

Oral health practices and dental caries among Libyan pupils, Benghazi (1993–94)

M.M. Al-Sharbati,¹ T.M. Meidan² and O. Sudani³

ممارسات صحة الفم وتسوس الأسنان بين التلاميذ الليبيين في بنغازي (1993–1994)

مروان محمد وجددي الشربتي وتونس محمود ميدان وعمر السوداني

خلاصة: كان هدف هذه الدراسة بحث ممارسات صحة الفم ومعدل انتشار تسوس الأسنان بين التلاميذ الليبيين (6–12 سنة)، وذلك بدراسة حالات 389 من الذكور و373 من الإناث تم اختيارهم عشوائياً من 11 مدرسة ابتدائية في ثلاث مناطق سكنية مختلفة تمثل مستويات اقتصادية اجتماعية مختلفة. وبمصررة إجمالية، فإن 321 تلميذاً (42.1%) لم يكونوا ينظفون أسنانهم بالفرشاة، مع وجود فروق يُعتد بها في المناطق المختلفة. وكان معدل انتشار تسوس الأسنان 61.9% من دون فروق يُعتد بها بين الجنسين. وفي سن الثانية عشرة، كان مُنسب الأسنان المتسوسة والمفقودة والمحشوة يبلغ 1.63. وكان متوسط النخر لكل طفل يبلغ 1.26، ومعدل انتشار تسوس الأسنان 50%. أما مُنسب احتياجات الحشو التي تمت تليبيتها فقد بلغ 0.01. ويقتضي الأمر النظر في إنشاء برامج تثقيفية صحية لتحسين ممارسات صحة الفم.

ABSTRACT We investigated the oral health practices and prevalence of dental caries among Libyan pupils (6–12 years), by studying 389 boys and 373 girls selected randomly from 11 public primary schools in three different residential areas indicating different socioeconomic levels. In all, 321 (42.1%) pupils did not brush their teeth, with significant differences in the different areas. The prevalence of dental caries was 61.9%, with no significant sex difference. At 12 years, the decayed, missing and filled teeth index was 1.63, the average decay per child was 1.26 and the prevalence of dental caries was 50%, but the filling needs met was 0.01. Health education programmes to improve oral hygiene practices should be considered.

Les pratiques de santé bucco-dentaire et les caries dentaires chez des écoliers libyens, Benghazi (1993–1994)

RESUME Nous avons mené une enquête sur les pratiques de santé bucco-dentaire et la prévalence des caries dentaires chez des écoliers libyens (6–12 ans) auprès de 389 garçons et 373 filles sélectionnés au hasard dans 11 écoles primaires publiques situées dans trois zones résidentielles indiquant différents niveaux socio-économiques. En tout, 321 écoliers (42,1%) ne se lavaient pas les dents, avec des différences significatives dans les différentes zones. La prévalence des caries dentaires était de 61,9%, avec aucune différence significative en ce qui concerne le sexe. A 12 ans, l'indice dents cariées, absentes ou obturées était de 1,63, le nombre moyen de dents cariées par enfant étant de 1,26 et la prévalence des caries dentaires de 50%, mais par rapport aux obturations nécessaires, celles qui avaient été réalisées représentaient 0,01. Des programmes d'éducation sanitaire en vue d'améliorer les pratiques d'hygiène bucco-dentaire devraient être envisagés.

¹Department of Behavioural Medicine, College of Medicine, Sultan Qaboos University, Al-Khoud, Oman.

²Department of Family and Community Medicine; ³Faculty of Public Health, Al-Arab Medical University, Benghazi, Libyan Arab Jamahiriya.

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Introduction

Dental caries is a highly prevalent chronic sugar-dependent infectious disease, affecting calcified tissue of the tooth and causing demineralization of the inorganic portion with subsequent destruction of the organic substance. The carious tooth never returns to its original state, even if it is treated

Three factors (the epidemiological triad) play a role in the development of dental caries: the host (genetic predisposition, malnutrition during teeth formation and behaviour, such as dietary habits and oral hygiene practices); the agent (mainly *Streptococcus mutans*); and finally the environment (lack of fluoride in water, lack of vitamin D and high consumption of refined sugars) [1-3]. These factors interact to produce a variety of dental diseases at varying rates and intensities. The factors contributing to these variations could be cultural, genetic, geographic and/or environmental in nature. Caries can be controlled by different measures but it can never be truly prevented [4]. Dental caries has a worldwide distribution, regardless of sex, age, race and socioeconomic level.

In many Arab countries, dental caries is increasing over time, especially since the relatively recent economic growth, which has resulted in an increased consumption of refined sugar [5,6], higher than in other developing countries [7]. Lack of awareness about oral health practices has also contributed to the increase in dental caries. In Morocco, Sudan, Jordan and Lebanon, for example, the decayed, missing, filled teeth indices (DMFT) were 2.6, 1.1, 0.2 and 3.6 respectively in the 1970s and increased to 4.5, 2.1, 1.7 and 5.0 respectively in the 1980s and 1990s [6,8, WHO unpublished data 1974, 1979, 1984]. However, the few studies conducted in the Libyan Arab Jamahiriya have

shown considerably lower values than other countries in early 1991 with DMFT of 1.58 [9].

The objective of this study was to investigate the oral health practices and prevalence of dental caries among Libyan pupils in Benghazi, and the various social and behavioural factors related to these problems.

Methodology

This cross-sectional survey was conducted between 8 December 1993 and 2 February 1994. Using multistage sampling, the public primary schools were listed in different areas of Benghazi according to different socioeconomic levels [10].

- higher social area (area one, Al-Fwehat Al-Gharbiya)
- middle social areas (area two, Al-Berka and Al-Slawi)
- lower social areas (area three, Sidi Younis and Al-Mheshi).

The schools and classes were chosen by simple random sampling. Because of the limited number of schools in the first area, two schools were selected, while the study covered four schools in the second area and five in the third area because of the large number of schools there.

We selected the sample by cluster sampling in the first area (i.e. all the pupils in the class were taken), and systematic sampling in the second and third areas (only some of the pupils were taken) because of the large number of classes, in order to ensure a stratified sample with regards to the class, area and sex. We calculated the sample size using the following formula [11]:

$$n = \frac{4(p \times q)}{E^2}$$

where n = the sample size, p = the prevalence of dental caries in the population of pupils, $q = 1 - p$ and E^2 = the allowable error of the prevalence rate.

We used the preliminary prevalence rate at the beginning of the study (60%) so as to have an allowable error of 5%–7.5% of the estimated prevalence at 95% confidence interval (CI). The sample size therefore lay between 474 and 1067 pupils.

We applied the diagnostic criteria of WHO regarding oral health surveys [12]. We explained in detail the aim and type of the study to the directors and teachers of the schools, then we choose the classes and pupils as described before. We told the pupils about the nature and objective of the research. Each child was interviewed by a researcher, using a specially prepared and pretested questionnaire. This was followed by an oral examination under good illumination. Other information, such as exact date of birth and educational level of the parents, were obtained from the pupils' files available in the schools, or from the parents themselves when the file information was not adequate.

The pupils were divided into the toothbrushing group and the non-toothbrushing group according to their toothbrushing behaviour. The first group was further subdivided into three subgroups. The first consisted of those who regularly brushed their teeth at night (alone or in addition to other times). This keeps the teeth clean from food debris during night hours, and in addition, salivary flow and oral movements decrease during sleep, which encourages the growth of plaques left on the teeth if brushing is not done. The second subgroup consisted of pupils who brushed their teeth in the morning only (perhaps for cosmetic reasons rather than cleansing the teeth). The third subgroup comprised those who brushed at other times.

Results

In all, 762 pupils (389 girls and 373 boys) were examined for dental caries and oral health practices. Similar numbers of boys and girls were taken from each area (Table 1).

The differences in the educational status of parents in the three areas were statistically significant ($P < 0.000$), which is a clear indication of the difference in socioeconomic levels in the different areas of our study.

Table 1 shows that 321 (42.1%) pupils did not brush their teeth. There were fewer pupils who did not brush in area one, 54 (21.2%), compared with area two, 95 (38.9%), while area three had the highest number of non-toothbrushers, 172 (65.4%). All types of toothbrushing behaviour were in descending order according to the area (from one to three).

Among all toothbrushers, 96% had one or more personal toothbrush(es), while the other 4% shared a toothbrush with others.

The percentage of the non-toothbrushing children declined with the higher level of education of both parents; 67% of children with illiterate fathers did not brush their teeth compared with 17.5% of those whose fathers were university graduates ($P < 0.000$). With regard to the mother's education, 57.1% of children whose mothers were illiterate did not brush their teeth, in contrast to 13.7% of those whose mothers were university graduates ($P < 0.000$).

The regular night toothbrushers constituted 109 (14.3%) of the 762 pupils, while 137 (18.0%) brushed in the morning only; 192 (25.6%) brushed at other times.

Our pupils did not start brushing early; half of the 6-year-old pupils ($n = 101$), had not started brushing. Furthermore, no pupil had been brushing for more than 2 years and 68% of the toothbrushing group of this age had brushed for less than 1 year.

Table 1 Composition of the sample according to the area, sex, toothbrushing behaviour and dental caries

Area		Boys	Girls	Total	Toothbrushing behaviour ^a			Dental caries ^b		
					No	Night	Morning	Other	No	Yes
One (high socioeconomic level)	No.	131	124	255	54	62	52	87	104	151
	%			33.5	21.2	24.3	20.4	34.1	40.8	59.2
Two (middle socioeconomic level)	No.	123	121	244	95	30	49	70	98	146
	%			32.0	38.9	12.3	20.1	28.7	40.2	59.8
Three (low socioeconomic level)	No.	135	128	263	172	17	36	38	88	175
	%			34.5	65.4	6.5	13.7	14.4	33.5	66.5
Total	No.	389	373	762	321	109	137	195	290	472
	%			100	42.1	14.3	18.0	25.6	38.1	61.9

^a $\chi^2_0 = 115.9$, $P = 0.0000$ (highly significant).

^b $\chi^2_2 = 3.628$, $P > 0.05$ (not significant).

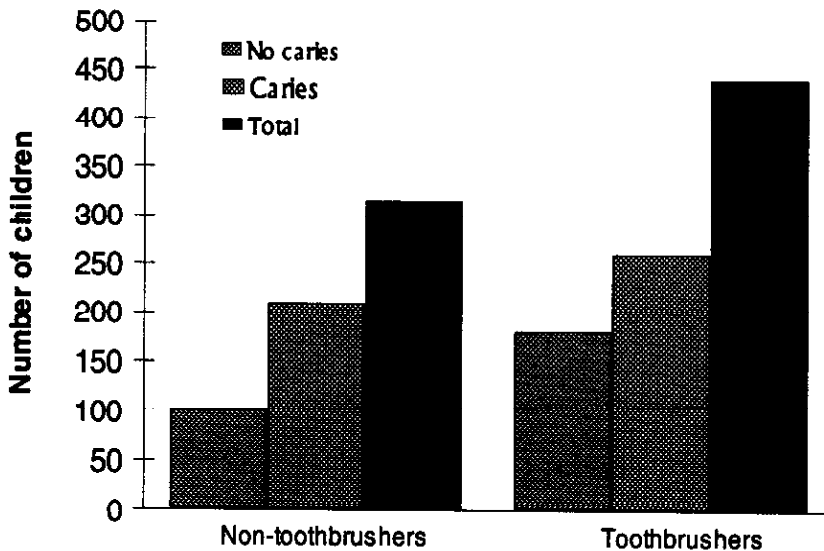


Figure 1 Presence of dental caries according to toothbrushing status

Among the 109 regular night toothbrushers (all ages), only 10 (9.2%) had brushed for more than 4 years; the majority 62 (56.9%) had been brushing for less than 2 years.

The prevalence of dental caries in our sample was 61.9% (95% CI: 58.4–65.4); one or more tooth might be decayed in the same child. Minimal differences in the prevalence of dental caries were noted between boys (62.2%) and girls (61.7%); this difference was not statistically significant ($P > 0.05$).

Both the prevalence and the number of carious teeth were greater in area three (66.5%) than the others. Areas one and two had a similar overall prevalence of dental caries (59.2% and 59.8% respectively). The difference was not statistically significant ($P > 0.05$).

Among the 321 pupils who did not brush their teeth, 106 (33.0%) had no caries, compared with 184/441 (41.7%) for all those who brushed. The difference in dental caries between non-toothbrushers and toothbrushers was statistically significant ($P < 0.005$) (Figure 1).

Among the 46 12-year-old pupils, 23 (50%) had one or more carious teeth. The average decayed, missed, and filled teeth per child were 1.26, 0.35, and 0.02 respectively. The DMFT index at 12 years was therefore 1.63, while the filling needs met (FNM) was 0.01.

Of the 762 pupils, 307 (40.3%) consulted the dentist, 145 (47.2%) of them because of pain. Dental consultations were more frequent in children whose parents were of a higher education level than others ($P < 0.01$).

Discussion

Toothbrushing

Our study showed that the practice of toothbrushing was not satisfactory for two

reasons; the first was the presence of a large number of pupils (42.1% of the sample) who did not brush their teeth at all. This figure is lower than that in Jordan (64.4%) of non or irregular toothbrushers among students 14–15 years old [13], but higher than that in the Syrian Arab Republic (29%) for infrequent toothbrushing [14]. The second reason the practice of toothbrushing was unsatisfactory was because of the late start of toothbrushing. No schoolchild at the age of 6 years had started brushing at 4 years of age. Also, in the best group (the regular night toothbrushers), only 10 children (9.2%) had brushed for more than 4 years, and 62 (56.9%) had brushed their teeth for less than 2 years — some of them for a few weeks only. The alarming situation is highlighted if we compare our results with those of a Hertfordshire town study for a group of 3-year-old children in which 90% of them brushed daily, and only 2% started brushing their teeth after the age of 2 years [15].

Another concern is the sharing of toothbrushes (4% of our sample), which increases the risk of infection (such as hepatitis B).

We found toothbrushing behaviour among the pupils was strongly related to the parental education. This could be attributed to the awareness created by continuous parental instruction and/or to the imitation behaviour of these children, as 84% of fathers and 98% of mothers who had a university and higher education brushed their teeth.

Dental caries

The prevalence of dental caries in our study was slightly higher in boys than girls, which differs from other studies [16]; however, the difference was not statistically significant.

Dental caries, was encountered less frequently among the toothbrushing group, a

finding in accord with others [15,17]. It is well known that good oral hygiene achieved by toothbrushing deprives *S. mutans* of the plaques that are a good medium for its growth [18].

The higher prevalence of dental caries in area three is in contrast to the finding in Ethiopia, which showed more caries in the teeth of children from affluent classes than those of lower socioeconomic ones [19]. Our results, however, simulate the situation in industrialized countries, where dental problems, including caries, are more common in the lower social classes, probably due to greater use of artificial feeding in infancy, the ability to afford sweets and refined sugar, ignorance, and poor dental hygiene [12,15,20]. There is little difference between using the educational level of the parents or the family income for classifying socioeconomic status with regard to the prevalence of dental caries [21].

In this study, 50% of the schoolchildren at 12 years were caries-free, indicating a low prevalence of caries according to WHO standards [12] that put a cut-off point of 20% caries-free children between the low and moderate prevalence rates of dental caries. The rate of dental caries at 12 years in our study (50%) is higher than in a previous Libyan (Tripoli) study of a comparable age (42.22%) [9], but lower than the Lebanese figure of the same age (92%) [22]. In our opinion, the low prevalence of dental caries in spite of unsatisfactory toothbrushing behaviour might be attributed to the acceptable levels of fluoride in the drinking-water in Benghazi (1.01 ± 0.21 parts per million) (figure obtained from the Benina Water Plant Laboratory, Municipality of Benghazi, 1 September 1993) [23].

The DMFT index at age 12 years in this study (1.63) is also slightly greater than the previous figure of Tripoli (1.58) [9]. However, it is lower than the global goal

of WHO, of no more than 3 for the same age [24]. FNM at 12 years was very low (0.01), which indicates a lack of dental care. Even though a fair number of children consulted a dentist, it seems that tooth extraction was the commonest type of treatment offered to them. This could mean that diagnosis of dental caries is made late and suggests the need for a programme for prevention and early diagnosis and treatment.

Conclusion

Our study demonstrates that, in spite of inadequate toothbrushing behaviour, the prevalence of dental caries in Benghazi was low according to WHO standards and compared with other countries in the region with similar dietary habits. This could be explained by the rich fluoride content of the drinking-water. We expect dental caries to decrease in the future provided that toothbrushing practice improves. Further studies are needed in the future to monitor the situation.

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Oral health profile of the Eastern Mediterranean

In 2000 the Regional Office reviewed and analysed the oral health situation in the countries of the Region allowing the assessment of the achievements of present Regional Office goals for 2000, in order to determine oral health problems and prepare an oral health plan for the first decade of the 21st century.

Source: The work of WHO in the Eastern Mediterranean Region. Annual Report of the Regional Director. 1 January-31 December 2000. Page 84.