To Assessed the Ph Change in Dental Plaque on Consumption of Plain/Flavored Milk in 7-14 Yr Old Children

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Abstract

Background: Dental caries is among the most common childhood disease. This disease causes demineralization of mineral structures of teeth. It is an infective, multifactorial and transmittable disease.

Methods: This study was conducted by the Department of Paediatric and Preventive Dentistry, Rajasthan dental college and Hospital, Jaipur. The present study was designed to assess the pH change in saliva and dental plaque on consumption of plain/flavored milk in 7-14 yr old children and to evaluate the antioxidant activities of them.

Results: The difference in Mean at Baseline between groups I and II, I and III, I and IV, I and V, II and III, III and IV, III and V, and IV and V was recorded to be 0.05,0.00,0.04,0.03,0.05,0.04,0.03, and 0.01 respectively. On application of Tukey HSD test, the same showed it to be statistically insignificant (p>0.05), whereas the same between group II and IV and II and V was found to be statistically significant (p≤0.05) with difference in Mean being 0.09 and 0.08 respectively.

Conclusion: The based on the antioxidant property and lesser reduction in plaque pH, consumption of Keasar milk, badam milk and Chocolate milk is recommended for children.

Keywords: Keasar milk, Badam milk and Chocolate milk

Introduction

Dental caries is among the most common childhood disease. This disease causes demineralization of mineral structures of teeth. It is an infective, multifactorial and transmittable disease. The factors including dietary habits, quality and quantity of dental plaque, quantity and quality of saliva, age and immunity of body, oral hygiene habits, oral microflora, condition of the teeth and genetic factors are among the effective invoices on dental caries.[1-5]

R.S.Levine in his study revealed that milk is one of the most important sources of calcium and phosphate. It causes a considerable reduction in plaque pH. The plain

milk is non-cariogenic. The anticariogenicity of milk lies within its high buffering capacity and its components i.e, calcium, phosphate, proteins and phosphoproteins [6]

Masih et al. and Danchaivijitr et al. showed that milk can be cariostatic and its consumption with cariogenic food dominantes this property.[7-8] Flavored milks contain 5% or more added sugar. Increasing the consumption of sweetened milk in the last two decades raises this question about the carcinogenicity of these kinds of milk.

The Study performed by Nassar et al., revealed the antibacterial property of honey and its prominent role in the prevention of s.mutans growth and biofilm formation [9]

Antonio et al. discussed that components containing soluble coffee have antioxidant property. It is related to the concentration of phenolic components, caffeine and melanoidin present in these foods [10]

Materials and Methods

Study design and Study population: This study was conducted by the Department of Paediatric and Preventive Dentistry, Rajasthan dental college and Hospital, Jaipur. The present study was designed to assess the pH change in saliva and dental plaque on consumption of plain/flavored milk in 7-14 yr old children and to evaluate the antioxidant activities of them.

Following ethical clearance from the concerned committee of the institute, (Annexure) written permission was obtained from the Helping Hand School (Annexure) which harbored around 300 children between the age group of 5 to 15years.

Sterilization: 30 sets of mouth mirror, probe, explorer and tweezer were autoclaved in the department before every visit to the school. Spot disinfection was carried out as and when required during the course of the study using chemical disinfecting solution.

Sample selection : Following case history recording on the Proforma (Annexure), research participants were

screened for oral health problems and/or injuries. 70 children between the age group of 7 to 14 years were selected for our study based on the inclusion and exclusion criteria designed for the study following which written consent was obtained from the Custodian/school authorities (Annexure).

Inclusion criteria

1. Children in the age group of 7-14 yrs.
2. Willing to take part in the study
3. Healthy and co-operative children
4. Teeth free from restoration on labial, buccal and lingual surface
5. Mentally and physically fit children capable of following and performing the given instructions.

Exclusion criteria

1. Xerostomia
2. Cracked and/or Fissured oral mucous membrane
3. Atrophic tongue
4. Lactose intolerance
5. Allergic to milk
6. DMFT/dmft of >3
7. Undergoing Orthodontic treatment
8. Children on antibiotic therapy in the past 1 month

Methodology

Grouping of subjects: 70 subjects considered for our study according on the inclusion and exclusion criteria designed were grouped into 5 based on the study material used with 14 subjects in each group as shown below.

Group-I	Rose Milk
Group-II	Chocolate Milk
Group-III	Kesar Milk
Group-IV	Badam Milk
Group-V	Plain Milk (Control)

Different kind of flavored milk evaluated, exhibited the same nutritional and ingredient information except for the respective added flavors. In case of plain milk (control) both the nutritional and ingredients information exhibited was different from the study materials.

Care was taken that the study materials were fit for consumption and that the date of manufacture was the same for all the study materials except for the plain milk which was used as and when required which displayed the date on the day it was used.

Observation

Table 2: Comparison of Mean plaque pH recorded in different Groups at various Study Time intervals

Time Interval	Group (Mean)		Difference in Mean	p value*
Baseline	Rose (6.87) (I)	Chocolate (6.82)	0.05	0.52(NS‡)
		Kesar (6.87)	0.00	NS‡
		Badam (6.91)	0.04	0.49(NS‡)
		Plain Milk (6.90)	0.03	1.000(NS‡)
	Chocolate (6.82) (II)	Kesar (6.87)	0.05	0.33(NS‡)
		Badam (6.91)	0.09	0.002 (S†)
		Plain Milk (6.90)	0.08	0.01 (S†)
	Kesar (6.87) (III)	Badam (6.91)	0.04	0.86(NS‡)
		Plain Milk (6.90)	0.03	0.98(NS‡)
	Badam (6.91) (IV)	Plain Milk (6.90)	0.01	1.000(NS‡)
Immediately	Rose (6.63) (I)	Chocolate (6.44)	0.195	< 0.001 (S††)
		Kesar (6.61)	0.024	1.000(NS‡)
		Badam (6.55)	0.08	0.01 (S†)
		Plain Milk (6.59)	0.04	0.60(NS‡)
	Chocolate (6.44) (II)	Kesar (6.61)	0.17	< 0.001 (S††)
		Badam (6.55)	0.11	0.001 (S†)
		Plain Milk (6.59)	0.15	< 0.001 (S††)
	Kesar (6.61) (III)	Badam (6.55)	0.06	0.21(NS‡)
		Plain Milk (6.59)	0.02	0.99(NS‡)
	Badam (6.55) (IV)	Plain Milk (6.59)	0.04	0.98(NS‡)
5 Minutes	Rose (6.33) (I)	Chocolate (6.10)	0.23	< 0.001 (S††)
		Kesar (6.32)	0.01	1.000(NS‡)
		Badam (6.16)	0.17	< 0.001 (S††)
		Plain Milk (6.40)	0.07	0.11(NS‡)
	Chocolate (6.10) (II)	Kesar (6.32)	0.22	< 0.001 (S††)
		Badam (6.16)	0.067	0.12(NS‡)

		Plain Milk (6.40)	0.30	< 0.001 (S††)
	Kesar (6.32) (III)	Badam (6.16)	0.16	< 0.001 (S††)
		Plain Milk (6.40)	0.08	0.03 (S†)
	Badam (6.16) (IV)	Plain Milk (6.40)	0.24	< 0.001 (S††)
10 Minutes	Rose (6.01) (I)	Chocolate (5.80)	0.21	< 0.001 (S††)
		Kesar (5.99)	0.02	0.99(NS‡)
		Badam (5.82)	0.19	< 0.001 (S††)
		Plain Milk (6.01)	0.00	NS‡
	Chocolate (5.80) (II)	Kesar (5.99)	0.19	< 0.001 (S††)
		Badam (5.82)	0.02	1.000(NS‡)
		Plain Milk(6.01)	0.217	< 0.001 (S††)
	Kesar (5.99) (III)	Badam (5.82)	0.17	< 0.001 (S††)
		Plain Milk(6.01)	0.02	1.000(NS‡)
	Badam (5.82) (IV)	Plain Milk(6.01)	0.197	< 0.001 (S††)
15 Minutes	Rose (5.98) (I)	Chocolate (5.73)	0.25	< 0.001 (S††)
		Kesar (5.94)	0.04	1.000(NS‡)
		Badam (5.82)	0.16	< 0.001 (S††)
		Plain Milk (5.99)	0.01	1.000(NS‡)
	Chocolate (5.73) (II)	Kesar (5.94)	0.208	< 0.001 (S††)
		Badam (5.82)	0.09	0.008 (S†)
		Plain Milk (5.99)	0.262	< 0.001 (S††)
	Kesar (5.94) (III)	Badam (5.82)	0.118	< 0.001 (S††)
		Plain Milk (5.99)	0.054	0.37(NS‡)
	Badam (5.82) (IV)	Plain Milk (5.99)	0.172	< 0.001 (S††)
20 Minutes	Rose (6.41) (I)	Chocolate (6.13)	0.28	< 0.001 (S††)
		Kesar (6.44)	0.03	1.000(NS‡)
		Badam (6.22)	0.19	< 0.001 (S††)
		Plain Milk (6.52)	0.11	0.05 (S†)
	Chocolate (6.13) (II)	Kesar (6.44)	0.311	< 0.001 (S††)
		Badam (6.22)	0.09	0.25(NS‡)
		Plain Milk (6.52)	0.39	< 0.001 (S††)
	Kesar (6.44) (III)	Badam (6.22)	0.22	< 0.001 (S††)
		Plain Milk (6.52)	0.087	0.32(NS‡)
	Badam (6.22) (IV)	Plain Milk (6.52)	0.30	< 0.001 (S††)

30 Minutes	Rose (6.87) (I)	Chocolate (6.81)	0.06	0.19(NS‡)
		Kesar (6.87)	0.00	NS‡
		Badam (6.89)	0.02	1.000(NS‡)
		Plain Milk (6.90)	0.03	0.98(NS‡)
	Chocolate (6.81) (II)	Kesar(6.87)	0.06	0.28(NS‡)
		Badam (6.89)	0.08	0.01 (S†)
		Plain Milk (6.90)	0.09	0.01 (S†)
	Kesar(6.87) (III)	Badam (6.89)	0.02	1.000(NS‡)
		Plain Milk (6.90)	0.03	1.000(NS‡)
	Badam (6.89) (IV)	Plain Milk (6.90)	0.001	1.000(NS‡)

*Tukey HSD

p≤ 0.05=Significant (S†)

p<0.001= highly significant (S††)

p>0.05=Not significant (NS‡)

The difference in Mean at Baseline between groups I and II, I and III, I and IV, I and V, II and III, III and IV, III and V, and IV and V was recorded to be 0.05,0.00,0.04,0.03,0.05,0.04,0.03, and 0.01 respectively.

On application of Tukey HSD test, the same showed it to be statistically insignificant (p>0.05), whereas the same between group II and IV and II and V was found to be statistically significant (p≤0.05) with difference in Mean being 0.09 and 0.08 respectively.

Similarly, the difference in Mean immediately on use of study material between groups I and III, I and V, and III and IV was noted to be 0.024,0.04, and 0.06 respectively, whereas the same between groups III and V, and IV and V was recorded to be 0.02, and 0.04 respectively.

On application of Tukey HSD test, the same was found to be statistically insignificant (p>0.05), whereas the same between group I and II, II and III, and II and V was found to be statistically highly significant (p<0.001) with difference in Mean being 0.195, 0.17, and 0.15 respectively. However, the same between groups I and IV and II and IV was recorded to be statistically significant (p≤0.05) with difference in Mean being 0.08 and 0.11 respectively.

At 5 minutes time interval, difference in mean between groups I and III, I and V, and II and IV was recorded to be 0.01,0.07, and 0.067 respectively which was found to be statistically insignificant (p>0.05) on application of Tukey HSD test.

Application of the same test between group I and II, I and IV, II and III, II and V, III and IV, and IV and V was found to be statistically highly significant (p<0.001) with the difference in Mean being 0.23, 0.17, 0.22, 0.3, 0.16, and 0.24 respectively, whereas the same between groups III and V was noted to be statistically significant (p≤0.05) with difference in Mean being 0.08.

The difference in Mean was found to be 0.02,0.00,0.02, and 0.02 between groups I and III, I and V, II and IV, and III and V respectively at 10 minutes time interval which was also found to be statistically insignificant (p>0.05) on application of Tukey HSD test, whereas it was statistically highly significant (p<0.001), between groups I and II, I and IV, II and III, II and V, III and IV, and IV and V where the difference in Mean recorded was 0.21,0.19,0.19,0.217,0.17, and 0.197 respectively.

At 15 minutes time interval, difference in Mean between groups I and III, I and V, and III and V was recorded to be

0.04,0.01, and 0.054 respectively and the same was found to be statistically insignificant (p>0.05) on application of Tukey HSD test.

On application of the same between groups I and II, I and IV, II and III, II and V, III and IV, and IV and V it was found to be statistically highly significant (p<0.001) with the difference in Mean being 0.25, 0.16, 0.208, 0.262, 0.118, and 0.172 respectively, whereas the same between groups II and IV was found to be statistically significant (p≤0.05) where the difference in Mean noted to be 0.09.

The difference in Mean was found to be 0.03,0.09, and 0.087 between groups I and III, II and IV, and III and V respectively at 20 minutes time interval which was also found to be statistically insignificant (p>0.05) on application of Tukey HSD test, whereas it was statistically highly significant (p<0.001), between groups I and II, I and IV, II and III, II and V, III and IV, and IV and V where the difference in Mean recorded was 0.28,0.19,0.311,0.39,0.22, and 0.3 respectively. However, the same between I and V was noted to be statistically significant (p≤0.05) with the difference in Mean being 0.11.

At 30 minutes time interval, difference in Mean between groups I and II, I and III, I and IV, I and V, II and III, III and IV, III and V, and IV and V was recorded to be 0.06, 0.00,0.02,0.03,0.06,0.02,0.03, and 0.001 respectively and analysis of the same showed it to be statistically insignificant (p>0.05).

0.08 and 0.09 which was noted to be the difference in Mean between groups II and IV and II and V respectively was found to be statistically significant on application of Tukey HSD test (p≤0.05)

DISCUSSION

Consumption of plain and flavored milk reduces plaque pH. Except chocolate milk, the rest of the tested milk increased salivary pH. Banana milk and strawberry milk had lower, and chocolate milk, honey milk and coffee milk had higher antioxidant concentration compared with plain milk. No similar studies have been done on pH changes of saliva and plaque following the intake of flavored milk, and on the evaluation of antioxidant property of these kinds of milk. Masih et al. performed a study on plain milk, sweetened milk, lactodex 2 milk and lactogen 2 milk. They revealed that after the consumption of sweetened milk, a considerable reduction in plaque pH occurred, and it reached to a pH lower than critical 5.5.

Our study showed that the intake of plain and flavored milk reduces plaque pH. The reduction of plaque pH by honey milk, chocolate milk and coffee milk was less than that obtained by plain milk. Probably it is related to the effect of other additives to these milk formulae such as chocolate, coffee and honey.

Conclusion

The based on the antioxidant property and lesser reduction in plaque pH, consumption of Keasar milk, badam milk And Chocolate Milk Is Recommended For Children

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