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Potential risk factors associated with dental caries among Libyan children

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Abstract

Aims: To investigate any association between the experience of dental caries and its potential risk factors in Libyan schoolchildren and to investigate any gender differences for these factors.

Methods: A cross-sectional study was conducted among schoolchildren in Benghazi. A random sample of 8-10-year-old children underwent dental examination. Data on dietary habits, oral hygiene practices, parents' educational levels were obtained by a survey. Dental caries was assessed using WHO recommendations. The data were entered and managed by using SPSS software version 25.

Results: For the whole sample (372) caries prevalence was 86.6%. The experience of caries increased with increasing the frequency of sugared dietary items consumption. This was not statistically significant association. Of the sample; 37.9% who had experience of caries consumed sugared dietary items with frequency of twice per day, 28.0% with frequency once per day, and 18.0% with frequency of two or three times per week. The experience of caries decreased with increasing the frequency of tooth brushing; 21.90% of the subjects with caries reported frequency of tooth brushing of two or more per day, 32.30% with frequency of once per day. Girls reported a higher frequency of tooth brushing than boys. The experience of caries decreased with parents' increasing educational level.

Conclusions: The present findings have important implications for public health strategy and further studies. More research is also necessary to explore the effectiveness of various interventions whether diet or oral hygiene practice or parents' educational levels in experience of caries in children from different social and cultural backgrounds.

Keywords: Caries; Children; Diet; Tooth Brushing; Parental Education

1. Introduction

Dental caries is a multifactorial disease involving a complex relationship of microbial, genetic, biochemical, and social factors [1]. The multifactorial etiology of dental caries has recognized a disagreement about which risk factors were more important to its progress. An essential first step in preventing dental caries in schoolchildren is the estimation of dental potential caries risk factors. Diet considered a key factor in the development of caries. High intake of sugared dietary items has been related to dental caries experience. Frequency of consumption of sugared diet is the most important risk factor in the experience of dental caries. Several researches have reported that dietary factors are directly related to experience of dental caries. Frequent consumption of sugared foods, the most important dietary factor in the progress of dental caries, has tripled worldwide over the past 50 years and is expected to continue to increase [2]. Several approaches have been used to evaluate diet such as diaries, 24-hour recall interviews, diet histories and food frequency questionnaires (FFQs). Each technique has both limitations and benefits. Numerous epidemiological studies

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have showed that dietary factors affect dental health through many ways and sugared diet are the most important in the development of dental caries for children [3-7]. And the amount and frequent exposure to sugared drinks and foods are the most important etiological factors [3,5,8,9]. Also, children habits regarding oral hygiene is considered to be the most essential risk factors in dental caries development, among other factors such as the impact of socioeconomic status of children's parents. Improved knowledge and data of risk factors of caries allowed us to classify individuals and children into caries risk groups. Oral health programs should place priority on the early identification of these high risk children and offer dental programs for preventing and affording treatment in these caries risk categories. Because dental caries is a disease that is both preventable and costly to treat, previous studies have focused on identifying the caries risk predictors, including sugared drinks and foods intakes, tooth brushing frequency, salivary buffer capacity and flow rate and past caries experience. Control of sugared drinks and foods intake is the most effective factor to control caries. Also, experience of dental caries is often connected to individuals with low standards of oral hygiene. Anyway, dental caries is caused by sugared foods, is more likely to occur with poor oral hygiene and is prevented to some extent by tooth brushing. High prevalence of dental caries in developing countries may be related to many factors as sugar intake, poor oral hygiene practices, limited access to oral health services, and limitation in preventing dental and educational programs [3]. In Libya, the change to Westernized sugared diet consumption may be the reason for increase the risk of dental caries in children. The increased experience of caries has associated with economic growth over the past decades, resulting in higher intake of sugared drinks and foods, particularly among children. Some studies in Libya have investigated the relationship between parental socioeconomic factors and dental caries in children based on parental educational levels, however, have been relatively limited. Additionally, numerous studies have reported that parental education has a direct impact on children's oral health [4,10-13]. As the parents have the primary social part and may influence the environment in which the child develops, the influence of parental educational levels may affect the oral health of the children. Unfortunately, the risk factors for the experience of dental caries in children are far from a handful. As dental Caries becomes the most common disease among children in the world today; there is a need to recognize potential risk factors that may be related to caries experience. However, agreement is lacking in the literature as regards the best suitable method for evaluating caries risk. Studies describing the roles of exposure to cariogenic sugared drinks and foods, oral hygiene practices, the impact of parents' education levels and their relation to caries experience among Libyan schoolchildren are few compared with data obtained from other countries. Therefore, the present study aimed to assess the common risk factors in order of significance, such as frequent consumption of sugared drinks and foods, oral hygiene practices, and socioeconomic status of children's parents and to investigate any gender differences for these factors.

2. Materials and methods

This cross-sectional observational study was conducted in Benghazi. The criteria required for subjects to be included in the study, should be resident in Benghazi, and aged 8-10 years, with properly filled questionnaires and with consent to participate in the study from their parents. Both genders were included in this study. Ethical clearance and consent to conduct the study in Benghazi were granted from the research ethical committee of Benghazi University and the Ministry of Education. Permissions were also obtained from schools. Written informed consents were received from the parents/guardians. A stratified random sampling method was used. A total of 372 schoolchildren were enrolled. The sample size was calculated at 5.5% margin of error, a 95% confidence interval (CI), and an estimated concordance of 50%. The minimal sample size to satisfy those parameters was estimated at 314 schoolchildren but the sample was increased by 40% to allow for withdrawals, giving a required total of 440 participants. Data gained from clinical examinations and questionnaire completed by parents. Clinical dental examinations of participant subjects were conducted in the schools with the child seated in an ordinary classroom-type chair and using artificial lighting. Pre-packed sterilized oral examination kits which contained a plain mouth mirror and a blunt probe were used. The criteria for the assessment of dental caries was based upon those recommended by the World Health Organization [14]. The experience of dental caries (Yes/No) was used. Since there is no governmental classification of areas based upon socioeconomic information in Libya, parents' education levels could be considered as a proxy measure of socioeconomic status. Data were collected through a questionnaire survey based on the used in the oral health component of the UK National Diet and Nutrition Survey and completed by children and parents [4]. The questionnaire survey comprised simple questions including age, gender, frequency of consumption of sugared drinks and foods, oral hygiene practices, and parents' educational levels. All questionnaire data were analyzed using SPSS software version 25 with Chi-Square analysis, to determine if there was a statistically significant difference in the responses for different groups. For information from both the dental examination and the questionnaire a process of bivariate analysis was used. The experience of dental caries (Yes/No) was used. The data from the questionnaire included consumption of sugared drinks and foods, oral hygiene practice and parental educations levels. The data were also analyzed by gender (Chi-Square analysis).

3. Results

Of the 440 questionnaires distributed, three hundred and seventy two questionnaires were returned complete. Overall, 372 schoolchildren aged 8-10-years-old were included in the study. These children underwent dental examination for dental caries and also the questionnaires were completed by their parents. As Figure 1 shows, of the whole sample, three hundred and twenty tow subjects (86.6 %) had experience of dental caries, and 50 (13.4%) were caries free.

As Table 1 shows, when the association between the experience of caries (Yes/No) and frequency of consumption of sugared drinks and foods was assessed, the proportion of subjects who had dental caries increased with increasing the frequency of sugared drinks and foods consumption, but no statistically significant associations were observed. As Table 1 shows, of 322 subjects who had experience of dental caries; 28.0% consumed sugared drinks and foods with frequency once per day, 37.9% with a frequency of two times per day, 16.1% with a frequency of one per week and 18.0% with frequency of two or three times per week. Of the sample, the highest proportion of children (37.9%) had experience of dental caries consumed sugared drinks and foods with highest frequency of twice per day.

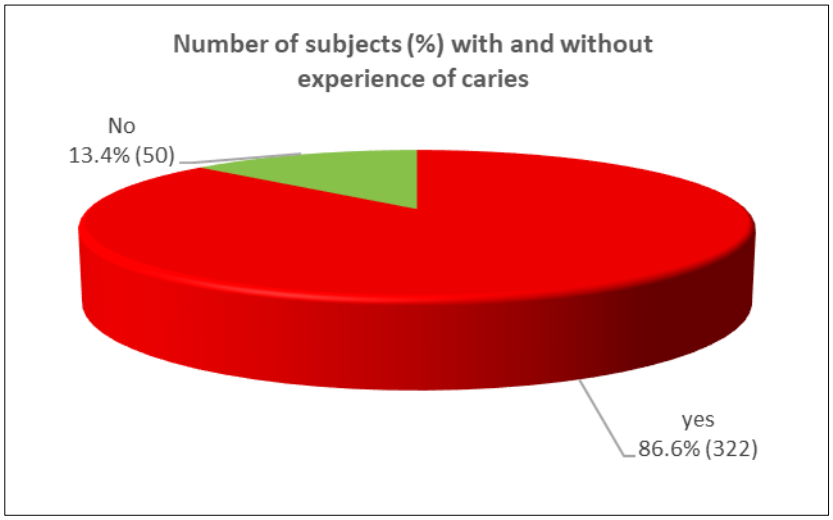

Figure 1 Frequency of caries and caries-free for all subjects.

Table 1 Relationships between the number (N) and (%) of subjects with and without experience of caries and the frequency of consumption sugared drinks and foods.

Frequency of consumption of sugared drinks and foods	Experience of caries					
	Yes		No		Total	
	N	%	N	%	N	%
1/d	90	28.0%	13	26.0%	103	27.7%
2/d	122	37.9%	18	36.0%	140	37.5%
1/w	52	16.1%	12	24.0%	64	17.3%
2-3/w	58	18.0%	7	14.0%	65	17.5%
Total	322	100%	50	100%	372	100%

$$Chi\_Square = 2.050\,, d.f = 3\,, p.value = 0.562$$

As Table 2 shows, of 322 subjects who had experience of dental caries; 174 was boys and 148 was girls. Of 174 subjects who had experience of dental caries; 37.4% of the boys consumed sugared dinks and foods with a frequency twice per day and 29.9% with a frequency once per day. Of 148 subjects who had experience of dental caries; 38.5 of the girls consumed sugared drinks and foods with a frequency of twice per day and 25.7% with a frequency once per day. Boys reported a higher frequency of consumption of sugared dietary items compared with girls but, with no statistically significant differences in consumption (Table 2).

Table 2 Relationships of frequency of consumption of sugared drinks and foods and experience of dental caries by gender.

	Experience of dental caries							
Gender	**Boys**				**Girls**			
	Yes		**No**		**Yes**		**No**	
Frequency of consumption of sugared drinks and foods	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
1/ d	52	29.9%	8	33.3%	38	25.7%	5	19.2%
2/ day	65	37.4%	6	25.0%	57	38.5%	12	46.2%
2-3/ w	27	15.5%	4	16.7%	31	20.9%	3	11.5%
1/ w	30	17.2%	6	25.0%	22	14.9%	6	23.1%
	174	100%	24	100%	148	100%	26	100%

$male\backslash Chi\_Square = 2.123\,, d.f = 3\,, p.value = 0.547$
female$\backslash_Square = 276\,, d.f = 3\,, p.value = 0.43$

As Table 3 shows, the most commonly reported frequency of tooth brushing was once a day (33.8%), followed by once or more per week (27.5%), twice or more per day (24.2%). The most commonly reported frequency of tooth brushing by boys was once per day (33.3%), followed by once or more per week (29.8%). The most commonly reported frequency of tooth brushing by girls was once a day (34.5%) followed by two or more per a day (29.3%). Girls reported a higher frequency of tooth brushing than boys but there was no significant gender difference (Pearson Chi-Square; p=0.090) (Table 3). Of the sample, the proportion of subjects who had evidence of dental caries decreased with increasing the frequency of tooth brushing. This was not statistically significant association (Table 4). Of the whole sample, (32.30%) of the subjects who had experience of dental caries reported frequency of tooth brushing of once per day, 21.90% with frequency of two or more per day, 30.30% with frequency of more than once per week and 15.50% with frequency of once per week. As Table 4 shows, the proportion of subjects with dental caries decreased with increasing the frequency of tooth brushing, but the associations between the experience of dental caries and number of times subjects brushed their teeth were not statistically significant.

Table 3 Significance of the association (P) between the number (N) and proportion (%) of subjects by gender and the frequency of tooth brushing

Tooth brushing	**Gender**					
	Boys		**Girls**			**Total**
	N	**%**	**N**	**%**	**N**	**%**
1/ day	66	33.3%	60	34.5%	126	33.8%
≥2/ day	39	19.7%	51	29.3%	90	24.2
1/ week	34	17.2%	20	11.5%	54	14.5
>1/ week	59	29.8%	43	24.7%	102	27.5
Total	198	100%	174	100%	372	100%

$\boldsymbol{Chi\ square = 6.504, d.f = 3,\quad p.value = 0.090}$

As table 5 shows, 54.2 %, 23.5% and 21.5% of the subjects, the mother's education level was at bachelor's degree or higher education, up to high-school diploma and under high-school diploma respectively. In Table 5, the highest proportion of subjects without caries observed amongst those mothers with a bachelor's degree or beyond or a high-school diploma than subjects whose mothers up to under high school diploma. Few number of subjects (3) whose mothers who were illiterate. As Table 6 shows, 36.03%, 35.75% and 27.15% of the subjects, the father's education was at high-school diploma level, bachelor's degree or higher level, and under high-school diploma respectively. As Table 6 shows, a similar trend was observed for the educational level of fathers, with the highest proportion of subjects without caries observed amongst those fathers with a high-school diploma or bachelor's degree or beyond. Few number of

subjects (4) whose fathers who were illiterate. Overall, the experience of caries decreased with increasing affluence and higher parents' education levels. None of these differences however, were statistically significant.

Table 4 Significance of the association (P) between the number (N) and proportion (%) of subjects with and without experience of dental caries and the frequency of tooth brushing

Frequency of tooth brushing	**Experience of dental caries**			
	No		**yes**	
	N	**%**	**N**	**%**
1/ day	76	35.00%	50	32.30%
≥2/ day	56	25.80%	34	21.90%
1/ week	30	13.80%	24	15.50%
>1/ week	55	25.30%	47	30.30%
Total	217	100%	155	100%

$Chi - Square = 1.752\,, d.f = 3\,, p.value = 0.62$

Table 5 Relationship between the number (N) and proportion (%) of subjects with and without caries experience and mother's education level

Level of mother's education			**Experience of caries**			
	Total number of subjects		**Yes**		**No**	
	N	**%**	**N**	**%**	**N**	**%**
Illiterate	3	0.8%	2	66%	1	33.3%
Under high-school diploma	79	21.5%	72	91%	7	8.9%
High-school diploma	86	23.5%	75	87%	11	12.8%
Bachelor's degree or higher	204	54.2%	173	85%	31	15.2%
Total	372	100%	322	87%	50	13.4%

$Chi\_Square = 3.016\,, d.f = 3\,, p.value = 0.389$

Table 6 Relationship between the number (N) and proportion (%) of subjects with and without caries experience and father's education level

Level of father's education			**Experience of caries**			
	Total number of subjects		**Yes**		**No**	
	N	**%**	**N**	**%**	**N**	**%**
Illiterate	4	1.07%	4	100%	0	0.0%
Under high-school diploma	101	27.15%	86	85%	15	14.9%
High-school diploma	134	36.03%	118	88%	16	11.9%
Bachelor's degree or higher	133	35.75%	114	86%	19	14.3%
Total	372	100%	322	87%	50	13.4%

$Chi\_Square = 1.135\,, d.f = 3\,, p.value = 0.769$

4. Discussion

This cross-sectional study aimed to collect data to evaluate caries experience (caries vs. no caries) and related risk factors among schoolchildren in Benghazi. This study has provided data on the prevalence and associated potential risk factors of dental caries at mixed dentition stage among 8-10-year-old schoolchildren. Information about the risk factors of dental caries was obtained from a randomly selected sample using a questionnaire survey completed by parents. But, it must be remembered that any dietary assessment method can offer only an estimation of the true long-term consumption. Frequent exposure to sugared drinks and foods, oral hygiene habits and impact of a parent's educational level in oral health of their children are acknowledged causes of dental caries, among other risk factors. This study contributes data on the risk factors related to the occurrence of caries in Libyan schoolchildren. Numerous studies have looked at the association between experience of caries and the risk factors but differences in the age of children and in the methodology sometimes make comparison difficult. The present study provides baseline data for future comparison regarding potential risk factors that underlie the high caries experience amongst schoolchildren in Benghazi, Libya. In the present study, the proportions of subjects reporting consumption of sugared drinks and foods with a frequency of twice per day and once per day were 37.5% and 27.7% respectively. These figures are higher than figures for schoolchildren in the UK at 13% and 15%, respectively [4] and higher than the 21% reported for children in Iraq [15]. Also, a questionnaire based survey was undertaken in Benghazi and Jardinah for children and collected data about consumption of sugared diet [16], the majority of the sample reported that they ate sugared dietary items once per day. In the present study, the reasons for high sugared drinks and foods consumption could be the high day-time temperature especially in summer and also because of the recent economic growth with subsequent increase of dietary sugars intakes and the availability of these drinks and foods at a relatively low cost. In the current study, gender differences in dietary behavior have been reported where boys tend to consume sugared drinks and foods more often than girls do and same pattern of gender difference was reported in UK studies [17,18]. But, it was not in agreement with other study [19]. The present study investigated the influence of the frequency of sugared drinks and foods consumed on experience of caries in children (Caries was a "yes/no" categorization). And the findings showed that children with caries consumed sugared foods at greater frequency compared with their caries-free peers. The proportion of subjects who had evidence of dental caries increased with increasing the frequency of sugared drinks and foods consumption. But, interestingly, it was not significantly associated. Similar finding was reported by other study [20]. Anyway, it has been suggested that the correlation between sugar consumption and the caries experience is currently different from that documented in the past decades, since dental health has improved greatly in the developed countries, with no parallel decrease in the sugary drinks and foods intakes [21]. On the other hand, several studies reported that sugared drinks was associated with experience with dental caries [5,9,22,23]. This difference in the findings of studies may be due to the chronological difference between dietary information collection, which usually covers only one day up to few months obtained often from questionnaires, and discovery of dental caries which develop over years [9]. It is also important to note that this study is cross-sectional and the collected dietary information might be not representative of a long-term dietary pattern which potentially contributes to the experience of dental caries. Also, dental caries is a multifactorial condition influenced by the interaction of chemical, biological, and behavioral factors, and this explains why some children had more dental caries experience than others, also, why some children consume non-sugared diets develop dental caries while some children consume sugared diets do not.

Based on the frequency of brushing teeth, most children brush their teeth once or more per day (58.0%). The most commonly reported frequency of tooth brushing was once a day (33.8%), followed by more than once a week (27.5%), twice or more a day (24.2%). Girls reported a higher frequency of tooth brushing than boys. There was no significant gender difference. This may be because there are differences in the value of dental hygiene between girls and boys. Girls have a tendency to better maintain their dental health and more care about the appearance. Our finding showing a similar pattern to that reported in Jordanian [24], Iraqi [15], and Indonesia [25]. In the current study, the majority of children did not meet professional recommendations, which encourage brushing twice per day [26]. When dental health habits amongst children from public schools were examined in another study in Benghazi, 42.1% of the sample did not brush their teeth [27]. A study was conducted by Ali et al [28] in Benghazi, found that majority of children (59%) reported undertaking no tooth brushing at all, 19% brushed once per day, 16% brushed twice per day while 7% brushed three times per day. Also, in a study conducted in Benghazi and Jardinah [29] to record extrinsic stains in Libyan schoolchildren, reported that the majority of subjects with extrinsic stains due to low frequency of tooth brushing. This low frequency in tooth brushing confirmed by the finding of our study as well. The reasons of low frequency may be due to the poor dental health education of children and parents and absence of planned, organised dental preventive measures. The number of children who brushed their teeth increased with the increased educational levels of parents [27]. Therefore, these results highlight the need for health education programs focusing on behavior change to improve children brushing habits. Of the sample, 33.8% of the subjects claimed they brushed their teeth once a day, higher than the 19% reported by Milosevic et al [17] in the UK, but lower than 63% reported by Ahmed et al [15] in Iraq. In this study, only 24.2% claimed they brushed their teeth twice or more a day, higher proportion of subjects have reported

twice daily tooth brushing in other studies; the 69% reported by Al-Omiri et al [30], the 55.6% reported by Almeida et al [31], 70% by Yabao et al [5], 72% by White et al [32] and 78% by Milosevic et al [17]. But, the proportion in this study was higher than the 19.7% reported in a Saudi Arabian study [33]. In the present study, the proportion of subjects with dental caries decreased with increased the frequency of tooth brushing; there was an association between experience of dental caries and frequency of tooth brushing, but not significant. An unexpected result of the present study is that tooth brushing appeared to have less effect on experience of caries. The association may also have been confused by relationship with other important behaviors, such as the age at which tooth brushing was began. The results of the present study are in agreement with other studies that reported no statistically significant association between dental caries and frequency of tooth brushing [5,9,20]. The reason may be the frequency of tooth brushing did not outweigh the destructive effect of sugared drinks and foods consumption, despite the fact that oral hygiene practice is one of the risk factors of experience of dental caries. Overall the benefits of frequency of tooth brushing did not appear to compensate the harmful effect of frequency of sugared drinks and foods consumption. Also it has been reported that frequency of tooth brushing only has a low effect in preventing dental caries [34]. Moreover, the association between the frequency of tooth brushing and experience of caries may have been affected by the age at which brushing was stared. Conversely, several studies reported that brushing frequency was associated with dental caries [25,35-37]. Anyway, it is also important to highlight that the present study is cross-sectional. The figures about tooth brushing may not be representative of a longer-term data, which could potentially contribute to the progress of dental caries.

Because there is no governmental classification of areas based upon socioeconomic information in Libya, parents' education levels could be considered as a proxy measure of socioeconomic status. Of the total sample, 35.7% and 54.2% reported a bachelor's degree or higher education level of their fathers and mothers, respectively. And 36.0% and 23.5% were up to high-school diploma level for fathers and mothers, respectively. Only 27.1% and 21.5% of the fathers' and mothers' education respectively, were under high-school diploma. A small number of subjects whose parents was illiterate. Parental education is of great importance in dental health of their children in order to provide their children with healthy dietary products and to develop proper oral hygiene habits. In the present study the proportion of subjects with dental caries decreased with the increasing of parents' educational level, but not significant associated. Parental attitudes toward oral health depend on their education. Lower parental educational levels and absence of awareness of health make the parents put aside attention to the dental health of their children. Moreover, parents of higher educational levels have a higher awareness and knowledge of dental health and care. In the present study high prevalence of caries was observed but the highest proportion without caries experience however, was observed among children whose parents' were educated to bachelor's degree or higher level. The reason of decreased experience of dental caries with increased parents' educational level may be that parents with a high educational level observe and control the dietary habits of their children despite the fact that rich families who parents had high education level could afford and have enough money for expensive sugared drinks and foods. Also, these findings can be attributed to improved awareness and knowledge of health related issues and better dental health practices in children of highly educated parents. Therefore, these results suggest the impact of a parents' educational level in oral health of their children and confirm the results of a previous Libyan studies [11,12]. Furthermore, similar trends were confirmed by other studies [4,10,13,15,38-41]. Parents play a key role in their children's dental health. Other results showing no association [42-44], the reason may be dental caries is a multi-factorial disease. Also, as the children grow, the parental influence decreases and parents may totally lose their control on the child's dietary practices and oral hygiene habits.

The current study used self-reported data through questionnaire on socioeconomic factors. Some parents could have reported a higher education levels than they actually possessed, which might have affected the results. While we adjusted for some potential risk factors, other unmeasured risk factors could have influenced our results and might even explain the relations recognized in the present study. Dental caries has multifactorial etiology, looking at one variable in isolation is challenging. Anyway, authors suggested frequent consumption of sugared drinks and foods, tooth brushing frequency and parents' education levels were the best predictors of dental caries. It is difficult, however, to compare the results of different studies due to the use of different indices to assess the prevalence of dental caries and its association with risk factors, especially when the sample numbers, age groups, gender, and number of examined teeth included in the studies also differ. Also, occurrence of dental caries is a chronic process; thus, its development apparently is influenced by a long period of time may be years of the potential risk factors, which could have changed more than once during the conduction of the study. Therefore, cross-sectional studies need to be interpreted cautiously. The present study had some strengths and limitations. The strengths in the study the methodology was properly prepared with international standards according to the World Health Organization (WHO). Consequently, the results may be easily compared with those obtained by other researchers. Also an inclusive questionnaire to collect dietary, oral hygiene habits and socioeconomic data was used. Anyway, as a limitation in the present study, this investigation was based on cross-sectional data and therefore only able to test for association rather than causal relationships. It is not possible to evaluate whether the collected dietary information was representative of a long-term dietary pattern, which would potentially contribute to the development of dental caries and its association to its risk factors. In addition,

the lack of strong correlations between caries experience and risk factors could be attributed to the small sample size, suggesting that the results need to be interpreted with caution. Also, radiographs were not taken. Regardless of the limitations, our study offers valued insights into the effects of frequent sugared dietary intake, frequent brushing and parents' educational levels on prevalence of dental caries in Libyan schoolchildren. Authors recommend conducting further studies in which factors related with experience of dental caries will be studied. Also it was recommended to repeat this type of studies after few years to update children's dental health.

5. Conclusions

The results of our study confirmed that frequent consumption of sugared drinks and foods, tooth brushing frequency and parents' education levels have an impact on increased dental caries risk.

More clinical study appears needed to provide evidence on specific recommendations against experience of dental caries. Prevention strategies may include maintains a correct oral hygiene by tooth brushing and minimizing the frequency of sugared drinks and foods consumption to tackle and challenge the dental caries. Health education for schoolchildren and parents should be considered to improve eating habits oral hygiene practice. Further oral epidemiological studies are needed to monitor the dental health of Libyan schoolchildren and evaluate the impact of consumption of sugared dietary items on dental health. In addition, further testing to identify the respective potential risk factors of dental caries is needed.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The authors (Huew R, Elsheibani S, Buzaribah K, Mansur E) reported no conflicts of interest regarding the publication of this paper.

Statement of ethical approval

Ethical clearance and consent to conduct the study were granted from the research ethical committee of Benghazi University and the Ministry of Education.

Statement of informed consent

Informed written consents were received from the parents in order to recruit their children in the present study.

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