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The prevalence and risk factors of gingivitis in a population of 6-year-old children in Iran

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Original Article

Abstract

BACKGROUND AND AIM: Gingivitis is a reversible inflammation of gingival tissue. The prevalence of gingivitis is different in various communities. The aim of this study was to determine the prevalence of gingivitis among 6-year-old (± 3 months) children of Rayen, Kerman, Iran.

METHODS: In this cross sectional study, 279 children (129 boys and 150 girls) from all Rayen's nursery schools and primary schools were selected. Data collected through clinical examination with the consent of parents and teachers. Gingival Bleeding Index (GBI) was measured by using light and dental probe pressure.

RESULTS: The prevalence of gingivitis was 37.8. There was statistically significant association between gender and gingivitis. Mouth breathing and toothbrush frequency were factors associated with gingivitis.

CONCLUSION: This study showed relatively similar prevalence of gingivitis compared to other studies. The prevalence of gingivitis was more in boys than girls. Health educators and parents should have a more active role in children's oral health education.

KEYWORDS: Gingivitis; Prevalence; Mouth Breathing; Children; Gender

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Gingivitis is a reversible inflammation of gingival tissue characterized by swelling, bleeding, change in normal colour, and often sensitivity and tenderness.¹ Histologically it is characterized by the presence of an inflammatory exudate and edema, some destruction of collagenous gingival fibers, ulceration and proliferation of the epithelium facing the tooth.² The most common form of periodontal disease in children is plaque induced gingivitis.³ Cariogenic bacteria, food impaction, mouth breathing and improper tooth position are the predisposing factors reasonable for this type of gingival disease.⁴ The inflammation of tooth surrounding tissues can spread to bone and results in loss of connective tissues and bone.⁵ The role of poor oral hygiene and dental plaque

in gingivitis formation has been well established.¹ Gingival health can be maintained with good oral hygiene. The prevalence of gingivitis is different in various communities. Most studies have reported it up to 50%-100%.⁶ In developed countries, the prevalence and severity of gingivitis are widely investigated at different ages. The prevalence of gingivitis in children has mentioned from 61.5% in the USA to 85% in Australia, 70% in Mexico, and 95% in India.⁷ In contrast to many developed countries, high prevalence of gingivitis has been reported in Iranian children.¹

Jalaleddin and Ramezani showed that the gingivitis prevalence is 97% in 6- to 7-year-old children in Qazvin, Iran.⁸ Ketabi reported the prevalence of gingivitis was 73% among 6- to 11-year-old children in Isfahan.⁷ Four indices

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commonly used to evaluate gingival inflammation in children and young adults in recent studies are: Gingival Index (GI) (Loe and Silness, 1963), Gingivitis Index (Suomi and Barbano, 1968), Papillary Bleeding Index (PBI) (Saxer and Muhlemann, 1975), and Gingival Bleeding Index (GBI) (Ainamo and Bay, 1976). The index described by Ainamo and Bay, considers presence or absence of bleeding on gentle probing of the gingival tissue. GBI has proved to be useful in a number of epidemiological and clinical trials. The diagnostic criteria (bleeding or no bleeding) are assumed to be relatively easy to interpret. Thus, this index is assumed to be relatively insensitive to examiner differences.⁹ Furthermore, researchers suggest that bleeding upon gentle probing of the gingival sulcus may occur before change in the colour, texture, or form.¹⁰ So GBI was used to assess the bleeding in this study.

Considering the high prevalence in this age group, the present study tends to evaluate prevalence and risk factors of gingivitis among 6-year-old children. It seems that factors such as family income and socioeconomic status would influence on prevalence.¹¹ It was considered necessary to develop a research study that would describe the prevalence of gingivitis in a preschool age population for a better screening in the design of intervention programs to limit the healthcare problem represented by periodontal disease. We assume that in deprived area such as some rustic regions the level of parent's awareness about children's oral health practice is low and lead to higher level of dental caries and gingivitis. The aim of this study was to evaluate the prevalence of gingivitis in nursery schools and primary schools of Rayen and increase level of parent's awareness about children's oral health.

Methods

A cross-sectional survey was carried out among 6-year-old (± 3 months) children in Rayen, one of the cities of Kerman, Iran.

Kerman Province is the largest Province in Iran and is located in the south east of the country and Rayen is located in the south east of Kerman with a population of over 50000. The racial structure of the population in this city is heterogeneous. All 279 children aged 6 years (± 3 months) in all nursery schools and primary schools of Rayen were selected through census method. After getting the consent of the school's authorities for participation in our survey, informed consent was obtained from the parents to include their children in the study. The ethical code (IR.KMU.REC.1394.245) was allocated to this study by ethics committee of Kerman University of medical sciences.

A checklist on the demographic characteristics, gingival bleeding index (GBI), habits, and systemic conditions were completed by a trained examiner for 279 children. Full mouth examination was done under natural light in a school's room and using disposable mouth mirror and periodontal probe (Williams-coded-Hufriedy, USA). Participants who had systemic diseases were not included. GBI was measured by using light and dental probe pressure. In this index, bleeding of marginal gingival cervices in all teeth or selected teeth are measured.¹² In this study, GBI was measured in selected teeth (51, 55, 65, 71, 75, 85). Zero score indicated the absence of gingival bleeding within 10 seconds. Score 1 indicated that there was bleeding in gingival margin of teeth. Total GBI was calculated by dividing the number of sites with hemorrhage on total number of tooth sites and multiplying the result to hundred to gain the percentage of gingival bleeding index.¹² Mobile teeth, teeth with gross caries (more than 3 surfaces were lost) and teeth during active phase of eruption were excluded. Factors such as gender, mouth breathing, and tooth brushing frequency were evaluated. Lip seal or incompetency was used for measuring mouth breathing index. Tooth brushing frequency was asked from participants. Lip seal or incompetency was

used for measuring mouth breathing index. Furthermore, parents were asked if their children open their mouth when they sleep. Tooth brushing frequency was asked from participants and their parents.

Data was analyzed by analysis of variance (ANOVA), post-hoc (Tukey test) and Student's t-test in SPSS (version 20.0, SPSS Inc., Chicago, IL, USA). P-values of less than 0.05 was considered to be statistically significant.

Results

In this study, the prevalence of gingivitis and its related risk factors were determined in 279 children aged 6 years (\pm 3 months). The prevalence of gingivitis was 37.8.

GBI was measured in boys and girls (Table 1). Statistically significant difference in GBI was seen between boys and girls. The prevalence of gingivitis was more in boys than girls, and this difference was statistically significant ($P = 0.005$).

Children were divided in four different groups based on toothbrush frequency:

1. Children who never used toothbrush or any material to clean their teeth (G1).
2. Children who were sometimes using toothbrush during a week (G2).
3. Children who were brushing their teeth daily (G3).
4. Children who were brushing their teeth twice or more a day (G4).

Statistically significant difference was seen between G1 and G2, G3, G4 ($P = 0.001$). Tukey test showed GBI difference was statistically significant between G2 and G3 ($P = 0.030$) as well as G2 and G4 ($P = 0.009$), but not for G3 and G4 ($P = 0.950$). Table 1 shows the comparison of GBI mean according toothbrush frequency. More than half (55.2%) of children examined did not brush their teeth whereas only 16.5% of them brushed twice or more a day. GBI among mouth breather children was significantly higher in comparison with non-mouth breathing group ($P = 0.001$).

Discussion

There is a lack of epidemiological studies about periodontal status and gingival disease at 6-year-old age in Iran. Our results showed that the prevalence of gingivitis was 37.8 among 6-year-old children. In other studies, this prevalence was recorded 16.41% in Sarvabad, a city in Kurdistan Province, Iran¹³ and 97% in 6- to 7-year-old children in Qazvin, Iran.⁸ Pourhashemi et al. found 95.7% of 6- to 10-year-old children in Tehran, Iran, were affected by gingivitis.¹⁴ It could be resulted from different community and the age of subjects.

Gingivitis was more common in boys which is in line with Taani,¹⁵ Ketabi et al.⁷, and Rezaeian et al.¹³ studies. It may be due to more precise oral hygiene cares in girls and less motivation of oral hygiene practices in boys.¹⁵

Table 1. The comparison of GBI mean according to gender, mouth breathing and toothbrush frequency

Variables	Groups	Number (%)	GBI mean (SD)	P
Gender	Boys	129 (46.23)	42.45 (35.29)	0.005
	Girls	150 (53.76)	33.07 (37.46)	
Mouth breathing	Yes	55 (19.71)	75.44 (18.09)	0.001
	No	224 (80.28)	28.12 (34.07)	
Toothbrush frequency	G1	154 (55.19)	64.15 (25.75)	0.001
	G2	28 (10.03)	16.05 (24.28)	
	G3	51 (18.27)	0.81 (4.12)	
	G4	46 (16.48)	0 (0)	

GBI: Gingival Bleeding Index; G1: Never; G2: Sometimes; G3: Daily; G4: Twice or more a day

We found that mouth breathing habit had positive effect on gingival health. This result is in agreement of Wagaiyu and Ashley¹⁶ and Jacobson¹⁷ studies. An explanation of this finding is dehydration of exposed surface of gingiva during mouth breathing.¹⁸ The various factors such as enlarged glandular tissue, asthma and allergies can lead to mouth breathing habit.¹⁹

It was estimated that there is an inverse relation between the incidence of gingivitis and oral hygiene practice frequency. Jessri and coworkers showed children who brushed their teeth once a week had almost 4 times the likelihood of experiencing dental caries and gingivitis compared to those who brushed their teeth 2 times a day.¹

More than half of examined children (55.2%) in our study did not use any material to clean their teeth and they had the most prevalence of gingival bleeding index. This result has been stated by a number of researchers.^{20,21} With regard to this fact that the poor oral hygiene is the most important factor in prevalence of gingivitis¹³ and the significant relation between tooth brush frequency and gingivitis, it is recommended to train children about importance and proper use of toothbrush. The most important association with gingivitis was dental plaque. Numerous studies indicated that gingival disease may be passed from parents to children.²² Based on these findings, the American Academy of Periodontology (AAP) recommends that treatment of gingival disease may involve entire families and that if one family member has periodontal disease, all family members should visit a dentist for periodontal disease screening.²³

This study had some limitations. For example, factors like family income and level of parent's education that have direct effect on child's oral health practice were not assessed in

this study. High prevalence of gingivitis in this study necessitates the implementation of immediate therapeutic and preventive policies. This study suggests that parents in Rayen should receive information about importance of gingivitis and its causes. The researchers designed a pamphlet containing information about oral health practice in children which was given to parents. Dental health programs and dental camps at school level are necessary in this region and they should be performed at regular intervals, because children in this area do not have accessed to standard dental care. Asking health educators to have a more active role in children's oral health education and also educating parents about their children's oral health could be a first step towards oral health promotion. Parents and caregivers should be educated on the need for effective plaque control to prevent this condition. Furthermore, we suggest evaluating the etiology of mouth breathing among pre-school children and curing it as soon as possible.

Conclusion

According to this study, the prevalence of gingivitis among 6-year-old children in Rayen is higher in boys.

The highest prevalence of gingivitis was seen among children who did not use toothbrush. With increasing toothbrush frequency, gingival bleeding index was decreased.

Gingivitis is more common in children with mouth breathing.

Conflict of Interests

Authors have no conflict of interest.

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