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A comparative study on dental caries incidence of the first permanent molars between two age groups children in Benghazi, Libya

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Abstract

Background: Oral health has a key role in the public health and well-being, dental caries is the most common oral disease in the world. The first permanent molar (FPMs) has been introduced as an index for predicting caries activity.

Aim: To compare the dental caries incidences of FPMs among two age group's children in Benghazi city, Libya.

Material and Methods: A cross sectional study was conducted of 375 children aged 6-12 years. The sample was divided into two groups according their ages, Group A, which included 150 children with age ranging between 6 to 8 years old. While group B which involved 225 children with age ranged from 9 to 12 years old. The diagnosis of caries was based on the World Health Organization (WHO) criteria. The collected data was analyzed using SPSS, version 16 and Chi-square test was used.

Results: In group A, the frequency of carious FPMs were (186 teeth; 12.4%), whereas sounds were (414 teeth; 27.6%). However in group B, the frequency of sound FPMs were (411 teeth; 27.4%), while carious were (489 teeth; 32.6%). A significant difference was found between the two age groups regarding caries incidence ($P < 0.0001$). The incidence of carious molars in group B was higher in the lower left jaw (9.4%).

Conclusion: Significant differences were found between two groups regarding caries incidence of FPMs. However, the highest rate of carious FPMs was found in group B, thus caries incidences of FPMs is increased as age increased, A significant difference ($P < 0.05$) was found between two groups regarding the distributions of caries in the different segment of dental arch.

Recommendation: FPMs are very important teeth for maintaining integrity of the dental arches. However, the incidences of caries in FPMs were increased with the age. Therefore, it is recommended that it necessary to pay careful preventive strategies involving fissure sealant, home care and fluoride applications. In addition, promote the educational programmers' for parents.

Keywords: Dental caries, FPMs, Dental arch, children

1. Introduction

Although, many studies in the past decades on dental caries was reported that caries incidences is declined significantly and were continuing to decline in populations. However, in United States dental caries is stated to be the most common chronic childhood disease of children aged 5 to 17 years [1]. Dental caries is age related disease involving about (60% - 90%) of school children [2]. FPMs is considered as a key to the permanent dentition and erupted early for about 6 years old, at that time temporary teeth start to change to permanent teeth, and erupting distally to the second primary teeth, this molar called the first permanent molar (FPM) is named by Kunzel (1988) [3]. The FPMs play an important role in control of teeth erupting later, in-front of them and behind. In addition, they also the biggest teeth support the masticator function [4]. Moreover, FPMs are at higher risk of damaged and lost, due to their morphology. These teeth have pits and fissures are not completely joined at the base thus are prone to the faster progression of decay (Yaghooti Khorasani and Irannezhad 2017). Some studies showed that there are associations between caries in first permanent molar with caries in other permanent teeth [5]. Early loss of teeth may lead to crowding, anterior position of tongue and mouth breathing [6].

These teeth are facing many challenges, as well as the complex anatomy and location of FPMs makes them more susceptible to dental caries [4]. FPMs were considered as an index for the incidence of caries, evaluation oral health status, and determination of vulnerability of groups to caries based on World Health Organization (WHO) in 1994. Hence, sufficient statistical data on the prevalence of caries of FPMs in different areas are useful for planning preventive measures and the correct pattern for the distribution of treatment facilities in the country [7]. There are a very few studies in Libya regarding caries incidence of FPMs. Therefore, the aims of this study to increase the documentary researches as well as to evaluate dental and oral health programs recommended for early ages. Those programs may include the education of parents about the important of these teeth and their early eruption, because most of the parents are unaware that these teeth are the first permanent teeth.

2. Material and Methods

This cross sectional study was conducted among school children attending Pediatric clinic at Faculty of Dentistry in Benghazi city. Ethical approval was given by Research Ethical Committee of Faculty of Dentistry. Consent letters were signed by the parents before recording their children's data. The parents who refused to allow their children to participate were excluded from the study. The total sample was three hundred and seventy five children aged between 6 to 12 years, and divided into two groups according to their ages. Group A consist of 150 children with age ranged from 6 to 8 years old, whereas group B consist of 225 children with aged ranged from 9 to 12 years old. The selection of sample was convents and depends on inclusion and exclusion criteria. The inclusion criteria were the age ranging between 6 to 12 years. The exclusion criteria were all children with systemic diseases, mental or physical problems and medical compromised patients were excluded. The data was recorded in individual dental records then all records centralized in order to be processed. The diagnostic criteria of dental caries were recorded as recommended by WHO (1986) criteria which utilized to diagnose the carious status of FPMs, in case of any doubt, the tooth was marked as sound. The clinical examination was conducted on the dental chairs using mouth mirrors and blunt probes. The tooth surface was dried with a cotton pellet. The intra-oral examinations were conducted by trained and calibrated examiners with a trained assistant for data recording. Intra examiner reliability was calculated by using Kappa statistics. The calibration of examiners was done and the agreement level was 0.84. Statistical analysis of data was performed using SPSS computer software version 16, Descriptive statistical methods (Percentage, frequency) and Chi-square tests were used for analyze the data, whereas P-value less than (0.05) was considered statistically significant. Dental service was provided to the children who required treatment. In addition, preventive dental services such as fissure sealants and fluoride applications were provided to the children who had sound teeth with deep fissures. All children and their parent received oral hygiene instructions.

3. Results

In this study, the total sample was three hundred and seventy five child were classified into two groups as follows; group A, there were 150 (40%) children with age ranging between 6 to

8 years old, while group B which consisted from 225(60%) children with aging from 9 to 12 years old as can be observed in Figure 1.

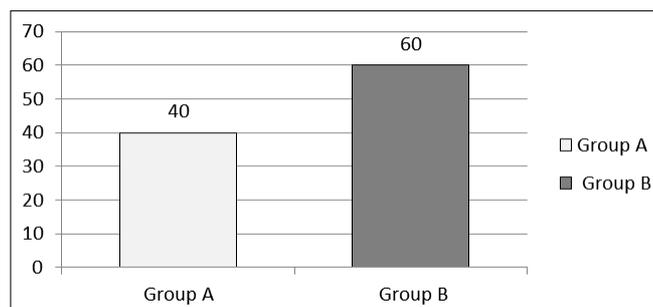


Fig 1: The percentage of children among group A and B

Overall sample, the prevalence of carious FPMs was (675 teeth; 45%) and sound was (825 teeth; 55%). A significant difference was found between groups regarding caries prevalence of FPMs ($P < 0.0001$), whereas, in group A, B sound FPMs were approximately equal (414 teeth; 27.5%) and (411 teeth; 27.4%) respectively. However, the carious FPMs in group B were significantly higher (489 teeth; 32.6%) than in group A, was (186 teeth; 12.5%) as shown in Figure 2.

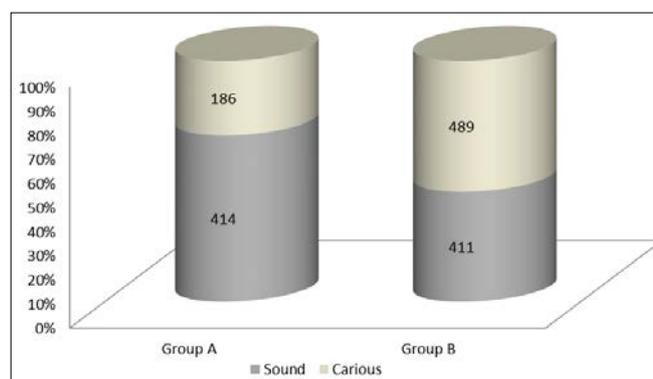


Fig 2: Comparative analysis of group A, B (based on frequency of caries incidence of FPMs)

In group A, total of (600 teeth; 40%), sound FPMs was approximately equal in both right and left side of maxillary arch (107 teeth; 7.1%) and (108 teeth; 7.2%) respectively. While in the lower arch sound FPMs were approximately equal too in both right and left side (101 teeth; 6.7%) and (98 teeth; 6.5%) respectively. while in group B, total of (900 teeth; 60%), the highest frequency of sound FPMs was found in the upper left segment (123 teeth; 8.2%) whereas the lowest rate was found in the lower left segment (84 teeth; 5.6%).

A significant difference was found between the two groups regarding caries incidences in the different segment of the dental arch ($P < 0.0001$). In Group A, carious FPMs was slightly equal in both lower right and left sides (49 teeth; 3.3%) and (52 teeth; 3.5%) respectively. in addition, carious FPMs was similar in both upper right and left arch (43teeth; 2.9%) and (42 teeth; 2.8%) respectively. In group B, carious FPMs was the highest rate in the lower left side (141 teeth; 9.4%), followed by the lower right, then the upper right side, and the lowest rate in upper left segment (102 teeth; 6.8) as shown in Figure 3.

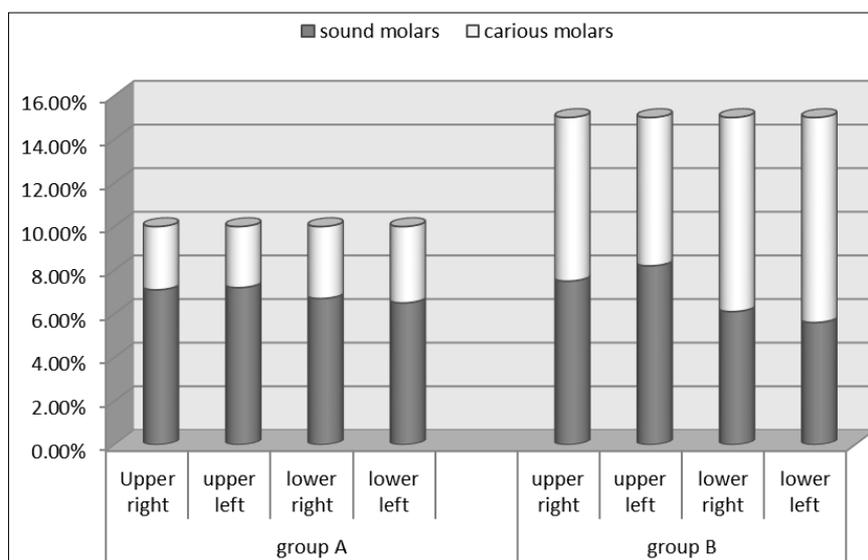


Fig 3: Caries distribution of FPMs in the different segments of dental arches

4. Discussion

In the current study, the frequency of sound FPMs was (825 teeth; 55%), while the frequency of carious FPMs was (675 teeth; 45%). These finding is disagree with the results reported among 6-14 years old Sudanese children, showed the carious FPMs was 61%, and sound molars were 39% [8], in Libya caries-free teeth in the permanent dentition were 63.8% while caries teeth were 36.2% [9], and in Egypt 62.8% had dental caries [10]. A similar study in Syria showed caries rate was higher 78.7% [11], in Libyans children aged 12 years caries incidence was high 57.8% [12]. Another studied of 12 years Iranians children reported carious FPMs was high 66.04% [13], in Tripoli, Libya caries prevalence was 74.7% [14], in Philippines caries prevalence was 71.7% [15], in Syrian children aged 8-12 years caries incidences was 79.1% [11], in Libyans children caries was 55.8% [16]. On the other hand, in Spanish children caries free were 58.6% [17], in Iran it was 51.5% [18], in Pitesti City caries free was 58.82% [3], in Iran caries free was 28.6% [19] and in Mexico 56.8% of sample had no caries in their four FPMs [20]. These finding might be due to the differences in the amount of fluoride in drinking water, oral hygiene and nutritional habits.

The results of this study also indicated that significant differences were found between two groups regarding caries incidence of FPMs ($P < 0.0001$). The frequency of sound FPMs were approximately equal in both groups A, B (414 teeth; 27.5%), and (411 teeth; 27.4%) respectively. However, in group B carious FPMs was higher significantly ($P < 0.0001$) than group A (32.6%, and 12.5% respectively). Therefore, the present study demonstrated that caries activity increase with age. A similar finding was reported in Iran, a significant difference of caries incidence was found between the two groups, group A which consisted of 225 children with age ranging 8-10 years frequency of carious FPMs was 57 teeth, while in group B which comprised of 222 children, the frequency of carious FPMs was 80 teeth [21]. Another study of 432 school children aged 9-12 years in Jeddah, Saudi Arabia, and showed that carious FPMs was increased with age, it was 67% at age 9 years, and it increased and reached 70.5%, 82%, and 83.5% at 10, 11, and 12 years old respectively [22], in Portugal the prevalence of dental caries were 46.9% in 6 year old and 52.9% in 12 year old [23], in Spain caries in 12 and 15 years children was (39.6% and 51.7% respectively) [24], and in Pakistan on prevalence of dental caries was found to be 60% in 8- 10 years children [25]. Similarly in Philippines the results

indicated that as the age of children increased from 6 to 12 years, dental caries of FPMs increased [15]. The differences in the finding between countries could be due to the differences in sample size, children age, food culture, fluoride supplement in the drinking water and oral health services.

The present study, showed that in group A, sound FPMs was approximately equal in both upper right and left sides (107 teeth; 7.1%) and (108 teeth; 7.2%) respectively, While in the lower arch, the frequency of sound first permanent molars incidences were approximately equal too in both right and left sides (101 teeth; 6.7%) and (98 teeth; 6.5%) respectively. These finding is higher than the results in Iran sound more was 34.7% [7] and the results in Libya that showed the highest rate of sound FPMs was found in the right and left maxillary jaw yielded (26.5%, and 28% respectively) [26].

In group A, slightly equal caries incidence of first permanent molars in both lower right and left arches (49 teeth; 3.3%) and (52 teeth; 3.5%) respectively. Caries incidence of FPMs was similar in both upper right and left segments with frequently of (43 teeth; 2.9%) and (42 teeth; 2.8%). This study showed that caries incidence was equal in both sides of the upper jaw as well as in the lower jaw. A similar finding was reported in Iranian children aged 12 years old, the prevalence of caries was equal in both maxillary and mandibular FPMs were (80.8% and 84% respectively) [4].

A significant relationship was found between two groups regarding caries distributions of FPMs in the different segments of the dental arch. In group B, the highest frequency of sound FPMs were found in the upper left side (123 teeth; 8.2%). Followed by the upper right side (112 teeth; 7.5%), then the lower right side (92 teeth; 6.1%), and the lower left side was (84 teeth; 5.6%). However, the highest incidence of carious molars was found in the lower left segment with frequency of (141 teeth; 9.4%). Followed by the lower right segment (133 teeth; 8.9%), then the upper right segment (113 teeth; 7.5%), and the upper left segment was (102 teeth; 6.8%). The results of this study showed that in group B, the lower arch had high incidence of carious FPMs were (274 teeth; 18.3%) while in maxillary arch it was 215 teeth (14.3%). In Group A, the mandibular first permanent molars exhibit higher percentage of carious (6.8%) than the maxillary counterpart (5.7%). These findings are agreed with the results reported on Sudanese children, mandibular FPM exhibited higher caries incidence (76.5%) than maxillary counterpart (69.9%) [27], in India, the total number of carious first molar

was higher in the mandible than the maxilla [28]. Another studied in Saudi Arabia showed strong correlations between upper contra lateral FPMs ($r=0.586$) and lower Contra lateral FPMs ($r=0.567$, $P < 0.001$) [29]. These finding may be explained as that the lower arch may be attributed to greater food and plaque accumulations. A similar results were reported in Saudi Arabia among 540 children on carious FPMs was 49.8%, hence caries incidence was high in the lower jaw in compared with the upper jaw [30]. In this study significant difference ($P < 0.0001$) was found between the caries incidence in FPMs in two age groups, because of molars of 9, 10,11, 12 years have been in oral cavity since more than three years or in other word group B children molars were present since 3 to 6 years as compared with group A. The carious status of all FPMs was increased significantly as the age increased. There few limitation of this study, number of children was more in group B than that in group A. The reason may be that the sample was randomly selected. Further studies on similar age groups are necessary for confirming the findings. Moreover, it should be concentrating on revealing the specific factors that influence the neglecting of the dental health.

5. Conclusion

The incidences of caries was increased significantly ($P < 0.05$) as age increased. Bilateral incidence of carious FPMs was similar on both sides of the jaw for the two groups. Therefore; the possibility of FPMs on right side would be carious given that FPMs on the left side is carious was high. It recommended starting efficient plans to promote the dental health care for children of Benghazi city. The plans should be comprised of the education and the motivation for the parents, dental health services, and the preventive measures which included preventive resins restoration and topical fluoride applications for the children.

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Conflict of Interests: Authors have no conflict of interest.

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