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Abstract

Introduction and Aim: Several factors affect the oral and dental-related quality of life. The present study investigates the effect of the prevalence of dental caries and its relationship with oral and dental quality of life in thalassemia patients according to the ICDASII index.

Methods: The present study was a cross-sectional analysis. The statistical population of the study consisted of 132 thalassemia patients who were selected and included in the study through convenience sampling in Kermanshah. Data collection tools included a demographic information form, ICADS index, and oral and dental health-related quality of life

questionnaire. Data were analyzed in SPSS 25 software using descriptive statistics, correlation tests, and linear regression at a significance level of 0.05.

Results: According to the results, the mean quality of life score was 38.9 ± 8.8. The results of Pearson's correlation test revealed a direct and significant correlation between the total score of oral and dental quality of life and the ICADS Ⅱ index ($P<0.05$, $r=0.564$). There was no significant correlation between the gender and age of patients and the ICADS Ⅱ index ($P<0.05$).

Discussion and Conclusion: Dental caries evaluation using the ICDASII system provides accurate recommendations for prevention and correct treatment. The severity and degree of caries in thalassemia patients were relatively high. A low quality of life score indicates an unfavorable oral and dental quality of life. Thalassemia patients have more severe problems than healthy people. Hence, the provision of services, care, and periodical examinations should be improved in these patients.

Keywords: Dental caries, Oral and dental health-related quality of life, ICDASII index, Thalassemia

INTRODUCTION

Thalassemia is a congenital disorder characterized by impairment in the production of α and β globulin chains in the hemoglobin molecule and thus microcytic and hypochromic red blood cells. Iran is one of the countries located on the thalassemia belt (1). Based on the information obtained from the databases of Iran's blood transfusion organization, the total number of patients with thalassemia major in Iran is over 17,000 (2). Performing preventive dentistry practices has a primary significance for these patients. The risk of dental and non-dental infection is highly serious in these patients. Regular programs are necessary to prevent periodontal diseases and non-dental infections since any of these diseases in these people may occur in a short period without any real cause (3).

In the study by Mustafaei, 73.5% of the subjects had different degrees of tooth caries (4). In the study by Mariah et al., the mean number of decayed and missing teeth increased significantly in thalassemia people compared to the control group (5). Gholampour et al. also showed that the mean DMFT increased significantly in thalassemia people compared to the control group (6). Owing to the significance of dental and oral problems in these patients and the complications that affect the teeth and oral mucosa, paying attention to them has a special significance in terms of maintaining and improving the health of the mentioned patients (7). Lugeli (2006) also referred to many oral and dental health problems of thalassemia patients and stated that it is necessary to conduct more studies in this regard to better understand the oral and dental health status of the mentioned patients (27). Also, according to the World Health Organization's definition of health,

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oral and dental health and oral and dental health-related quality of life and the impact of health and diseases on quality of life have been considered for about one decade (8).

The oral health-related quality of life is related to how oral and dental health affects physical, mental, and social health, eating, chewing, swallowing, speaking, playing, learning, happiness, embarrassment, and social communication. Measuring the oral health-related quality of life is useful in determining the broad dimensions of oral and dental diseases in children (9). With increasing the person's oral and dental health behaviors, the number of decayed, missing, and filled teeth will decrease. Therefore, the oral and dental health-related quality of life will be higher and the person's daily performance is less disturbed due to oral and dental problems (10).

Studies have indicated that oral and dental problems affect the psychological, social, and physical aspects of the patient. They also can affect the quality of life and significant aspects of a person's life by disrupting social presence and interpersonal relationships (11). According to the existing systematic review studies, malocclusion negatively affects oral health-related quality of life, which is also affected by the cultural environment (12). Functional disorders of the teeth such as chewing and speaking (13), increasing the probability of impact in accidents (14), and periodontal problems (15) are caused due to the presence of malocclusion.

There is a growing concern about the effect of various oral diseases and disorders on a person's quality of life and psychosocial state. Oral health affects a person's general health and quality of life significantly (16). People with good oral hygiene show a better quality of life compared to people with poor oral hygiene (17). Oral health-related quality of life is a multidimensional concept that indicates people's comfort when eating or sleeping and their satisfaction with their oral health (18). Oral health includes the health of the mouth and related tissues, which prepares a person for eating, speaking, and optimal social relationships without active disease, discomfort, and dissatisfaction (19).

One of the major concerns in epidemiological studies is to develop a way to accurately record the dental health status to obtain a correct insight into the extent of the disease and the required treatment considerations (29). To detect caries in the early stages, an index was introduced that can report caries from a small visible change in the enamel to a large cavity in the dentin. This index is very useful for detecting early lesions and multiple examinations over time (21). This index was introduced as ICDAS in 2002 (22). The ICDASII index was introduced in 2005 by removing the difficulty of measurement and the complexities of the steps and strictures of the previous method (23). Many studies consider this index the closest index to achieving the goals of the World Health Organization (24).

The quality of life index measures the impact of physical and mental health on oral health and the effect of oral and dental disorders on daily life. Given what was stated, the relationship between tooth caries and some diseases has been proven. However, oral and dental problems are less common in thalassemia patients. The ICDAS system has not been addressed in Iran, no training

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is provided in this field in dental schools and caries status is still examined by DMF. Hence, there is a gap in information in this field. Also, no comprehensive study has been conducted in this field in Kermanshah. Thus, the present study was conducted to investigate the prevalence of dental caries and its relationship with the dental and oral quality of life in thalassemia patients in Kermanshah city in 2019 based on the ICDAS index. Gaining knowledge about the outcomes of malocclusion and their effect on the quality of life and social and psychological well-being of people, obtaining information that can be used as a guide to clinical decision-making and its intervention in health and treatment services, and providing support to implement public policies aimed at promoting oral and dental health and prioritizing dental will be very useful in this regard.

Materials and Methods

This study was a descriptive, analytical, and cross-sectional study. The statistical population of the study included all thalassemia patients living in Kermanshah city. The patients were examined after obtaining permission from the ethics committee of Kermanshah University of Medical Sciences (code of ethics: IR.KUMS.REC.1399.1034) and making the necessary coordination with the thalassemia patients' association. A convenience and non-probabilistic sampling method was used. The inclusion criteria of the study included being at least 10 years old and willing to participate in the study to perform examinations. The sample size was estimated at 132 people based on the study conducted by Maria Cadenas de Llano-Pérula (25). The researcher examined the oral and dental health status of the patients through interviews and examinations of the patients. A questionnaire including two sections of demographic questions and the ICDASII index was used to collect the data.

Research tools

1-The demographic information form

It was designed based on the similar form found in the texts and the table of variables. Using this form, the required information including age, gender, job, education, etc. was recorded.

2-Oral Health-Related Quality of Life

Oral health-related quality of life is measured using the OHIP-14 questionnaire. In the mentioned questionnaire, questions measure the oral health-related quality of life of the person in 7 different areas, including functional limitation, physical pain, psychological discomfort, physical disability, mental psychological disability, and handicap. To answer the questions, the patient should select one of the options: never, rarely, sometimes, most often, and almost always. A score of zero indicates the absence of any impact and a score of 4 indicates the worst impact of oral health on quality of life. The score range was between 0 and 56, and a higher score indicated a lower oral health-related quality of life. This questionnaire was translated into Persian by Ravaghi et al. and its validity and reliability were confirmed (26).

ICDASII index

ICDASII index has one caries component (including codes 0 to 6 from a completely healthy level to a completely decayed level), and codes 1 to 6 were considered tooth caries. It also has a restoration component (including codes 0 to 9). Codes 3 to 8 were considered filled teeth, and four codes were for missing teeth, of which one code (code 97) was considered to be missing due to caries. This index was recorded in all five surfaces of the teeth (buccal, lingual, occlusal/incisal, mesial, and distal) (27). Examinations were performed in the examination department of the Kermanshah Faculty of Dentistry using a dental unit, mirror, probe, and light unit. The patients were asked to brush their teeth before the examination. The examination was performed to record the ICDASII index by one of the researchers who were calibrated with an experienced specialist dentist using a mirror and a probe under the unit light. The examination started from the right third molar of the upper jaw and ended with the examination of the third molar of the right lower jaw. The status of the teeth was examined and recorded in 5 levels for posterior teeth and 4 levels for anterior teeth, first in a wet state and then in a dry state (with air blowing for five seconds) according to the ICDASII codes. The ICDASII index is a system with two-digit codes. The digit on the left determines the tooth filling and extraction state with a code of zero to nine. The digit on the right determines the state of tooth caries with codes from zero to six. To eliminate examination errors and align the opinions of two examiners with each other and also the primary examiner with self (intra-and inter-examiner reliability), each examiner examined 10 people separately and the agreement coefficient between the two examiners was calculated as 90%. Then, the primary examiner re-examined a group of 10 people examined two days later and the coefficient of agreement between the examiner and self was calculated at 95%. Data were analyzed in SPSS 25 software at a confidence level of 95% at two descriptive and analytical levels. At the descriptive level, frequency of distribution was used, and at the analytical level, Pearson's and Spearman's correlation tests were used.

Results

Demographic characteristics

The present study was conducted on 132 thalassemia patients. The mean age of the patients was 32.3 with a standard deviation of 9.3 years in the range of 18 to 49 years.

Table 1-Relative and absolute frequency distribution of demographic variables in patients

Variable	f	%

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Gender	Female	63	47.7
	Male	69	52.3
Education	Less than diploma	60	45.5
	Diploma	34	25.8
	University	38	28.8

Based on Table 1, 47.7% of the participants of the study were female and 52.3% were male. Also, 45.5% had less than a diploma education, 25.8% had diploma, and 28.8% had an university education.

Table 2- Investigating the distribution of the quality of life scale related to the oral and dental quality of life and its subscales

Dimensions	mean ± SD	Test statistic	P-value	Skewness	Kurtosis
Functional limitation	1.5 ± 6.01	0.247	0.001	0.305	-1.02
physical pain	2.09 ± 5.2	0.139	0.001	-0.502	-0.582
psychological discomfort	5.1 ± 2.07	0.116	0.001	-0.316-	-0.722
physical disability	6.2 ± 1.8	0.273	0.001	-1.56	-0.266
Psychological disability	5.09 ± 1.2	0.136	0.001	-0.397	-0.533
Social disability	5.4 ± 1.9	0.197	0.001	-0.471	- 0.663
Handicap	5.8 ± 1.9	0.203	0.001	-1.03	-0.495
oral and dental quality of life (total score)	8.8 ±38.9	0.116	0.001	-0.549	-0.737

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Based on the Kolmogorov-Smirnov test, as shown in Table 2, the distribution of the quality of life scale and its subscales in patients was abnormal. In this study, the standard error of the skewness coefficient and the standard error of the kurtosis coefficient were used to test the normality of the data, considering that the standard error of skewness and kurtosis for all variables is between -2 and +2 and the sample size is high. Hence, the distribution of the data is assumed to be normal .

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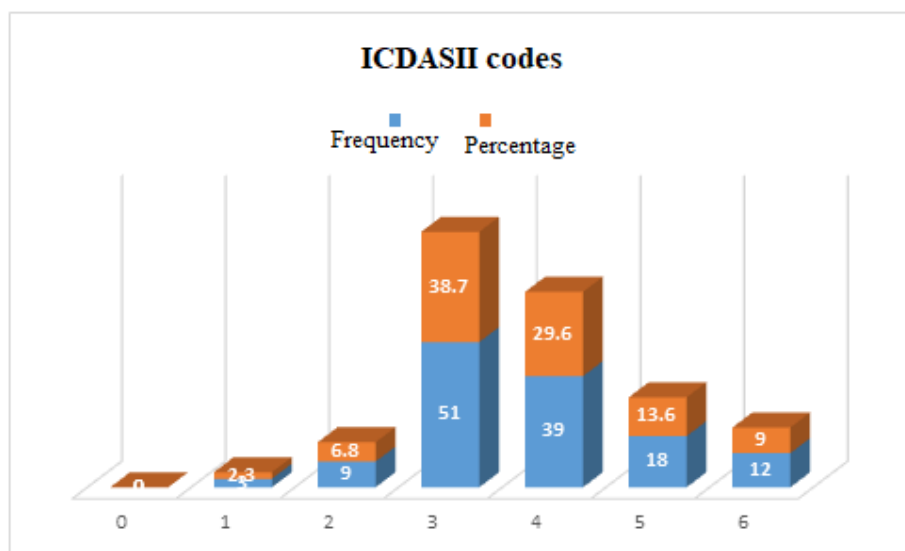

Chart 1-3: Distribution of relative and absolute frequency of patients according to the ICADSII codes

Figure 1 shows the distribution of the relative and absolute frequency of each component of related quality of life or oral and dental health. None of the studied subjects had a code of 00 (healthy) on all surfaces of the teeth. It means that each person had at least one surface with a caries lesion. Only 9.2% of people had codes 00 to 02, which means that these people have the least enamel lesions in terms of caries. These patients had the highest prevalence in codes 03 (local caries of tooth enamel) and 04 (shade of dentine caries under the enamel), respectively. The most surface with

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caries was the occlusal surface, followed by the distal and mesial surfaces, respectively. The least involved surfaces were the lingual and buccal, respectively.

Testing the research hypotheses

1-There is a relationship between the prevalence of dental caries and dental and oral quality of life in thalassemia patients based on the ICDASII index.

Table 3- Pearson's correlation coefficient between the total oral and dental quality of life and the ICADS index in thalassemia patients

Variables	index ICADSII	
	correlation coefficient	P-value
Quality of life	0.564	0.001

The results of Pearson's correlation test revealed a direct and significant correlation between the total score of oral and dental quality of life and the ICADSII index (P<0.05, r=0.564). In other words, patients who have more healthy teeth have a higher dental and oral quality of life.

2) There is a relationship between the prevalence of dental caries and demographic variables in thalassemia patients based on the ICDASII index.

According to the results of the Spearman correlation test, there was no significant relationship between the patients' age and caries codes (P>0.05). The results also showed no significant relationship between the patients' gender and caries codes (P<0.05). According to the results, no significant relationship was found between education and caries rate (P<0.05).

Table 4- Correlation coefficient between age, gender, and education variables and ICADSII index in thalassemia patients

Variables	index ICADSII	
	Correlation coefficient	P-value
Age	0.089	0.985
Gender	0.076	0.990

Discussion

The ICDASII index, as an accurate and valid index, can be used to examine dental status. In this study, the dental caries status was examined in thalassemia patients. The most common state of caries in people was caries with extension at the enamel surface. To compare with other studies, ICDASII codes were converted to DMFT codes. Thus, comparing the results of the present study with other studies is based on the DMFT index. The value of DMFT evaluated in this study was

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7.91, which was higher compared to the studies conducted by Seyed Moallemi (28). These differences can be due to the precision in the measurement resulting from following the ICDASII pattern.

The DMFT value calculated in this study was consistent with the value reported in Arabion et al.'s study (8.41) (29). The high prevalence of caries index in our study and similar studies may be due to the lack of knowledge and awareness, poor oral hygiene, improper nutrition habits, and low motivation to maintain the dental health of these patients. In the ICDASII system, code zero means perfect health and code 00 to 02 indicates a good health status and only the need for preventive services, and dental examinations at longer intervals, and codes 03 to 06 indicate the need for restorative treatments in addition to preventive services and dental examinations with shorter intervals. In the present study, none of the subjects had all their teeth completely healthy, which is in line with the results of Banova's study (30). Also, Mostafaee et al. (20) evaluated the oral health status of patients with thalassemia major using the DMFT index. The results revealed that 73.5% of the subjects had different degrees of tooth caries. This result is consistent with the present study results.

In the present study, the mean score of oral and dental quality of life of thalassemia patients is at a relatively good level, which was consistent with the results of Mohammadi's study (31). Although oral and dental diseases can overshadow the quality of life of patients, they did not have a clear effect on the oral health-related quality of life in the studied population. Owing to many dental caries and poor oral hygiene, they are not dissatisfied with their oral health. This issue can indicate that these patients are more worried about their systemic problems (32). One of the goals of this study was to evaluate the relationship between oral and dental quality of life and the ICADSII index. The results revealed that there is a direct and significant relationship between the oral and dental quality of life and the ICADSII index. This result was in line with the results of the studies conducted by Amirabdi (33) and Mohammadi et al. (31). Vaziri et al. also reported a direct and significant relationship in their study, which is consistent with the results of the present study (34). According to the results of the Spearman correlation test, there was no significant relationship between the patients' age and caries codes. This result was consistent with the results of Mohammadi et al.'s study (31).

Consistent with similar studies, the present study showed that oral health affects various aspects of the quality of life. Oral and dental diseases affect public health, and systemic diseases can cause symptoms in the oral cavity. In other words, there is an association between oral and dental health and public health (35). In Arabion et al.'s study, a significant difference was found between thalassemia patients and healthy people in the age group of 19-30 years regarding plaque index. The mean Gingival Index was significantly different between the case and control groups in the age groups of 13-18 years and 19-30 years. Moreover, in all 3 age groups, a difference was found the means of the Periodontal Index and the DMFT index in both the patient and healthy groups (29). This discrepancy might be due to study population, the sample size, and the studied to

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determine caries. According to the results, no significant relationship was observed between the patients' gender and caries codes. Shahsawari et al. reported that the DMF index was not significantly different between males and females in both groups (36). They compared dental caries in thalassemia and healthy patients according to the DMFT index. No significant difference was observed between the two groups (36). In the meta-analysis by Mooszadeh et al., dental caries in thalassemia and healthy patients were compared according to the DMFT index. The mean DMFT in thalassemia patients was higher (37). Based on the results of Mooszadeh's study, it can be concluded that the rate of tooth decay in thalassemia patients is higher than healthy people.

Marieh et al. also showed that the number of decayed and missing teeth increased in thalassemia patients, compared to the control group. In examining the treatment needs of thalassemia patients, the most treatment need was related to pulp treatment and tooth restoration in the control group (5). Gholampour et al. also reported that DMFT was higher in thalassemia patients than in the control group (6). Jaideep Singh et al. examined the dental and periodontal health status of beta thalassemia major and sickle cell anemia patients. They concluded that the prevalence of dental caries and periodontal diseases in beta-thalassemia patients was higher than that in the control group. However, the results were significant only for missing decayed filled teeth when the group I (beta thalassemia) was compared with group II (sickle cell anemia). In all these studies, a high DMFT index (converted ICDASII) in thalassemia patients suggests the need for restorative treatments in these patients. However, insurance problems and time constraints in thalassemia patients have made it more difficult to perform the necessary treatments in these patients. High DMFT indicates active oral infections in these patients with medical problems. It may be due to the chronic nature of thalassemia. Dental treatment had been neglected in patients with this life-threatening disease. The high prevalence of caries in these patients may be due to the lack of dental knowledge, poor oral hygiene, wrong eating habits, and low motivation in these patients. The high rate of caries in these patients suggests that these people have problems accessing restorative and preventive dental treatments (29).

Conclusion

The results suggest the low oral and dental health-related quality of life in thalassemia patients and the impact of poor teeth status on the quality of life. Given the effect of dental status on the quality of life and the impact of tooth missing on reducing the quality of life, necessary interventions should be performed to improve the dental status and quality of life of these patients. Impairment in the oral health of thalassemia patients is observed significantly. The prevalence of gingivitis in patients seems to be related to local factors such as poor oral hygiene, malocclusion, and dry gums due to the inability of patients to close their mouths because of dentures. Additionally, chronic anoxia in some people makes them susceptible to gingival disorders. Dental caries have a multifactorial etiology. Disease prevention should be prioritized in all patients, especially in high-risk people. Preventive programs and frequent control sessions should be provided to thalassemia patients to reduce the need for invasive treatments. Also, thalassemia patients are at high risk of

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viral hepatitis and proper precautions should be taken by the dental team in the treatment of these people. Proper dental and periodontal care improves the patient's quality of life. Preventive dental care is essential for thalassemia patients. Future researchers are recommended to analyze other factors affecting the oral and dental-related quality of life in thalassemia patients and compare them with healthy people.

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