

Dental erosion and its association with diet in Libyan schoolchildren

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Key words: Erosion, diet, children.

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Abstract

AIM: To investigate any association between dental erosion and its potential dietary risk factors in a group of schoolchildren in Benghazi, Libya. **STUDY DESIGN:** A cross-sectional observational study. **METHODS:** A random sample of 12-year-old schoolchildren in 36 randomly selected schools completed a questionnaire to provide dietary data and underwent dental examination. Dental erosion was assessed using UK National Diet and Nutrition Survey (2000) criteria. Associations between erosion and dietary variables under study were investigated through processes of bivariate and multivariate analyses. **RESULTS:** Of 791 schoolchildren dentally examined, 40.8% had dental erosion; erosion into enamel affecting 32.5%, into dentine affecting 8% and into pulp affecting 0.3% of subjects. Bivariate analysis showed frequency of fruit-based sugary drink intake was statistically significantly and positively associated with erosion ($p=0.006$, Odds Ratio; 1.498, 95% CI; 1.124, 1.996) as was the length of time taken to consume acidic drinks ($p=0.005$, Odds Ratio; 1.593, 95%CI; 1.161, 2.186). Additionally, multivariate analysis showed frequency of consumption of fruit other than bananas, sugared tea with milk and flavoured milk to also be positively associated with erosion ($p<0.05$). **CONCLUSIONS:** In this group of Libyan 12-year-olds, frequency of consumption of fruit-based sugary drinks and length of time taken to consume acidic drinks were the primary statistically significant positive risk factors for dental erosion.

Introduction

Dental erosion has been defined as progressive irreversible loss of hard dental tissues by a chemical process not involving bacteria [WHO, 2003]. Epidemiological studies have indicated that dietary factors are the most important in the development of dental erosion in children due to the consumption of acidic drinks and foods [O'Brien, 1994; Walker et al., 2000; May and Waterhouse, 2003; WHO, 2003; Luo et al., 2005; El Karim et al., 2007]. Evidence from some studies suggests that carbonated drinks, in particular, play an important role in development of dental erosion in children and adults [Dugmore and Rock, 2004; Waterhouse et al., 2008; Bardolia et al., 2010].

The consumption of acidic drinks by children has increased markedly over recent decades [Gregory et al., 2000]. In addition, there has been increasing concern to adopt a healthy diet (including fruits, vegetables and fruit juices) which has led to increased consumption of acidic foods and drinks [Al-Dlaigan et al., 2001a, b]. Moreover, in some cultures significant proportions of the population are vegetarian which may also result in increased acid consumption in the diet as vegetarians may consume acidic drinks, yoghurts, grapes, vinegar and salad dressings more frequently than non-vegetarians [Al-Dlaigan et al., 2001c]. A high intake of dietary acids may be an important aetiological factor for dental erosion whether part of a vegetarian or non-vegetarian diet.

There are, however, few published data about the association between vegetarianism and dental erosion. In relation to the intake of acidic drinks, several factors may affect the severity of dental erosion such as the frequency and amount of acidic drinks intake, the length of time the drink is retained in the mouth, use of a straw, method of drinking and salivary buffering capacity [Kunzel et al., 2000; Lussi et al., 2000; Chadwick and Pendry, 2004]. In addition, consumption of acidic drinks overnight has been shown to significantly increase the prevalence and severity of dental erosion [Al-Majed et al., 2002; Nunn et al., 2003; Talebi et al., 2009].

There is extensive information on dental erosion, its prevalence and associated dietary risk factors in industrialised countries. However data in developing countries is sparse, particularly the Middle East, and there is no data for Libya.

The aim of this study was to investigate any association between the experience of dental erosion and its potential risk factors in 12-year-old schoolchildren in Benghazi, Libya. This was achieved through completion of a questionnaire in order to collect information about consumption and habits regarding acidic and non-acidic dietary items (foods and drinks) and a clinical dental examination for dental erosion. In addition, any particular risk factors for dental erosion that could be recognised in these children by correlating the results of the dental examination and data from the questionnaire were investigated.

Materials and methods

After the official permission from the researcher's (RH) sponsor was obtained, ethical approval and permissions were secured from local authorities, the Health Ministry, the Education Ministry and the Dental Faculty in Benghazi, Libya. Subsequent to these permissions, the Ministry of Education sent official letters to the selected schools. Written consent was obtained from parents and subjects. Only schoolchildren with written consent were included in the study.

Benghazi is a good example of a Libyan urban area comprising a population with different socio-economic, cultural and original backgrounds and therefore an appropriate site for the study and suitably representative of the Libyan population as a whole. Public schools comprised 90% of the total number of schools in Benghazi and they are government-funded [GAI, 2006]. The total number of 12-year-old schoolchildren of both genders studying in the 81 public elementary schools based in the 15 different Districts in Benghazi was 7,682 children.

Sample size The sample size needed to provide suitable statistical power was calculated with the assistance of a medical statistician. There are no published data concerning the prevalence of dental erosion in Libya. Consequently, the prevalence of dental erosion found in 11-14 year-old British children, which had been estimated as 52% in a study by Walker et al., [2000], and 34% in 13-14 year-old Brazilian children [Auad et al., 2007] was considered. Based on these figures, it was expected that the prevalence of dental erosion in 12-year-old school children in Benghazi could be 35% \pm 5%. Therefore, the sample size was calculated based on this estimate; with a sample of 770 subjects the 95% confidence interval was \pm 4% (standard error 2.04%).

Cluster sampling Schools were used as cluster sampling for procedure. A random sample of schools was selected; at least one school from each district, and at least two schools from districts with 6 or more schools. All 12-year-old schoolchildren of both genders attending 36 randomly selected schools in Benghazi (n=3,014) were invited to participate in the study.

The main reasons for non-responses were lack of signed parental consent or absence from schools during the survey days. From the children with written consent to take part in the study, the final sample size (792) of 22 children from each of 36 schools was randomly selected using a list of randomly generated numbers.

Questionnaire The subjects were asked to complete a questionnaire to provide data about their dietary intake through a questionnaire based on that previously used in the oral health component of the UK National Diet and Nutrition Survey (NDNS) [Walker et al., 2000] and used by others [Waterhouse et al., 2008; Auad et al., 2009]. The questionnaire survey included questions on amount, frequency and timing of consumption of acidic food and drink items, consumption of tap or bottled water, consumption of non-acidic drinks, sugary drinks, bedtime drinks, oral hygiene practices, general health, socio-economic status, and other potential risk factors for dental erosion.

The acidic sugary drinks included sugared carbonated drinks, sports drinks, squashes, fruit-based sugary drinks and natural unsweetened fruit juices (natural unsweetened fruit juices are not sugar-free and may contain up to 12% non-milk extrinsic sugars (NMES)). The acidic sugar-free

drinks included sugar-free carbonated drinks, and carbonated water. The non-acidic drinks included milk, flavoured milk, sugared tea with milk and tap or bottled water. Information about the use of carbonated drinks, squashes, and fruit juices consumed at bedtime was also collected.

The questionnaire was piloted in the UK in order to test content and face validity and obtain information regarding any difficulties with its completion. Five 11-12 year-old children based in the UK, who were Arabic speaking, and were not involved in the study were asked to complete the questionnaire and provide comments regarding its ease of use which were then used to refine the design of the questionnaire.

In Libya, the questionnaires were distributed to the children in the randomly selected schools, before the dental examination to prevent bias following the dental examination. A questionnaire was distributed to each participating child by the researcher (RH) and they were asked to complete it after receiving instructions to help understand questions where necessary, the importance of giving honest answers, and that there were no wrong or right answers.

Dental erosion This was determined by one calibrated examiner (RH), using the index used in the oral health component of the UK National Diet and Nutrition Survey (NDNS) [Walker et al., 2000]. The depth and area of tooth surface loss for the labial and palatal surfaces of all permanent maxillary incisors and the occlusal surfaces of the first permanent molars was recorded on oral health assessment sheets, the tooth surfaces being examined for a range of appearances from loss of surface enamel characteristics to exposure of dentine or pulp.

Diet analysis Intakes of acidic and non-acidic drinks were divided into "higher" (\geq 1/day), "lower" ($<$ 1/day) and "never" (0/day) frequencies of consumption. Daily acidic food (including fresh fruits) intake was dichotomised into "higher" (\geq one portion/day) and "lower" ($<$ one portion/day) frequency of consumption.

Statistical analysis Following descriptive analysis, all questionnaire data were analysed using SPSS with Chi-squared analysis, to determine if there was a statistically significant difference in the responses for different groups. The data were also analysed by gender using Chi-squared analysis. For individuals with data from both the dental examination and the questionnaire survey, as the data were not normally distributed, a process of bivariate analysis for non-parametric data was undertaken using the exact versions of Chi-squared, Fisher's and linear association tests. The bivariate process investigated the associations between the experience of dental erosion (Yes/No) as the dependent variable and exploratory variables which included reported intake of acidic foods and drinks and oral habits. In addition, odds ratio (OR) and 95% confidence intervals (CI) were calculated for 2 x 2 tables. Only two-sided statistical tests were used.

The statistical significance level was set at 5% ($p < 0.05$). After completion of the bivariate analysis, multivariate analysis using a forward stepwise logistic regression model was used to determine the variables independently associated with experience of dental erosion, controlling for confounding factors.

Results

Data collection in schools took five months from September 2007 to January 2008. Positive written consents were obtained from 2,662 out of the 3,014 subjects (88.3%). A total of 791 subjects were dentally examined and completed a questionnaire; 397 boys and 394 girls. The age range was 10.8–12.5 years (mean age 11.7 (SD 0.31) years).

With regard to acidic drinks consumption, sugary carbonated drinks were the most commonly used acidic drink consumed by 513 (64.8%) subjects, while 374 (47.2%) subjects reported consumption of fruit-based sugary drinks and 420 (53%) subjects reported drinking squashes. There was no statistically significant difference between genders for frequency of consumption of these drinks.

In a majority (89%) of the subjects claimed to never consume sports drinks, but of the children who did consume them there were statistically significantly more boys than girls (Pearson Chi-squared; $p=0.001$). A majority (88.1%) of the subjects never consumed natural unsweetened fruit juices. The difference

between genders in consumption of these drinks was not statistically significant (Pearson Chi-squared; $p=0.501$). Non-sugary carbonated drinks and carbonated water were less frequently consumed by the subjects, although boys were more likely to consume these drinks than girls. Of the 791 subjects, 90.2% and 84% did not consume non-sugary carbonated drinks or carbonated water, respectively.

When the relationship of experience of dental erosion and frequency of consumption of acidic drink types was explored, as Table 1 shows there was a statistically significant positive association for frequency of consumption of fruit-based sugary drinks ($p=0.02$, odds ratio; 1.498, 95% CI; 1.124, 1.996). No other drinks showed any positive or negative associations with experience of dental erosion (Table 1).

When tap and bottled water consumption was considered, of the total sample of 791 subjects, 235 reported tap water consumption. Of these children, 138 had no evidence of dental erosion while 97 subjects had dental erosion. Of 115 subjects with a reported consumption of bottled water, 58 had no evidence of clinical dental erosion and 57 had erosion. Of the 441 subjects who reported the consumption of both waters, 272 (58.1%) had no evidence of erosion, while 169 (52.3%) had dental erosion.

In addition to acidic foods consumption, of 323 subjects who had experience of dental erosion 98.5% consumed fruit (excluding bananas and fruit juices) less than once per day and

Table 1: Significance of association (p) between the number (N) and proportion (%) of subjects with ($n=323$, 40.8%) and without experience of erosion ($n=468$, 59.2%), and the frequency of consumption of acidic and non-acidic drinks, categorised by the type of drinks consumed. (Odds Ratio; 1.498, 95%CI; 1.124, 1.996)

	Experience of erosion	Frequency of consumption				p-value	Direction of association \pm
		Never n (%)	<1/day n (%)	\geq 1/day n (%)	Total n (%)		
Fruit-based sugary drink	Yes	26 (8.10)	128 (39.6)	169 (52.3)	323 (100)	0.02*	+ve
	No	31 (6.60)	232 (49.6)	205 (43.8)	468 (100)		
Sugary carbonated drink	Yes	11 (3.40)	210 (65.0)	102 (31.6)	323 (100)	0.993	
	No	17 (3.60)	302 (64.5)	149 (31.8)	468 (100)		
Squashes	Yes	47 (14.6)	188 (58.2)	88 (27.2)	323 (100)	0.979	
	No	88 (18.8)	232 (49.6)	148 (31.6)	468 (100)		
Non-sugary carbonated drinks	Yes	296 (91.6)	19 (5.90)	8 (2.50)	323 (100)	0.203	
	No	417 (89.1)	33 (7.10)	18 (3.80)	468 (100)		
Natural fruit juice	Yes	282 (87.3)	23 (7.10)	18 (5.60)	323 (100)	0.572	
	No	415 (88.7)	30 (6.40)	23 (4.90)	468 (100)		
Tea with milk	Yes	72 (22.3)	46 (14.2)	205 (63.5)	323 (100)	0.098	
	No	85 (18.2)	52 (11.1)	331 (70.7)	468 (100)		
Flavoured milk	Yes	154 (47.7)	124 (38.4)	45 (13.9)	232 (100)	0.066	
	No	202 (43.2)	171 (36.5)	95 (20.3)	468 (100)		
Milk	Yes	81 (25.1)	67 (20.7)	175 (54.2)	323 (100)	0.266	
	No	113 (24.2)	74 (15.8)	281 (60.0)	468 (100)		

*Statistically significant at $p < 0.05$

Table 2: Relationship between the number (N) and proportion (%) of subjects with and without experience of dental erosion and length of time taken to consume drinks.

Length of time taken to consume drinks	Experience of erosion			p (Fisher's exact test)	OR (Odds Ratio)	95% CI (Confidence Interval) Lower,Upper
	Yes	No	Total			
	N (%)	N (%)	N			
Drink it straight away	80 (24.8)	161 (34.4)	241	0.005*	1.593	1.161, 2.186
≥ 15 minutes	243 (75.2)	307 (65.6)	550			
Total	323 (100)	468 (100)	791			

*Statistically significant at $p < 0.01$

Table 3: Significance of association (Regression Coefficients, p, OR (Odds Ratio) and 95% CI) between the experience of erosion and the variables under study, as explained by the logistic regression model.

Variable	Un-standardised Coefficients		p	OR	95% CI (Confidence Interval) Lower upper
	B	Std. Error			
Frequency of consumption of fruit-based sugary drinks (1= subjects never consume the drink, 2= <1/d, 3= ≥1/d)	0.300	0.152	0.049*	1.349	1.001, 1.819
Frequency of consumption of fruit other than bananas (1= subjects consume fruit <1/d, 2= ≥1/d)	1.227	0.497	0.014*	3.411	1.288, 9.030
Frequency of consumption of sugared tea with milk (1= subjects never consume the drink, 2= <1/d, 3= ≥1/d)	0.319	0.156	0.041*	1.375	1.013, 1.868
Frequency of consumption of sport drinks (1= subjects never consume the drink, 2= <1/d, 3= ≥1/d)	0.910	0.570	0.111	2.484	0.812, 7.595
Time taken to consume drinks (1= drink it straight away, 2= ≥15 minutes)	0.134	0.129	0.298	1.144	0.888, 1.473
Frequency of consumption of flavoured milk (1= subjects never consume the drink, 2= <1/d, 3= ≥1/d)	0.249	0.208	0.231	1.283	0.853, 1.930

*Statistically significant at $p < 0.05$

1.5% consumed fruit once or more per day. This association was statistically significant ($p=0.002$), but weak (contingency coefficient =0.108). In contrast, there was no statistically significant association between dental erosion and chewing gum use. Of 323 subjects who had experience of dental erosion; 26.9% chewed gum with a frequency of more than once a day and 69.7% chewed gum once per day ($p=0.169$).

Dental erosion was statistically significantly positively associated with the reported length of time taken to consume acidic drinks. Of subjects who had evidence of erosion; 24.8% had the habit of drinking drinks straightaway compared with 75.2% who reported that they made drinks last up to 15 minutes or more than 15 minutes. The experience of erosion was statistically significant higher amongst subjects who made the drink last up to 15 minutes or more ($p=0.005$, OR; 1.593, 95% CI; 1.161, 2.186) (Table 2).

The habit of consuming acidic drinks at bedtime was not statistically significantly associated with the experience of dental erosion (Fisher's exact test; $p=0.618$, OR; 0.912, 95% CI; 0.659, 1.262). This lack of association might have been due to a low proportion of subjects reporting consumption of sugary acidic drinks at bedtime; only 16% of the 791 children reported this habit, which made it difficult for any possible association to become clear.

A multivariate analysis using a logistic regression model was used to determine the variables independently associated with experience of dental erosion permitting control for confounding factors. Variables which were statistically significantly associated with the experience of dental erosion following the bivariate analysis were selected to be included in the logistic regression model (Table 3). This showed positive regression coefficients and significant relationships between experience of erosion and consumption of fruit-based sugary drinks, fruits, and sugared tea with milk.

The risk of dental erosion was 1.349 times more when subjects consumed fruit-based sugary drinks ≥ 1 /day (odds ratio; 1.349 ($p=0.049$, 95% CI; 1.001, 1.819)), while it was 3.411 times more when subjects consumed fruit other than bananas ≥ 1 /day (odds ratio; 3.411 ($p=0.014$, 95% CI; 1.288, 9.030)). The risk of dental erosion was 1.375 times more when subjects consumed sugared tea with milk ≥ 1 /day (odds ratio; 1.375 ($p=0.041$, 95% CI; 1.013, 1.868)). In addition, the risk of erosion was 1.144 times more likely when the time taken to consume drinks was up to or more than 15 minutes as opposed to when they were consumed straight away (odds ratio; 1.144 ($p=0.298$, 95% CI; 0.888, 1.473)) (Table 3).

Discussion

This is the first study in Libya where the relationship of the experience of dental erosion and its potential dietary risk factors were assessed. Although a child required approximately 30–50 minutes to complete the questionnaire there were no reported difficulties in understanding or their completion.

The most popular drinks consumed were fruit-based sugary drinks, followed by sugary carbonated drinks and thirdly squashes. Of the 791 subjects, 96.5% consumed sugary carbonated drinks. This figure is similar to the 97% reported in a Brazilian schoolchildren study [Waterhouse et al., 2008] but higher than in UK studies [Walker et al., 2000; Al-Dlaigan et al., 2001b; Dugmore and Rock, 2004]. The reason for increased drinks consumption could be the high day-time temperature especially in summer and also the availability of these drinks at a relatively low cost. Conversely, in the present study the majority never consumed non-sugared carbonated drinks, sports drinks, natural unsweetened fruit drinks, or carbonated water (90.2%, 89%, 88% and 84%), respectively.

The experience of dental erosion was statistically significantly positively associated with frequency of consumption of fruit-based sugary drinks. It is important to note that the fruit-based sugary drinks were the most common acidic drinks consumed on a daily basis by 47% of subjects. This is in agreement with the findings of several studies that found significant association between acidic drinks consumption and experience of dental erosion or tooth wear [Al-Dlaigan et al., 2001b; Al-Malik et al., 2001; Harding et al., 2003; Dugmore and Rock, 2004; Luo et al., 2005; El Karim et al., 2007; Waterhouse et al., 2008; Bardolia et al., 2010].

Harding et al. [2003] reported that the frequency of acidic drink intakes was associated with dental erosion in Irish children. Waterhouse et al. [2008] found a statistically significant association between sugary carbonated drinks and erosion in a Brazilian study. Luo et al. [2005] found an association between prevalence of erosion in Chinese children and an acidic diet.

In contrast, a review of the findings of the UK Child Dental Health Survey of 1993 and two National Diet and Nutrition Surveys in 1992/3 and 1996/7, suggested no statistically significant association between dental erosion and dietary intake [Nunn et al., 2003]. In addition, Caglar et al. [2005] found no significant statistically relationship between erosion and carbonated drinks in 153 11 year-old Turkish children. Other studies [Árnadóttir et al., 2003; Milosevic et al., 2004; Wiegand et al., 2006] have shown no statistically significant association between diet and dental erosion. This might be because dental erosion is a multifactorial condition, the influence of other factors such as differences in salivary flow rate, buffering capacity, the amount of drinks consumed, different drinking patterns and time of drink consumption (i.e. as snacks or with meals) and interaction of all these factors explain why some individuals exhibit more erosion than others after exposure to the same acid challenge.

Interestingly, consumption of sugared tea with milk showed a statistically significant positive association with experience of dental erosion in the multivariate analysis. This contrasts with the results of a study in the UK, which showed that the consumption of tea and milk was statistically significantly lower amongst children with dental erosion [O'Sullivan and Curzon, 2000]. In addition, a Brazilian study also found a statistically significant negative association between consumption of tea and erosion [Waterhouse et al., 2008]. Subjects who consume sugared tea with milk, may have a lower consumption of acidic drinks as they are displaced from the diet and additionally the protective effect of milk and fluoride in tea may reduce the erosive risk. However, the results of this study re-iterate that dental erosion is a multifactorial condition and other factors have a major influence on the experience of dental erosion seen clinically.

There was no statistically significant association between frequency of consumption of tap water, bottled water or both types of water and experience of dental erosion. This is in agreement with other studies that found there was no significant relationship between water fluoridation and erosion or tooth wear [Harding et al., 2003; Burke et al., 2010]. The reason for this may also be due to the multifactorial aetiology for dental erosion; looking at one variable in isolation is challenging when trying to identify aetiological and risk factors for erosion. The present study highlighted the fact that large proportions of the sample of schoolchildren consumed tap water, bottled water or both types of water (29.7%, 14.5% and 55.8%, respectively). Fluoride concentration of drinking tap water and bottled water in Benghazi was 0.66 (SD \pm 0.11) and 0.27 mg/litre (SD \pm 0.16), respectively [Huew, 2010]. The regular consumption of tap water should be encouraged and maintained within the Libyan school population for its fluoride protection effect against dental erosion and to displace acidic drinks consumption.

In the present study, there was a statistically significant association between experience of dental erosion and the frequency of fruit consumption, but this association was weak. As almost 96% of the subjects consumed less than one portion of fruit per day, it is possible that the results were influenced by the impact of this low frequency of consumption. Several studies have found an association between fruit consumption and experience of dental erosion [Kunzel et al., 2000; Al-Dlaigan et al., 2001b], while other studies have found no association [Walker et al., 2000; Harding et al., 2003; Caglar et al., 2005; Waterhouse et al., 2008]. In the present study the level of fruit intake was below the current dietary recommendations of at least 400g or five portions of fruits and vegetables per day to prevent the onset of chronic conditions including obesity, cardiovascular disease, diabetes and cancer [WHO, 2003] although the children's vegetable intake was unknown. It is reassuring that this current recommendation does not contribute a significant risk for dental erosion as a number of vegetables and fruits have erosive potential, and this could lead to conflicting recommendations from dentists who might advise subjects at risk of developing erosion to reduce the acidic drinks and foods such as fruit. The present results reinforced the need to encourage the consumption of fruits as they are important part of a healthy diet. It is also important to note that this study was cross-sectional and the collected dietary information might be not representative of a long-term dietary pattern which may potentially contribute to erosion experience.

Data relating to the intake of acidic drinks at bedtime and the length of time taken to consume drinks showed a higher experience of erosion amongst subjects who made drinks last up to or more than 15 minutes compared with those who drank them straight away. This is in agreement with the findings of Al-Majed et al. [2002], who found a statistically significant association between the number of permanent maxillary incisors with pronounced dental erosion and the length of time taken to consume a drink. Conversely, other studies [Walker et al., 2000; Auad et al., 2007] have shown no significant association between experience of erosion and the length of time taken to consume the drinks.

No statistically significant association was found between the experience of dental erosion and consumption of acidic drinks at bedtime. This is in agreement with the results by Waterhouse et al. [2008] and Milosevic et al. [2004]. In contrast, a Saudi Arabian study found a statistically significant association ($p=0.020$) between consumption of bedtime drinks and experience of dental erosion [Al-Majed et al., 2002]. In addition, in a Chinese study of 3-5 year-olds in China a statistically significant association ($p < 0.05$) was shown between the experience of dental erosion and consumption of fruit drinks at bedtime [Luo et al., 2005]. In the present study, the lack of association found might have been due to a low proportion of subjects reporting consumption of acidic drinks at bedtime; only 16% (129) out of the 791 subjects

reported this habit, which made it difficult for any possible association to become clear. This is in agreement with a Brazilian study; only 4.8% of the 458 subjects consumed acidic drinks at bedtime and no statistically significant association between the experience of erosion and consumption of acidic drinks at bedtime was found [Waterhouse et al., 2008].

Conclusions

A relationship between prevalence and severity of erosion and frequency of consumption of acidic dietary items was found in a cohort of Libyan children. The bivariate analysis showed frequency of consumption of fruit-based drinks and length of time taken to consume acidic drinks were statistically significant positive risk factors for erosion. Additionally, multivariate analysis showed frequency of consumption of fruit other than bananas and sugared tea with milk to also be positively associated with erosion ($p < 0.05$).

The present findings suggest that it would be wise to encourage; i) the consumption of fruits as they are important part of a healthy diet and; ii) the consumption of tap water for its fluoride protection effect against dental erosion and to displace acidic drinks consumption.

Acknowledgements

We would like to acknowledge the Ministry of Higher Education, Libya for sponsoring this study. The authors thank Professor June H. Nunn for calibration of the researcher in the use of the dental erosion index. The authors are grateful to all schoolchildren, parents, schools staff and local authorities in Benghazi for their cooperation with the study.

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