

# An Overview of Gingival and Periodontal Diseases in 12 to 15 years using Gingivitis and Periodontitis Site Prevalence Index (WHO, 1978)

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## ABSTRACT

The aim of the study was to overview the gingival and periodontal disease in children and adolescents aged 12 to 15 years in Belgaum city. Visible plaque, gingival bleeding, supragingival and subgingival calculus and periodontal pockets were measured. Examination of buccal, lingual and mesial areas of each tooth was recorded sequentially in both arches using Gingivitis and Periodontitis Site Prevalence Index (WHO, 1978). The prevalence of gingival and periodontal disease was more in males than females and in Hindu population compared to others. The sites affected by gingivitis and periodontitis increased with the age. Periodontal problems were significantly more prevalent in patients with betel nut chewing habit. Visible plaque was most common while periodontal pockets were least common in the adolescents. Age, socioeconomic status, brushing habits and brushing frequency did not affect much to the prevalence of sites of gingivitis and periodontal disease. It was concluded that early diagnosis and preventive measures would surely reduce the growing problem of gingival and periodontal diseases among the children and adolescents.

**Keywords:** Adolescent, Plaque, Calculus, Gingivitis, Periodontitis, Pockets, Prevention.

## INTRODUCTION

Periodontal diseases in children and adolescents can be limited to gingival tissues or manifest by destruction of the periodontium, which may lead to loss of the tooth in some cases. Periodontal diseases have been the subject of interest of many studies from anatomical, epidemiological, clinical and cellular aspects.

Gingivitis, a reversible dental plaque-induced inflammation of the gingiva, is a common occurrence in children as young as 5 years of age.<sup>1,2</sup> Periodontitis, which is bacterially induced, is usually accompanied by gingivitis resulting in irreversible destruction of the supporting tissues surrounding the tooth, including the alveolar bone.<sup>3</sup> A severe form of periodontitis—aggressive periodontitis, produces destruction of the periodontium which is apparent during childhood.<sup>2,3</sup>

Periodontal disease and dental caries are the most prevalent infections affecting the human dentition.<sup>4</sup> Gingivitis is common, especially around puberty<sup>2</sup> affecting over 80% of young children while almost entire population experiences gingivitis, periodontitis or both.<sup>5</sup> Periodontal disease occurs at any age, and is usually an extremely slow process. The early stages are common around puberty<sup>3,5,6</sup> and unless these early stages are eliminated, degenerative periodontal diseases are inevitable in the later years of life.<sup>6</sup>

Hence, it is of utmost importance to recognize the periodontal problems and treat them in the childhood to accomplish a healthy oral environment in adulthood. Thorough history, examination, proper classification and the diagnostic options are necessary for the diagnosis.

Thus, the aim of this paper is to overview the periodontal diseases in children and adolescent aged between 12 and 15 years by Gingivitis and Periodontitis Site Prevalence Index<sup>5</sup> (Annexure 1).

## MATERIALS AND METHODS

The study was conducted on 500 subjects belonging to age group of 12 to 15 years from various schools of Belgaum, using random sampling. Medically compromised children were excluded from the study. Prior permission was taken from the principals of various schools and an informed consent was obtained from the parents of the children included in the study. The ethical clearance committee of the college approved the study.

Each child was examined thoroughly, and the relevant information and findings were entered in the examination form.

Periodontal examination was performed in natural day light in the respective classrooms using the mouth mirror and a periodontal probe. A systematic approach of examination was

**Annexure 1: Gingivitis and periodontitis site prevalence index (WHO, 1978)**

This index was designed as an index which would be helpful not only in epidemiological studies but also in daily dental practice for the recording of gingival and periodontal conditions. It is based on a site affected or not affected decision; severity score of an individual is expressed as the number of sites examined. Plaque, calculus, periodontal pockets and gingival bleeding are recorded.

*Method:* The recording starts with a visual determination of presence or absence of clearly visible plaque. Separate recordings are made for the buccal, mesial and lingual tooth surfaces. Only a mouth mirror is needed. The plaque should be visible beyond doubt for a positive scoring. The visual examination is continued by using the mirror for usually found around the lower anterior and upper molar teeth. After the visual examination of plaque and supragingival calculus, a periodontal probe is used for recording of subgingival calculus deposits. While probing the tooth surfaces for subgingival calculus, a general impression is obtained also about the presence of deepened periodontal pockets. Periodontal pockets greater than 3 mm are next recorded, and finally the mouth mirror is again used for visual recording of gingival bleeding caused by the use of the probe within the sulcus or pocket area. Any positive finding is coded 1.

The original methodology provides for the recording of the five measurements—visible plaque, supragingival and subgingival calculus, periodontal pockets and gingival bleeding for three areas (buccal, mesial and lingual) for each tooth in the mouth. Investigators may wish to use data handling, for a survey would be considerably reduced.

carried out in order from teeth 11-17, 21-27, 31-37 and 41-47. Periodontal status of the children was recorded in three different areas, i.e. mesial, buccal and lingual for each tooth in oral cavity as per the Gingivitis and Periodontitis Site Prevalence Index (WHO, 1978).

Assessment was made for visible plaque, supragingival and subgingival calculus, periodontal pockets and gingival bleeding. Recording of presence or absence of clearly visible plaque was done followed by the gingival bleeding by placing the periodontal probe into the gingival sulcus and then checking for bleeding. Supragingival and subgingival calculus were also recorded. While probing for the subgingival calculus, general information was obtained for the presence of deepened periodontal pockets. Positive findings were scored as code 1 and later calculated in terms of percentage.

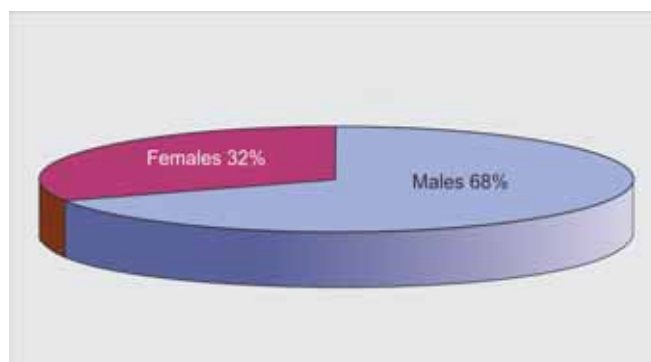
**Statistical Analysis**

The data was analyzed statistically using the SPSS software. The results were tabulated accordingly.

**RESULTS**

**Age and Sex Distribution**

The distribution of sites affected by periodontal diseases is more among the males (68%) as compared to females (32%). Males also showed a maximum of 86.78% sites affected in the age group of 13 years while females showed a maximum of 39.08% of affected sites in age group of 14 years. Fourteen years old children showed maximum (39.4%) affected sites (Table 1 and Fig. 1).



**Fig. 1: Age and gender distribution**

**Distribution with Respect to Ethnic Group**

Among the males Hindus showed maximum prevalence of periodontal diseases (69.5%) while Christians showed least (57.4%) in terms of affected sites. In females it is the Christians who had most sites affected (42.8%) while Hindus showed least sites affected (30.5%). Overall, the Hindus were mostly affected by the periodontal diseases (80%) (Table 2 and Fig. 2).

**Prevalence of Gingivitis and Periodontitis Sites**

Gingivitis and periodontitis were most prevalent in 15 years old children (73.30%) and least prevalent in 12 years old children (Table 3 and Fig. 3).

**Distribution of Contributing Habits**

Out of the total examined children, 17.6% had habit of betel nut chewing, 2% tobacco chewing, 1% smoking. All three habits

**Table 1: Age and gender distribution**

Age in years	Males		Females		Total	
	No.	Percentage	No.	Percentage	No.	Percentage
12	79	68.69	36	31.30	115	23.0
13	85	86.73	13	13.26	98	19.6
14	20	60.91	77	39.08	197	39.4
15	57	63.33	33	36.66	90	18.0
Total	241	68.20	159	31.80	500	100.0

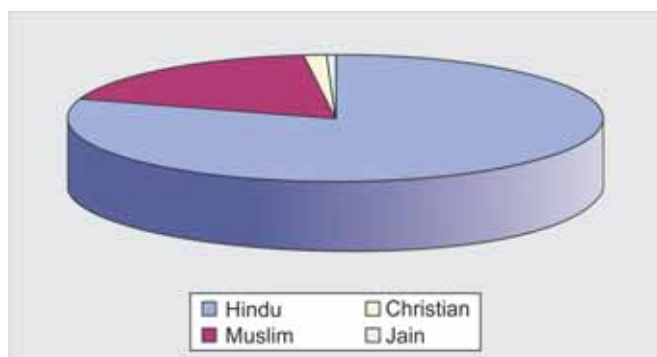


Fig. 2: Distribution with respect to ethnic group

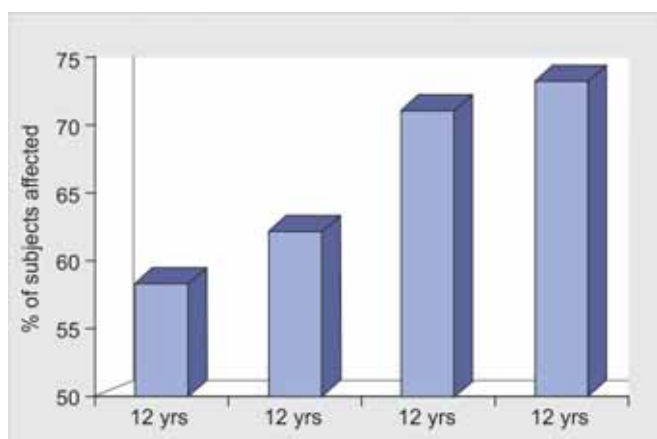


Fig. 3: Prevalence of gingivitis and periodontitis sites

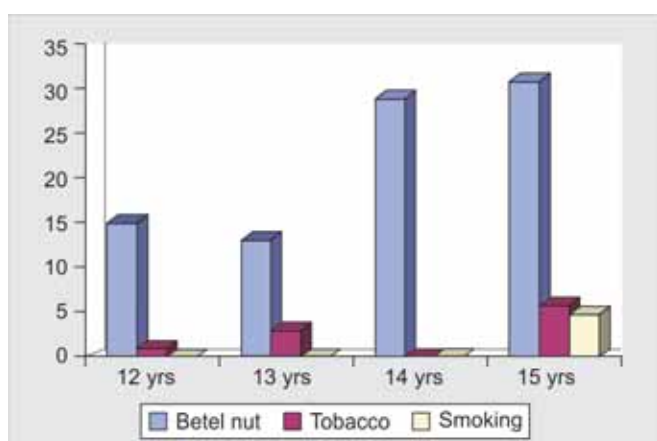


Fig. 4: Distribution of habits

Table 3: Prevalence of gingivitis and periodontitis sites

Age in years	No. of children examined	No. of children affected	Percentage
12	115	67	58.26
13	98	61	62.24
14	197	140	71.06
15	90	66	73.30

were more prevalent in 15 years age group. Smoking was exclusively seen among the 15 years old children (Table 4 and Fig. 4).

### Percentage Prevalence of the Sites involved with Respect to Age

The total number of surfaces affected ranged from 2028 to 4272. Almost 50% of both males and females showed visible plaque. The prevalence of supragingival calculus and subgingival calculus was similar in all the age groups. Both the sexes showed supragingival calculus more than the subgingival calculus in all the age groups. Mild increase in the prevalence of supragingival calculus was observed in 14 to 15 years. No significant difference was seen among the age groups for subgingival calculus. Periodontal pocket depth >3 mm was seen in only 1% of 15 years children while others showed minimal involvement. Gingival bleeding was recorded in about 20% of children of all ages. Amongst the measured diagnostic criteria, visible plaque was most prevalent in all age groups while periodontal pocket was least prevalent (Tables 5A and B, Fig. 5).

### Percentage Prevalence of the Sites involved with Respect to Socioeconomic Level

Around 5027-5345 surfaces were affected with some form of periodontal disease. The socioeconomic level showed no significant influence on the visible plaque, supragingival and subgingival calculus, periodontal pockets and gingival bleeding. Professionals showed slight variation in findings. They showed least amount of visible plaque (41.7%), gingival bleeding (24.7%), periodontal pockets (0.5%), supragingival (21.8%) and subgingival calculus (10.3%). Amongst the socioeconomic group, the prevalence of visible plaque was more while periodontal pockets were least prevalent (Tables 6A and B, Fig. 6).

Table 2: Distribution with respect to ethnic group

Ethnic group	Males		Females		Total	
	No.	Percentage	No.	Percentage	No.	Percentage
Hindu	278	69.5	122	30.50	400	80.0
Muslim	57	63.3	33	36.66	90	18.0
Christian	4	57.4	3	42.80	7	1.4
Jain	2	66.6	1	33.30	3	0.6
Total	341	68.2	159	31.80	500	100.0

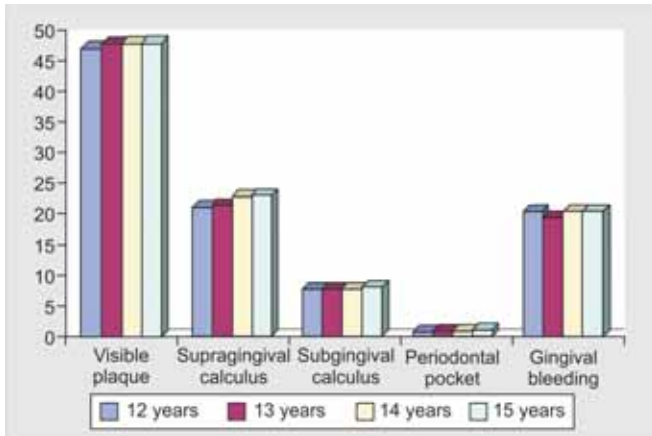


Fig. 5: Prevalence of sites with respect to age

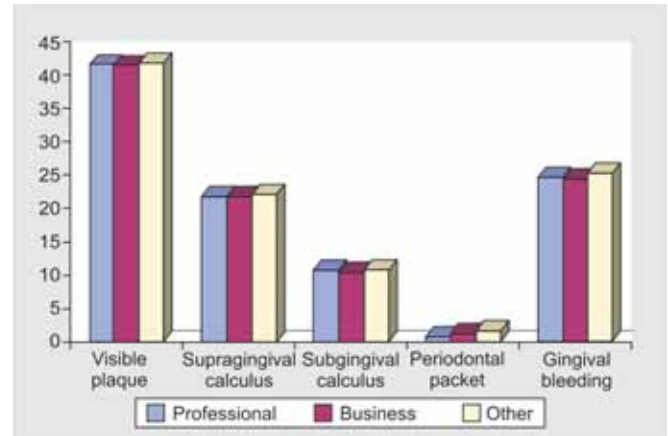


Fig. 6: Prevalence of sites affected with respect to socioeconomic level

Table 4: Distribution of habits

Age in years	Total	Betel nut		Tobacco		Smoking	
		No.	Percentage	No.	Percentage	No.	Percentage
12	115	15	13.0	1	0.86	0	0
13	98	13	13.2	3	3.06	0	0
14	196	29	14.7	0	0	0	0
15	91	31	34.4	6	6.66	5	5.55
Total	500	88	17.6	10	2.0	5	1.0

Tables 5A and B: Prevalence of sites with respect to age

Age in years	No. of children	Total surfaces examined	Surfaces affected	Visible plaque		Supragingivals calculus	
				No.	Percentage	No.	Percentage
				12	115	9660	2028
13	98	8232	2081	1022	49.1	457	21.9
14	197	16548	3645	1721	49.2	857	23.5
15	90	7560	4272	1982	49.3	1017	23.8

Age in years	No. of children	Total surfaces examined	Surfaces affected	Subgingival calculus		Periodontal pocket		Gingival bleeding	
				No.	Percentage	No.	Percentage	No.	Percentage
				12	115	9660	2028	171	8.0
13	98	8232	2081	16	8.07	18	0.86	416	19.9
14	197	16548	3645	292	8.0	29	0.9	746	20.9
15	90	7560	4272	354	8.2	44	1.0	875	20.9

**Percentage Prevalence of the Sites involved with Respect to Brushing Habit**

All the parameters showed more prevalence in children using their finger for brushing than those using toothbrush. Percentage prevalence of the sites affected with respect to brushing habit showed greater prevalence of visible plaque (39%) while periodontal pockets were least (1.5-2%) (Tables 7A and B, Fig. 7).

**Percentage Prevalence of the Sites involved with respect to Frequency of Brushing**

The children who brushed once daily were found to have more periodontal problems than those brushing twice daily. Even in these children, visible plaque (38.8-40.2%) was much more prevalent compared to the periodontal pockets (0.5-1.5%) (Tables 8A and B, Fig. 8).

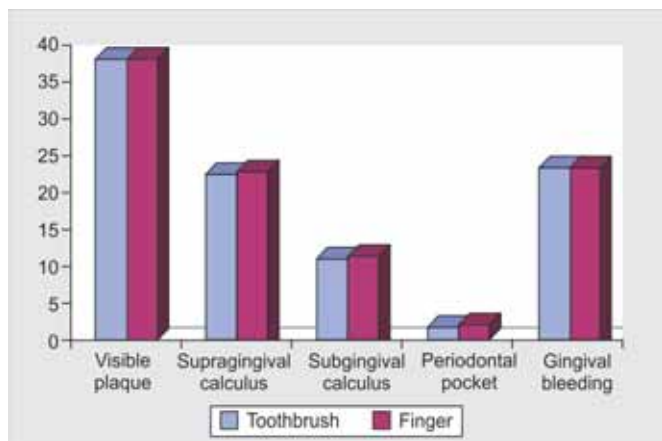


Fig. 7: Prevalence of sites affected with respect to brushing habits

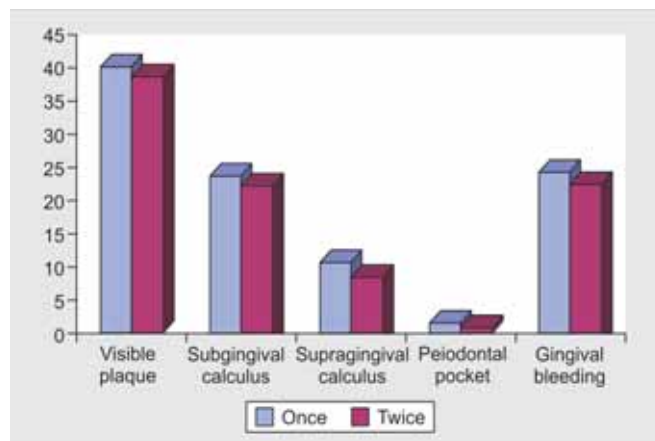


Fig. 8: Percentage prevalence of sites affected with respect to brushing frequency

Tables 6A and B: Prevalence of sites affected with respect to socioeconomic level

Socioeconomic status	No. of children	Total surfaces examined	Surfaces affected	Visible plaque		Supragingival calculus	
				No.	Percentage	No.	Percentage
Professional	249	20916	5207	2173	41.7	1139	21.8
Business	76	6	2246	935	41.0	492	21.9
Others	175	14784	4345	1829	42.0	957	22.17

Socioeconomic status	No. of children	Total surfaces examined	Surfaces affected	Subgingival calculus		Gingival bleeding		Periodontal pockets	
				No.	Percentage	No.	Percentage	No.	Percentage
Professional	249	20916	5207	569	10.8	1288	24.7	43	0.8
Business	76	6	2246	236	10.5	352	24.5	31	1.3
Others	175	14784	4345	435	10.9	1102	25.3	72	1.6

Tables 7A and B: Prevalence of sites affected with respect to brushing habits

Method of brushing	No. of children	Surfaces affected	Visible plaque		Supragingival calculus	
			No.	Percentage	No.	Percentage
Brush	494	9962	4007	39.0	2882	23.2
Finger	6	742	290	39.1	174	23.4

Method of brushing	No. of children	Surfaces affected	Subgingival calculus		Gingival bleeding		Periodontal pockets	
			No.	Percentage	No.	Percentage	No.	Percentage
Toothbrush	494	9962	1125	11.2	2376	23.8	150	1.5
Finger	6	742	85	11.4	178	23.9	15	2.0

**DISCUSSION**

Gingivitis is the most predominant form of periodontal disease in children and adolescents.<sup>2,4,7</sup> Dental plaque initiates reaction

in tissues which starts early during infancy and results in bacterial challenge in the host. When the balance between microbial challenge and the host response is disrupted, inflammatory process results in loss of periodontal attachment.<sup>7</sup>



**Tables 8A and B:** Percentage prevalence of sites affected with respect to brushing frequency

<b>A</b>								
Frequency of brushing	No. of children	Surfaces affected	Visible plaque		Supragingival calculus			
			No.	Percentage	No.	Percentage		
Once	336	9281	3733	40.2	2155	23.2		
Twice	164	2600	1011	38.8	584	22.4		

<b>B</b>								
Frequency of brushing	No. of children	Surfaces affected	Subgingival calculus		Gingival bleeding		Periodontal pockets	
			No.	Percentage	No.	Percentage	No.	Percentage
Once	336	9281	985	10.6	2266	24.4	142	1.53
Twice	164	2600	222	8.5	589	22.6	14	0.50

Chronic periodontitis affects most of the adult population to some degree, and it has its incipient beginning in adolescence.<sup>2,8</sup> Other serious and aggressive periodontal diseases are also seen occasionally in children and some of these diseases are signs of systemic diseases or conditions. Current modalities for managing periodontal diseases of children and adolescents may include antibiotic therapy in combination with nonsurgical and/or surgical therapy.<sup>3</sup> Since early diagnosis ensures the greatest chance for successful treatment, it is important that children receive a periodontal examination as part of their routine dental visits.<sup>8</sup>

Definitive diagnosis usually requires a detailed dental examination, including intraoral radiographs and periodontal probing, however clinical signs can be recognized from visual inspection of the gingival and other oral structures.<sup>7</sup>

Periodontal disease initiation and progression depend on various factors like age, sex, socioeconomic status, brushing habits and their frequency. In our study, males were more affected as compared to females. Periodontal diseases are mostly prevalent or severe in males than in females.<sup>9,10</sup>

Males usually exhibit poor oral hygiene.<sup>11</sup> Assessment of the possible role of female hormones in destructive periodontal disease may help in understanding the definite increase in periodontal diseases seen in males. As the age increases, the prevalence of periodontal diseases increases. The studies of periodontal disease prevalence, or extent and severity from epidemiologic studies show more prevalence in older age group as compared to younger groups.<sup>3,9-11</sup>

Gingival inflammation is enhanced during the pubertal and prepubertal period.<sup>2,7</sup> The potentiated gingival reaction creates an environment in the gingival sulcus, which in the long run paves the way for the development of more severe form of periodontal disease.<sup>12</sup> Several authors have reported a peak incidence of gingivitis around 9 to 14 years of age.<sup>2,12</sup>

Parfitt<sup>13</sup> observed the peak at the age of 13 years in case of boys while 10 years in girls. He suggested that there was an association of gingivitis with onset of puberty indirectly to that

of the hormonal changes taking place.<sup>12,13</sup> This age is also a period of life when the psychological readiness to increase plaque control activities is often low.<sup>12</sup>

The relationship between periodontal diseases to socioeconomic status can be viewed globally, where there is a wide variation in the socioeconomic status among different people. Comparative studies of the populations from the developing countries and developed countries suggested that periodontal disease may be associated with nutritional deficiencies.<sup>14</sup> However, Ramjford et al<sup>15</sup> found that periodontal condition of young men in India who exhibited the clinical symptoms of general malnutrition was not different from the periodontal condition of well-nourished individuals.

The effect of smoking on periodontitis had no association with gender, but it was associated with age. The result showed that there is increased loss of attachment in smokers than nonsmokers. Ashril<sup>16</sup> and Avery et al<sup>17</sup> confirmed that tobacco is an important risk factor for periodontal disease. In our study, there is steady increase in the usage of betel nut and tobacco with advancing age, which stresses the importance of counseling against this deleterious habit.

Children with overt gingival inflammation, subgingival calculus or early signs of alveolar bone loss should be considered 'at risk' of periodontitis and should be included in a preventive program as early as possible<sup>7,18</sup>. Brushing frequency and habits also play a major role in development or prevention of the periodontal diseases, and hence proper oral hygiene instructions should constantly be delivered to patients. The best approach to managing periodontal diseases is prevention, followed by early detection and treatment.<sup>7,18,19</sup>

## CONCLUSION

Periodontal screening should be an integral part of the dental examination of younger individuals. Gingivitis and periodontitis site prevalence index is useful not only in epidemiological studies but also in daily dental practice.

Plaque is the causative agent in periodontal diseases affecting younger individuals, but the balance between bacterial challenge and host response is important. Gingivitis can progress to incipient adult type (chronic) periodontitis in a significant proportion of adolescents, so pediatric health care providers should be alert for early signs of periodontal disease in children and adolescents, and periodical examination by a dentist is recommended every six months.

In this study, sample size was too small to be conclusive. More research in this field is required with other parameters like diet, fluoridation, genetics and hormones. Taking into consideration “prevention is better than cure”, one must look in for early diagnosis and prompt treatment to avoid unpleasant consequences.

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