Original Research Article

Oral Hygiene Status and Dental Caries Experience in Transfusion Dependent Thalassemia Patients: An Analytical Cross-Sectional Study

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Abstract

Background: Patients with thalassemia are prone to dental decay, although they are unconcerned about maintaining regular oral hygiene. The purpose of this study was to evaluate the oral hygiene status and dental caries experience of beta-thalassemia major patients in a tertiary care centre to those of healthy controls from the same centre.

Methods: Participants in the study ranged in age from 16 to 55 years. All study participants' carers or parents provided informed written consent. This research was carried out over a six-month period. All participants in the study were divided into two groups: (a) Group A (n = 30) consisted of patients with transfusion dependent thalassemia, and (b) Group B (n = 30) consisted of age- and sex-matched healthy controls. Following a thorough general examination, including demographic data, an intraoral examination was performed using the Decayed-Missing-Filled Permanent Teeth Index (DMFT Index) and the Oral Hygiene Index-Simplified (OHI-S) [Calculus Index (CI) and Debris Index (DI)].

Results: Sociodemographic characteristics revealed that the mean age of the case group was not statistically significant, that male cases outnumbered controls, and that the p value was not significant. However, when the OHI-S and DMFT indexes were examined, the p values were significant in both situations.

Conclusions: Thalassemia patients are more prone to poor oral hygiene and carious lesions. Early visit to dentist is a key to good oral health for thalassemia population and prevents many emergencies and surgical episodes.

Key Words: beta-thalassemia, Oral hygiene, dental caries, Oral Hygiene Index -Simplified (OHI-S),Decayed-Missing-Filled permanent Teeth Index(DMFT)

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Introduction

Thalassemia is a disorder of the myeloproliferative system that is inherited as an autosomal recessive trait. It is caused by anomalies in haemoglobin production, such as an imbalance in the α/β-globin chain ratio, which results in inefficient erythropoiesis, anaemia, and iron overload. The disease affects multiple systems and organs of the human body, including the heart and liver. [1] Sub-Saharan Africa has the largest prevalence of sickle cell disease, while Southeast Asia has the highest prevalence of thalassemia.[2] Thalassemia carriers are not sick and do not need blood transfusions. HbE (Haemoglobin E) beta thalassemia and beta thalassemia intermedia are examples of non-transfusion dependent thalassemia that do not require regular blood transfusions for survival.[3]

Patients with thalassemia may have facial abnormalities, malocclusions, and impacted dentition with altered tooth size and dental discolouration. [4-7] Generalanaemia symptoms such mucosal pallor and atrophic glossitis are very common in these patients. Thalassemia patients also have parotid hypertrophy and abnormal phosphorous and immunoglobulin A (IgA) levels in their saliva.[8,9] The oral mucosa of patients with congenital bleeding disorders shows signs of bleeding or bruises. Patients may ignore dental care owing to bleeding fears, resulting in the necessity for invasive dental operations with a higher risk of bleeding.[10] Early oral hygiene screening is beneficial in avoiding such invasive procedures. The Oral Hygiene Index Simplified (OHI-S) has been found to be higher in Thalassemia patients.[11]

Kaplan et al [12] found that the decayed missing filled permanent teeth (DMFT) index was slightly higher in individuals with thalassemia major than in a comparable study on children (8.3 vs 7.0). Subsequent research discovered that patients with thalassemia have a higher rate of dental caries than healthy controls.[9,13,14]

As childhood mortality falls, more adult thalassemia patients are visiting dental hospitals and clinics. As a result, the current study was conducted to assess the oral hygiene state and dental caries experience of transfusion dependent thalassemia major patients in a tertiary care hospital Thalassemia Day care unit, and to compare the results with healthy controls from the same centre.

Materials and Methods

This analytical cross-sectional study was conducted in a tertiary care hospital's Thalassemia Day Care Unit for two months (April to May, 2023). This study was approved by the institution's human subject ethics board (ethical committee) [Memo no. IEC/NBMC/M-06/004/2023] and was carried out in accordance with the Helsinki Declaration of 1975, as revised in 2013. Each group's sample size was predicted to be 30 participants, for a total sample size of 60. The trial included 41 eligible patients from the Thalassemia Day Care Unit. Thirty patients (aged 16 to 55 years) were chosen from among them if they were willing to participate in the study and met the inclusion and exclusion criteria.

The study included 60 patients (30 beta-thalassemia major patients, 30 age-matched and sex-matched healthy controls) ranging in age from 16 to 55 years. The healthy controls were drawn from the same hospital workers and colleagues. Before the clinical evaluation, all subjects signed an informed consent form. All participants in the study were divided into two groups: Group A and Group B.

- Patients who had previously been diagnosed with transfusion dependent thalassemia major and were attending the Day Care facility for follow up and blood transfusion sessions were eligible for group A.
- Adults free of thalassemia, periodontal disorders, and dental caries, as well as age- and sex-matched controls, were used as healthy controls in Group B.

Exclusion criteria in the study:

- Patients with any systemic condition that predisposes them to dental caries or periodontal disorders
- current drug use
- necessity for hospitalisation
- wearing full or partial dentures
- patients who have had or are currently receiving orthodontic treatment - patients who are unwilling to participate in this study

- patients who have smoked for more than six months - patients who have had dental treatment or received dental prophylaxis during the last six months of study initiation

A well-structured proforma was designed to record the demographic data, family history, Oral Hygiene Index Simplified (OHI-S)[15], and Decayed-Missing-Filled Permanent Teeth (DMFT) Index[16] of thalassemia patients and healthy controls (Table 1) separately, and intraoral examination was performed using a mouth mirror and explorer during their regular transfusion. Sociodemographic factors from the study group were analysed and compared to healthy controls. For all subjects tested, descriptive data such as mean and standard deviation for OHIS and DMFT were calculated.

Results

A total of 60 patients (thalassemia major 30 and healthy control 30) were enrolled in this analytical cross-sectional study. The participants in the study ranged in age from 16 to 55 years. MS Excel was used for all statistical analysis. Table 1 summarises the demographic data of the study groups. Sociodemographic characteristics revealed that the mean age of the case group was not statistically significant, that male cases outnumbered controls, and that the p value(0.705) was not statistically significant. But while analyzing OHI-S and DMFT index p value (0.000 and 0.028) were significant in both cases (Table 2 and Table 3).

Mean OHI-S score for thalassemia patient and healthy control was 2.20 ±1.02 and 0.76 ±0.53 respectively. Mean Calculus Index score (1.33 ±0.64) for thalassemia patient was greater than mean Debris Index score (0.87 ±0.55) for the same. In thalassemia patient DMFT score 1 was found in maximum number of patients (53.3%) followed by score 2 (33.3%). But most of the controls were also found DMFT score 1 (60%).

Table 1: Sociodemographic variables

	Group		Total	Statistical test, p value
	Thalassemia	Control		
Age of the participant (In years)	28.80 ± 12.84	32.13 ± 10.86	30.47 ± 11.81	t= 0.461, p= 0.449
Gender of the participant				
Male	20 (66.7%)	18 (60.0%)	38 (63.3%)	χ^2 = 0.144, p = 0.705
Female	10 (33.3%)	12 (40.0%)	22 (36.7%)	

Table 2: Oral Hygiene Index-Simplified (OHI-S) in thalassemia patient and control groups

	Group		Total	Statistical test, p value
	Thalassemia Mean ± SD*	Control Mean ±SD*		
Calculus Index	1.33 ± 0.64	0.44 ± 0.24	0.89 ± 0.66	F=7.579, p=0.000
Debris Index	0.87 ± 0.55	0.31 ± 0.44	0.59 ± 0.57	F=0.315, p=0.005
OHI-S	2.20 ± 1.02	0.76 ± 0.53	1.48 ± 1.09	F=8.334, p=0.000

*SD means Standard Deviation

Table 3: Decayed Missing and Filled Teeth Index (DMFT) in permanent teeth of thalassemia patients and control groups

DMFT	Group		Total	Statistical test, p value
	Thalassemia	Normal		
0	0 (0.0%)	6 (20.0%)	6 (10.0%)	$\chi^2 = 5.559$, p = 0.028
1	16 (53.3%)	18 (60.0%)	34 (56.7%)	
2	10 (33.3%)	6 (20.0%)	16 (26.7%)	
3	4 (13.3%)	0 (0.0%)	4 (6.7%)	

Discussion

The changes in the maxillofacial skeleton and dental tissues in thalassemic patients are primarily the result of maxillary enlargement, which causes maxillary protrusion of anterior teeth, increased spacing between teeth, and the development of over-bite and open bite, resulting in varying degrees of malocclusion that predisposes an individual to the development of dental caries.[4]

A recent large population-based study (n = 50,487) in rural West Bengal found 6.61% and 2.78% carriers of beta-thalassemia and HbE (Haemoglobin E).[17] The frequency of Thalassemia in India is particularly high among certain communities such as Punjabi, Sindhi, Gujarati, Bengali, Parsee, Lohana, and certain tribes, i.e., Northern, Western, and Eastern areas, while it is considerably lower in the south.[18] Dhote et al.[19] found considerably more dental caries in thalassemia patients, as well as an increase in the prevalence of gingivitis and plaque formation in patients with thalassemia major when compared to controls, in their study.

When thalassemia patients were compared to normal youngsters, Kaur et al.[20] discovered a greater frequency of dental caries. However, no significant increase in gingival inflammation, gingivitis, or plaque buildup was detected in -thalassemia patients compared to control persons. These children receive transfusion therapy at a young age and will receive regular blood transfusions, decreasing the normal facial traits and difficulties associated with them.[19] There have been conflicting findings about the relationship between thalassemia and periodontal disease. While no difference in plaque index, gingival index, or periodontal probing depth was detected between thalassemia patients and healthy controls,[14] other investigations indicated thalassemia patients to have a worse periodontal condition. [13,21,22]

A pilot study in thalassemia found that triglycerides and the cholesterol/high-density lipoprotein ratio linked positively with periodontal parameters, implying that periodontal health may influence thalassemia patients' lipid profiles.[22]

The primary goal of this study was to evaluate the oral health condition and dental caries experience of adult major beta-thalassemia patients to healthy controls of the same age group. The current study's DMFT ratings were lower than those reported in previous research. [14,19, 23] This could be because the majority of these patients had a previous dental history. As a result, kids were already aware of the significance of keeping proper oral hygiene. A higher mean Calculus Index score (1.33 ± 0.64) in compared to the Mean Debris Index score (0.87 ± 0.55) could potentially be the result.

Male cases outnumber controls, and the p value (0.705) is not statistically significant. This could be owing to the tiny sample size. Poor dental health and increased caries risk in thalassemia patients may not be directly related to the disease. Their chronic life-threatening condition, as well as the worry and dread of bleeding while brushing, keep them from practising excellent dental hygiene most of the time.

Despite the small sample size (all patients following up at the specified tertiary care centre were included in this study), it provides a snapshot of the region's impacted persons. This is a preliminary study with a limited sample size. It does have certain limits. The sample size of the population in this study was limited, which may have an impact on the representativeness of the results. Second, a cross-sectional study cannot draw conclusions regarding casual partnerships. Third, this study population covered a wide age range. As a result, additional investigations in this field with the same population

and proposals for expanding sample sizes with a small range of age groups and significantly longer durations are required to corroborate the findings of this study.

Ethical Clearance: This study was approved by the institution's human subject ethics board (ethical committee) [Memo no. IEC/NBMC/M-06/004/2023] by North Bengal Medical College, Darjeeling(IEC) on 2nd May 2024 and was carried out in accordance with the Helsinki Declaration of 1975, as revised in 2013.

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Conflicts of interest: There are no conflicts of interest.

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