

## Association Between Middle Ear Infection and Dental Caries Amongst Children: A Hospital Based Study

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### ABSTRACT

**Background:** Otitis Media or infection of Middle Ear is a broad term that encompasses all the inflammation of the middle ear without any specific etiology or pathogenesis. The present study was conducted with the aim to determine the incidence of dental caries amongst the subjects with middle ear infection.

**Materials and Methods:** Controls were subjects who didn't had dental caries of ear infection. Children with any other medical condition were excluded from the study. Children with infection of middle ear were categorized according to age and gender. Group I subjects were having middle ear infection and Group II were controls. Centrifugation was done for 10 mins and the deposits obtained were used for culturing. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software. Probability value of less than 0.05 was considered as significant.

**Results:** The mean age of the subjects was 10.67 $\pm$ 3.62 years. The mean colony forming units in Group I was 5.7 $\pm$ 9.65 and in Group II was 1.6 $\pm$ 2.78. There were 5 children in Group I and 30 children in Group II with very good health of teeth. Good oral health was seen amongst 5 subjects in Group

I and 20 subjects in Group II. Majority of subjects in Group I (40) had average oral health. There was a significant difference in the Groups amongst oral health amongst the groups.

**Conclusion:** There was an increased risk of early childhood caries amongst children with middle ear infection.

**Keywords:** Caries, Infection, Otitis Media.

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### INTRODUCTION

The term "childhood diseases" are generally given to the diseases like pneumonia, diarrhea or malaria that are few of the prime reasons of death amongst children under the age of five years. Otitis Media or infection of Middle Ear is a broad term that encompasses all the inflammation of the middle ear without any specific etiology or pathogenesis.<sup>1</sup> Infection of Middle ear and caries are not chief reason of mortality amongst children, but both disorders have high prevalence worldwide and are the most frequently diagnosed childhood diseases.<sup>2,3</sup>

It is a disease that generally afflicts infants and young children during the initial 3 years of life, with around 80% of subjects having at least one episode of otitis media episode at the age 3

years and 50% have been affected by at least three episodes, while fewer had their first episode after the age of 3 years.<sup>4,5</sup> Researchers has shown that otitis media prevalence ranges between 62-84% in children.<sup>3,6,7</sup> This disease may be due to the structural and functional deformity of the Eustachian tube and due to immaturity of immune system.<sup>6,8</sup> It has been related to increased levels of salivary bacteria Streptococci mutans and with a significantly increased risk for development dental caries, as primary teeth begin to calcify during the first year of life.<sup>9-11</sup> The present study was conducted with the aim to determine the incidence of dental caries amongst the subjects with middle ear infection.

## MATERIALS AND METHODS

This descriptive observational study was performed amongst randomly selected children whose age was 5 years and younger reporting to the hospital for any regular checkup. Ethical committee clearance was obtained from institutional ethical board and all the subjects were informed about the study and a written consent was obtained from them in their vernacular language. Controls were subjects who didn't had dental caries of ear infection. Children with any other medical condition were excluded from the study. Children with infection of middle ear were categorized according to age and gender. These children were assessed by ENT specialists. Parents or guardians of these children were asked about history of ear infection. Information was also obtained from them regarding brushing habit, feeding

information, oral hygiene habits, method of feeding, childhood illness etc. These were based on questionnaire and it was filled by the parents. Saliva samples were obtained from the children and collected in a sterile container. Group I subjects were having middle ear infection and Group II were controls. Centrifugation was done for 10 mins and the deposits obtained were used for culturing. Mitis salivaris agar was used for culturing. Deposits were plated and the media was kept at room temperature for incubation for 24 hours. Digital colony counter was used for counting the colonies. Gram staining was also used for checking colonies. Smears were prepared from the colonies. All the data thus obtained was arranged in a tabulated form and analysed using SPSS software. Probability value of less than 0.05 was considered as significant.

**Table 1: Comparison of colony forming units**

Group	Mean CFU	P value
I	5.7+/-9.65	<0.05
II	1.6+/-2.78	

**Table 2: Results of questionnaire based survey**

Question	Group I	Group II	P value
<b>How is the health of teeth ?</b>			
Very good	5	30	<0.05
Good	5	20	
Average	40	0	
<b>How often do you clean teeth ?</b>			
Once a day	45	50	>0.05
More than once	5	0	
<b>How often have you experienced pain and discomfort in teeth ?</b>			
Occasionally	20	0	<0.05
Never	30	50	
Don't remember	0	0	

## RESULTS

The present study enrolled 100 subjects with 50 in each group. The mean age of the subjects was 10.67+/-3.62 years. The mean colony forming units in Group I was 5.7+/-9.65 and in Group II was 1.6+/-2.78. On applying chi square test there was a significant difference between the group as the p value was less than 0.05.

Table 2 shows the results of the questionnaire based survey. There were 5 children in Group I and 30 children in Group II with very good health of teeth. Good oral health was seen amongst 5 subjects in Group I and 20 subjects in Group II. Majority of subjects in Group I (40) had average oral health. There was a significant difference in the Groups amongst oral health amongst the groups. There were 45 subjects in Group I and 50 subjects in Group II who brushed teeth once. There was no significant difference in the frequency of tooth brushing amongst the groups. None of the subjects in Group II ever experienced any dental pain or discomfort whereas there were 20 subjects in Group I who experience pain and discomfort occasionally. There was a significant difference between the two groups as the p value was less than 0.05.

## DISCUSSION

It is theorized that the infections of middle ear infection that during this period can lead to some damage to the enamel forming cells and this can result in the making of hypoplastic enamel of primary teeth that increase their caries vulnerability. Studies from past on dental caries have shown the action of Streptococci mutans as a marker for caries risk.<sup>12</sup> Increased level of S. mutans in the saliva generally leads to early colonization of the organisms amongst children. Children that are colonized by S. Mutans at an early age have more caries than those colonized at a later age.<sup>13</sup> The colonization of S. mutans can also affect the colonization of S. pneumoniae in the nasopharyngeal area. Therefore, the vice versa association like middle ear and nasopharyngeal aggregation can also affect teeth development during early childhood.<sup>14</sup> Culturing S. mutans from saliva of children has high usefulness in risk assessment of caries. Salivary mutans streptococcus culture may Therefore be more efficient, simple and less time consuming.<sup>15</sup> The results of the present study were like the results of the study conducted by Alaki et al., that demonstrated a relationship between otitis media and dental caries.<sup>16</sup> In our study, there were

5 children in Group I and 30 children in Group II with very good health of teeth. Good oral health was seen amongst 5 subjects in Group I and 20 subjects in Group II. Majority of subjects in Group I (40) had average oral health. There was a significant difference in the Groups amongst oral health amongst the groups. There were 45 subjects in Group I and 50 subjects in Group II who brushed teeth once. There was no significant difference in the frequency of tooth brushing amongst the groups. None of the subjects in Group II ever experienced any dental pain or discomfort whereas there were 20 subjects in Group I who experience pain and discomfort occasionally. There was a significant difference between the two groups as the p value was less than 0.05. The study concluded that children with otitis media, were at higher risk for caries development after the first year of age. Amongst young children who were fed by feeding bottles were at an increased risk in the establishment of colonies of *Streptococcus mutans* and *Streptococcus pneumoniae*, which were accountable for otitis media and dental caries. As per the studies by Knuutila and Makinen, Vadeboncoeur et al. and Kontiokari et al<sup>17-19</sup> similar observations were seen. In yet another study performed by Meurman and Pienihakkinen, concluded that higher S. Mutans scores have been correlated to the increased caries incidence amongst preschoolers.<sup>20</sup> As per the study by Ingemansson Hultquist et al. concluded that tooth brushing was not significantly related to the presence of S. mutans.<sup>21</sup> Earlier aggregation by S. mutans amongst young children generally is associated with elevated caries rates as per Kohler et al.<sup>22</sup>

## CONCLUSION

There was an increased risk of early childhood caries amongst children with middle ear infection. Increased number of colonies of S. mutans was observed amongst children with middle ear infection. Also, there was increased prevalence of oral discomfort amongst children with middle ear infection.

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