



## A Hospital based Study of Caries Experience in Beta –Thalassemic Major Children

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### Abstract

**Aim:** To assess and compare the occurrence of caries experience in  $\beta$ -thalassemia major individuals and age matched healthy controls between the age of 2-17 years.

**Material and Methodology:** This study was conducted in Department of Paedodontics and Preventive Dentistry, Sudha Rustagi Dental College, Faridabad and in association with Government and Private Hospitals located in Delhi. This observational Study included a convenient sample of 150 child sample with established thalassemia major patients (study group) reporting for periodic treatment. Data was collected from medical records, questionnaires and oral health examination according to WHO examination 2013 Caries occurrence was calculated using DMFT/ deft Index Equal number of age matched children were also examined for caries as control group.

**Results:** Mean DMFT/ deft was found to be significantly higher among (p value (.000\*))  $\beta$ -Thalassemic patients in comparison with age matched individuals. Mean for DMFT/ deft in study was found to be lesser ( $16.41 \pm 3.19$ ) in males than, in females ( $21.70 \pm 1.54$ ).

**Conclusion:** There was statistically significant difference in the dental caries status of children with  $\beta$ -Thalassemia higher and their normal counterparts in total. Female thalassemic major patients had significantly higher caries experience than age matched control group.

**Keywords:** Beta- Thalassemia; Dental Caries; Children; Gender

### Introduction

Thalassemia is considered as the most common genetic disorder world-wide. It was first described by Thomas B Cooley and Pearl Lee in 1925. It has been derived from the Greek word 'thalas' which means the sea. It is an autosomal recessive blood disease involving defects in synthesis of  $\alpha$  and  $\beta$  polypeptide chains of hemoglobin. Based on their clinical and genetic orders, thalasse-

mias are classified mainly into major (homozygous) and minor (heterozygous) types. Thalassemia major ( $\beta$ -thalassemia) or Cooley's anaemia, exhibits the most severe clinical symptoms while thalassemia minor ( $\alpha$ -thalassemia) is mild and is considered to be clinically asymptomatic.

$\beta$ -thalassemia is the most commonly found Thalassemia with an estimated 60-80 million people in the world. There are about

65,000-67,000  $\beta$ -thalassemic patients in our country with around 9,000-10,000 cases being added every year.

Oral health of children suffering from Thalassemia major is reported to be poor by most of the researchers. As low priority is given to the oral health status by the masses in the country in general, this negligence might be compounded for children already suffering from a life threatening systemic disease because the parents might focus on the medical procedures required to overcome this disease during early childhood. So, this poor oral health in turn leads to further deterioration of systemic health in these children.

A number of studies have been conducted relating dental caries with thalassemia.

**Materials and Methods**

The following study was conducted in Department of Paedodontics and Preventive Dentistry, Sudha Rustagi Dental College, Faridabad and in association with Government and Private Hospitals located in Delhi and NCR to assess and compare the incidence of Dental caries status of Beta-thalassemia major individuals with age related healthy control group.

It is a hospital based study. A total of 350 children, 150 Thalassemic patients (study group) and 200 age matched healthy (control group) and were assessed.

Teeth were examined for Dental Caries using the Decayed-Missing-Filled Teeth (DMFT) Index given by Henry T. Klein, Carrole E. Palmer and Knutson J. W. in 1938 and decayed-extracted-filled teeth (deft) Index given by Gruebbel A. O. in 1944, modified by WHO in 1986. Dental caries was diagnosed by visual examination using a probe and dental mirror utilising the criteria recommended by the World Health Organization, and documented using the tooth description code

**Thalassemic individuals**

The Inclusion criteria for Thalassemic individuals were:

- Individuals diagnosed with Beta-thalassemia major
- Age between 2 and 17 years.
- Written consent

The Exclusion criteria for the Thalassemic individuals were

1. Dental prophylaxis in the last 6 months.
2. Suffering from other systemic diseases known to influence dental caries and systemic disease such as Down’s syndrome and diabetes.

**Age matched healthy control group**

Inclusion criteria

- Were Medically fit
- Were free of thalassemia, both Major and Minor forms

Exclusion criteria involved were

- Individuals undergoing antibiotic or anti-inflammatory therapy or had undergone such therapy in the previous 6months

**Statistical analysis**

Statistical analysis was done using SPSS (21.0 version).. Descriptive statistics including mean and standard deviation of each clinical parameter were determined for all the groups examined. Mann-Whitney U (for comparing two groups) and Kruskal-Wallis test (forcomparing more than two groups). Chi square test was used for categorical variables. Spearmen correlation coefficient was used to find association between variables. Level of statistical significance was set at p-value less than 0.05

**GROUP A (2-7YRS)**



Figure 1

**GROUP (7-13YRS)**



Figure 2

**GROUP (~13-17YRS)**



Figure 3

**Results and Discussion**

**Result**

Present study was an examination and structured questionnaire based study which was conducted on 150 Thalassemic Major

patients and 200 healthy patients in the age group of 2-17 years by comparing the occurrence of dental caries status. Occurrence of dental caries was evaluated by using DMFT /deft index.

|                      | CONTROL GROUP |      |        |      | STUDY GROUP |      |        |      | Total |
|----------------------|---------------|------|--------|------|-------------|------|--------|------|-------|
|                      | Male          |      | Female |      | Male        |      | Female |      |       |
|                      | N             | %    | N      | %    | N           | %    | N      | %    |       |
| A (3-7 years)        | 32            | 30.2 | 32     | 34.0 | 28          | 33.3 | 20     | 30.3 | 112   |
| B (8-12 years)       | 62            | 58.5 | 48     | 51.1 | 19          | 22.6 | 20     | 30.3 | 149   |
| C (13-18 years)      | 12            | 11.3 | 14     | 14.9 | 37          | 44   | 26     | 39.4 | 89    |
| Total                | 106           | 100  | 94     | 100  | 84          | 100  | 66     | 100  | 350   |
| Chi square value     | 1.220         |      |        |      | 1.136       |      |        |      |       |
| P <sup>a</sup> value | 0.540         |      |        |      |             |      |        |      |       |

**Table 1:** Shows the sample distribution according to age and gender compared to control group.

In the control group,106 males were included out of which 32 were in the age range >2<7,62 were in the age range >7<12, 12were in the age range >12<17 while in the study group, out of 84 male, 28 were in the age range >2<7,19 were in the age range >7<12, 37were in the age range >12<17. No significant difference was found between the two group using chi square test (p-value<0.05) (Table 1). Mean Caries experience in the control group was 0.13 ± 0.11 and in the study group was 0.18 ± 0.12. Mean Caries experience in the control group was 0.19 ± 0.19 and in the study group was 0.20 ± 0.14. For clinical variables, caries experience (p=.00) was reported significantly higher among study group (Table 1).

| Caries Experience** |          | Male          | Female      |
|---------------------|----------|---------------|-------------|
|                     |          | Control group | 0.19 ± 0.19 |
| Study group         |          | 0.20 ± 0.14   | 0.18 ± 0.12 |
|                     | In total | .080          | .000*       |

**Table 2:** Gender Wise.

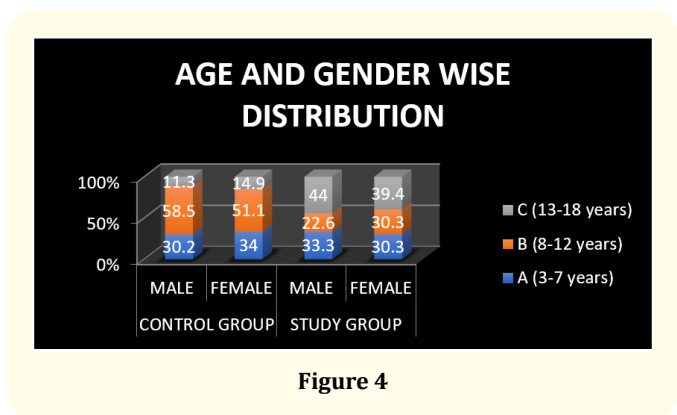
| Caries Experience**  | Group a (2-7 yrs) |      | Group b (7-13 yrs) |      | Group c(13-17yrs) |      | total          |
|----------------------|-------------------|------|--------------------|------|-------------------|------|----------------|
|                      | M                 | F    | M                  | F    | M                 | F    |                |
| Male(M)<br>Female(F) |                   |      |                    |      |                   |      |                |
| Study group          | 0.14              | 0.16 | 0.21               | 0.21 | 0.15              | 0.15 | 0.061          |
|                      | Control group     | 0.23 | 0.15               | 0.18 | 0.12              | 0.17 | 0.14           |
|                      |                   |      |                    |      |                   |      | B>A<C<br>A>B>C |

**Table 3:** Group wise distribution of caries experience in three age groups A (2-7YRS), B (7-13YRS) and C (13-17YRS).

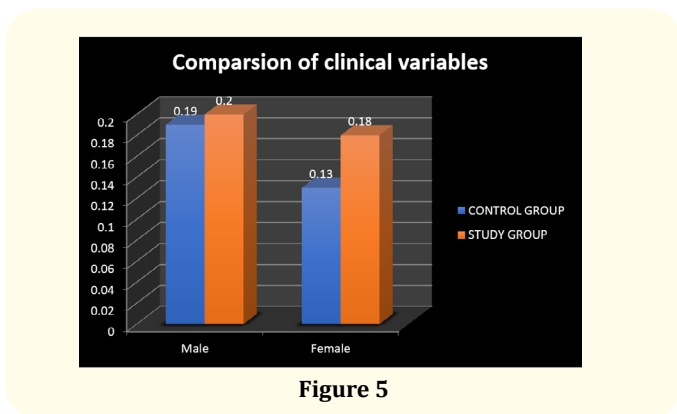
The comparison of among age groups showed that beta thalassemia major (study group) affected children have higher caries experience than their age matched control group in all age groups A(2-17yrs), B(7-13yrs) AND C(13-17yrs). In control group caries experience among three groups was 0.096(A>B>.C) while in study group, it was 0.061 (B>A<C). Age related high increase in caries experience in early years in our study group β-thalassaemia major patients shows urgent need to educate these patients in the prevention and control of dental caries and maintenance of good oral hygiene.

**Discussion**

The current study discussed the difference between Thalassemic Major and age matched control group amongst different age groups i.e. A(3-7yrs), B (7-13yrs) and C(13-17yrs) and in males



**Figure 4**



**Figure 5**

and females separately. In our study, caries experience between study and control group was found to be significant as higher in females ( $21.70 \pm 1.54$ ,  $16.41 \pm 3.19$ ) but not significant in males. In a similar study, caries experience was found to be significantly higher in patients with thalassemia major; the mean DMFT in healthy group 0.73 and 2.16 in the Thalassemic group. According to authors, variation in concentration of iron in serum leads to changes in the concentration of iron in teeth which might lead to the severity of dental caries. Al Wahadni, *et al.* and Arora, *et al.* also reported that dental caries was significantly higher in patients with thalassemia [5].

Similarly, Al-jobouri showed that beta thalassemia had higher DMFS ( $9.29 \pm 7.66$ ) as compared to control group ( $2.54 \pm 2.44$ ) [2]. Patients and the parents of the patients are preoccupied with their main, life-threatening problems arising from the disease and hence, neglecting the basic preventive dental care is also the reason. In one study, it was demonstrated that thalassemic major children were associated with lower concentrations of IgA in saliva which could allow the increased microbial proliferation leading to higher caries experience. Similarly, Al-jobouri showed that beta thalassemia had higher DMFS ( $9.29 \pm 7.66$ ) as compared to control group ( $2.54 \pm 2.44$ ) [3]. Patients and the parents of the patients are preoccupied with their main, life-threatening problems arising from the disease and hence, neglecting the basic preventive dental care is also the reason. Siamopoulou-Mavridou, *et al.* evaluated gingivitis and caries in 22 thalassemia patients and suggested that the lower level of the salivary antibodies set the higher prevalence of gingivitis and caries in patients with thalassemia [1].

According to Kaplan, *et al.*, caries in thalassemic patients might be because of the fact that parents are more concerned about the serious physical problems and pay less attention to the dental ailments, and seek dental care only when the child is in pain whereas in normal patients the occurrence of dental caries can be attributed primarily to the casual approach towards oral health [4]. Kuriakose, *et al.* (2013) conducted a study to compare the salivary buffering capacity (BC), flow rate (FR), resting pH and salivary immunoglobulin-A (s-IgA) levels in children who are caries resistant and who have rampant dental caries; it observed that a reduction in salivary FR, BC, resting pH and s-IgA in children with rampant caries which might have led to dental caries formation [6-8].

## Conclusion

Age-related high increase in caries experience in early years in our study group  $\beta$ -thalassaemia major patients shows urgent need to educate these patients in the prevention and control of dental caries and maintenance of good oral hygiene.

## Acknowledgements

Not applicable

## Conflict of Interest

Not applicable

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