

The Effect of Dairy Products Intake on Dental Caries across Adolescent Females in Al Thahab Al Abyedh Village Baghdad

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ABSTRACT

Background: Milk is an important part of human diets and consideration has been given for the possibility that the dairy food intake could help in preventing oral health problems. This study aimed to estimate the effect of milk and other dairy products on the dental caries and plaque among the adolescents.

Materials and Methods: The study subjects were 405 adolescent females from the secondary school in Al-Thahab Al-Abyedh village aged 13-18 years. The information on the dairy intake was assessed by using a self-administered food frequency questionnaire for the adolescents. To represent the dairy products consumption clearly, it was divided into three levels. The dental caries and plaque were assessed by the visual and tactile examination using the dental mirrors and community periodontal index probes.

Results: The mean plaque index value among 13-15 years was found to be higher than 16-18 years females (0.951, 0.940) respectively but with no statistical difference ($P>0.05$). The means of (DS, MS, FS, DMFS and DMFT) were lower among the younger group. Significant differences were detected among the yogurt consumption levels regarding the mean of plaque index specifically between the low and high levels, whereas no significant differences among all levels of dairy intake and the caries experience.

Conclusions: These data suggested that no differences were occurred between the levels of dairy intake and the dental caries. Nevertheless, a high level of yogurt intake might be associated with lower prevalence of the dental plaque among the adolescents.

Key words: Adolescent, Baghdad, Dairy products, Dental caries

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INTRODUCTION

The diet and oral health relationship are intriguing [1]. Milk is an important part of human diets and consideration has also been given for the possibility that the intake of dairy food might help to prevent oral health problems [2]. It contains nutrients such as calcium, casein, phosphate and lipid that might be linked to the anticariogenic properties, the underlying mechanisms include buffering, reducing the bacterial adhesion, salivary stimulation, reducing the enamel demineralization in addition to promoting the remineralization of enamel by calcium and phosphate ions and casein. The

cario-static impact of milk and/ or its products might be the result of the effects mentioned in addition to the presence of biologically active peptides within the protein fraction or that presented in the naturally occurring probiotics [3]. In the enamel slab studies (both the *in vitro* and *in vivo*) showed that the bovine milk had little potential to induce the demineralization of enamel and it could remineralize the previously demineralized enamel [4].

Several previous epidemiological studies have shown that the consumption of milk among the children and adolescents was associated with a lower caries experience. Petridou et al. stated that a negative association was found between the dairy products and dental caries [5]; Głabska et al. revealed that a reduction in the dental caries coefficient was due to the cheese consumption [6]. Moreover, Lempert et al. suggested that the

high dairy products consumption as well as the consumption of other dairy components such as dairy calcium, casein and whey might be a predictor for the lower caries risk at the level of DMFS, besides dairy intake could help in the prevention of the dental decay development in the young age [7]. In contrast, Marshall et al. found that milk had a neutral effect concerning the dental caries [8].

Although many studies addressed the relationship between the dairy products consumption and the dental caries. Yet, no previous Iraqi study has been carried out regarding the effect of milk and/or dairy products on the dental caries. This study aimed to assess the effect of dairy intake on the dental caries and plaque across the adolescent females in Al-Thahab Al-Abyedh village.

METHODS

This cross-sectional research was carried out among the secondary school females aged 13-18 years old in Al-Thahab Al-Abyedh village/ Baghdad during the period from November 2019 till February 2020. The permission for performing this research was established from the ethics committee of the faculty of dentistry, Baghdad University (2019).

The clinical examinations were performed using dental mirrors and community periodontal probes (CPI probe). A portable head lamp light was used to provide a constant source of light. Dental plaque was measured using Silness et al. plaque index (1964) [9], while the dental caries was evaluated according to WHO criteria [10]. The dairy intake was self-reported using the "Youth and Adolescent food frequency questionnaire (YAQ)" [11] to estimate the habitual dairy intake over the previous year, which was based on "Willett food frequency questionnaire" [12,13]. The questionnaire was

translated to Arabic by the Arab Board of Health Specialization. The consumption categories of dairy intake were classified as seen in Table 1. Data analysis had been accomplished by the SPSS program (version 21) using independent two-sample T-test, one-way analysis of variance (ANOVA) and a post-hoc test (Games-Howell test). The level of significance (P value) which is less than the 0.05 was considered statistically significant and the P value of less than 0.01 was considered statistically high significant.

RESULTS

In this study the total sample involved 405 female students aged (13-18) years old; then the age group was divided in two groups (13-15) and (16-18) years old. The descriptive and statistical test of the mean of plaque index (PII) between the two groups is illustrated in Table 2, the mean of plaque index for 13-15 years was higher than that for 16-18 years (0.951, 0.940) respectively. Yet, the difference was not significant statistically ($P > 0.05$). The caries experiences among the subjects were represented by (DS, MS, FS, DMFS and DMFT) have been shown in Table 3. The means of dental caries variables were higher among 16-18 years students than the other group and the differences were highly significant in (DS, DMFS and DMFT), significant for MS and non-significant for the FS score. As seen in Table 4, no significant differences were found among the different levels of milk and cheese consumption regarding the means of plaque index, while significant differences were exist among the three levels of yogurt consumption regarding the means of plaque index. According to the statistical test using Games-Howell test, the significant difference was between the low and high levels of yogurt consumption as seen in Table 5. Lastly, no significant differences at the three levels of dairy intake and caries experience

Table 1: The consumption categories of the dairy products.

Dairy products	Consumption category		
	Low	Moderate	High
Milk	0-4 glasses/m	2-7 glasses/w	>1 glass/d
Yogurt	0-3 cups/m	1-6 cups/w	≥ 1 cup/d.
Cheese	0-4 slices/m	2-7 slices/w	>1 slice/d

Table 2: Descriptive and statistical test of plaque index between the age groups.

Variable	Age (years)	N	Mean	± SE	T	df	P value
PII	13-15	207	0.951	0.023	0.295	370.487	0.768
	16-18	198	0.94	0.031			

Table 3: Descriptive and statistical test of caries experience between age groups.

Variables	Age (years)				T	df	P value
	13-15		16-18				
	Mean	±SE	Mean	±SE			
DS	2.623	0.241	3.939	0.399	2.825	325.923	0.005**
MS	0.362	0.108	0.798	0.135	2.525	381.373	0.012*
FS	0.522	0.11	0.717	0.101	1.309	401.447	0.191
DMFS	3.507	0.3	5.455	0.421	3.771	359.138	0.000**
DMFT	2.097	0.152	3.293	0.182	5.039	387.456	0.000**

*Significant (P<0.05), **Highly significant (P<0.01).

Table 4: Descriptive and statistical test of plaque index among dairy intake levels.

Dairy products	Variable	Low		Moderate		High		F	P
		Mean	±SE	Mean	±SE	Mean	±SE		
		Milk	PII	0.945	0.025	0.943	0.033		
Yogurt	PII	1.011	0.029	0.923	0.041	0.892	0.031	4.131	.017*
Cheese	PII	0.977	0.026	0.927	0.034	0.886	0.051	1.657	0.192

Table 5: Multiple comparisons test between the yogurt intake levels and plaque index.

Multiple Comparisons					
Games-Howell					
Dairy Product	Dependent Variable	(I) Trans	(J) Trans	Mean Difference (I-J)	P value
Yogurt	PII	Low	Moderate	0.088	0.196
			High	0.119	0.016*
		Moderate	High	0.031	0.819

Table 6: Descriptive and statistical test of caries experience among the dairy intake levels.

Dairy products	Variables	Low		Moderate		High		F	P
		Mean	±SE	Mean	±SE	Mean	±SE		
		Milk	DS	3.144	0.3	3.565	0.414		
MS	0.537		0.104	0.605	0.168	0.833	0.389	0.343	0.71
FS	0.607		0.104	0.685	0.111	0.375	0.168	0.442	0.643
DMFS	4.288		0.341	4.855	0.45	4.25	0.801	0.508	0.602
DMFT	2.626		0.16	2.798	0.205	2.667	0.42	0.205	0.814
Yogurt	DS	2.952	0.284	2.91	0.43	3.705	0.441	1.329	0.266
	MS	0.545	0.143	0.567	0.19	0.607	0.131	0.053	0.948
	FS	0.539	0.094	0.552	0.128	0.717	0.143	0.658	0.518
	DMFS	4.036	0.362	4.03	0.501	5.029	0.462	1.789	0.169
	DMFT	2.539	0.186	2.627	0.302	2.838	0.19	0.646	0.525
Cheese	DS	3.55	0.383	3.2	0.35	2.549	0.326	1.232	0.293
	MS	0.517	0.115	0.64	0.16	0.634	0.223	0.244	0.784
	FS	0.579	0.086	0.784	0.183	0.437	0.118	1.345	0.262
	DMFS	4.646	0.412	4.624	0.42	3.62	0.437	1.104	0.332
	DMFT	2.732	0.183	2.768	0.208	2.38	0.244	0.657	0.519

(DS, MS, FS, DMFS and DMFT) as illustrated in Table 6.

DISCUSSION

This is the first research that investigates the effect of the various consumption levels of milk, yogurt and cheese with the mean of plaque and dental caries in adolescent females living in Al-Thahab Al-Abyedh village. The mean plaque index was slightly higher in the younger age group, statistically these differences were not significant. However, they all were in good oral

hygiene (0.1-0.9) according to the criteria of Silness et al. [9]. This agrees with Bendoraitienė et al. who noted that more than 60% of the girls were in good oral hygiene [14]. In contrast to Yazdani et al.who found that the majority of the adolescents were of poor oral hygiene [15]. This may be due to the accumulation of plaque depends on oral self-care practices, professional plaque control and other local factor like crowding of the teeth [16]. The mean values of all the variables (DS, MS, FS, DMFS and DMFT) were higher among 16-18 years students than 13-15 years. The accumulative as well as the

irreversible nature of dental decay may be attributed to this finding [17]. Other factors relating to the hormonal changes that modify the biochemical composition and the overall flow rate of saliva in many ways by the fluctuations of the hormone level throughout events like puberty and menstruation [18]; in addition to the increased stress for the pre-college students could affect their eating habits [19]. Furthermore, changes in the dental behavior as the parents become gradually less actively involved in the dental caring of their teenagers. DS scores were the highest scores than FS and MS, this may be because of the lower access to the dental clinics.

Concerning the dairy intake, the present study shows that the mean of the plaque index decreased with the increased level of yogurt consumption and the significant difference was found between the lowest and highest levels. On the other hand, milk and cheese consumption shows no statistical significance regarding the mean of plaque score. This may be since yogurt contains probiotics as well as whey protein which might have beneficial effects within the oral cavity. The probiotics positive effect was more likely related to the displacement of streptococcus mutans and other cariogenic bacteria from their binding sites on the dental surfaces and in the oral biofilms [20]. While whey protein might enhance the immune system function and inhibit the plaque formation. Besides, whey protein is found in yogurt more than that in cheese as most of it is lost during rippling [21]. A previous study found that the consumption of ≥ 3 servings/day of milk products was significantly associated with low plaque score among 606 Danish adults aged 65 and older [22]. Whereas Tsitaishvili et al. did not find any association between the dairy intake or other eating habits with plaque score [23]. The present study shows no significant differences regarding the consumption of milk or other dairy products and the dental caries experience; this result agrees with Marshall et al. (2003) [8]. In contrast, many studies showed that low caries prevalence was associated with milk intake [5-7]. The reason may be due to dental decay is considered as a multifactorial disease that developed through the interaction of the three main factors with the presence of time, namely, the oral microorganism (acidogenic bacteria), susceptible host (the physical and chemical

properties of saliva as well as the tooth quality) and the substrate (fermentable carbohydrates) [3]. In addition to the factors dealing with the oral hygiene habits like those of teeth brushing, flossing, and visiting the dentist. Also, the differences in the age group and methodology that had been used could affect the result of the studies.

CONCLUSION

This study has found that the high yogurt consumption may decrease the prevalence of plaque within the adolescents. Nevertheless, no significant effect of dairy intake on dental caries was found. Additional studies, particularly, longitudinal studies and controlled intervention trials are warranted to exactly understand how the dairy consumption affects the oral health outcomes.

REFERENCES

1. Adegboye AR, Tomaz M, Jeavons CA, et al, Intake of dairy foods and oral health: Review of epidemiological data. *Dan Dent J* 2017; 120:884-891.
2. Watt RG. Strategies and approaches in oral disease prevention and health promotion. *Bull World Health Organ* 2005; 83:711-718.
3. Whelton H. Nutrition and health: Nutritional and oral health-promoting properties of dairy products: *Caries Prevention Oral Health* 2011; 1034-1040.
4. Rugg-Gunn A, Woodward M. Milk and oral health. 2011.
5. Petridou E, Athanassouli T, Panagopoulos H, et al. Sociodemographic and dietary factors in relation to dental health among Greek adolescents. *Community Dent Oral Epidemiol* 1996; 24:307-311.
6. Głabska D, Sińska B, Remiszewski A. Analysis of the dependence between milk and dairy products consumption, and dental caries observed in group of children and teenagers. *Roczniki Panstwowego Zakladu Higieny* 2007; 58:69-75.
7. Lempert SM, Christensen LB, Froberg K, et al. Association between dairy intake and caries among children and adolescents. results from the Danish EYHS follow-up study. *Caries Res* 2015; 49:251-258.
8. Marshall TA, Levy SM, Broffitt B, et al. Dental caries and beverage consumption in young children. *Pediatrics* 2003; 112:184-191.
9. Silness J, Løe H. Periodontal disease in pregnancy II. Correlation between oral hygiene and periodontal condition. *Acta Odontologica Scandinavica* 1964; 22:121-135.
10. https://www.who.int/oral_health/publications/9789241548649/en/

11. <https://regepi.bwh.harvard.edu/health/nutrition.html>
12. Rockett HR, Wolf AM, Colditz GA. Development and reproducibility of a food frequency questionnaire to assess diets of older children and adolescents. *J Am Diet Assoc* 1995; 95:336-340.
13. Rockett HR, Breitenbach M, Frazier AL, et al. Validation of a youth/adolescent food frequency questionnaire. *Preventive Med* 1997; 26:808-816.
14. Bendoraitienė E, Zūbienė J, Vasiliauskienė I, et al. Periodontal status in 18-year-old Lithuanian adolescents: An epidemiological study. *Medicina* 2017; 53:253-258.
15. Yazdani R. Dental health and school-based health education among 15-year-olds in Tehran, Iran. University of Helsinki, Finland 2009.
16. Eden BD. Prevention strategies for periodontal diseases. *Prevention Clin Oral Health Care* 2008; 1:213-229.
17. Thomson WR, Milne PB, Caspi A, et al. Socioeconomic inequalities in oral health in childhood and adulthood in a birth cohort. *Community Dent Oral Epidemiol* 2004; 32:345-353.
18. Lukacs JR, Largaespada LL. Explaining sex differences in dental caries prevalence: Saliva, hormones, and "life-history" etiologies. *Am J Hum Biol* 2006; 18:540-555.
19. Sanlıer N, Ogretir AD. The relationship between stress and eating behaviors among Turkish adolescence. *World Appl Sci J* 2008; 4:233-237.
20. Meurman JH. Prebiotics and probiotics and oral health. *Prebiotics Probiotics Sci Technol* 2009; 1067.
21. Krissansen GW. Emerging health properties of whey proteins and their clinical implications. *J Am Coll Nutr* 2007; 26:713-723.
22. Adegboye AR, Christensen LB, Holm-Pedersen P, et al. Intake of dairy products in relation to periodontitis in older Danish adults. *J Nutrients* 2012; 4:1219-1229.
23. Tsitaishvili L, Kalandadze M, Margvelashvili V. Periodontal diseases among the adult population of Georgia and the impact of socio-behavioral factors on their prevalence. *Iran J Public Health* 2015; 44:194.