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Chronicles of Biomedical Sciences

journal homepage: https://cbsciences.us/index.php/cbs

The prevalence of dental caries among schoolchildren in Libya

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ARTICLE INFO

Article Type:
Original Article

Keywords:
Dental Caries
Decayed
Missing
Filled Teeth
DMFT
Schoolchildren

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Received on: Apri 19, 2024

Revised on: May 6, 2024

Accepted on: May 7, 2024

ABSTRACT

Background: The present study has been performed to determine the dental caries prevalence: Decayed, Missing, and Filled Teeth and DMFT indexes among 13 - 15 year-old schoolchildren of Maserati in Libya.
Objective: This study tried to assess the prevalence of dental caries and to examine there are statistically significant differences in prevalence of dental caries according to gender and age among 13 - 15-year-old schoolchildren.
Methods: A sample of 400 individuals of both sexes (181 were females and 219 were males) their ages ranged from 12- to 15-year-old. In the current study 10 schools (5 boys and 5 Girls schools were randomly selected from different areas within the state of Maserati in Libya.
Results: The results showed that there was statistically significant difference between male and female in Prevalence of Dental Caries. Which indicated female schoolchildren had a higher mean DMFT value 4.303 (± 3.12) than male children 2.93 (±2.94). Furthermore, the results indicated that there was statistically significant difference in (FT) and (DMFT) among age (13-15) years old. Therefore, 15-year-old children showed a significantly higher incidence of dental caries prevalence than 13- and 14-year-old ($P < 0.05$). Howoever, the results indicated that there were no signficant differences in Decayed and Missing teeth among schoolcheldern age ($P > 0.05$).
Conclusion: High prevalent dental caries was found among schoolchildren in Libya from age 13 to 15 years especially in females. The reasons for this would mainly be lack of dental awareness, motivation, ignorance, poor oral hygiene, improper tooth brushing techniques, and inadequate exposure to fluorides. Other contributing factors could be improper dietary habits, longer outdoors stay of children at this age leading to greater consumption of in between meals snacks, cariogenic diet, and nutritional deficiencies.

Introduction

Dental caries currently represents the most widely Incurable malady among. It is five times more typical than asthma and seven times more common than allergic rhinitis [1]. In some countries, oral illnesses are the fourth most costly ailment to treat. Treating dental caries (DC), assessed at US $3513 (UK £2,240) per 1,000 students, would surpass the aggregate wellbeing spending plan for of most low-pay nations [2]. However, the reasons why some students evolve DC are complicated.

There is no single country that claims to own decay free students, and all grown-ups and over 90% of students will encounter caries sooner or later in their lives [3]. Dental caries is characterised as a multi-factorial Incurable illness caused plaque.

The prevalence of dental caries is diminishing in developed countries because of taking preventive measures, while in developing countries the prevalence of dental caries is growing [4]. The important indices for measuring dental caries of permanent and primary teeth are DMFT and dmft, respectively. In these indices, the number of permanent teeth (T), decayed teeth (D), missing due to caries (M), or filled because of caries (F) is evaluated. This index is used as an important criterion to reflect the status of oral and dental health and plays a significant role in healthcare decision-making [5]. The problems associated with dental caries led to diminished quality of life as well as increased economic costs for the patients. The prevalence of caries is high among children, and the pain resulting from caries causes increased school absence as well as the reduced ability for learning, the impaired ability for eating food, increased talking problems, and eventually reduced rate of growth for children [6].

In a lot of Arab countries, dental caries is increasing by the time, mostly since the relatively recent economic growth, that has resulted in an increased consumption of refined sugar, higher than in other developing countries. Deficiency of consciousness about oral health practices has also contributed to the increase in dental caries. In Lebanon, Morocco, Jordan, Sudan, and others. dental caries considers an extremely of the childhood common disease in Libya. There is no information regarding the predominance of caries together with learning, behavior and dental cleanliness rehearses among school students. furthermore, there has been no investigation in the city of Misurata and there have only been a few examinations in other cities of Libya.

Dental caries is defined as a multi-factorial infectious disease caused by plaque bacteria. When food enters the mouth, bacteria metabolize fermentable carbohydrates, producing acids, which diffuse into hard dental tissue, and demineralize tooth enamel [7]. Dental caries is often measured by a worth, which is the aggregate of the quantity of rotten, absent and filled teeth (DMFT Index) [8]. This worth has been wide used for assessing the oral health standing of populations for public health planning and political functions[9]. The DMFT Index was initially presented by Klien in 1930 [10]. It is a measure of cumulative caries assaults that demonstrates the events of carries, including over a wide span of time DC. In spite of the fact that the DMFT Index has been being used for over 80 years it remains the foremost usually used epidemiological indicator for assessing DC [11]. The World Health Organization, 2013 (WHO) and International Dental Federation, 2014 (FDI) built up the primary worldwide OH objective of a normal not in excess of three rotted, missing, and filled perpetual teeth (DMFT) at 12 years old to be accomplished by the year 2000 [12]. During the following decades most, high-income countries achieved or even surpassed these objectives. However, for some low-salary nations this remaining parts a distant aspiration [8]. In 2003, the FDI, the WHO and the International Association for Dental Research (IADR) issued "Worldwide Goals for Oral Health 2020" [13]. These objectives gave direction to neighbourhood, local and national organisers and strategy producers to enhance the OH status of their populaces. The new OH objectives were not numerically particular. Rather, every nation might specify aims in step with its current pervasiveness and severity, nearby needs and OH frameworks. In view of the DMFT worth, the WHO supplied a scale to a classify the intensity of caries: DMFT between 0.0-1.1 is thought to be low, 1.2-2.6 is low, 2.7-4.4 is direct, 4.5-6.5 is high, and at least 6.6 is thought to be high [14].

Different epidemiologic examinations from various parts of the world detailed that DMFT worth and the frequency of caries is high among school students (12-14 years of age) in a few nations and higher than the figure prescribed by the WHO objective; for example, in Saudi Arabia (mean DMFT 5.94, caries predominance 93.7%) [15], Puerto Rico (mean DMFT 3.8, caries pervasiveness 81%) [16], Peru (mean DMFT 3.9, caries frequency 83.3%) [17], Albania (mean DMFT 3.8, caries pervasiveness 85.5%[18], and Lithuania (mean DMFT 3.7, caries frequency 85.5%) (Al-Darwish et al. 2014; Milčiuvienė et al., 2009).

The total number of 13–15-year-old school children in Libya in the 2020/2021 academic year was (19500 males and females). This is a descriptive cross-sectional study. A list of all intermediate schools (12–15-year school children) were provided by the Ministry of Education in Libya 2017, although the WHO mentioned that between 10 to 15 sampling sites are usually sufficient for this kind of study, in the current study 10 schools (5 boys and 5 Girls schools were randomly selected from different areas within the state of Maserati in Libya.

Thus, a total of 520 questionnaires were distributed using stratified random sampling Method, from which only 400 questionnaires were successfully returned. Interestingly, the completed and usable questionnaires for this study totaled 400. The population is 19,500 children in the Misurata in Libya. schools were selected by referring to the official schools list published by the Ministry of Education. According to the [20] table, if the population of the study is 19,500 then the sample of the study is 392. The present study will collect data from a sample of 400 children in Maserati for this study, the sample size was determined using Slovin's formula [21].

n= N/ (1+Ne2)

n= 19,500/ (1+19,500*(5%)^2)

n= 19,500/ (1+19,500*0.05* 0.05) = 392

Where:

n is the sample size

N is the population size = (19,500)

e is the margin of error = 5%= 0.05

Table 1: Number of Questionnaires to Respondents

Children Age of sampling	Population Number	Percentage of questionnaires distributed	Sampling selection.	
Age 13	8000	41%	214	140
Age 14	7200	37%	192	144
Age 15	4300	22%	114	116
Total	19500	100%	520	400

Data Analysis and Results

Statistical assessment was carried out using SPSS program version 25 to do descriptive statistics like mean and standard deviation, were used to describe caries prevalence. Furthermore, the study was used independent sample test and one-way Anova to test the statistically differences in prevalence of dental caries according to gender and age.

Socio-Demographic Status

A total of 400 school students out of 520 originally sampled completed the study. Of which, 219 (55%) were males and 181 (45%) were females. Out of the study population 140 (35%) were aged 13 years, 144 (36%) aged 14 years and 116 (29%) aged 15 years. As shown in table 2 and figure 1.

Table 1. Summarizes the socio-demographic characteristics by gender of the sample.

Gender	Age Group (Years)			Total
	13 n(%)	14 n(%)	15 n(%)	
Male	80 (57)	74 (51)	65 (56)	219 (55)
Female	60 (43)	70 (49)	51 (44)	181 (45)
Total	140 (35)	144 (36)	116 (29)	400 (100)

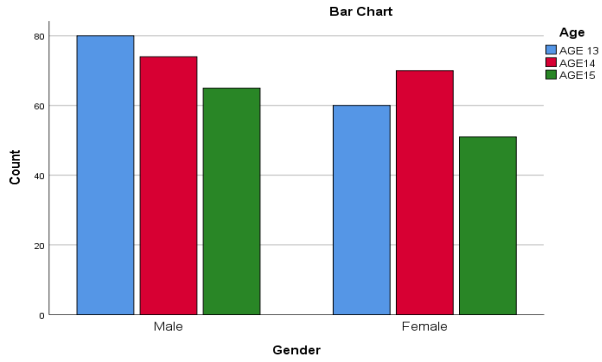

Figure 1. Distribution of school students by gender and age

Mean caries indices and S.D. by socio-demographic and other characteristics

The study findings show that the highest mean score (DT) was 3.712(±2.97) for female, (MT) and 0.173(±.556) for male, (FT) at 0.447(±902) for female and (DMFT) with 4.303(±3.11) for female. With regards to DT and MT, age 14 years had the highest mean was 3.319(±3.03) and 0.243(±.721) respectively while age 13 years for (FT) and (DMFT) had the lowest means at 2.35 and 2.928 respectively. On the other hand, age 15 years had the highest mean for FT with 0.620(±1.26) but age 13 years had the lowest mean score at 235(±.715). The overall of mean score in prevalence of dental caries for gender and age were 3.619 and 3.592 respectively.

Therefore, there are prevalence of dental caries (DT, MT, FT and DMFT) among the three groups at age 13-15 years old schoolchildren in Libya (H1). Table 6: presents the mean caries indices and S.D. by socio-demographic and other characteristics among school children in Libya (N=400)

Table 2. Mean dental caries indices and S.D. by socio-demographic and other characteristics.

Variables	Category	DT		MT		FT		DMFT		Total
		Mean	S. D	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Gender**	Male	2.470	2.459	0.173	0.556	0.292	0.911	2.936	2.946	3.619
	Female	3.7127	2.973	0.143	0.517	0.447	0.902	4.303	3.112	
Age * **	Age 13	2.578	2.578	0.114	0.417	0.235	0.715	2.928	2.526	3.592
	Age 14	3.319	3.032	0.243	0.721	0.277	0.673	3.840	3.265	
	Age 15	3.224	2.880	0.112	0.367	0.620	1.262	3.956	3.394	

DT=Decayed Teeth, FT=Filled Teeth, MT=Missing Teeth, DMFT=Decayed, Missing and Filled Teeth, ** By Independent sample t-test, ***By One way ANOVA test 3.619 + 3.564= 3.59

Prevalence of Dental Caries by gender

Independent sample t-test was used to compare prevalence of dental caries between male and female among schoolchildern at age (13, 14, 15) in Libya. The results indicate that there was significantly difference between male and female in Decayed Teeth (DT) by schoolchildern (t (398) = 4.574, $p < 0.001$). This is because, the mean score of female in decayed teeth prevalence (M = 3.712, SD = 2.97) is greater than mean score of male (M = 2.470, SD = 2.459). Therefore, there is statistaclly signficant difference in in decayed teeth prevalence according to gender for female.

On the other hand, the findings show that there is no significant difference between male and female in the missing teeth (MT) among schoolchildern in Libay (t (398) = -0.552, p =.582). Beacuse, the mean score in missing teeth for female (M = 0.143, SD = 0.517) is almost similarity with mean score of male (M = 0.173, SD = 0.556) as indicatin Table 7. Thus, there is no significant differences between (male and female) in missing teeth prevalnce among schoolchildern in Libay.

Furthermore, the findings show that there is no significant difference between male and female in the Filled Teeth (FT) among schoolchildern in Libay (t (398) = 1.703, p= .089>.05). This is because, the mean score in filled teeth for female (M = 0.447, SD = 0.902) is almost similarity with mean score of male (M = 0.292, SD = 0.711) as indicatin Table 7. So, there is no significant differences between (male and female) in filled teeth prevalnce among schoolchildern in Libay for female.

Finally, The results indicate that there was statiscaly significantly difference between male and female in decayed, missing and filled teeth (dmft) by schoolchildern (t (398) = 4.504, $p < 0.001$). This is because, the mean score of female in (DMFT) (M = 4.430, SD = 3.11) is greater than mean score of male (M = 2.936, SD = 2.94). Therefore, there is statistaclly signficant difference in (DMFT) according to age for female. That means, female is more than male in decayed, missing and filled teeth (DMFT) prevalnce among schoolchildern in Libay. Thus, there are statistically significant differences between male and female in Prevalence of Dental Caries for female (H2). Table indicates Independent sample t-test for dental caries prevalence.

Prevalence of dental caries by age group

The results show that there is no significant difference between three age groups (13, 14, 15) as indicated by one-way ANOVA; $F(2,397) = 2.954$, $p = .053$ (the level of insignificance) As shown in Table 5. Therefore, There is no significant differences in decayed teeth prevalence among three age (13, 14, 15) . Additionlly, that there is no significant difference in Missing Teeth (MT) among age groups (13, 14, 15) as indicated by one-way ANOVA; $F(2,397) = 2.=698$, $p = .069$ (the level of insignificance) As shown in Table 5. Therefore, There is no significant differences in decayed teeth prevalence among three age groups (13, 14, 15).

Table 3. t-test for Equality of Means

Variable			Mean	S.D.	F		df	Sig. (2-tailed)	Mean Difference
Decayed Teeth (DT)	Equal variances assumed	Female	3.7127	2.97308	7.404	4.574	398	.000	1.24239
	Equal variances not assumed	Male	2.4703	2.45935		4.493	348.999	.000	1.24239
Missing Teeth (MT)	Equal variances assumed	Female	.1436	.51782	.920	-.552	398	.582	-.02987
	Equal variances not assumed	Male	.1735	.55606		-.555	392.344	.579	-.02987
Filled Teeth (FT)	Equal variances assumed	Female	.4475	.90293	3.826	1.703	398	.089	.15528
	Equal variances not assumed	Male	.2922	.91194		1.704	385.313	.089	.15528
Decayed, Missing and Filled Teeth (DMFT)	Equal variances assumed	Female	4.3039	3.11295	2.019	4.504	398	.000	1.36779
	Equal variances not assumed	Male	2.9361	2.94686		4.481	375.358	.000	1.36779

Table 4. One way ANOVA Test for Dental Caries by age groups (13, 14, 15)

Variables	Group	Mean	S.D		Sum of Squares	df	Mean Square	F
DT	Age13	2.5786	2.319	Between Groups	44.964	2	22.482	2.958
	Age14	3.3194	3.032	Within Groups	3017.61	397	7.601	
	Age15	3.2241	2.880	Total	3062.57	399		
MT	Age13	.1143	.4170	Between Groups	1.552	2	.776	2.698
	Age14	.2431	.7217	Within Groups	114.208	397	.288	
	Age15	.1121	.3676	Total	115.760	399		
FT	Age13	.2357	.7158	Between Groups	11.017	2	5.508	6.846
	Age14	.2778	.6736	Within Groups	319.421	397	.805	
	Age15	.6207	1.262	Total	330.438	399		
DMFT	Age13	2.9286	2.526	Between Groups	85.393	2	42.697	4.535
	Age14	3.8403	3.265	Within Groups	3737.39	397	9.414	
	Age15	3.9569	3.394	Total	3822.79	399		

DT=Decayed Teeth, FT=Filled Teeth, MT=Missing Teeth, DMFT=Decayed, Missing and Filled Teeth

Ligand Preparation: Discovery Studio visualizer [18] as well as the Autodock tool was used for ligand preparation. During the preparation procedure, the first step was to

Table 5. Multilabel comparison Test among three ages

						95% Confidence Interval	
Variable	**(I) Age in years**	**(J) Age in years**	**Mean Difference**	**Std. Error**	**Sig.**	**Lower Bound**	**Upper Bound**
DT	13	14	-.74087	.32723	.062	-1.5107	.0289
		15	-.64557	.34615	.150	-1.4599	.1688
	14	13	.74087	.32723	.062	-.0289	1.5107
		15	.09531	.34396	.959	-.7139	.9045
	15	13	.64557	.34615	.150	-.1688	1.4599
		14	-.09531	.34396	.959	-.9045	.7139
MT	13	14	-.12877	.06366	.108	-.2785	.0210
		15	.00222	.06734	.999	-.1562	.1606
	14	13	.12877	.06366	.108	-.0210	.2785
		15	.13099	.06692	.124	-.0264	.2884
	15	13	-.00222	.06734	.999	-.1606	.1562
		14	-.13099	.06692	.124	-.2884	.0264
FT	13	14	-.04206	.10646	.918	-.2925	.2084
		15	-.38498*	.11262	.002	-.6499	-.1200
	14	13	.04206	.10646	.918	-.2084	.2925
		15	-.34291*	.11191	.007	-.6062	-.0796
	15	13	.38498*	.11262	.002	.1200	.6499
		14	.34291*	.11191	.007	.0796	.6062
DMFT	13	14	-.91171*	.36417	.034	-1.7684	-.0550
		15	-1.02833*	.38523	.022	-1.9346	-.1221
	14	13	.91171*	.36417	.034	.0550	1.7684
		15	-.11662	.38279	.950	-1.0172	.7839
	15	13	1.02833*	.38523	.022	.1221	1.9346
		14	.11662	.38279	.950	-.7839	1.0172

On the other hand, there was a statistically significant difference in filled teeth prevalence between three age (13, 14, 15) by ANOVA test, ($F(2,397) = 6.846$, $p = .001$) which is less than the significance level of 0.05. Moreover, Table 5 indicates the age 15 seems better than the other groups as the mean of age 15 is greater at 0.620 compared to age 13 and age 14. Furthermore, Tukey post hoc test shows that the (age 15) was able to throw the statistically significantly further than group age 13 and age 14 with ($p = .002$) and ($p = .007$) resepectivly as indicating in Table 6.

Moerover, there was statistically significant difference in (DMFT) among three age (13, 14, 15) *($F(2,397) = 4.535$, $p = .011$)* which is less than the significance level of 0.05 . In addition, (age 15) seems better than the other groups as the mean score of (DMFT) is greater at 3.956. Moreover, Tukey post hoc test indicates that the (age 15) was able to throw the statistically significantly further than (age 13) and (age 14) at (0.022) and (0.034) as shown in Table 5 and Table 6. Therfore, there are statistically significant differences among age groups (13, 14, 15) in Prevalence of Dental Caries (H3).

Discussion

Healthy teeth and oral tissues and the need for oral health care are important for any section of society. Oral disorders can have a profound impact on the quality-of-life. This study tried to assess the prevalence of dental caries and to examine there are statistically significant differences in prevalence of dental caries according to gender and age among 13 - 15 years old schoolchildren in Libya. The present study has been performed to determine the dental caries prevalence, Decayed (DT), Missing (MT), and Filled Teeth (FT) and DMFT indexes.

Based on the findings, The overall of mean score in prevalence of dental caries (DMFT) for gender and age were 3.619 and 3.592 respectively. Furthermore, the result showed that there were statistically significant differences between male and female in Prevalence of Dental Caries.

In this study, Results indicated female schoolchildren had a higher mean DMFT value 4.303 (± 3.12) than male children 2.93 (±2.94). This finding was consistent with previous studies which suggested that sex of the schoolchildren was one of the factors significantly associated with dental caries [7,22,23]. Therefore, female children showed a significantly higher incidence of dental caries than male children ($P < 0.05$). The study results were similer to those of some pervious studies [7,23,24].

Furthermore, the results indicated that there were statistically significant difference in (FT) (DMFT) among age (13-15) years old. Therefore, 15 year old children showed a significantly higher incidence of dental caries than 13 and 14 year old ($P < 0.05$). The study results were consistent with previous studies [25].

Conclusion

Conclusively, the results indicated that there were no signficant differences in Decayed and Missing teeth among schoolcheldern age ($P > 0.05$). Age plays a signficant role in prevlance of dental caries among schoolcheldern.

Conflict of Interest: The authors have no competing interests.

Funding Source: No funding was received from any agency for this study.

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