thalassemia (6, 7).

The most important components affecting general health in this study were physical symptoms, anxiety, dysfunction, and depression, respectively. Diabetes, heart failure, late puberty, and growth disorders are some of the complications of thalassemia that can affect the general appearance of a person. Premature fatigue due to anemia or headache caused by it can reduce the general health of patients. Patients' high anxiety is associated with factors such as fear of premature death, worries about forming a family, frequent blood transfusions, poor self-concept, and having different feelings (22, 23, 28). Social dysfunction may suggest the effect of three factors of physical symptoms, anxiety symptoms, and depression on social functioning. The public belief in the inability of patients with thalassemia to function properly at work can lead to their dysfunction. Patients' low self-esteem, high dependence on their families, and fear of rejection by others are other causes of this dysfunction (22). Patients' depression can be due to the chronic nature of the disease, long period of treatment, the expectation of premature death, the change in the individual's appearance, the feeling of deprivation, and the reaction of social institutions such as family, community, and school (29-31).

The data of this research revealed that none of the demographic variables had a significant relationship with the general health of patients and this result was in line with the result of the study conducted by Naderi et al. (4). As already mentioned, different results have been found at different times and in different places (32). In addition, based on the results of this study, there was no statistically significant association between general health status and sleep quality in patients with physical complications caused by a history of heart disease, other diseases, hepatitis, and surgery. Because these complications occurred in the small number of participants in this study, lack of a significant association was predictable. Conducting a similar study in a population of patients with more medical complications could yield different results. The results of this study indicate a

positive and significant association between sleep quality and general health. This means that patients' general health is more likely to improve by increasing sleep quality. In addition, a positive and significant correlation was found between the subjective quality of sleep, delay in falling asleep, duration of sleep, sleep disorders, use of sleeping pills, and daily functional disorders with general health. This result was consistent with the research conducted by Shamsaei and Cheraghi (14). The hallmarks of good sleep are maintaining physical health, increasing adaptability, reducing depression and anxiety, and increasing focus on daily activities, all of which are components of general health. Thus, there is a significant and direct correlation between sleep quality and general health.

Limitations: One of the limitations of our study was the failure to use a random sampling method due to the small statistical population of patients with thalassemia. The present cross-sectional research was conducted in Kerman. Conducting longitudinal studies on patients living over a larger geographic area will provide more complete information in this regard. Besides, the sleep quality measure in this study provides information based on the participants' subjective reports, and the use of objective tools such as polysomnography (PSG) to confirm the results will be useful.

Conclusion

Thalassemia affects the sleep quality of patients and reduces sleep quality. There is also a positive and significant association between sleep quality and general health; thus, patients' general health is more likely to improve as sleep quality improves. Therefore, identifying the factors influencing improvement in sleep quality may lead to an improvement in the general health status of patients with thalassemia major. Promoting the physical and mental health of this group of people seems to require adequate planning and policies by the authorities to provide appropriate solutions, as well as conducting educational workshops focusing on concepts such as sleep health. Because of an association between sleep quality score and general health, people with thalassemia major should be monitored and evaluated regularly for psychiatric problems, particularly sleep disorders.

Conflict of Interests

Authors have no conflict of interests.

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