Evaluation of Health Status of the First Permanent Molars of Children Aged 6 to 12 years in Benghazi, Libya

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INTRODUCTION

Dental caries is considered the most prevalent oral disease among children; the first permanent molar is particularly more susceptible tooth to the decay in the dental arch. Aims of this study were to determine caries-free status and DMFT index of the first permanent molars (FPMs) among Libyan children. A total of 375 children aged between 6 to 12 years were examined for caries incidence based on the guideline provided by the World Health Organization (WHO). Data were analyzed by using Chi-square tests and the Kruskal Wallis test. The prevalence of carious FPMs among all groups was (45%), while the incidence of sound FPMs was (55%). The lowest rate of carious FPMs was observed in 6 years of children (0.9%). However, the highest rate was observed in 12 years of children (8.9%). There were statistically significant between the frequency of (one-two-three-four) molar involved in the DMFT index and the age (P <0.05). In both children aged 10 and 12 years the incidence of involved four molars was the highest rate (10.7%). The DMFT index of FPMs of all samples was (1.80±0.081). Hence, in 12 years children were significantly (P <0.05) the highest rate (2.66±0.21) compared with the other group. In addition, it was high compared to WHO standards in 2010 (>1). Moreover, caries incidence was increased with age. According to these findings, it is strongly recommended efficient plans to provide oral health services for Libyan children. Besides that FPMs require special attention during clinical examination, demands careful prevention measures including fissure sealants, topical; fluoride application, and home care.

Keywords: Dental caries, FPMs, DMFT, Oral health, CF.

Abstract: Dental caries is considered the most prevalent oral disease among children; the first permanent molar is particularly more susceptible tooth to the decay in the dental arch. Aims of this study were to determine caries-free status and DMFT index of the first permanent molars (FPMs) among Libyan children. A total of 375 children aged between 6 to 12 years were examined for caries incidence based on the guideline provided by the World Health Organization (WHO). Data were analyzed by using Chi-square tests and the Kruskal Wallis test. The prevalence of carious FPMs among all groups was (45%), while the incidence of sound FPMs was (55%). The lowest rate of carious FPMs was observed in 6 years of children (0.9%). However, the highest rate was observed in 12 years of children (8.9%). There were statistically significant between the frequency of (one-two-three-four) molar involved in the DMFT index and the age (P <0.05). In both children aged 10 and 12 years the incidence of involved four molars was the highest rate (10.7%). The DMFT index of FPMs of all samples was (1.80±0.081). Hence, in 12 years children were significantly (P <0.05) the highest rate (2.66±0.21) compared with the other group. In addition, it was high compared to WHO standards in 2010 (>1). Moreover, caries incidence was increased with age. According to these findings, it is strongly recommended efficient plans to provide oral health services for Libyan children. Besides that FPMs require special attention during clinical examination, demands careful prevention measures including fissure sealants, topical; fluoride application, and home care.
occlusal irregularities which play an important role in planning dental service for the society (Elfseyie, 2013). A study was conducted in Mexico, showed a strong correlation between the comprehensive DMFT and FPMs, and reported that the general status of caries can be inferred on the basis of FPMs; this might be useful in national surveys, the decision to use an abbreviated DMFT Index protocol can serve to evaluate the benefits of reduced effort for data collection in terms of the possible loss of data (Pontigo-Loyola et al., 2020). Although caries incidence was high in the world, a few studies were conducted in Libya, and little data was published, especially in Benghazi. It is necessary to obtain baseline data regarding the condition of FPMs which may serve an important role in controlling, preventing and organizing oral health care services. Therefore, the objective of the current study was to determine DMFT index of FPMs in children age groups living in Benghazi, Libya.

**MATERIAL AND METHODS**

This cross-sectional study was conducted in Pediatric Clinic Department of Faculty of Dentistry. Ethical approval was given by Ethical Research Committee of the Faculty of Dentistry. A consent form was signed from children’s parents, who agreed to include their children in the study. The selection of subjects was convenient because all children should met inclusion and exclusion criteria. The inclusion criteria were children’s age ranged from 6 to 12 years. The exclusion criteria were all children with mental or physical problems and medical compromised were excluded. The clinical examinations of dental caries were based on diagnostic criteria which are recommended by WHO (1986). In this study, only FPMs was included, this molar was the first permanent molar FPMs is named by Kunzel (1988) (Chirca et al., 2015). All selected children were examined for dental caries by using dental explorer and a plane mouth mirror and cotton rolls to remove debris and plaque. FPMs were evaluated starting from the upper right side of dental arch and ending at the lower left side of the dental arch. A dental chart was used to record CF and DMFT index. It is resulted from adding the total number of decayed, missing, and filled teeth; this index expressed by letters D, M, and F which represented decayed teeth, missing teeth due to decayed and filled teeth, respectively. Based on WHO criteria, a tooth is considered as decayed if it restored teeth with recurrent caries or teeth with temporary dental dressing. Teeth extracted due to caries were considered as missing teeth (Gorgi et al., 2017). To ensure the reproducibility of the study, calibration between the examiners was done on (10%) of sample. Cohen’s Kappa was used to measure the level of intra-examiner agreement (0.84-89).

Statistical analysis of data was performed by using SPSS software (version 16, SPSS Inc., Chicago, IL, USA). Chi-square tests were used to analyze the data and p-value less than (0.05) was considered statistically significant. The Kruskal Wallis test was applied for age groups against DMFT index, and the Student’s t test was used to compare the differences among the means at significant level (0.05).

**RESULTS**

The total sample of three hundred and seventy five subjects was classified by age as following: 6, 7, 8, 9, 10, 11 and 12 years’ age groups, which consisted of 34, 44, 72, 68, 66, 41, 50 subjects respectively. The distribution of caries incidence, the prevalence of sound FPMs were (825 teeth; 55%) while the incidence of carious FPMs was (675 teeth; 45%), which included the decayed teeth DT, MT, FT was (41.7%), (1.3%), and (2%) respectively as shown in Figure 1.

![Figure 1 Distribution of caries incidence in all groups](image_url)
The highest rate of CF was observed in children aged 8 years (10.9%), whereas the lowest rate of CF was observed in 12 years children (4.5%). The lowest rate of incidence of carious FPMs was found in children aged 6 years (0.9%), while the highest rate of carious FPMs was found in children aged 10 and 12 years was (9%, and 8.9% respectively) as shown in Figure 2.

Figure 2: Distribution of caries according to the children’s age

As can be observed in the results presented in Table 1, DMFT index of FPMs in whole samples was (1.80±0.081). The DMFT was significantly (P <0.05) the highest rate (2.66±0.21) in children aged 12 year, followed by the children aged 11 year (2.22±0.23). However, it was significantly (P <0.05) the lowest rate in children aged 6 years (0.38±0.25). The incidence of DT was higher in the children aged 10 years compared with other age groups. Whereas, the lowest rate of DT was recorded in children aged 6 years (1.9%). The prevalence of MT was higher in children aged 11 years compared to other age groups. However, the prevalence of MT in children aged 6, 7 years was zero. The highest prevalence of FT was observed in children aged 11 years, while in children aged 7 was zero.

Table 1: The distribution of the DMFT index of first permanent molars

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>DMFT(^2) (Mean ±SE)</th>
<th>DT(^1) N %</th>
<th>MT(^1) N %</th>
<th>FT(^1) N %</th>
<th>Total N %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>0.38±0.25</td>
<td>13 (1.9)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>13 (1.9)</td>
</tr>
<tr>
<td>7</td>
<td>1.11±0.22</td>
<td>47 (7)</td>
<td>0 (0.0)</td>
<td>2 (0.3)</td>
<td>49 (7.3)</td>
</tr>
<tr>
<td>8</td>
<td>1.72±0.17</td>
<td>117 (17.3)</td>
<td>1 (0.1)</td>
<td>6 (0.9)</td>
<td>124 (18.4)</td>
</tr>
<tr>
<td>9</td>
<td>1.90±0.18</td>
<td>126 (18.7)</td>
<td>1 (0.1)</td>
<td>2 (0.3)</td>
<td>129 (19.1)</td>
</tr>
<tr>
<td>10</td>
<td>2.06±0.18</td>
<td>128 (19)</td>
<td>5 (0.7)</td>
<td>3 (0.4)</td>
<td>136 (20.1)</td>
</tr>
<tr>
<td>11</td>
<td>2.22±0.23</td>
<td>73 (10.8)</td>
<td>8 (1.9)</td>
<td>10 (1.5)</td>
<td>91 (13.5)</td>
</tr>
<tr>
<td>12</td>
<td>2.66±0.21</td>
<td>121 (17.9)</td>
<td>5 (0.7)</td>
<td>7 (1.0)</td>
<td>133 (19.7)</td>
</tr>
<tr>
<td>Total</td>
<td>1.8±0.08</td>
<td>625 (92.6)</td>
<td>20 (3.0)</td>
<td>30 (4.4)</td>
<td>675 (100)</td>
</tr>
</tbody>
</table>

DMFT: Decayed, Missing, Filled Teeth Index; DT: Decayed teeth; MT: Missing teeth; Filled teeth.\(^1\)Pearson Chi-square=32.50, p =0.001. 
\(^2\)Mean ±SE. *\(\ldots\) means with different superscripts in DMFT index are differ significantly (P <0.05).

A statically significant (P < 0.05) was found between the frequency of FPMs (one–two-three-four) molar involved in DMFT and the age. The highest rate was found in four molars incidence (49.8%) and the lowest rate was one molar incidence (6.5%). In children aged 6 years, the frequently of FPMs with three molars involved was (0.9%)
however, the frequent of four molars involved did not reported at that age. In both children aged 10, 12 years the incidence of involving four molars were highest rate (10.7%) as shown in Table 2.

Table 2: Number and frequency of molars, DMFT (%) in relation to age groups

<table>
<thead>
<tr>
<th>Age/year</th>
<th>Frequency of FPMs and DMFT index</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>%</td>
</tr>
<tr>
<td>6</td>
<td>3 (0.4)</td>
<td>13 (1.9)</td>
</tr>
<tr>
<td>7</td>
<td>4 (0.6)</td>
<td>49 (7.3)</td>
</tr>
<tr>
<td>8</td>
<td>11 (1.6)</td>
<td>124 (18.4)</td>
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<tr>
<td>12</td>
<td>6 (0.9)</td>
<td>133 (19.7)</td>
</tr>
<tr>
<td>Total</td>
<td>44 (6.5)</td>
<td>675 (100)</td>
</tr>
</tbody>
</table>

Pearson chi-square ($\chi^2$) = 32.193, P value = 0.021.

DISCUSSION

In this study, the prevalence of sound FPMs amongst all groups was (55%). CF in children aged 6 years was (8.2%). This result is agreed with Global goals for oral health 2020 to increase the proportion of caries free 6 year’s children (Hobdell et al., 2003). A similar studied was conducted on children aged 6 years in Taiwan and showed that caries free of FPMs was (48%) (Warren et al., 1997). Another study was conducted on 6 years children in South Africa reported that (39.7%) were caries free. While in Sudanese children free caries was 39% (Abuaffan et al., 2018). Which is below the goal of (50%) set by the Department of Health for the year 2000 (van Wyk and van Wyk, 2004). In the present study, CF in children aged 7 years was (8.5%), and the highest rate of CF was observed in children aged 8 years (10.9%). Whereas in children aged 9 years was (9.5%). However the lowest rate of CF was observed in 12 years children (4.5%). These findings are consistent with the finding reported in Jeddah, Saudi Arabia showed the four sound FPMs were varied according to age with the highest (33%) in 9 years and the lowest (16.5%) in the oldest children 12 years (Al-Samadani and Ahmad, 2012).

In the current study, the incidence of carious FPMs (45%), which divided into DT, MT and FT which were 41.70%, 1.30% and 2%, respectively. It seems to be higher percentage of DT in comparison with missing and filled one, this may be due dietary habits of more sugar consumption, low concentration of fluoride in drinking water, inadequate oral hygiene, limited the access to public preventive and restorative programs. These findings is slightly lower than the results in Benghazi, higher caries (61.9%) (Al Sharbati et al., 2000). Nevertheless, in another study on the prevalence of dental caries was (57.8%) in the same region (Huew et al., 2011). In addition the results reported in Sudanese children aged 6-14 years, carious FPMs was (61%) (Abuaffan et al., 2018), and in South West Coast of India carious FPMs was (83.8%) (Thushara Sudhakaran, 2016). Moreover, in Iranian children aged 12 years carious FPMs were 66.04% (Poureslami et al., 2017). A similar finding was reported in Dammam, Saudi Arabia 49.8% had carious molars (Khan et al., 2017). These finding might be due to the differences in the amount of fluoride in water, food cultures and oral hygiene habits. In contrast with another study from Pakistan, it showed a lower caries prevalence was (30.6%) among 8-12 years children (Ali et al., 2013), and in Benghazi city, Libya caries-free teeth in the permanent dentition were 63.8%, while caries teeth were 36.2% (Elfseyye et al., 2020). In the current study, the highest rate of carious FPMs was observed in 12-year children (8.9%) compared to other ages. These findings are in agreement with the results reported in Iranian children aged 12 years, showed that the higher carious FPMs (53.12-66.04%). Therefore the children at these ages need restoration and/or extraction of this tooth services (Poureslami et al., 2017). Hence, the decreased in parent awareness of these teeth lead to early loss, therefore, it is absolutely necessary to provide health, educational and dental treatment for the children.
In this study, the DMFT of all samples was (1.80±0.081). Hence, in children aged 12 year was significantly (P <0.05) the highest rate (2.66±0.21), followed by the children aged 11 years DMFT was (2.22±0.23). On the other hand, this result is disagreed with the Global Oral Health Data Bank and WHO Oral Health, 2000, reported that the incidence of DMFT in 12-year in Libya was very low (<1.2). In addition, it disagreed with WHO Health 21 policy for Europe who has been formulated goals for the 2020 Year, on average no more than (1.5) of DMFT should be observed in children aged 12 years. A statically significant was found between the caries incidence and the age especially in 12 years children, because their FPMs have been in the oral cavity since 6 years (Petersen, 2004a). According to National Oral Health Survey (2002-2003), caries prevalence in India was 51.9% (mean dmft=2), 53.8% (mean DMFT=1.8) and 63.1% (mean DMFT=2.4) at ages 5, 12 and 15 years respectively (Arora et al., 2015). This finding of increased rate in several developing countries may be due to high consumption of sugars and inadequate fluorides application (Petersen, 2004b). Another study in Libya showed that DMFT of 12 years children was (1.68 ±1.86), it was met the WHO goal for 2000 (Huw et al., 2011), and in Tripoli, a study conducted on 392 children with aged ranged from 6 to 12 years, showed that, the highest rate (P <0.05 ) of DMFT was observed in 12 years children (Kabar et al., 2019), and in Benghazi DMFT index was (1.80±.081) and the highest rate was in left side of the mandible (0.51±.026) (Elfseyie et al., 2020). This may be due to changing life-styles, living conditions and a more sugar consumption. While in South Africa the DMFT of (1.1) for the children aged 12-years, and in Libyan children aged 6 to 12 years DMFT index was 1.21±0.19 (Elfseyie et al., 2020).

However, it was below than the (1.5) set by the Department of Health for this group for the year 2000 (van Wyk and van Wyk, 2004), may be due to improved oral hygiene by using fluoridated toothpaste, mouth wash, and topical application of fluorides. In the present study, the lowest rate of DMFT was found in children aged 6 years (0.38±0.25). These finding are in agreement with WHO Health 21 policy for Europe has been formulated goals for the 2020 Year. By that year, at least 80% of 6-year children should be caries free (Petersen, 2008). A similar result of the lowest rate (P <0.05) of DMFT was reported in 6, 7 years children in Tripoli, Libya (Kabar et al., 2019).

In the current study, the lowest rate of DT was found in children aged 6 years (1.9%). However, the higher rate of DT was found in 10 years children (19%) followed by the 9 years was (18.7%) and 12 years was (17.9%). This result is disagreed with Global goals for oral health 2020 which is the reduced of DMFT in 12 years children particularly DT component (Hobdell et al., 2003). The high level of DT is an importance to concern due to the fact of the extraction is most used procedure in public clinic; therefore the application of fluoride is very necessary. The prevalence of MT was higher in children aged 11 years in compared to other age groups. Whereas, the prevalence of MT in children aged 6, 7 years was zero.

In this study, statically significant was found between the frequency of (one–two-three-four) molars involved in DMFT and the age (P <0.05). The four molars involved were the highest rate (49.8%). While, the lowest rate was one molar involved (6.5%). The four molars involved did not reported at age of 6 years. In both children aged 10, 12 years the incidence of involved four molars were highest rate (10.7%). A similar finding was reported in children aged 8 to 12-years, in Pakistan (1.8%) of children had all (four) first molars affected by caries (Ali et al., 2013). Another study conducted in Sri Lanka in 13-16 years children, and showed (36%) of cases had sound four FPMs, and (11%) had caries in all four (FPMs) (Warnakulasuriya, 1991).

CONCLUSION

The DMFT of total sample was high and the highest rate was observed in children aged 12 years. In addition, it was high in compared to WHO standards in 2010 (>1). Moreover, caries incidence was increased with age. According to these finding FPMs require special attention during clinical examination, demands careful prevention measure including fissure sealants, topical; fluoride application and home care as well as plan should be start to provide an early intervention to educate the children and their parents about the etiological factors and eating habits and consumption of sugars, thus it is strongly recommended to start oral health programs to provide oral health care for Libyan children.
ACKNOWLEDGMENT

The authors wish to thank Dr Mohamed Idris Ashelmani for his assistance in data analysis procedure.

CONFLICT OF INTERESTS

None declare

REFERENCES


