



## Prevalence of Dental Caries and Gingivitis among 6 - 12 Year Old Children in Thiruvananthapuram District, Kerala, India - A Cross-Sectional Study

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### Abstract

**Background:** The major oral diseases seen in children are dental caries and gingivitis. Our study aimed to find the prevalence of dental carries and gingivitis among 6 - 12-year-old children in Thiruvananthapuram district, Kerala, India.

**Methods:** It was a cross sectional study conducted among 465, 6 - 12-year-old children.

**Results:** The prevalence of dental caries in deciduous teeth of the children was 52.25% (47.71 - 56.78%) and that in permanent teeth of the children was 37.2% (32.90 - 41.67%). The prevalence of mild gingivitis among children was 73.11% (69.09 - 77.15%) and that of moderate gingivitis was 24.9% (21.17 - 29.03%). Severe gingivitis was prevalent in 0.86% (0.23 - 2.18%) of children.

**Conclusion:** We believe that our findings would provide basis to plan oral health education intervention for 6 - 12-year-old children.

**Keywords:** Prevalence; Dental; Caries; Gingivitis; Children; Oral

### Abbreviations

DMFT: Decayed-Missing-Filled Teeth (DMFT) Index; def: Decayed-Extracted-Filled Teeth (def) Index; GI: Gingival Index (GI); OBC: Other Backward Caste (OBC); SC: Scheduled Caste (SC); ST: Scheduled Tribe (ST); OHE: Oral health education (OHE)

### Introduction

The major oral diseases seen in children are dental caries and gingivitis [1]. Children with poorer oral health status are more likely to experience dental pain and miss many hours of school due to oral pain and related problems [2]. Oral disease result in loss of more than 50 million hours annually from school [3].

If left untreated the decayed tooth can become infected leading to abscess formation, pain, facial swelling, and fever; at this stage, root canal treatment or extraction of tooth becomes necessary [4]. In gingivitis there will be inflammation of the gum adjacent to the tooth surface, reddish colour of the gums and bleeding from gums.

Preschool age children also have more dental caries and gingivitis. According to Colak, *et al.* [5] the causes for dental caries in preschool children are breast feeding, reduced parental education and low socio economic status. According to Pari, *et al.* [6] the causes for gingivitis in preschool children are teeth deposits, systemic diseases, nutritional deficiency, viral fungal or bacterial infections, and trauma.

The burden of tooth decay for 12-year-olds is highest in middle-income countries. The main cause is the rise in sugar consumption. About two-thirds of the tooth decay in these countries remains untreated due to weak oral healthcare systems [4]. In India in 2017 among 6 - 12 year old children prevalence of dental caries in primary dentition and permanent dentition were 64.2% and 26.6%, respectively [7]. Among 3-12-year-old children, in India in 2019, the prevalence of gingivitis was 41.28%. About 32.35% had mild gingivitis, 67.36% had moderate gingivitis and 0.29% had severe gingivitis [8]. Among 12 year old children the prevalence of gingivitis was 59%, among them 53.09% children had mild gingivitis 5.5% children had moderate gingivitis and 41.41% had severe gingivitis [9].

According to the latest review of studies on prevalence of dental caries in Kerala, only three studies looked into the prevalence of dental caries among 6 - 12 year old school children in Kerala [10]. But none of the studies actually focused on Thiruvananthapuram, the capital of Kerala and also one of the major educational districts holding highest number of schools in state. Only one study done in the year 1999 specifically looked into prevalence of dental caries among 6 - 12 years in Thiruvananthapuram district [11].

### Aim of the Study

So, our study aimed to find the prevalence of dental caries and gingivitis among 6 - 12-year-old children in Thiruvananthapuram district, Kerala. We believe that this information would provide basis to plan oral health education intervention for these children.

### Materials and Methods

#### Study setting

Thiruvananthapuram district in Kerala state is divided into

three educational districts; which are Neyyattinkara, Thiruvananthapuram and Attingal [12]. In both Neyyattinkara and Attingal educational districts, more than 95% of the students study in rural schools. In Thiruvananthapuram educational district 43% of students study in urban schools and 57% of students study in rural schools. In order to get an adequate representation of children studying in both urban and rural schools, the study was conducted in schools coming under Thiruvananthapuram educational district. Since 6 - 12-year-old children study in standards one to seven, this study involved children studying in first to seventh standards of government or government aided schools coming under Thiruvananthapuram educational district.

#### The inclusion criteria set for schools were as follows:

##### It should be

- A school for general education
- A co-education (mixed) school
- A government or government aided school
- Contain standards one to seven (since 6 - 12-year-old children study in these standards)
- Have at least 20 students studying in all standards from one to seven.

In Thiruvananthapuram educational district there were 16 schools which met these inclusion criteria: 6 urban schools and 10 rural schools. Expecting a dental caries prevalence of 77% based on a previous study by Christian [13]; at a 95% confidence interval and assuming a design effect of 1.5 the sample size was calculated as 409. Assuming a 13.55 non-response rate the final sample size was calculated was 465. Across sectional survey was conducted among 465 children.

The general information was collected using a pretested questionnaire. In clinical oral examination the prevalence of dental caries among permanent teeth was recorded using Decayed-Missing-Filled Teeth (DMFT) Index [14] and the prevalence of dental caries among deciduous teeth was recorded using Decayed-extracted-filled teeth (def) index [15]. The prevalence of gingivitis was recorded using Gingival Index (GI). All the recordings were done by the first author (NS, a dentist).

### Results

#### General information

All the children were from government schools. More than half (57%) of children were from rural schools and the rest (43%) were

from urban schools. Over half (51%) of children studied in English medium schools and the rest (49%) in Malayalam medium schools.

The age of the children ranged from 8 to 13 years. The mean age of the children was 10.43 ± .92 years. About 58.7% of the children were boys and rest of them were girls (41.3%). Majority of the children were Hindus (66.9%) and rest of them were Muslims (30.1%) and Christians (3%). Most of the children belonged to other backward caste (OBC) (62.6%). Table 1 gives distribution of children according to caste.

Caste	Frequency (N)	Percent (%)
General	98	21.1
Other Backward Caste (OBC)	291	62.6
Scheduled Caste (SC)	73	15.7
Scheduled Tribe (ST)	3	0.6
Total	465	100

**Table 1:** Distribution of children according to caste.

The socio-economic status of the children was estimated based on their father’s occupation, mother’s occupation, ownership of

their house and the roofing of their house. About 60.2% of them belonged to low socio-economic status, rest of them belonged to medium (16.3%) and high socio-economic status (23.4%).

**Prevalence of dental caries**

The prevalence of dental caries among the children was 67.1%. The prevalence of dental caries in deciduous dentition of the children was 52.25% and the prevalence of dental caries in permanent dentition of the children was 37.2% (Table 2). About 22.4% of children had dental caries in both deciduous and permanent dentition. Age and sex wise prevalence of dental caries is given in table 3. The prevalence of dental caries was more among males compared to females.

Prevalence
Prevalence of dental caries 67.1% (62.73 - 71.26%)
Prevalence of dental caries in the deciduous dentition 52.25% (47.71 - 56.78%)
Prevalence of dental caries in the permanent dentition 37.2% (32.90 - 41.67%)

**Table 2:** Prevalence of dental caries among 6 - 12 year old children in Thiruvananthapuram educational district.

Age	Sex		Permanent caries prevalence	Deciduous caries prevalence
	Male	Female		
6 - 10	150 (54.9%)	108 (56.3%)	86 (49.7%)	144 (59.3%)
11 - 12	123 (45.1%)	84 (43.8%)	87 (50.3%)	99 (40.7%)
Total 465	273	192	173	243

**Table 3:** Age and Sex wise prevalence of dental caries.

**Prevalence of gingivitis**

About 98.9% of children had some form of gingivitis while rest of them had normal gingival status. The prevalence of mild gingivitis was 73.11% and that of moderate gingivitis was 24.9%. Severe gingivitis was prevalent in 0.86% of children (Table 4). Age and sex wise prevalence of gingivitis is given in table 5. The prevalence of gingivitis was more among males compared to females.

	Prevalence
Prevalence of mild gingivitis	73.11% (69.09 - 77.15%)
Prevalence of moderate gingivitis	24.9% (21.17 - 29.03%)
Prevalence of severe gingivitis	0.86% (0.23 - 2.18%)

**Table 4:** Prevalence of gingivitis among 6 - 12 year old children in Thiruvananthapuram educational district.

Age	Sex		Prevalence of gingivitis
	Male	Female	
6 - 10	150 (54.9%)	108 (56.3%)	258 (55.7%)
11 - 12	123 (45.1%)	84 (43.8%)	205 (44.3%)
Total 465	273	192	463

**Table 5:** Age and sex wise prevalence of gingivitis.

**Discussion**

In our study the prevalence of dental caries among the children was 67.1% (62.73 - 71.26%). The prevalence of dental caries in deciduous teeth of the children was 52.25% (47.71 - 56.78%) and the prevalence of dental caries in permanent teeth of the children was 37.2% (32.90 - 41.67%). Similar findings were reported by earlier

studies also. Kuriakose et al. reported that the prevalence of dental caries in deciduous dentition of the preschool children of Thiruvananthapuram district was 54% [16]. David., *et al.* had reported that the prevalence of dental caries in the permanent dentition of 12 year old school children in Thiruvananthapuram district was 27% [17].

In our study the prevalence of dental caries was more among males compared to females and this could be due to better oral hygiene practices seen among female children. Earlier studies had reported that compared to males, females gave more attention to their oral health, they used medium type tooth brush, brushed their teeth more than once daily and regularly visited their dentist [18]. Mamai-Homata., *et al.* in the meta-analysis of data of 385 students by gender showed that females brushed their teeth significantly more often than males and thus females had better oral hygiene status than males [19].

In our study the prevalence of mild gingivitis among children was 73.11% (69.09 - 77.15%) and that of moderate gingivitis was 24.9% (21.17 - 29.03%). Severe gingivitis was prevalent in 0.86% (0.23 - 2.18%) of children. Similar findings were given by earlier studies also. In the study by Sing., *et al.* among 5 - 14 old school children the overall prevalence of gingivitis was 78.35% (mild gingivitis 54.38%, moderate 21.77%, and severe 2.27%) [20].

In our study the prevalence of gingivitis was more among males compared to females and this could be due to better oral hygiene practices seen among female children. Earlier studies had reported that females had better oral health related knowledge, attitude and practices leading to lower prevalence of gingivitis among them [21]. Pari., *et al.* in 2014 had reported that the prevalence of gingivitis were less in girls than boys, and it was related to good oral hygiene practices followed by girls [6].

In our study we focused on 6 - 12 year old children; 6 - 12 years is the time of mixed dentition; first permanent teeth erupts by the age of 6 years. The most appropriate time to provide oral health education (OHE) to children is 6 - 12 years. According to Erikson's 8 Stages of Psychosocial Development children in 6 - 12 years of age group are productive and they learn the pleasure of applying themselves to the task, and feel pride in their accomplishments [22]. This age group also falls under the concrete operational stage

of Piaget's theory. They can attach concepts to concrete thoughts. They acquire and use cognitive operations such as mental activities that are components of logical thought [23]. So, they are the best age group to plan for oral health education interventions.

Our findings would provide a basis to plan oral health interventions for 6 - 12 year old school children. In the current Covid situation to get such extensive information regarding prevalence of dental caries and gingivitis among children when they are not coming to school would be a little difficult in future times.

## Conclusion

The prevalence of dental caries among the children was 67.1% (62.73 - 71.26%). The prevalence of dental caries in deciduous teeth of the children was 52.25% (47.71 - 56.78%) and the prevalence of dental caries in permanent teeth of the children was 37.2% (32.90 - 41.67%). The prevalence of mild gingivitis among children was 73.11% (69.09 - 77.15%) and that of moderate gingivitis was 24.9% (21.17 - 29.03%). Severe gingivitis was prevalent in 0.86% (0.23 - 2.18%) of children.

## Patents

Nil.

## Author Contribution Details

The manuscript has been read and approved by all the authors. All authors had contributed in concept, design, data analysis, statistical analysis, manuscript preparation, manuscript editing and manuscript review. Each author believes that the manuscript represents honest work and authors alone are responsible for the content and writing of the paper.

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## Institutional Review Board Statement

The study got approval and clearance from the Institutional Ethics Committee (IEC) of Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) (IEC Regn No. ECR/189/Inst/KL/2013). Written permission from the Additional Director of Public Instruction, Kerala and the Deputy Director of Education Thiruvananthapuram had been obtained.

### Informed Consent Statement

Participant information sheets were given to participants, informed consent were obtained from parent/ guardian and assent were obtained from children.

### Data Availability Statement

Hard and soft copies of data are available with Principal investigator.

### Conflict of Interest

Nil.

### Sample Availability

Not applicable.

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