



RISK FACTORS FOR GINGIVITIS AMONG 12-15 YEAR SCHOOL CHILDREN IN BANGALORE – A CROSS SECTIONAL STUDY

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ABSTRACT:

Background

Gingivitis is the most common and mild form of oral disease. It is important to diagnose the risks factors to treat gingivitis and for effective management of periodontal problems in early stages of life and also to accomplish a healthy oral environment from childhood to adulthood.

Aim

The aim of this study was to assess the prevalence and associated risk factors for gingivitis among the school going children of Bangalore city.

Methods and Material

A sample of 516 school children (Male 256 and female 259) of 12-15 years old enrolled from the public and private schools in Bangalore city. Demographics and oral hygiene habits were assessed by self reported questionnaires. Socioeconomic data was collected from school records. Oral examination was carried out to find the presence of visible dental plaque and to assess Gingivitis and dental crowding using GI (Gingival Index, Loe and Silness 1964) and DAI (Dental Aesthetic Index) respectively.

Statistical analysis

Data were analyzed using Poisson regression analysis [odds ratio, 95% confidence interval].

Chi-square test, unpaired t test, logistic regression.

Results:

Prevalence of gingivitis was 38.3% (95% CI). The mean GI and DAI scores were 0.25 (SD \pm 0.36) and 20.33 (SD \pm 5.6) respectively. GI (Gingival index) scores and DAI (Dental Aesthetic Index) scores are strongly correlated with gingivitis. Logistic regression showed socioeconomic status, upper middle class, $p < 0.03$, oral hygiene practices, frequency of daily tooth brushing ($p < 0.02$), Last visit to dentist ($p < 0.01$) to be significantly associated with gingivitis.

Conclusions:

Gingivitis is associated with oral hygiene practices, dental crowding, visit to dentist and sociodemographic factors.

Key-words: Dental crowding, Gingivitis, Oral Hygiene Practice, Risk factors, Socioeconomic factors.

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INTRODUCTION

Dental health is as essential as total body health for the overall well-being of the patient.¹ Gingivitis is the most common and mild form of oral/dental disease.² Untreated gingival diseases in childhood, may progress to severe form of periodontal diseases in adulthood.³ Periodontal diseases in children and adolescents can be limited to gingival tissues or manifest by the destruction of the periodontium, which may lead to loss of teeth in some cases.⁴

Gingivitis, a reversible dental plaque-induced inflammation of gingiva, is a common occurrence in children as young as 5 years of age. 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.

Studies examining the prevalence of gingivitis in children have shown different results, but generally the average prevalence of gingivitis has been found to be 66.7% in Karnataka in the year 2011.⁵

Periodontal diseases and dental caries are the most prevalent infections affecting the human dentition. Gingivitis affect about 80% of the young children especially around puberty and almost entire population experiences both gingivitis and periodontitis.

Periodontal disease occurs at any stage and is an extremely slow process. The early stages are common around puberty and unless

these early stages are eliminated, degenerative periodontal diseases are inevitable in life.⁵

Hence, it is utmost important to diagnosis and treat gingivitis and the periodontal problems in early stages of life or young age groups, as in childhood to accomplish a healthy oral environment in adulthood.⁵ Thus, the aim, of this paper is to describe the prevalence of gingivitis and associated factors among the schoolchildren of Bangalore.

SUBJECTS AND METHODS

The present study was a cross-sectional study to assess the prevalence and extension of gingivitis and associated factors among 12-15 year old school going children in Bangalore city.

A pilot study was carried out among 10% of the sample. Prior to the start of the study, a protocol of the intended study was submitted to the Ethical Review Committee, The Oxford Dental College, Hospital and Research Center, Bangalore and ethical clearance for the present study was obtained.

Permission was obtained from the Block education officers followed by Head masters and Principals of all the government and private high schools selected for the study in Bangalore city. Students who agreed to participate in the study provided informed consent from their parents for conducting oral examination and filling the proforma.

SAMPLE SIZE FOR THE STUDY WAS ESTIMATED BASED ON THE FOLLOWING:

According to the 2011 census, Bangalore

City has 84,25,970 inhabitants with nearly million school children in 2076 Public and Private schools (census, 2011).

Sample size was estimated based on the previous literature findings and under the prevalence rate of gingivitis in 12-15 year old children in Bangalore city being 66.2% with a standard error of 2 %.

A stratified simple random sampling technique was used.

INCLUSION CRITERIA

- Subjects who are willing to participate and those who had their parents consent for the oral examination.
- Subjects who are present on the day of the examination.

EXCLUSION CRITERIA

- Those who were not willing to participate.
- Subjects with physical disability.
- Subjects with systemic illness on medication.

The study was systematically scheduled to spread over a period 3 months from the month of June to August 2014 among 12-15 year old school going children in Bangalore city.

A questionnaire was given to the study participants to evaluate the risk factors for gingivitis.

A calibrated examiner carried out the oral examinations along with an assistant to record the details. The parameters were presence or absence of dental plaque,

crowding and gingival bleeding.

Gingivitis of the study participants was assessed using Gingival Index . The Gingival Index was developed in 1963 by Loe and Silness.

Malocclusion was assessed using Dental Aesthetic Index (WHO proforma 1997). The collection of data according to DAI criteria permits analysis to be made of each of the components of the Index.

The study was systematically scheduled to spread over a period 3 months from the month of June to August 2014 among 12-15 year old school going children in Bangalore city.

STATISTICAL ANALYSIS

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean \pm SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance was assessed at 5 % level of significance. For statistical analysis age group was categorized into 12-13 and 14-15 age group. Chi-squared test was used to test the association between Socio-demographic factors (Age, Gender and SES) with dental plaque, gingival bleeding , crowding Gingival Index and Dental Aesthetic Index. Those attributes which were statistically significant ($p < 0.05$) was subjected to Pearson's Correlation Test followed by linear regression analysis.

SIGNIFICANT FIGURES

+ Suggestive significance (p value: $0.05 < p < 0.01$)

* Moderately significant (p value: $0.01 < p \leq 0.05$)

** Strongly significant (p value: $p < 0.01$)

RESULTS

Demographic variables have been described in **Table 1**. Majority of the participants were in the age group of 14 years (50.3%). **Table 2** shows oral hygiene practices of the students, out of total 515 children, according to daily tooth brushing, 486 (94.4%) children were practicing toothbrushing daily and 29 (5.6%) children were not practicing tooth brushing daily.

Table 3. In the study population, when the gingival scores were associated with age, gender and SES, it was found that out of the total 341 children in the age group of 12-13 years, 203(59.5%) children had no inflammation, 126 (37%) children had mild inflammation and 12 (3.5%) children had moderate inflammation. Similarly, in the age group of 14-15 years, 115(66.1%) children had no inflammation followed by 51(29.3%) children and 8 (4.6%) children had mild and moderate inflammation respectively. However, the value was not statistically significant.

Table 4. In the study population, when the DAI scores were associated with age, gender and SES, it was found that out of the total 341 children in the age group of 12-13 years, 257 (75.4%) children had no abnormality, 64

(18.8%) children had definite malocclusion, 16 (4.7%) children had severe malocclusion and 4 (1.2%) children had very severe malocclusion. Similarly, in the age group of 14-15 years, 148 (85.1%) children had no abnormality followed by 16 (9.2%) children, 8 (4.6%) children and 2 (1.1%) children had definite, severe and very severe malocclusion respectively which was statistically significant [$p=0.04$].

Table 5. Pearson's correlation between DAI and GI was found to be moderately correlated with a value of 0.666. Linear regression with respect to GI and DAI was found to be statistically significant. [$p < 0.001$]

DISCUSSION

A cross sectional study was carried out to assess the prevalence of gingivitis and the associated risk factors among the school going children of Bangalore city.

The age group for this study was 12 to 15 years. This age group was chosen because WHO has recommended 12 and 15 years to be global monitoring age. The Gingival Index by Loe and Silness was used to assess the severity of gingivitis.

In the present study, most of the children 259 (50.3%) were in the age group of 14 years, followed by 96(18.6%) children were 13 year old, 75 (14.6%) children were 12 year old and less children 85(16.5%) were 15 year old. In a study done by Fotedar et al⁷, 12-year-old children (58.1%) were more as compared with that among the 15-year-old children(53.5%).

Table 1: Distribution of study participants based on age .

Age (years)	n	%
12	75	14.6
13	96	18.6
14	259	50.3
15	85	16.5
Total	515	100

Table 2: Distribution of study participants based on oral hygiene practices.

Do you brush your teeth		
	n	%
No	29	5.6
Yes	486	94.4
How many times do you brush a day		
Once	445	86.4
Twice	69	13.4
Thrice	1	0.2
Do you use dental floss		
No	476	92.4
Sometimes	39	7.6
Daily	0	0
Do you notice bleeding during brushing		
Yes	358	69.5
No	157	30.5

When was your last visit to the dentist		
< 1 year	506	98.3
> 1 year	9	1.7
Total	515	100.0

Table 3: Distribution of study participants based on Gingival index

Age (years)	Absence of inflammation n (%)	Mild inflammation n (%)	Moderate inflammation n (%)	Total	Chi-square value	p-value
12-13	203 (59.5)	126 (37.0)	12 (3.5)	341	3.10	0.21
14-15	115 (66.1)	51 (29.3)	8 (4.6)	174		
Gender						
Male	150 (58.6)	94 (36.7)	12 (4.7)	256	2.48	0.28
Female	168 (64.90)	83 (32.0)	8 (3.1)	259		
SES						
Upper	1 (25.0)	3 (75.0)	0	4	3.25	0.51
Upper middle	294 (62.20)	160 (33.8)	19 (4.0)	473		
Lower middle	23 (60.5)	14 (36.8)	1 (2.6)	38		
Upper lower	0	0	0	0		
lower	0	0	0	0		
Total	318	177	20	515		

Table 4: Distribution of study participants based on DAI.

Age (years)	No abnormality n (%)	Definite malocclusion n (%)	Severe malocclusion n (%)	Very severe malocclusion n (%)	Total	Chi-square value	p-value
12-13	257 (75.4)	64 (18.8)	16 (4.7)	4 (1.2)	341	8.17	0.04*
14-15	148 (85.1)	16 (9.2)	8 (4.6)	2 (1.1)	174		
Gender							
Male	197 (77.0)	38 (14.8)	16 (6.2)	5 (2.0)	256	5.81	0,12
Female	208 (80.3)	42 (16.2)	8 (3.1)	1 (0.4)	259		
SES							
Upper	3 (75.0)	1 (25.0)	0	0	4	5.91	0.43
Upper middle	377 (79.7)	71 (15.0)	20 (4.2)	5 (1.1)	473		
Lower middle	25 (65.8)	8 (21.1)	4 (10.5)	1 (2.6)	38		
Upper lower	0	0	0	0	0		
lower	0	0	0	0	0		

Table 5. Correlation and linear regression analysis between Dental Esthetic Index and Gingival Index.

Correlations			
		Total GI score	Total DAI Score
Total GI score	Pearson Correlation	1	.666**
	Sig. (2-tailed)		.000
	N	515	515
Total DAI Score	Pearson Correlation	.666**	1
	Sig. (2-tailed)	.000	
	N	515	515

** . Correlation is significant at the 0.05 level (2-tailed).

Model	Unstandardized Coefficients		95.0% Confidence Interval for B		p-value
	B	Std. Error	Lower Bound	Upper Bound	
Total GI score	-	-			
Total DAI Score	.043	.002	.039	.047	<0.001*

In the present study, there was almost equal distribution of gender, 256 (49.7%) males and 259 (50.3%) females, but whereas in the study done by Fotedar et al⁷ males were more in number.

The present study sample consisted of equal number of children both from private and government schools in order to have true

representation of children from all the social, economic, and cultural communities. 257 (49.9%) children were from Private school and the remaining 258 (50.1%) children were from the government school. Similar to the distribution by Fotedar et al⁷. In the study done by Fabiana et al⁴ the number of children from government schools were

more.

With respect to the distribution of the children according to class, 171 (33.2%) children were in standard VIII and 172 (33.4%) children were equally present in standard IX and X.

In the current study, when the distribution of children were according to religion, it was found that Hindus 439 (85.2%) were more than Muslims 59 (11.5%) and Christians 17 (3.3%). Comparison could not be done as there were no previous studies that assessed religion.

With respect to SES, majority of the children, 473 (91.8%) belonged to upper middle class followed by 38 (7.4%) children in lower middle class and 4 (0.8%) children in upper class. In a study done by Meghna Singh et al⁸, they could not get proper data for the parents income as information given by the children were not reliable. Since, most of the children were from government school, the socioeconomic status was considered to be homogenous. The study done by Fotedar et al⁷ had reported that a higher number of children (81.2%) were from the lower social class group.

In the present study, 94.4% children were brushing daily which was lower than a study done by Fabiana et al, where 98.7% children were brushing daily.

Current study showed that with regard to frequency of daily brushing, 86.4% children were brushing once daily followed by 13.4% children were brushing twice daily and 0.2%

children were brushing thrice daily. In a study done by Fabiana et al⁴, 55% children were brushing once daily, 9% children were brushing twice daily and 32 % children were brushing thrice daily.

With respect to the use of dental floss, 476 (92.4%) children were not using dental floss and 39 (7.6%) children were using dental floss sometimes in the present study. Whereas, in a study done by Fabiana et al⁴, 55% children were not using dental floss and 36.4% were using dental floss sometimes.

The possible reason could be lack of knowledge regarding oral hygiene practices and low socioeconomic status to afford the oral hygiene tools.

According to last dental visit, 506 (98.3%) children had visited a dentist last year and 9(1.7%) children had visited a dentist before 1 year. In a study done by Fabiana et al⁴, where less number of children, 68.1% had visited the dentist last year and 31.9% children visited a dentist before 1 year. The possible reason could be fear of dental trauma and pain. The accessibility to dental services in the location could be an another reason.

Dental plaque is the principal etiologic factor for periodontal disease, which is influenced by the host's immunologic response¹. In the present study, dental plaque was significantly associated with gender. A study done by V Agarwal⁹ et al reported that females had a higher prevalence for plaque accumulation than males. In contrary, a study done by

Fotedar et al⁷ reported no association between dental plaque and gender. The possible reason for the association between dental plaque and gender could be the hormonal factors.

It is known that gingival bleeding is an early sign for gingivitis, which was significantly associated with gender in the present study, similar to a study done by Shivayogi et al⁵.

Gingivitis is a common oral disease among school children due to lack of knowledge regarding oral hygiene practices, hormonal factors and habits¹. The prevalence of gingivitis in this current study was found to be 38.3% with no significant difference found in age, gender and SES. In an another study done by Meghna Singh in the year 2011⁸ it was found that prevalence of gingivitis was 78.36% with a significantly higher prevalence in females. The reason could be due to hormonal changes. Paurait J et al⁴ found that gingivitis increases as age advances and more females were affected by gingivitis particularly among 12 and 13 year olds. In contrary, the study from Madhya Pradesh⁵ reports no significant difference in prevalence of gingivitis among males and females. Carranza report from US National sample surveys 1986 – 1987¹⁰ among 12-17 year olds that there is 58.8% prevalence of gingivitis with a significantly higher prevalence in females. A study done by Fotedar et al⁷ found gingivitis to be more prevalent in the lower socio-economic classes.

In the present study, the prevalence of malocclusion was 21.4% and was significantly correlated with age. According to Meghna et al in 2011⁸ a higher prevalence, 34.9% of malocclusion was found and the age group of 11-14 years was significantly correlated, similar to findings of Deepak Bhaya et al³. The possible reason could be retained deciduous teeth leading to malocclusion in these age groups.

Malocclusion was associated with gingivitis as it facilitates retention of plaque due to limited access of oral hygiene aids to all the surfaces of teeth³. Malocclusion was moderately correlated with gingivitis with a value of 0.66 in the present study. Similarly, malocclusion was highly correlated (0.82) with gingivitis by Das UM, Beena JP et al in 2009¹². In contrary, Nihal Hamaci et al¹¹ reported that malocclusion was poorly correlated (0.35) with gingivitis. The reason for the poor correlation between malocclusion and gingivitis could be due to maintenance of proper oral hygiene.

LIMITATIONS

- Hormonal changes during puberty and menstrual cycle aggravate the gingival response to local factors. Pronounced inflammation, edema, and gingival enlargement result from local factors that would ordinarily cause a comparatively mild gingival response.

The effect of hormonal changes on gingival tissues may influence some of gingival indices measured in girls.

- Other factors like diet and genetics could have been assessed.

CONCLUSION

To concluded, this study focused on the biological as well as the social and demographic pathways. The study could contribute to the knowledge of gingivitis in the age group of 12-15 years, providing a better understanding of the oral health and disease process and it was estimated that gingival diseases of different severity is highly prevalent.

Dental plaque, oral hygiene habits and crowding are the important etiological factors for gingivitis. Gingival bleeding is an early sign of gingival diseases.

Since, the school children do not know much about dental diseases and methods of their prevention, therefore education and motivation of children to maintain proper oral hygiene is of paramount importance.

REFERENCE

1. Ketabi M, Tazhibi M, Mohebrasool S. The Prevalence and Risk Factors of Gingivitis Among the Children Referred to Isfahan Islamic Azad University (Khorasgan Branch) Dental School, In Iran. DRJ 2010; 3(1): 1-4.
2. Shivakumar KM, Chandu GN, Subba Reddy V V2, ShaB ulla. Prevalence of malocclusion and orthodontic treatment needs among middle and high school children of Davangere city, India by using Dental Aesthetic Index. J Indian Soc Pedod Prevent dent Oct - Dec 2009; 27(4)
3. Bhayya DP, Shyagali TR, Mallikarjun. Study of oral hygiene status and prevalence of gingival disease in 10-12 year old children in Maharashtra, India. JI OH 2010; 2(3): 21-5.
4. Chiapinotto FA, Ferreira FV, Demarco FF, Bello Corrêa FO, Masotti AS. Risk factors for gingivitis in a group of Brazilian Schoolchildren. JI PHD 2013; 73(2): 9-17
5. A, Reddy RPV. An Overview of Gingival and Periodontal Diseases in 12 to 15 years using Gingivitis and Periodontitis Site Prevalence Index (WHO, 1978). WJD 2011; 2(3): 175-80
6. Pauraite J, Milciuviene S, Sakalauskiene J. The prevalence of gingivitis among 4-16 year old schoolchildren in Kaunas. Stomatologija, Baltic Dental and Maxillofacial Journal 2003; 5: 97-100.
7. Shailee F, Girish M S, Sharma KR1, Pruthi N. Oral health status and treatment needs among 12- and 15-year-old government and private school children in Shimla city, Himachal Pradesh, India. I J Comm H 2013 ; 3 (1): 44-50.
8. Singh M, Saini A, Saini S C, Bajpai A K. Prevalence of dental diseases in 5- to 14-year-old school children in rural areas of the Barabanki district, Uttar Pradesh, India. I J Comm H 2011 ; 22(3): 396-399

9. Agarwal V, Khatri M, Singh G, Gupta G, Marya CM, Kumar V. Prevalence of Periodontal Diseases in India. JOHCD 2010; 4 : 7-16.
10. Carranza FA, Newman MG. Carranza's Clinical Periodontology. 9th ed. Philadelphia: WB Saunders; 2002. p.308.
11. Hamamci N , Guvenc B, Ersin U. Dental Aesthetic Index scores and perception of
12. personal dental appearance among Turkish university students. EJO 2009; 3:166-174.
13. Das UM, Beena JP, Azher U. Oral health status of 6- and 12-year-old school going children in Bangalore city: An epidemiological study. J Indian Soc Pedo Prev Dent 2009; 27(1): 6-8.

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