The Comparison of Periodontal Indices Condition in Major Thalassemia Patients and Healthy People

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ABSTRACT

Chronic periodontitis is the most common form of periodontitis. Chronic periodontitis is defined as: "An infectious disease that leads to the inflammation in the supporting tissues of the tooth, loss of progressive joints and bone resorption. Oral and maxillofacial problems are among the most important concerns of patients with major thalassemia while one of these most common problems can be mentioned as dental caries and gum disease. Therefore, this study aims to investigate the periodontal health status of patients with major tularaemia. This was a case-control study. Recorded data included: name, age, gender, education, occupation, spleen status and number of desferal per month. PI (Plaque Index), PPD (Probing Pocket Depth), GI (Gingival Index), CAL (Clinical Attachment Loss) indexes were also recorded for patients. Data were then analyzed by SPSS22 software. In this study, 23 patients with thalassemia and 23 healthy patients were evaluated. The mean GI in thalassemic patients was 1.39 ± 0.72 and in the healthy group was 0.91 ± 0.666. PI in thalassemic patients was 47.1 ± 0.59 and in healthy subjects was 1.26 ± 0.44. The mean pocket depth in thalassemic patients was 47.4 ± 0.59 and in healthy subjects was 0.17 ± 0.38. The mean GI and mean loss of attachment were significantly higher in thalassemic patients. The mean pocket depth was higher was more in thalassemic patients and statistically significant at the borderline level. The level of PI was higher in thalassemic patients, but this difference is not significant. The PI index was significantly higher in those who had undergone the spleen remove than subjects with spleen, but statistically there was no significant difference in the GI, PPD, and CAL indexes. Also, there was no significant difference between the indices and the number of consumed desferal in this study.

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INTRODUCTION

Oral health and decay rates are factors that usually affect the quality of life of patients [1]. If these diseases are not prevented, then affect different dimensions of the patients' life and also their related people. Naturally, the consequences of a patient's oral and dental diseases affect work

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time, activity, rest, economic status and psychological conditions [2].

Gingivitis and periodontitis are two important and common diseases associated with gum. Gingivitis is referred to inflammation of gingiva, which is divided into two general types including dependent on the plaque and independent of the plaque. The presence of any of the symptoms, such as erythema, increased gingival enlargement, bleeding on probing, alteration of the contour, and the presence of calculus or plaque without radiographic evidence of bone resorption, can be considered as symptoms of clinical gingivitis [3]. However, due to the methodological limitations and access to the target population, there is no definitive information on the prevalence of various periodontal diseases in the country, but the evidence suggests a high prevalence of gingivitis in different classes of society [4]. Plaque-induce gingivitis is the most common form of gingivitis, which accounts for a high percentage of each population [5].

Chronic periodontitis is the most common form of periodontitis [6]. Chronic periodontitis is defined as "an infectious disease that leads to the inflammation in the supporting tissues of the tooth, loss of progressive joints and bone resorption" [7].

Thalassemia was diagnosed in 1925 by an American scientist Thomas Cook. This disease is inherited and associated with hypochromic anemia, which in the major type (homozygous) is more severe than the type of minor (heterozygous) [8].

Fortunately, in the last decade, advances in red blood cell transfusion and the use of iron chelators have greatly improved the condition of the patient so that the probability of rising a child with thalassemia to adulthood has increased [9]. Since gingival problems increase with age, the importance of studying the gingival status of these patients will increase [10].

Oral, and maxillofacial problems are one of the most important concerns of patients with thalassemia major. One of these problems is dental caries and gingival disease [11]. The connection between some systemic diseases and gingival disease has been proven. But there not much studies have been conducted on the major thalassemia, and there are contradictions in it. AL-Wahadni *et al*., did not find any significant difference in GI index between the patient and control group [12]. Meanwhile, Maulidita *et al*., found a strong association between thalassemia and leukemia with periodontal disease in 2014 [13].

Therefore, considering the existing contradictions and the importance of periodontal health in this group of patients, this study aims to investigate the periodontal health status of patients with major tachymilia.

MATERIALS AND METHODS

This case-control study was conducted on patients with β-thalassemia major aged 15-35 years who were normally referred for blood sampling examinations and follow- up procedures to Boo-Ali Hospital of Sari. Ethics Code of this study is IR.MAZUMS.REC.95.2432. Based on the inclusion and exclusion criteria of this study, the control group included subjects without a disease referred to the department of diagnosis of the dental school. Sample selection was conducted as non- random.

The inclusion criteria of this study included: Any person with β-thalassemia who did not have other systemic diseases affecting periodontitis, have had at least 20 teeth in their mouths and have collaborated during the examinations. Exclusion criteria include: smoking, diabetes, history of corticosteroid usage, history of radiation therapy, history of periodontal treatment in the last 6 months, immunocompromised and history of antibiotic use in the last 3 months, oral breathing.

First, all stages of the study were explained to the patient and received written consent from the subjects. Then, they completed the examination form for all participants. Recorded data included: name, age,gender, education, occupation, spleen status and number of desferal per month. PI, PPD, GI, CAL indexes were also recorded for patients. All measurements were performed by a pre-trained examiner on Ramfjord teeth [14].

PI index
To measure this index, a score is assigned to each dental surface, and then the total score of the surfaces is divided by 4. Score Zero: without plaque. Score 1: Presence of adhesive plaque at

the gingival margin or adjacent tooth area that can be identified with a probe or disclosing tablet. Score 2: Average plaque in the gingival pocket or gingival margin that can be observed with no need for magnification, Score 3: Excessive accumulation of plaque in the gingival pocket, gingival margin or on the tooth [15].

GI index

In this index, the normal gum has zero, mild inflammation (a brief change in color and edema and absence of bleeding at the probe) has score 1, moderate inflammation (red, edema, gingival glare, bleeding at the probe) has score 2, severe inflammation (completely red Specifically, Edema, wounded, tendency to self-bleeding) has score 3. Then the numbers of all teeth are gathered together and divided by the number of teeth. If the number is between 0.1 and 1, inflammation is mild, if it is between 1.1 and 2, inflammation is moderate and if the score is between 1.2 and 3, inflammation is severe [3].

PPD Indicator: Gingival margin distance to Salcos depth on the probe of the periodontal Williamsis, which was entered to the surface of the teeth in parallel with Salcos, was measured in millimeters [3]. If it was between 0.1 and 1 mm, mild, 1. 1 and 2 mm moderate, and 1.2 and 3 severe inflammations are determined.

CAL Index: is pocket depth to CEJ. If it was 1 to 2 mm, the intensity was mild, 3 to 4 mm moderate, and 5 and more inflammation was severe [3].

To determine the sample size in this study, which aims to compare the status of periodontal indexes in patients with thalassemia major and normal people, according to Joseph R *et al*., [16] in 2009, information for the case and control group was obtained as follows:

The mean and standard deviation of GI index in the case group were 1.58 and 0.39 respectively and in the control group, respectively, was 0.86 and 0.53, respectively. Sample size with a confidence level of 99%, 90% test power was determined for the two domains of the test and using the formula for comparing the two meanings in the G-Power software (Specific Sample Size) as 30 (15 in the case group and 15 in the control group). This sample size was increased by considering the effect of project 1.5 to 46 (23 cases in the case group and 23 in the control

group). Meanwhile, the sample size was calculated based on the PI, GI, PPD, and CAL indices, because the sample for the GI index had the highest estimates, hence the GI was the criterion for determining the sample size.

In this research, after the examinations, studied indexes and the variables were recorded. After collecting data, they entered the SPSS 22 software and then were described using descriptive statistics and quantitative variables, using the mean ± standard deviation and qualitative variables were reported using descriptive statistics. Data analysis was performed by Pearson correlation coefficient and independent t-test, Chi-square and ANOVA. All tests were performed at a significant level of 0.05.

RESULTS

In this study, 23 patients with thalassemia and 23 healthy patients were studied and compared in terms of the periodontal indexes. The distribution of gender is presented in Table 1. According to the Chi-square test results, the ratio in the thalassemic group was not statistically significant (p <0.05) in the thalassemic and healthy group (p <0.05). The mean age in thalassemic patients was 24.95 ± 5.13 and for the healthy group as 82.4 ± 39/25.

Table1: Distribution of Gender

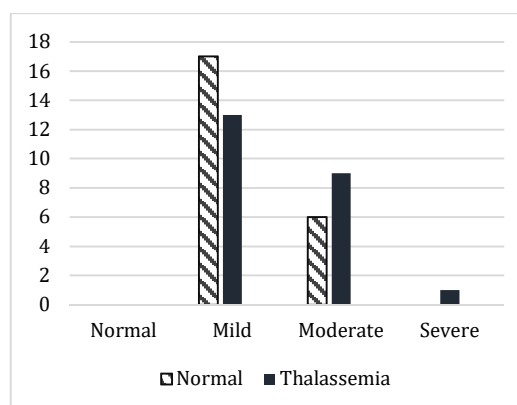| Group / Variable		Thalassemia	Normal
Gender	Male	11(47.8%)	10(43.5%)
	Female	12(52.2%)	13(56.5%)

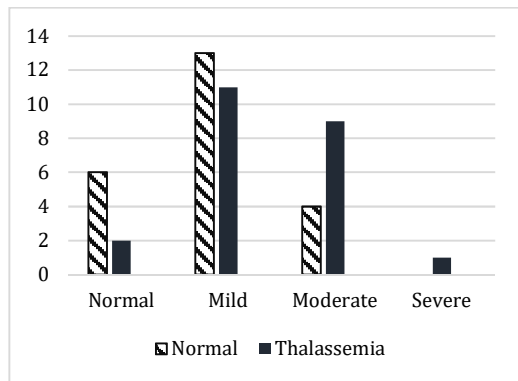**Diagram 1: Grouping of Gingival Index (GI)**

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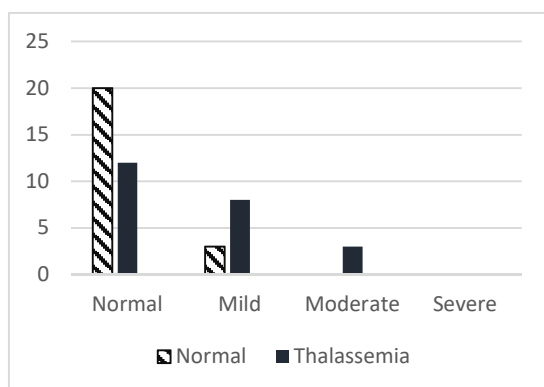**Diagram 2: Grouping of Plaque Index (PI)**

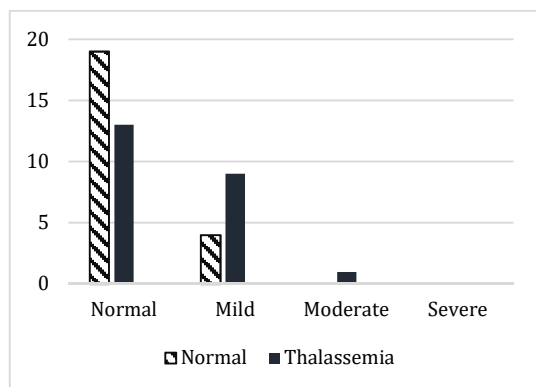**Diagram 3: Grouping of Probing Pocket Depth (PPD)**

Diagram 4: Grouping of Clinical Attachment Loss (CAL)

GI, PI, PPD, CAL indices were statistically analyzed for two groups of thalassemic patients and healthy people. The distribution of individuals according to severity for each of the mentioned indicators is shown in Diagrams 1-4.

The mean GI in thalassemic patients was 1.39 ± 0.72 and in the healthy group was 0.91 ± 0.666.

This difference was statistically significant (p = 0.028).

PI in thalassemic patients was 1.47 ± 0.59 and in healthy subjects was 1.26 ± 0.44, and PI level was higher in thalassemic patients, but it was not statistically significant and this difference was not significant. (p<0.05)

The mean pocket depth was 47.0 ± 0.59 for thalassemic patients and 0.17 ± 0.38 for healthy subjects. This difference was statistically significant at the borderline level (P = 0.051).

The mean of loss of attachment in the thalassemic group was 0.60 ± 0.72 and in the healthy group was 0.13 ± 0.36, which was statistically significant (p = 0.009).

A total of 7 thalassemic patients had undergone splenectomy that the distribution of spleen status has been demonstrated by sex in Table 2.

Table 2: Distribution of splenectomy in separation of gender

Group Variable		Gender		Total
		Male	Female	
Splenectomy	Yes	3(13%)	4(17.4%)	7(30.4%)
	No	8(34.8%)	8(34.8%)	16(69.6%)

The mean and the relation between the spleen and the studied indices are shown in Table 3.

Table 3: Indices average in separation of splenectomy status

Index	Splenectomy	Mean ±SD
GI	Yes	1.71±0.48
	No	1.25±0.77
PI	Yes	1.85±0.37
	No	1.31±0.60
PPD	Yes	0.57±0.53
	No	0.43±0.62
CAL	Yes	0.14±0.37
	NO	0.81±0.75

The PI index was higher in those who did not undergo the splenectomy, and this difference was statistically significant, but there was no significant difference in GI, PPD, CAL indices, and no significant difference.

Among thalassemic patients, 5 patients did not use any desferal, and 10 had consumed less than 100 pills a month, and 8 people consumed 100

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pills or more per month. The average number of desferal consumed for each of the studied indexes is presented in Table 4.

Table 4: Indices average in separation of the number of desferal consumed

Index	Number of Desferal	Mean ± SD
GI	0	1.60±0.54
	<100	1.60±0.84
	≥100	1.0±0.53
PI	0	1.80±0.44
	<100	1.60±0.69
	≥100	1.12±0.35
PPD	0	0.20±0.44
	<100	0.40±0.69
	≥100	0.75±0.46
CAL	0	1.20±0.83
	<100	0.50±0.52
	≥100	0.37±0.74

The results of the Chi-square test showed that the observed differences were not statistically significant ($p < 0.05$) in order to investigate the relationship between the studied indices and the number of desferal consumed.

DISCUSSION

The results of the analysis of the data of this study indicate that the mean GI and the mean loss of connections in the thalassemic patients group were higher than the healthy people. This difference was statistically significant. Also, PI level was higher in thalassemic patients, but it was not statistically significant and this difference is not significant. The mean pocket depth was higher in thalassemic patients than in healthy subjects. This difference was statistically significant at the borderline level ($P = 0.051$). The PI index was higher in those who did not undergo the splenectomy, and this difference was statistically significant, but there was no significant difference in GI, PPD, CAL indices, and no significant difference. It should be noted that in this study, there was no significant difference between the indices and the number of consumed desferal.

Oral, and maxillofacial problems are among the most important concerns of patients with thalassemia major. One of these problems is dental caries and gum disease [11]. The association between some systemic diseases and gum disease has been proven. But there is not much research about major thalassemia, and there are contradictions in it.

For example, AL-Wahadni *et al*., used PI, PPD, GI and DMFT indices to assess the gingiva and tooth status of 61 patients with thalassemia major. They stated that there was no obvious association between major thalassemia and gum disease and gingivitis, and no significant difference was found between the GI of the patient and the control group, but the prevalence of caries was obviously increased in these patients [12]. This is different from the findings from this study.

Meanwhile, Maulidita *et al*., (2014) acknowledged that there was a direct association between gingivitis and thalassemia major in a study titled as studying the periodontal parameters, total antioxidants level and ferritin levels in patients with thalassemia major were studied. There is a significant prevalence of dental caries and inflammation in patients with thalassemia major. Therefore, there was a strong association between thalassemia and leukemia with periodontal disease. They used the CPITN(Community Periodontal Index of Treatment Needs) index to assess children's gingival status [13]. These results are similar to our current study.

Gunay *et al*., in 2015, in a study entitled as studying periodontal parameters, total levels of antioxidants and Ferritin in thalassemic major pationts, stated that thalassemia major was not a risk factor for gingivitis [17].

Singh *et al*., (2013) compared the dental and periodontal health of patients with β thalassemia major and sickle cell anemia. The statistical population included 750 patients who assessed DMFT, PI and GI indexes. They stated that there was only a statistically significant association between the two groups of β-thalassemia and sickle cell anemia in the DMFT index and there was a statistically significant relationship between PI and GI indices in the two groups of thalassemia and sickle cell anemia with the group Healthy subjects (controls) were not observed [18].

In 2012, Kaur *et al*., developed a study to investigate dental caries and periodontal health in children with thalassemia major. The sample size was 70 patients and 69 healthy subjects aged 3-15 years. The PI and GI indices were used to assess gingival health. They did not have a statistically significant relationship between PI and GI indices with thalassemia major [19]. Contrary to the study of Kaur, our study found significant GI and

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thalassemia, which could be due to differences in the age group of statistical societies.

In a study by Nuraleyani *et al*., which was conducted as a dissertation entitled as a study on the Periodontal Health in children and adolescents with thalassemia major in Ardebil province in 2013, the gingival-dependent variable was measured using CPITN index. A total of 56 children were evaluated, with an average CPITN of 2. They concluded that in thalassemic patients, the formation of plaque and consequently high gingivitis [20]. In our study, the mean PI was higher in the thalassemic group than in healthy subjects, but the observed difference was not significant.

In 2006, Banihashemrad *et al*., reviewed the oral and gastric health status of patients with thalassemia major. Their case-control study was performed on 100 patients and 100 healthy individuals. They used the GI and OHI-s (Simplified Oral Hygeine Index) indices. They stated that the study of the indices showed that the gingival index and dextrose index in the patient group were significantly different from that of the control group, and no significant difference was found between the two groups in the study of calculus index. Also, in patients who had previously had a splenectomy, gingival diseases were significantly increased in patients who had not undergone splenectomy. Finally, they stated that in thalassemic patients, the level of plaque formation and consequently gingivitis has increased [21]. Comparing the research data of Banihashemrad *et al*., and the present study, it should be noted that in our study, the PI index was higher in subjects who had not undergone splenectomy. Therefore, the findings of their research are similar to the present study.

In 2005, Shahsavari *et al*., reviewed 58 patients and 58 healthy subjects in a study entitled as "The Prevalence of Gingivitis in Thalassemic Patients". They only studied the GI index. In the study, 39 patients with mild gingivitis, 19 cases in the case group and 55 patients with mild gingivitis and 3 subjects in the control group were observed. After statistical analysis, they stated that there was a significant relationship between GI index between the two groups [22]. These findings are in line with the results of this study.

CONCLUSION

In this study, the mean GI and mean CAL were significantly higher in thalassemic patients than in healthy subjects. Also, PI level was higher in thalassemic patients, but it was not statistically significant and this difference is not significant. The average pocket depth (PPD) in thalassemic patients was higher than healthy subjects, which was statistically significant at the borderline level ($P = 0.051$). The PI index was higher in those who did not perform the splenectomy, and this difference was statistically significant, but there was no significant difference in GI, PPD, CAL indices, and no significant difference. Also, there was no significant difference between the indices and the number of consumed desferal in this study.

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