

The Association between Dental Health Status and Oral Health-Related Quality of Life of Children Diagnosed with β -Thalassemia Major in Zahedan City, Iran

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Abstract

Background: β -thalassemia major is a common hereditary blood disease that can affect patients' oral health and quality of life. The present study aims to determine the relationship between health of deciduous teeth and the Oral Health-Related Quality of Life (OHRQoL) in children diagnosed with β -thalassemia major compared with healthy children.

Materials and Methods

This cross-sectional study was performed on 50 children diagnosed with β -thalassemia major and 50 healthy children aged 3-6 years old. Decayed, missing, and filled teeth (dmft) of the participants were measured according to the World Health Organization (WHO) criteria and the OHRQoL with the Early Childhood Oral Health Impact Scale (ECOHis). Data were analyzed using SPSS software version 19.0.

Results: The results showed that the dmft index of the patient group with a mean of 5.36 was significantly higher than the healthy group with a mean of 3.36. The mean OHRQoL in the patient group (19.24) was significantly higher than that of the healthy group (11.24). The mean dmft had a significant positive relationship with the ECOHis score of the children with thalassemia major ($r=0.769$, $p=0.000$), and healthy children ($r=0.756$, $p=0.000$).

Conclusion: According the results, the positive correlation between the dmft index and the mean OHRQoL indicated that dental problems in most children with β -thalassemia major are associated with a poorer OHRQoL. Since the dmft index and ECOHis were higher among children diagnosed with β -thalassemia major, the prevention and treatment of dental problems seem necessary for improving their quality of life.

Key Words: Beta-Thalassemia, Children, dmft index, Quality of life.

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1- INTRODUCTION

With an estimated annual incidence of over 300, thalassemia is a common hemoglobinopathy disorder in Iran (1). There are two types of thalassemia major: α -thalassemia and β -thalassemia. β -thalassemia major is the most severe type of congenital hemolytic anemia due to synthesis deficiency of β globin chain (2, 3). Clinical manifestations of the disease begin between the ages of 6 to 24 months and include fever, diarrhea, splenomegaly, susceptibility to infection, and growth retardation (3-5). Facial symptoms of these patients arise from extra-medullary hematopoiesis and compensatory growth of bone marrow and include maxillary protrusion, class II malocclusion, and chipmunk face (4, 6). Additionally, patients may have other symptoms in their mouths due to poor oral hygiene, decreased hemoglobin levels, increased levels of ferritin, and iron deposition (6).

High caries, high calculus index, mucosal pallor, atrophic glossitis, sialadenitis, gingival pigmentation, retained deciduous teeth, short and spiked roots of teeth, thinning of lamina dura, and taurodontism are among the oral symptoms of thalassemia major (2, 5, 6). Oral problems can lead to eating, talking, laughing, and sleeping disorders, and subsequently to the child developmental retardation (7, 8).

Oral health, on the other hand, can also affect child's self-esteem, learning, and social relationships. As a result oral health is an important factor in the daily activities and quality of life (7). Considering the progression in diagnostic and therapeutic techniques over the past decades, the prognosis and survival rate of patients diagnosed with thalassemia have improved dramatically. However, thalassemia is a chronic disease and has always been a concern for health-related quality of life (9). Today, health-related quality of life is measured as a means of monitoring

diseases and setting health priorities (10). Children's Oral health-related quality of life (OHRQoL) can be assessed with a number of questionnaires including Early Childhood Oral Health Impact Scale (ECOHIS) which has been designed for pre-school children and proven to be a successful tool (7, 11). A review of the literature reveals that OHRQoL of thalassemia children has been investigated in only one study (12), but no study has been conducted on the relationship between OHRQoL and dental status of children with thalassemia.

Given that Sistan and Baluchestan province is a region with a high birth rate of thalassemia in Iran (13), the researchers decided to study the relationship between the health of deciduous teeth and OHRQoL of children with β -thalassemia major and compare it with healthy children in this province.

2- MATERIALS AND METHODS

2-1. Study design and population

In this cross-sectional study, 50 children aged 3-6 years diagnosed with β -thalassemia major referring the thalassemia department of Ali-Asghar hospital (Zahedan, Iran) were selected. The children had medical records, were healthy in terms of other systemic diseases, had acceptable cooperation, and were matched with other children of the same age group in terms of disease severity and duration as well as received medicines. To match the control and case groups in terms of age, gender, and socioeconomic status, the children were asked to bring a friend for the next meeting.

2-2. Methods and measuring tools

The children's teeth were examined on a dental chair by a well-informed senior student using a headlight, a dental mirror, and a probe. Dental status was determined

according to the World Health Organization (WHO) criteria (14). To determine the dmft, the total number of decayed, missing, and filled primary teeth was calculated. The dental exam data and the demographic data of patients including age and gender were recorded. If there were caries or particular problems, the parents were guided to resolve them and were trained on oral hygiene at the end of the examinations. In addition, the Early Childhood Oral Health Impact Scale (ECOHIS) questionnaire was completed by parents at the same session. The validity and reliability of the Persian version of the ECOHIS was confirmed by Jabarifar et al. (7). It consists of 13 items in two main domains of impact on children and families. The impact on children has four components: symptoms (1-question), child's performance (4-question), mental health (2-question), and self-confidence and social interactions (2-question).

The impact on families includes parental concerns (2-question), and family performance (2-question). Responses are measured based on the Likert scale: 0 = never, 1 = rarely, 2 = just a few times, 3 = several times, 4 = often, 5 = do not know. According to the scale developer, those who answer "I do not know" in more than one item are excluded from the study. The total score ranges from 0 to 36 in the domain of impact on children and 0 to 16 in the domain of impact on families. A higher score implies a greater impact, more oral health problems, and a poorer OHRQoL.

2-3. Ethics

This study was approved by the Ethics Committee of the Zahedan University of

Medical Sciences with 7342 code. At the start of the study, parents were provided with the procedure and objectives and, if accepted, they signed an informed consent in order to permit the participation of their children in the study.

2-4. Data analysis

The data were analyzed using SPSS software version 19.0 and dmft and OHRQoL in the case and control groups were compared with Mann-Whitney test, Spearman's rho Correlation Coefficient. P-value less than 0.05 were considered statistical significance.

3- RESULTS

The mean dmft index in the patient and healthy children was 5.36 ± 2.58 and 3.36 ± 2.46 , respectively (total score = 4.36 ± 2.7). Mann-Whitney test showed that dental caries was significantly higher among children with thalassemia major than those healthy ones (**Table. 1**).

The mean OHRQoL in the domain of impact on children, the domain of impact on families, and total in the patient children were significantly higher than healthy ones (**Table. 2**). Despite boys' high values of mean dmft and ECOHIS, the Mann-Whitney test did not show a significant difference between boys and girls (**Table. 3**).

Spearman correlation showed a significant positive relationship between the mean dmft and ECOHIS score among children with thalassemia major ($r=0.769$, $p=0.000$), and healthy children ($r=0.756$, $p=0.000$). In other words, the increase in dmft was associated with an increase in ECOHIS and dental problems (**Table. 4**).

Table-1: The comparison of the mean dmft index in thalassemia and healthy children

| Dental Status | Group | Mean | Standard Deviation | P value* |
|---------------|-------------|-------|--------------------|----------|
| Decayed Teeth | Thalassemia | 4.260 | 2.193 | 0.000 |
| | Control | 2.660 | 2.076 | |
| Missed teeth | Thalassemia | 0.980 | 1.020 | 0.083 |
| | Control | 0.600 | 0.6998 | |
| Filled teeth | Thalassemia | 0.10 | 0.303 | 1.00 |
| | Control | 0.10 | 0.303 | |
| dmft index | Thalassemia | 5.360 | 2.577 | 0.000 |
| | Control | 3.360 | 2.456 | |

* Mann-Whitney test. dmft: decayed, missing or filled teeth.

Table-2: The comparison of the mean ECOHIS in thalassemia and healthy children

| OHRQoL Status | Group | Mean (SD) | P value* |
|-----------------------|-------------|----------------|----------|
| Child impact section | Thalassemia | 14.000 (5.876) | 0.000 |
| | Control | 7.060 (4.257) | |
| Family impact section | Thalassemia | 5.240 (2.095) | 0.009 |
| | Control | 4.180 (2.505) | |
| ECOHIS total | Thalassemia | 19.240 (7.247) | 0.000 |
| | Control | 11.240 (6.464) | |

* Mann-Whitney test; mean score of ECOHIS: 15.24± 7.93. ECOHIS: Early Childhood Oral Health Impact Scale.

Table-3: The comparison of the mean dmft index and ECOHIS according to gender in thalassemia and healthy children

| Variables | Group | Gender | Number | Mean (SD) | P- value* |
|------------|-------------|--------|--------|-----------------|-----------|
| dmft index | Thalassemia | Boy | 24 | 5.542 (2.604) | 0.688 |
| | | Girl | 26 | 5.192 (2.593) | |
| | Control | Boy | 27 | 3.926 (2.786) | .130 |
| | | Girl | 23 | 2.696 (1.845) | |
| ECOHIS | Thalassemia | Boy | 24 | 19.3333 (6.565) | 0.861 |
| | | Girl | 26 | 19.1538 (7.953) | |
| | Control | Boy | 27 | 11.8148 (7.560) | 0.992 |
| | | Girl | 23 | 10.5652 (4.961) | |

*Mann-Whitney test; mean score of ECOHIS=15.24± 7.93; dmft: 4.36±2.7. ECOHIS: Early Childhood Oral Health Impact Scale; dmft: decayed, missing or filled teeth.

Table-4: Correlation between the mean dmft index and ECOHIS in thalassemia and healthy children

| Dental Status | Group | Parameter | ECOHIS | | |
|---------------|-------------|-------------------------|-----------------------|----------------------|--------------|
| | | | Family impact section | Child impact section | ECOHIS total |
| dmft index | Thalassemia | Correlation coefficient | 0.551 | 0.752 | 0.769 |
| | | P-value | 0.000 | 0.000 | 0.000 |
| | Control | Correlation coefficient | 0.583 | 0.805 | 0.756 |
| | | P-value | 0.000 | 0.000 | 0.000 |

ECOHIS: Early Childhood Oral Health Impact Scale; dmft: decayed, missing or filled teeth.

4- DISCUSSION

This research aimed to study the relationship between the health of deciduous teeth and OHRQoL of children with β -thalassemia major and compare it with healthy children. In this study, dmft was 5.4 in 3-6 year-old children with thalassemia major; while Asl Amin Abadi et al. in Tabriz (Northwestern Iran), Al-Hadithi (Iraq), Arora et al. (India), Dang et al. (India) reported dmft to be 4, 4.64, 2.02, 1.8, respectively (15-18). The difference in dmft in various studies may have resulted from different inclusion criteria such as age range, the number of subjects, nutritional habits, health and economic status, and genetic variation in different geographical areas (17).

The present study also showed that thalassemia patients had significantly higher caries and dmft than healthy subjects, which was consistent with other studies (15, 16, 18, 19). The levels of streptococcus mutans, one of the most effective bacteria in decay, are significantly higher in the saliva of patients with thalassemia major than healthy individuals (20). There is also an inverse correlation between pH, flow rate, and content (calcium, magnesium, and phosphorus) of saliva with DMFS of patients with thalassemia major (21).

In addition, low levels of Immunoglobulin A (IgA), and lysozyme have been reported in the saliva of patients with thalassemia (22). On the other hand, it has been shown that children diagnosed with thalassemia major do not use dental floss and brush less often than healthy children (15). This indicates that oral hygiene is neglected in thalassemia children, which can be attributed to the involvement of these patients with systemic problems. The difference of dmft between two genders in thalassemia children was not significant; this is consistent with most studies (15-17, 23, 24). Phrai-in et al., evaluated OHRQoL with child-OIDP (Child-Oral Impact on

Daily Performance) index and showed 82.8% of children have one oral impact effective on their daily performance. The most common impact was eating problems (12). In the current study, OHRQoL evaluated with ECOHIS, revealed successful questionnaire among pre-school children. The mean ECOHIS of thalassemia patients (19.2 ± 7.2) was significantly higher than healthy children (11.2 ± 6.4). According to the literature review, there is no study in this regard. In other words, the present study is the first study to compare thalassemia and healthy children in terms of oral health-related quality of life. There was also no significant difference in the mean ECOHIS between healthy and thalassemia girls and boys; this finding is similar to other studies on healthy children (8, 25). The mean dmft in healthy children has a significant positive correlation with the mean ECOHIS scores, so that ECOHIS increase follows an increase in dmft; this is consistent with other studies (8, 10).

Chaffee et al., showed that ECOHIS is three times higher among children with dmft >5 than in caries free children (dmft =0) (10). The mean dmft of thalassemia children had a significant relationship with the mean ECOHIS score. Following an increase in dmft, the mean ECOHIS and the oral health problems increased and oral health-related quality of life declined among the thalassemia patients. Consistent with the present study, Motallebnejad et al. reported that those who self-reported a better oral health had lower mean DMFT and higher oral health-related quality of life. Note that in the study conducted by Motallebnejad et al., the oral health-related quality of life was assessed through the General Oral Health Assment Index (GOHAI), and oral health impact profile (OHIP). Questions among the adult patients with thalassemia major showed that the oral health status affects the psychological aspects of oral health-related

quality of life more than the functional aspects. In this regard, it was found that these patients were not particularly concerned about oral and dental problems and despite the low number of teeth and their poor conditions; they felt satisfied with their oral and dental health. This indicated that these patients are more concerned about their systemic problems (26). Regarding the high mean value of dmft and ECOHIS in thalassemia children compared to healthy children, these patients require therapeutic and preventive dentistry services and education around daily oral and dental care.

4-1. Limitations of the study

Lack of radiography was one of the limitations of this study that can affect the dmft index in the case of interdental caries. Since people usually remember events in the recent past, the cross-sectional nature of this study was another limitation and may have contributed to the information bias in the study.

5- CONCLUSION

The results of this study showed that the number of dental problems among children with thalassemia major was significantly higher than healthy ones. It was also found that the higher dental problems cause the poorer oral health-related quality of life of children diagnosed with thalassemia major. Despite the extensive dental caries, missing teeth and the low number of restored teeth, children with thalassemia major and their parents should be aware of the effects of dental problems on children's quality of life. In addition, they should be encouraged and trained to prevent dental problems and maintain a good oral hygiene. Insurance programs should also be considered to cover these children's dentist visit and dental check-up and restoration costs, and they should be provided with other necessary treatments to improve their quality of life.

6- CONFLICT OF INTEREST: None.

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