Prevalence of Dental Erosion among Children aged 11-12 years Old in Primary Schools at Sammawa City(South of Iraq)

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Objective: The purpose of this research was to assess the prevalence of dental erosion in children between the ages of 11 and 12 years and compare the various factors influencing dental erosion in both study and control groups.

Materials and Methods: a clinical assessment of the research was performed among children aged 11- 12 years to assess the prevalence of dental erosion in relation to various factors that may cause erosion. The sample size was 102 children with diagnosed dental erosion(63 boys and39 girls) and saliva from these children was collected using a questionnaire to study the various factors that correlate with dental erosion.

Results: the children examined were 1000 aged between 11and 12 years. The prevalence was 10.2 per cent more than girls (3.9per cent) with the highest level in boys(6.3per cent). The salivary flow rate and saliva PH were lower in the study group compared to the control group and lower in boys compared to girls in the same group. Tooth brushing frequencies and carbonated drink intake exhibited a greater effect on the development of erosion in study group compared with the control group.

Conclusion: in Sammawa city, the prevalence of dental erosion was low and in boys more than girls, and in study group, the salivary flow rate and saliva PH was low. The severity of dental erosion increases with increased intake of carbonated beverages and tooth brushing frequencies.

Keywords*: dental erosion, children, Sammawa city.*

Introduction

Erosion is derived from the Latin word erosum , meaning (to corrode) that describes the degradation of a slowly occurring surface through either chemical or electrochemical process[1,2]

It can be defined as a chemical process with no bacterial involvement that causes irreversible loss of enamel and dentin [3]. The principal cause of dental erosion is acidity, whether it comes from an intrinsic source such as gastro intestinal sources or from extrinsic sources such as diet and environmental factors [4]. Demineralization caused by acids is the same as for caries, the difference can be seen in affected enamel surface area, which in erosion affects a much larger enamel surface area, whereas in caries only in plaque areas, so dental erosion usually occurs in plaque-free areas, whereas dental caries occurs plaque accumulation areas [5]. Clinically the dental erosion of enamel in young children and adolescents appears as a large concavity on a smooth enamel surface with elevated amalgam restorations and occlusal surface cupping [6].

There are numerous studies illustrating the important factors that play an important role in influencing dental erosion, one of these factors being the low salivary flow [7,8,9,10]. The other factor is the saliva's buffering capacity that will withstand any changes that may arise if an acid adds to it [11], the third factor is the method of drinking, where the effect of erosive drinks can be reduced by using a straw especially if it is positioned towards the back of the mouth [5]. The tooth surface may become more susceptible to dental erosion with frequent tooth brushing, as frequent tooth brushing will cause removal of outer mineralized enamel protective layer [12]. Drinks containing acids have a PH value of approximately 2.9 which can dissolve enamel and contain large quantities of fermentable sugar can be dangerous if people drink

them in large quantities, particularly if they keep drinks in the mouth for a period of time before swallowing [4].

Erosion is difficult to diagnose in early stages until it is evident, the test must be conducted on a dry and clean enamel surface, but if dentin is involved, it can be appear as a yellow area via thin enamel [6].

Materials and Methods

Study subjects

This study was conducted in different areas of Sammawa city district, located 300 km south of the capital Baghdad, between January 2019 and June 2019 among school children aged 11-12 years. Children with only e extreme erosion were regarded as a study group with the same number of children of the same age without any evidence of dental erosion. The children examined were 1000, (500) boys and (500) girls.

Clinical examination &Sample collection

Children examination was done under natural light in the school using a mirror and an explorer. The teeth were dried with cotton wools before being examined. All surfaces of all teeth were examined by Smith and Knight(1984) [13], updated by Millward et al(1994) [14], and graded according to the index of tooth wear as follows: Score 0 no loss of enamel surface

Score 1 loss of enamel surface only

Score2 loss of enamel with appeared dentin less than one third Score 3 complete loss of enamel with pulp exposure

Score 5 excluded from analysis such as missing tooth or incomplete eruption, heavily carious, tooth with big restoration, crown or fractured tooth.

The children diagnosed with erosion were classified into

Group 1: mild erosion in which erosion in any surface with score 1 Group 2: moderate erosion that involve any surface with score 2

Group 3: sever in which erosion involved any surface with score 3 or score 4

After that the saliva was gathered for 5 minutes using spitting method of un stimulated saliva. Every child had been advised not to eat or drink anything 1 hour

before collecting saliva. Before collecting saliva , the child was sitting and bending his head forward, then spitting in a disposable tube every 1 minute, then examining the collected sample immediately after using a digital PH meter for the PH value. after that the saliva volume was examined using graduated glass as ml/min, questionnaire were also given for all children in the study and control groups.

Statement of ethics : parents were given the approval that the examination and samples would be for study purpose.

Statistical analysis: data for windows7 was analyzed using SPSS software version 22, chi-square test at $p \leq 0.05$.

Results

The children we examined were 1000 (500 boys) and (500 girls). The prevalence of dental erosion was 10.2 per cent (102 students, 63 boys and 39 girls were in the study group). The severity prevalence was mild at 4.5 per cent, moderate at 3 per cent, and sever at 2.7 per cent distributed in Table 1

Table (1) prevalence of dental erosion

severity	No. of boys	No. of girls	total	Prevalence(%)
mild	23	22	45	4.5
moderate	20	10	30	3
sever	20	7	27	2.7
total	63	39	102	10.2

The prevalence according to gender in study group (102 children) was 6.3% for boys and 3.9% for girls as shown in Table 2

Table (2) Prevalence According to Gender

Gender	Number	%
Boys	63	6.3
Girls	39	3.9
Total	102	10.2

In Table 3 the mean of salivary flow rate showed a high significant decrease in study group compared with control group.

Table (3) Salivary Flow Rate of Study and Control Group

Study group		Control group		t-value	p-value
Mean	SD	Mean	SD	7.9	P < 0.01**
0.333	± 0.083	0.530	± 0.097		

**high significant.

While in Table 4, there is the difference in salivary flow rate according to gender which shows a high significant difference between boys and girls in both study and control groups.

Table (4) Difference in Salivary Flow Rate by Gender

	Boys no. 20		Girls no. 7		P-value
control study	Mean	SD	Mean	SD	
	0.528	±0.100	0.534	±0.095	P< 0.01**
	0.333	±0.080	0.344	±0.096	

**high significant.

Table 5 explained the difference between the study and control group in the PH of saliva which was higher in control group compared with study group as shown below.

Table (5) Difference in Salivary PH of Study and Control Groups

Group	Mean	SD	t-value	P-value
Study	7.153	± 0.659	2.6	p< 0.01**
Control	7.526	± 0.299		

** high significant.

There was a high significant difference in salivary PH between boys in study and control groups and between girls in study and control groups in which the salivary PH was higher in control group as shown in Table 6.

Table (6) Differences in Salivary PH according to Gender

	Girls no. 7		Boys no. 20		
	Mean	SD	Mean	SD	P-value
Control Study	7.546	±0.292	7.519	± 0.30	P < 0.01**
	7.197	±0.817	7.138	± 0.61	
** high significant.					

Discussion

The age chosen for this study was 11-12 years old, the reason being that in this age, the permanent incisors and first molars are present for many years, and they are exposed to several influences that can cause erosion, in addition to being more cooperative in children at this age.

The prevalence of dental erosion in Sammawa city was high (10.2%) compared to other Iraqi studies in other cities for the same age group [15, 16, 17], this could be due to different social or dietary factors correlating with dental erosion. The prevalence was higher in boys(6.3%) than girls(3.9%) who, in agreement with other studies at this point, explained that it might be due to an increase in acidic drinks in boys compared to girls because of these communities prefer boys more than girls so they give them acidic drinks as a gift.

Despite the high percentage of dental erosion in the current study, but the highest form was mild erosion (4.5%)compared to sever (2.7%) , indicating that erosion is restricted to enamel only, so that the children have a low risk of development of dental erosion.

The salivary flow rate and PH of saliva were lower in study group compared to control group and in boys lower than girls, which clarified the cause of the development of dental erosion because un stimulated saliva plays a very important role in protecting the teeth from wear [18], in addition , the low acidic PH of saliva in the study group causes the development of dental erosion , which agrees with other studies in this part [15,16,17] that when PH of saliva decreases, it will cross the point of saturation at a point called critical PH which causes the demineralization of the teeth [10].

The study showed a high significant increase in tooth brushing frequencies in the study group compared to control, which may explain the effect of frequent tooth brushing with abrasive dentifrices, which may make the tooth surface more susceptible to dental erosion, especially after an acid attack that may decrease the micro- hardness of enamel and dentin, thus increasing the susceptibility of the tooth to mechanical loss through tooth brushing [12].

In this research in the sample community the consumption of acidic carbonated beverages was substantially higher, this argument has drawbacks as the diet is difficult to examine and the consistency is limited because it can be modified over time. Due to lack of dental knowledge about predisposing factors of dental erosion, the high acidic intake in the study group may explain the development of dental erosion. Many children at this age are un ware of the impact of these drinks, so it may be necessary to inform them.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: None

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