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Prevalence and Intensity of Gingivitis among 6-10 Years Old Elementary School Children in Tehran, Iran

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Gingivitis is one of the most prevalent diseases in children. The aim of this study was to evaluate the prevalence and intensity of gingivitis disease in 6-10 years old children and investigate its related factors. During a cross sectional study, a total of 442 boys and girls from elementary school children were selected from north, south, east, west and central areas of Tehran city in Iran by multistage random sampling. A questionnaire was completed. Children's gums were examined and they were evaluated by using of Leo and Silness gingival index method. Results showed that 422 (95.8%) of children were affected by gingivitis. The intensity of mild and moderated gingivitis was 277 (62.67%) and 145 (32.81%), respectively. There was no significant differences between the prevalence and intensity of gingivitis with age ($p>0.05$). Also, prevalence and intensity of gingivitis has a reverse relationship with daily brushing and gingivitis in the south and west of Tehran City is more than other areas.

Key words: Gingivitis, gingival index, elementary school children, oral health, brushing

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INTRODUCTION

Gingivitis is the most common and mildest form of oral or dental disease in the inflammatory and recurrent reaction of free gingival. It is developed both by local stimulus and systemic factors (Ainamo and Bay, 1975; Am Laugsson and Magnusson, 1995). Gingivitis is often caused by inadequate oral hygiene, which leads to inflammation, bleeding of the gums and plaque buildup. If not treated, it can progress to more serious gum diseases such as periodontitis and eventually to the destruction of bone and to tooth loss (Breuer and Cosgrove, 1989; Page, 1986; Brown and Loe, 1993). The main cause of gingivitis is plaque, a soft, sticky film that forms on the teeth when starches and sugars react with bacteria that is naturally present in the mouth (Moore *et al.*, 1987). Gingivitis can develop periodontal disease in advance and finally destroys the tissues of periodontium. So that remedy requires advance treatment such as periodontal surgery (Sirafi and Moghaddass, 1988). Children are more predisposed to gingivitis due to special condition of periodontium and poor oral hygiene. Thus, the prevalence of gingivitis is very high in children especially adolescence age (Hagoson *et al.*, 1981). The prevalence of gingivitis is different in various communities and most investigators have reported it between 50 to 100% (Benjamin *et al.*, 1993). According to the Food and Drug Administration, approximately 15% of adults between 21 and 50 years old and 30% of adults from 50, have gum disease (FDA, 2002).

Some studies of gingivitis had previously been conducted in Iran (Sirafi and Moghaddas, 1988; Khordimood, 1991; Makarem, 1987). The city of Tehran was selected for this study because there was no whole information available on the prevalence and intensity of gingivitis and its relation factors for oral health programs. The objectives of this study were to determine the prevalence and intensity of gingivitis among 6-10 years old elementary school children in Tehran City in Iran and to investigate the association of gingivitis with oral health care.

MATERIALS AND METHODS

This descriptive study was carried out about prevalence and intensity of gingivitis disease on 442, 6-10 years old elementary school children, which were selected by multistage random sampling from north, south, east, west and central areas of Tehran city in 2002. Ten schools were studied at these five areas (two schools

from each area). Then, two classes of schools with 20-24 students were examined. The examination was performed by a dentist, using disposable mouth mirror, sterilized instruments, disinfection solution, disposable gloves, mask and periodontal probe. A questionnaire was designed to record the status of gums along with the occupational, educational levels of parents and health habits such as daily brushing and using dental floss. Method of Loe and Silness was used for determining of gingival index and evaluation of the gum health. This index is extensively used in epidemiologic studies for prevalence of gingivitis. In this index, some factors such as gum inflammation, the color of gum and existence of edema (to detect by direct observation) and bleeding (to detect by using of a probe) were employed to ascertain the condition of gum. Four gingival regions of gum including mesiobuccal, midbuccal, distobuccal and midlingual in

$$\begin{array}{c|c} 6-E & E-6 \\ \hline 6-E & E-6 \end{array}$$

teeth were examined. The conditions of gum were divided into normal, mild and moderate types of gingivitis. Adjacent tooth was examined in some cases of a missed tooth. The samples were chosen based on 75% probability prevalence and 95% confidence interval. After computing descriptive statistics, bivariate analyses used chi-square tests for prevalence of gingivitis and analysis variance (ANOVA) for gingivitis intensity. p-values of less than 0.05 were considered to be statistically significant.

RESULTS

Frequency distribution of gingivitis in children related to their gingival status was shown in Table 1. Prevalence and intensity of gingivitis showed that 4.5% of children gum status was normal, 62.7% was mild and 32.8% was moderate. Results in Table 2 shows that there was no significant differences between the prevalence and intensity of gingivitis with age ($p>0.05$).

Table 3 shows the prevalence of gingivitis related to gender in studied students. There was no significant differences between the prevalence and intensity of gingivitis with gender ($p>0.05$).

This study showed that there was a relationship between the prevalence of gingivitis and children's residence ($p<0.05$). The highest gingivitis values belong to children who live in south and west of Tehran. The best situation belongs to who live in the center of Tehran

Table 1: Frequency distribution of gingivitis in elementary school children related to their gingival status

Status of gum	Frequency	(%)
Normal	20	4.52
Mild	277	62.67
Moderate	145	32.81
Total	442	100.00

Table 2: Frequency distribution of gingivitis in elementary school children related to age

Age	Status of gum according to GI*					
	Normal		Mild		Moderate	
	Frequency	(%)	Frequency	(%)	Frequency	(%)
10	0	0.00	2	0.45	2	0.45
9	2	0.45	40	9.05	26	5.89
8	6	1.36	95	21.49	50	11.31
7	7	1.58	92	20.82	45	10.18
6	5	1.13	48	10.86	22	4.98
Total	20	4.52	277	62.67	145	32.81

*Gingival Index, Pearson's Chi-Square (χ^2) = 1.73, p = 0.78

Table 3: Frequency distribution of gingivitis in elementary school children related to gender

Gender	Status of gum according to GI					
	Normal		Mild		Moderate	
	Frequency	(%)	Frequency	(%)	Frequency	(%)
Male	9	2.03	149	33.71	69	15.61
Female	11	2.49	128	28.95	76	17.21
Total	20	4.52	277	62.67	145	32.81

Pearson's Chi-Square (χ^2) = 1.81, p = 0.405

Table 4: Frequency distribution of gingivitis in elementary school children at different areas of Tehran City

Area	Status of gum according to GI					
	Normal		Mild		Moderate	
	Frequency	(%)	Frequency	(%)	Frequency	(%)
North	28	6.34	6	1.35	53	11.99
South	34	7.69	1	0.23	55	12.44
East	40	9.05	2	0.45	48	10.86
West	25	5.66	5	1.13	59	13.35
Center	18	4.07	6	1.36	62	14.03
Total	145	32.81	20	4.52	277	62.67

Pearson's Chi-Square (χ^2) = 17.27, p = 0.027

Table 5: Frequency distribution of gingivitis in elementary school children related to brushing

Brushing	Status of gum according to GI					
	Normal		Mild		Moderate	
	Frequency	(%)	Frequency	(%)	Frequency	(%)
Never	10	2.26	0	0.00	7	1.58
Sometimes	67	15.16	1	0.23	78	17.65
One time	49	11.09	7	1.58	78	17.65
Two times	14	3.17	5	1.13	58	13.12
Three times	5	1.13	7	1.58	56	12.67
Total	145	32.81	20	4.52	277	62.67

Pearson's Chi-Square (χ^2) = 44.88, p < 0.0001

(Table 4). There are no differences significant between prevalence and intensity of gingivitis with parent's job, their education and the number of children in family.

Table 6: Frequency distribution of gingivitis in elementary school children related to use of dental floss

Using of dental floss	Status of gum according to GI					
	Normal		Mild		Moderate	
	Frequency	(%)	Frequency	(%)	Frequency	(%)
Most times	2	0.45	2	0.45	11	2.49
Sometimes	5	1.13	2	0.45	22	4.98
Never	138	31.23	16	3.62	244	55.20
Total	145	32.81	20	4.52	277	62.67

Pearson's Chi-Square (χ^2) = 6.30, p = 0.043

At present study, It was observed that 425 (96%) of students brushed their teeth daily (Table 5). There was a significant relationship between the prevalence and intensity of gingivitis and the number of daily brushing (p < 0.05). It showed a reverse relation between prevalence and intensity of gingivitis and the number of daily brushing. Students who brushed their teeth, they had more prevalence and intensity of gingivitis than others.

It has been observed that the most students don't use the dental floss. There is a significant relation between prevalence and intensity of gingivitis with flossing (Table 6). In other words, the prevalence and intensity of gingivitis in children who use dental floss is less than others.

DISCUSSION

This study revealed that the prevalence and intensity of gingivitis in 6-10 years old elementary school children in Tehran was 95.7%. Other studies have shown different prevalence of gingivitis. It could be resulted from different community and the age of samples. Sirafi and Moghaddas (1988) reported that the prevalence of gingivitis is about 100% in 6-12 years old elementary school children. Khordimood (1991) has reported that gingivitis is 86.5% in 6-13 years old school children of Mashhad City (6). In another study, Makarem (1987) has shown that the prevalence of gingivitis is 76.7% in 12 years old Mashhad school children. Mofid and Sadr (1990) have studied the prevalence of periodontal disease in 6-9 and 15 years old children by using CPI index. They declared the high prevalence of gingivitis in children. Also, epidemiological studies have shown that the prevalence of gingivitis in other countries is high. Moore (1991) declared that the prevalence of gingivitis is 93% in 1123 people of 7-13 of years old Indian children. Ghandehari Motlagh *et al.* (2007) reported that 98.5% of elementary school children in Andimeshk have a healthy gum. No bleeding was observed in gums. Sixty nine of students brush daily and only 0.5% of them uses dental floss. Also 33.9% of children never brush their teeth. It is related to have a poor hygienic knowledge. Other study is also referred to

have a high prevalence of gingivitis in school children. Valentaviciene *et al.* (2004) found the prevalence rate of gingivitis in Lithuania about 40-47.3% of cases. Also, they found periodontitis about 45.1 to 54.3% of cases. A dental health study of primary school children in Zaria City, Northern Nigeria, in mid-1979, showed that approximately, 87.5% of the children had gingivitis (Osuho, 1983). With regard to this fact that the poor oral hygiene is the most important factor in prevalence of gingivitis; two main factors could be enumerated for the prevalence of gingivitis and periodontal diseases. At first, oral condition in children is important at mixed dentition period. Because teeth gradually exfoliate, permanent teeth erupt and physiological changes occur in puberty and it may provide circumstance for prevalence of gingivitis. The second factor can relate to neglectful of children about oral hygiene and having a gum healthy. It's suggested that natural difference of gum in primary teeth and different growth of inflammatory cells of gum could increase the gingivitis with age (Tohnue, 1986).

Prevalence rate of gingivitis in the west and south of Tehran City is various with other. It may be related to socioeconomic factors. In other words, low class of life could be increased the gingivitis. This factor is mentioned in the most epidemiological researches in appearance and prevalence of dental caries and periodontal diseases (McCombie and Stothard, 1964). Dummer *et al.* (1987) presented the effect of social class on the dental disease status of a group of 11-12 years old school children in South Wales. They reported that the plaque and gingival bleeding scores had an overall trend to increase from social class I through to social class V. The girls, in particular, showed progressively increasing and significantly different mean plaque and gingivitis scores.

Age is also one of several sociodemographic factors that assume to be associated with oral health status. Oral health behavior affects the intense and incidence of gingivitis (Sriyono, 2005). Sayegh *et al.* (2005) investigated the association between oral health, in terms of dental caries and gingivitis and socio demographic factors, dental plaque, oral hygiene behaviors, infant feeding and dietary practices in 4-5 year old Jordanian children. They showed that about 66% of the children had gingivitis. Dental plaque and prolonged breast feeding exerted an independent effect on caries severity and gingivitis. The strongest association with gingivitis was dental plaque. Several studies suggest that gum disease may be passed from parents to children and even between couples (Asikainen and Chen, 1996; Saarela and von Troil-Linden, 1993). Based on these findings, the American Academy of Periodontology (AAP) recommends that treatment of gum disease may involve entire families and that if one family member has

periodontal disease, all family members should see a dental professional for a periodontal disease screening (Geerts and Legrand, 2004). If gingivitis was not treated, it can progress to more serious gum diseases such as periodontitis. Periodontitis is a chronic infection by oral bacteria that affects the supporting structures of the teeth and eventually to the destruction of bone and to tooth loss (Offenbacher, 1996). A mechanism has been proposed whereby the burden of bacterial pathogens, antigens, endotoxins and inflammatory cytokines of periodontitis contributes to the process of atherogenesis and thromboembolic events. In response to infection and inflammation, susceptible individuals may exhibit greater expression of local and systemic mediators and may thereby be at increased risk for a myocardial infarction or stroke (James *et al.*, 2005; Beck *et al.*, 1998). A study found that 91% of patients with cardiovascular disease also suffered from moderate to severe periodontal disease (Geerts and Legrand, 2004) and people with gum disease have a 25% greater risk of heart disease than those with healthy gums (Noack and Genco, 2001). According present study more than 90% of children have gingivitis with mild to moderate intensity. It can be a risk for suffering from heart disease. Also, in this study more than 30% of children brush their teeth one time and also 90% of them do not use dental floss daily. Therefore it is necessary to emphasize the instruction of oral hygiene especially at school and promote the knowledge of students about importance of teeth and oral health. It is concluded that the present survey has indicated an obvious need for dental public health services among elementary school children in Tehran and it should be given a high priority to preventive services. Provision of adequate dental health services which will include dental health education, facilities and personnel for early diagnosis and early treatment for these and other such school children would make a very valuable contribution to sound dental health in Iran. Gingivitis is both preventable and treatable. Although factors such as medications and lowered immunity make them more susceptible to gingivitis, the most common cause is poor oral hygiene. Brushing and regular professional cleanings can significantly reduce the risk of gingivitis.

REFERENCES

- Ainamo, J. and I. Bay, 1975. Problems and proposals for recording gingivitis and plaque. *Int. Dent. J.*, 35: 251-261.
- Am Laugsson, S. and T.E. Magnusson, 1995. Prevalence of gingivitis in 6 years old in Reykjavik, Iceland. *Acta Odontol. Scand.*, 54: 242-252.

- Asikainen, S. and C. Chen, 1996. Likelihood of transmitting *Actinobacillus actinomyces* and *Porphyromonas gingivalis* in families with periodontitis. *Oral Microbiol. Immunol.*, 11: 387-394.
- Beck, J., S. Offenbacher, R.R. Williams, P. Gibbs and R. Garcia, 1998. Periodontitis: A risk factor for coronary heart disease? *Ann. Periodontol.*, 3: 127-141.
- Benjamin, P., M. Elie and B. Enrique, 1993. Change in periodontal status of children and young adolescents: A one longitudinal study. *J. Clin. Pediatr. Dent.*, 18: 3-6.
- Breuer, M.M. and R.S. Cosgrove, 1989. The relationship between gingivitis and plaque levels. *J. Periodontol.*, 60: 172-175.
- Brown, L.J. and H. Loe, 1993. Prevalence, extent, severity and progression of periodontal disease. *Periodontology*, 2: 57-71.
- Dummer, P.M.H., M. Addy, R. Hicks, A. Kingdon and W.C. Shaw, 1987. The effect of social class on the prevalence of caries, plaque, gingivitis and pocketing in 11-12 year old children in South Wales. *J. Dent.*, 15: 185-190.
- FDA., 2002. Gum Disease. http://www.fda.gov/fdac/features/2002/302_gums.html.
- Geerts, S.O. and V. Legrand, 2004. Further evidence of the association between periodontal conditions and coronary artery disease. *J. Periodontol.*, 75: 1274-1280.
- Ghandehari Motlagh, M., Gh.R. Jahed Khaniki and H. Adiban, 2007. Investigation of dental caries prevalence among 6-12 year old elementary school children in Andimeshk, Iran *J. Med. Sci.*, 7: 116-120.
- Hagason, A., G. Koch and H. Rylander, 1981. Prevalence and distribution of gingivitis, periodontitis in children and adolescents. *Swed. Dent. J.*, 5: 91-103.
- James, D.B., P. Eke, G. Heiss, P. Madianos and D. Couper *et al.*, 2005. Periodontal disease and coronary heart disease: A reappraisal of the exposure. *J. Am. Heart Assoc.*, 112: 19-24.
- Khordimood, M., 1991. Epidemiological evaluation of oral health status and Gum in Mashhad 13-16 years old children. *J. Dent. Khorasan Univ. Med. Sci.*, 12: 12.
- Makarem, A., 1987. Prevalence of gingivitis in Mashhad 12 years old children. Mashhad University of Medical Sciences, Thesis No. 100, Mashhad, Iran, pp: 150-156.
- Mccombie, F. and D. Stothard, 1964. Relationship between gingivitis and other dental conditions. *J. Can. Dent. Assoc.*, 30: 506-512.
- Mofid, R. and J. Sadr, 1990. Evaluation of CPITNs in 6-15 years old Tehran children. Shhid Beheshti University of Medical Sciences, Thesis No. 5. Tehran, Iran.
- Moore, L.V.H., W.E.C. Moore, E.P. Cato, R.M. Smibert and J.A. Brumeister *et al.*, 1987. Bacteriology of human gingivitis. *J. Dent. Res.*, 66: 989-995.
- Moore, B., 1991. Early onset of periodontitis in the United States of America. *J. Periodontol.*, 62: 608-616.
- Noack, B. and R.J. Genco, 2001. Periodontal infections contribute to elevated systemic C-reactive protein level. *J. Periodontol.*, 72: 1221-1227.
- Offenbacher, S., 1996. Periodontal diseases: Pathogenesis. *Ann. Periodontol.*, 1: 821-878.
- Osuho, A., 1983. Dental health of primary school children in Zaria City, Northern Nigeria. *Public Health*, 97: 17-23.
- Page, R.C., 1986. Gingivitis. *J. Clin. Periodontol.*, 13: 345-359.
- Saarela, M. and B. von Troil-Linden, 1993. Transmission of oral bacterial species between spouses. *Oral Microbiol. Immunol.*, 8: 349-354.
- Sayegh, A., E.L. Dini, R.D. Holt and R. Bedi, 2005. Oral health, sociodemographic factors, dietary and oral hygiene practices in Jordanian children. *J. Dent.*, 33: 379-388.
- Sirafi, M. and H. Moghaddass, 1988. Epidemiological evaluation of prevalence and intensity of gingivitis in children. *Dam Darman J.*, 7: 15-75.
- Sriyono, N.W., 2005. Correlation of age, attitude and dental care behavior with the oral health status of institutionalized elderly in Yogyakarta, Indonesia. *Hong Kong Dental J.*, 2: 30-34.
- Tohnue, S., 1986. Epidemiology of gingivitis. *J. Clin. Periodontol.*, 13: 366.
- Valentaviciene, G., O. Anuseviciene, P. Paipaliene and N. Irena, 2004. Oral health status in the participants of the juvenile hypertension program 2002. *Stomatologija, Baltic Dental Maxillofacial J.*, 6: 24-27.