

FIRST-MOLAR CARIES IN PRIMARY SCHOOL CHILDREN OF A NORTHERN CITY OF IRAN

*SEYYED AMIRHOSSEIN FAZELI

**SEYYED ALI FAZELI

(Persons interested in comparative studies may find this study conducted in a northern city of Iran, useful –Ed)

ABSTRACT

The first permanent molar is unquestionably the most important unit of mastication and is essential in the development of functionally desirable occlusion. The loss of a first permanent molar in a child can lead to changes in the dental arches that can be traced throughout the life of that person. The aim of this project was to study the caries status of different first molars in male and female primary school children in Bandargaz (a northern city of Iran).

In May 2002, as an epidemiologic survey, this study was conducted with 327 third-grade schoolchildren who were studying in 10 primary schools of Bandargaz City, located in south-east border of Caspian Sea, north of Iran. By a double-blind approach, some dental hygiene habits of all the students were asked and recorded in questionnaires and the relevant DMFT was calculated solely for first molars according to Oral Health Surveys: All mentioned data including hygiene habits and first molars caries status were analyzed using SPSS 10.5 statistical software. The significance was set at $P < 0.05$.

98.5% of all schoolchildren had received the fluoride-solution for 3 years and 80.7% of the schoolchildren brushed at least once a day but unfortunately, 92.2% of students did not floss. The first-molars oriented DMFT of this population was 0.6330 ± 1.0331 . In the case of girls, the first-molar DMFT was 0.7665 ± 1.1562 while in boys' it was 0.4938 ± 0.8687 . Therefore, the girls' caries rate was significantly much higher than boys'. ($P < 0.0009$)

In addition to previous studies, some further comprehensive studies are necessary to find the exact factors causing higher incidence of first-molar caries among female in primary school children.

Key words: First-molar caries, Primary school children, Iran.

INTRODUCTION

The first permanent molar is unquestionably the most important unit of mastication and is essential in the development of functionally desirable occlusion. A carious lesion may develop rapidly in the first permanent molar and occasionally progress from an incipient

lesion to pulp exposure in a 6-month period. The loss of a first permanent molar in a child can lead to changes in the dental arches that can be traced throughout the life of that person. These changes, unless appropriate corrective measures are instituted, include diminished local function, drifting of teeth and continued eruption of opposing teeth.' The aim of this project was to study

* Faculty of Medicine, Gorgan University of Medical Sciences, Gorgan, Iran

** Dental Health Unit, Health Center of Bandargaz City, Golestan Province, Iran

Correspondence address: Seyyed Amirhossein Fazeli No 4, Farmandari alley, Emam Khomeini Ave, Kordkuy City, Golestan Province, Iran. Postcode: 4881636874, Tel: +98 (173322) 2995, Fax: +98 (171)4421657 & 4425165, [E-mail: glia161@yahoo.com](mailto:glia161@yahoo.com)

the caries status of different first molars in male and female primary school children in Bandargaz a northern city of Iran.

SUBJECTS & METHODS

In May 2002, as an epidemiologic survey, this study was conducted with 327 third-grade schoolchildren who were studying in 10 primary schools of Bandargaz City, located at south-east border of Caspian Sea, north of Iran. 167 were female with 9.11 ± 0.45 years old (Mean \pm SD) and the remainder were male with 9.17 ± 0.45 years old.

By a double-blind approach, some dental hygiene habits of all the students were asked and recorded in questioners. These habits were about the histories of fluoride-solution applications, brush frequency and dental flossing.

In addition, caries status i.e., decay, missing and filling, of each of four permanent first molars was assessed in the case of all individuals and the relevant DMFT was calculated solely for first molars according to Oral Health Surveys: Basic Methods.'

All mentioned data including hygiene habits and first molars caries status were analyzed using SPSS 10.5 statistical software. The significance was set at $P < 0.05$.

RESULTS

The students' histories of dental hygiene habits are summarized in table 1. As shown in this table, 98.5 % of all schoolchildren have received the fluoride-solution for 3 years. However, the length of girls' administration (3.0000 ± 0.1981 years) was not significantly different from the boys' (3.0063 ± 0.1778 ; $P = 0.956$).

With a wide spectrum of brush frequencies, 9.8% of students never brushed while 15% of them brushed three times a day; but, taken as a whole, 80.7% of the schoolchildren brushed at least once a day.

In contrast to the girls that just 3.6% of them never brushed, 16.4% of boys did not brush. Also, the count of girls who brushed three times a day (18.0% of all girls) was more than their counterpart boys' (11.9% of all boys). Collectively, 86.2% of the girls and 75.0% of the boys brushed at least once a day.

TABLE 1: CHILDREN'S HISTORIES OF FLUORIDE-SOLUTION APPLICATION, BRUSH FREQUENCY AND DENTAL FLOSSING

	Total students	School-girls	School-boys
Fluoride-solution Application			
1 year	1	1	0
2 years	1	0	1
3 years	321	164	157
4 years	2	2	0
5 years	1	0	1
Brush Frequency			
3 t/day	49	30	19
2 t/day	65	49	16
1 t/day	148	63	85
4 t/week	2	2	0
3 t/week	2	2	0
2 t/week	0	0	0
1 t/week	5	5	0
Weekly but irregularly	14	7	7
Sometimes	9	3	6
Never	32	6	26
Dental Flossing			
3 t/day	4	1	3
2 t/day	2	1	1
1 t/day	11	6	5
4 t/week	0	0	0
3 t/week	1	1	0
2 t/week	1	1	0
1 t/week	1	1	0
Weekly but irregularly	1	1	0
Sometimes	3	1	2
Never	302	154	148

92.2% of students did not floss and only 1.2% of them flossed three times a day. Although the number of girls who flossed three times a day was less than corresponding boys (0.6% of girls Vs 1.9% of boys); but never-flossing boys were more than girls who did not floss. (93.1% boys Vs 92.2% of girls).

According to the results summarized in Table 2, the first-molars oriented DMFT of this population was 0.6330 ± 1.0331 so that D-, M- and F-components were

TABLE 2: FIRST-MOLAR ORIENTED DMFT OF STUDIED CHILDREN AND COUNTS OF CARIES-FREE AND PAN-CARIES INDIVIDUALS

	Total students	School-girls	School-boys
First-molars DMFT ¹			
All	0.6330±1.0331	0.7665 + 1.1562	0.4938 ± 0.8687
Mandibular	0.4465 ± 0.7447	0.5569 ± 0.8258	0.3313 ± 0.6317
Maxillary	0.1865 ± 0.5065	0.2096 ± 0.5470	0.1625 ± 0.4609
Caries-free Individuals'			
All	214	104	110
Mandibular	231	110	121
Maxillary	283	143	140
Pan-caries Individuals ³			
All	12	9	3
Mandibular	50	36	14
Maxillary	17	11	6

1. The values of DMFT were reported as mean ± SD.
2. Individuals with healthy first molars.
3. Individuals whose all first molars were unhealthy i.e. decayed, missed or filled.

95.16%, 0.96% and 3.86% respectively. Among 327 children, 214 pupils (64.4% of all) were caries-free individual i.e. had no first-molar caries (DMF=0). By contrast, 12 students (3.7% of all) were pan-caries who have four first-molar caries (DMFT=4). Also, 325 children (99.4% of all) had been missed no first molars and just 2 students (0.6% of all) had not one of them.

In the case of girls, the first-molar DMFT was 0.7665±1.1562 while the boys' was 0.4938±0.8687. Therefore, the girls' caries rate was significantly much higher than boys' (P<0.0009).

The D-component of girls DMFT was 96.87% and the reminder M- and F- components were sequentially 0.78% and 2.34%. While 92.40% of boys' DMFT was DMFT1

composed by D-component, the M- and F- components were 1.26% and 6.32% respectively.

Although the D-component of girls' DMFT was higher, but, by contrast, its reminder components were lesser than boys' corresponding components. 62.3% of schoolgirls (104 from 167 girls) and 68.8 of boys (113

9 girls (5.4% of girls) and 3 boys (1.9% of boys) were pan-caries individuals.

When jaw-related DMFTs were calculated, it was found out that the girls' DMFT of mandibular first molars were significantly higher than the boys' (0.5569±0.8258 Vs 0.3313+0.6317; P<0.0009). The caries rate of female maxillary first molars was higher than that of male but no significance was shown (0.2096±0.5470 Vs 0.1625±0.4609 ;P =0.084).

The mandibular and maxillary first-molars, in turn, show different caries rates; so that mandibular DMFT of all students was higher than their maxillary's (0.4465±0.7447 Vs 0.1865+0.5065; P<0.0009). The girls' upper jaws had higher rate of first-molar caries than their lower jaws (0.5569±0.8258 Vs 0.2096±0.5470; P<0.0009). The same comparison between relevant boys' values showed similar finding about the first-molar caries status of two jaws (0.3313±0.6317 of mandibular Vs 0.1625+0.4609 of maxillary; P<0.0009). Individuals whose both mandibular first molars were intact (DMFT=0), were 231 people including 110 girls and 121 boys. In comparison to them, 283 students (143 girls and 140 boys) had no caries of maxillary first molars. While just 17 individuals (11 girls and 6 boys) had two first-molar caries (DMFT=2) in their maxilla; 50 children (36 girls and 14 boys) had the same status for mandibular first molars. Through the calculation of mandibular to maxillary DMFT ratio (Man/Max DMFT) which is 2.6569 and 2.0387 for the girls and boys respectively, it was shown the girls rather than the boys, had higher difference between their mandibular and maxillary first-molar caries.

DISCUSSION

In comparison to similar studies in other developing countries, the studied schoolchildren of Bandargaz city had a lower rate of first-molar caries. For instance, in Warren et al study, mean DMFT computed solely from first-molar data for Taiwanese first-grade children were 1.19. Also, 48 percent of Taiwanese children were caries-free in their permanent first molars.³

The results showed, although the girls' tendency to observe the dental hygiene was more than the boys; the females had higher rates of first-molar caries rather than the males. In agreement to present results, Warren et al also found the schoolgirls experienced higher rates of first-molar caries than their boy coun-

terparts.³ According to Legler et al study, it is recognized that in almost any population group, higher frequencies of dental caries are found in girls than in boys.⁴ In addition, studies of Beck et al and Alfano MC showed that the adult females also had higher caries frequency than adult males.⁵ Therefore, it seems that there are some factors that precipitate the caries of females' first molars. As a basis of these differences, Shafer and Mahler demonstrated that diethylstilbestrol and estradiol are responsible for increased dental caries development on experimental rats. Their data showed that androgens are without effect on dental caries development in either male or female rats, while oestrogens increase dental caries significantly. There are other data in the literature that support their findings.⁶ The difference in serum concentrations of estradiol between boys and girls is an established fact.⁷ Estradiol is significantly higher in girls, and girls have a higher incidence of dental caries.⁴ It is common knowledge that the level of estrogens is higher in women than in men. According to these experiences, it can therefore be concluded that beside environmental factor the oestrogene is a culprit in caries development as a host factor but some studies else make the conclusion difficult. Studies of Burger et al, Nicol et al, Sbarra et al and Nilsson et al suggested that oestrogene can strengthen the body defence and, as a conclusion, females have stronger defence against infectious agents.^{8,9,10} Hence, in contrast to first group of studies, these experiences predict the lower rates of dental caries for females. As another result, it was shown that the difference between caries status of mandibular and maxillary first molars was more considerable in girls. So, it seems that the females' caries-precipitating factors, may have higher impacts on mandibular first molars or their impacts may be reinforced by other factors.

The initiating events of first-molar caries were forgotten, the loss of first molar in these ages can lead to severe sequale. The second molars, even if unerupted, start to drift mesially after the loss of first permanent molar. Although the premolars will undergo the greatest amount of distal drifting, all the teeth anterior to the space, including the central and lateral incisors on the side where the loss occurred, may show evidence of movement. Contacts will open and the premolars, in particular, will rotate as they fall distally. When the maxillary first permanent molar

loses its opponent, it will erupt at a faster rate than the adjacent teeth. The alveolar process will also be carried along with molars and will cause problems when prosthetic replacements are needed.'

CONCLUSION

The schoolchildren of present study were at the late years of childhood and arriving in puberty ages result in certain endocrinologic and behavioral states that may affect their susceptibility to dental caries. Therefore, either in favor or against of caries-facilitating role of oestrogene, a further comprehensive study is necessary to find the exact factors causing higher frequency of female first-molar caries in primary school ages.

ACKNOWLEDGMENT

We appreciate the financial support provided to us by Gorgan University of Medical Sciences Health Center of Bandargaz City and are indebted to all colleagues particularly to Ms Mirnejad who helped us in this project.

REFERENCES

- 1 Dean JA, McDonald RE, Avery DR, Managing the Developing Occlusion, In: Dentistry for the Child and Adolescent. 7th ed., Mosby, 2000, pp 695-698.
- 2 World Health Organization. Oral Health Surveys: Basic Methods. 3rd ed. Geneva: WHO; 1997.
- 3 Warren JJ, Hand JS, Yao JH. (1997) First-molar caries experience among Taiwanese first-grade children. *ASDC J Dent Child.* 64(6):425-8.
- 4 Legler, DW, Menaker, L. (1980) Definition, Etiology, Epidemiology and Clinical Implications of Dental Caries. In Menaker, L. (ed) *The Biological Basis of Dental Caries.* Harper & Row, p. 217.
- 5 Alfano, MC. (1980) Nutrition in Dental Caries, in Menaker, L. (ed) *The Biologic Basis of Dental Caries.* Harper & Row, p. 356.
- 6 Liu-Lin, FTY, Lin, HS. (1973) Effect of contraceptive steroids norethynodrel and menstranol on dental caries activity in young adult female rats. *J Dent Res.* 52,753-757.
- 7 Angsusingha, K, Kenny, FM, Nankin, HR, and Taylor, FH. (1974) Unconjugated estrone, estradiol and FSH and LH in prepubertal males and females. *J of Clinical Endocrinology and Metabolism.* 39, 63-68.
- 8 Nicol, T, Bilbey, DLJ, Charles, LM, Cordingley, JL, Vernon-Roberts, B. (1964) Oestrogen: The Natural Stimulant of Body Defence. *J Endocrin.* 30,277-291.
- 9 Sbarra, AJ, Paul, B, Strauss, R, Mitchell, GW Jr. (1970) Metabolic and Bactericidal Activities of Phagocytizing Leucocytes in Gordon, AS. ed. *Regulation of Hematopoiesis.* Vol. 2, 1102-1103. Appleton Century Crofts, New York
- 10 Nilsson, B, Damber, MG, von Schoultz, B. (1980) Effect of Oestrogen Progestogen combinations on Polymorphonuclear Leucocytes Chemotaxis. *Acta Obstetrica et Gynecologica Scandinavica.* 59(2), 165-168.