IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

The Effects Of Various Beverages And Eatables On Salivary pH

Gauri Sanpurkar[1], Lata Kale[2], Amruta Bansode[3], Kapil Pawar[4], Chaitali Sarwade[5]

[1]Post Graduate Student, Department of Oral medicine and radiology, CSMSS Dental College, Aurangabad, Maharashtra.

[2] Professor, HOD, DEAN, Department of Oral medicine and radiology CSMSS dental college, Aurangabad, Maharashtra.

[3,4]Lecturer, Department of Oral medicine and radiology, CSMSS dental college and hospital, Aurangabad, Maharashtra.

[5]Post Graduate Student, Department of Oral medicine and radiology, CSMSS Dental College, Aurangabad, Maharashtra.

Abstract-

Aim: Assessing the effect of selected locally available beverages and eatables on salivary ph

Methodology: Study comprised of 20 subjects. Test samples undertaken were soft drink, fruit drink, chocolate and wafers. Before intake and immediately after intake followed by 5, 10, 15 minutes later salivary ph was determined with digital ph meter.

Result: Difference in the mean salivary ph at base line and at different interval of time after consumption of different beverages and eatables was found to be statistically significant.

Conclusion: It is always advised to minimize the consumption of beverages and eatables, especially amongst children and adult to maintain a good oral health.

Key words: saliva, salivary pH, beverages, snacks.

I. INTRODUCTION

Oral health has often been viewed in isolation from the general health. In the past, dental health professionals have focused largely on local reparative treatment of oral disease[1]. Diet is a major etiological factor for dental caries and enamel erosion. Nutritional status impacts the development of the teeth and the host's resistance to many oral conditions, including periodontal diseases and oral cancer[2].

Saliva provides the physiologic environment in oral cavity where the complex interactions between the agent, host and the environment factor occur, to bring about demineralization of the tooth and subsequent development of caries[3]. The salivary parameters which affect the enamel stability in the oral environment are pH of saliva, salivary flow rate, oral clearance, concentrations of calcium, phosphate and fluoride ions and salivary levels of the oral microorganisms[4].

The normal pH of saliva is 6.7 to 7.4 but as bacteria break down the carbohydrates, they release lactic acid, butyric acid, and aspartic acid which bring down the pH of saliva. When the pH level in mouth goes below 5.5 (i.e., the critical pH value), the acids begin to break down the enamel on teeth. The longer the teeth are exposed to a low salivary pH, the more likely the development of dental caries[5].

The globalization in turn is bound to increase the availability of processed food items as well as sweets. The association between diet, particularly sucrose, and dental caries has been well-documented in many cross-sectional, longitudinal, and ecological studies. In this modern age, use of junk food items and snacking between meals is commonly seen in the younger age group and among their peer groups[6]. Hence, the following study was undertaken with the aim of effect of various beverages and eatables on salivary ph.

II. MATERIAL AND METHOD

The present study was an experimental study conducted to evaluate the changes in salivary pH, after consumption of different snacks and beverages. The study was carried out in department of oral medicine and radiology in CSMSS dental college, Aurangabad, Maharashtra.

Sampling

10 boys and 10 girls selected who were dental students. These subjects were selected on the basis of the following inclusion and exclusion criteria.

Inclusion criteria-

- Subjects who were 19–25 years of age.
- Subjects who were caries-free.
- Subjects who were not suffering from any systemic disease or illness.

Exclusion Criteria:

- Subjects who did not give informed consent.
- Subjects who were using alcohol or tobacco in any form

All the study subjects were similar with respect to their age, dietary habits, oral hygiene measures and other lifestyle factors which could have significant effect on the study results.

Ethical Clearance

Before carrying out the present study the ethical clearance was obtained from the institutional ethical clearance committee.

Informed Consent

Before the start of the study, the purpose and methodology of the study was explained to each of the subject and informed consent was obtained.

Study design

The present study was an experimental study conducted on dental students in the department of oral medicine and radiology of CSMSS dental college. After the collection of baseline salivary samples (before the consumption of test food) the subjects were given one food (beverages or eatables) item to eat and then unstimulated saliva samples were collected at the following fixed time intervals:

- 1st follow-up, immediately after test food consumption.
- 2nd follow-up, 5 minutes after the test food consumption.
- 3rd follow-up, 10 minutes after the test food consumption.
- 4th follow-up, 15 minutes after the test food consumption.

The study divided into 4 groups of beverages and eatables i.e.

- Group A- CHOCOLATE
- Group B- FRUIT JUICE
- Group C- COLD DRINK
- Group D- WAFERS

The study subjects were given 4 different types of beverages and eatables for subsequent 4 days and subsequent salivary samples were collected. Carbonated beverage (pepsi), fruit drink (orange drink), potato chips and chocolates were taken by subjects. Where appropriate, the foods were consumed as a single item

or as a 10g portion, or as 50 mL of liquid drink. In all cases, subjects were requested to consume the food item in as normal a fashion as possible, avoiding excessive chewing or rinsing procedure.

Collection of Salivary Samples

For collection of unstimulated saliva, all students were asked to sit comfortably on a chair, with their head bent forward for easy collection of sample in a disposable glass. After baseline score was documented, eatables and beverages were tested on all students. For four subsequent days, different eatables and beverages were given to students. They were asked to sip each beverage and eat as they usually do at home. Immediately after consumption of different eatables and beverages, salivary pH was measured and then again at an interval of 5, 10, &15 minutes.

Measurement of salivary pH

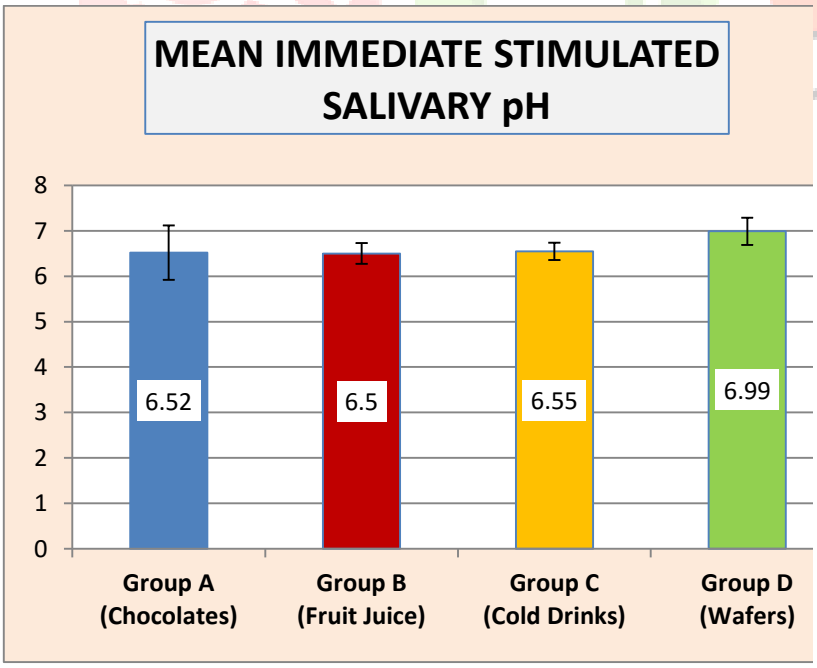
To measure salivary pH, saliva was accumulated in different disposable glass for each interval. The pH-meter i.e. "pHep pocket sized pH meter (manufactured by HANNA instruments)" was immersed in sample for the reading. In between readings, cleaning of electrode with a distilled water was carried out which was then dipped in a standard solution having pH 7·0, to ensure a stable reading**.**

Statistical Analysis

Statistical analysis was performed using (SPSS) version 21. Descriptive quantitative data was expressed in mean and standard deviation respectively. For intergroup comparison among 4 groups, Anova F test is used. The p ≤0.05 was fixed to be statistically significant.

III. RESULT

Table 1 shows mean immediate stimulated salivary pH. The mean pH of fruit juice was found to be the least at 6.5, followed by that of chocolates (6.52), cold drink i.e. pepsi (6.55), and wafers (6.99). The p value was statically significant.

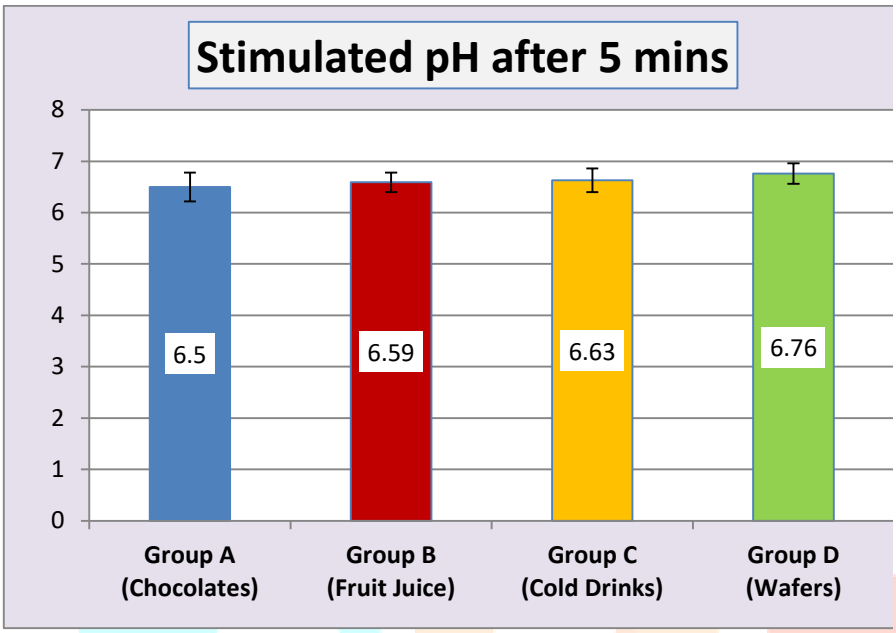


p value, Significance
p <0.001**

Table 1: **MEAN IMMEDIATE STIMULATED SALIVARY pH**

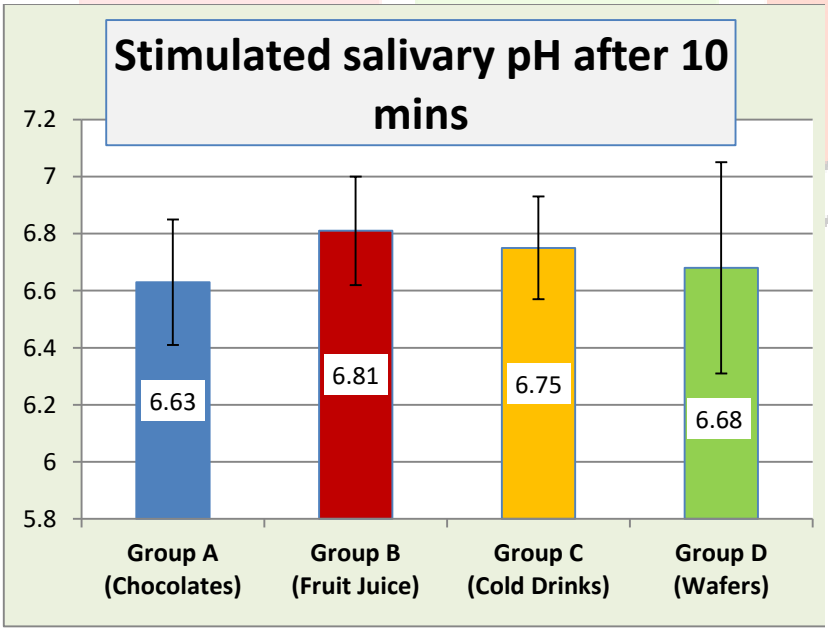
Table 1 shows mean immediate stimulated salivary pH. The mean pH of fruit juice was found to be the least at 6.5, followed by that of chocolates (6.52), cold drink i.e. pepsi (6.55), and wafers (6.99). The p value was statically significant.

Table 2 shows mean stimulated pH after 5 minutes. The mean pH of chocolate was found to be least (6.76) and maximum in wafers. The p value was 0.007 which was showing significant p value.



p value, Significance
p =0.007*

Table 2: **MEAN STIMULATED pH AFTER 5MINS.**

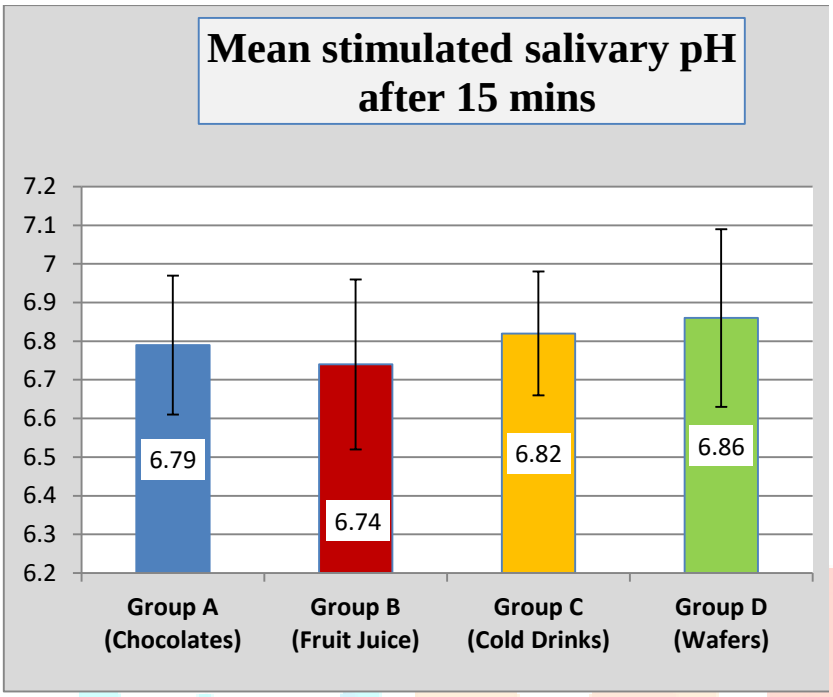


P value, Significance
p = 0.125

Table 3: **MEAN STIMULATED pH AFTER 10MINS.**

Table 3 shows mean stimulated pH after 10 minutes. The mean pH of chocolate was found to be least (6.63) and maximum in fruit juice (6.81). The p value was 0.125.

Table 4 shows mean stimulated pH after 15 minutes. The mean pH of fruit juice was found to be least (6.74) and maximum in wafers (6.86). The p value was 0.301.



p value, Significance
p = 0.301

Table 4: **MEAN STIMULATED pH AFTER 15MINS.**

CHANGE FROM UNSTIMULATED TO STIMULATION AFTER 5 MINS	MEAN	S.D		
Group A (Chocolates)	**0.375**	**0.32**		
Group B (Fruit Juice)	**0.27**	**0.26**	**Anova F test**	**P value significance**
Group C (Cold Drinks)	**0.24**	**0.29**	F= 3.507	0.019*
Group D (Wafers)	**0.09**	**0.21**		

Table 5: Comparison of mean change from unstimulated pH to stimulated salivary pH values after 5mins among different groups respectively

It was found that the difference in the mean salivary pH value at baseline and at different intervals of time up to 5mins after the consumption of chocolate, fruit drink, cold drink and wafers was found to be statistically significant ($p = 0.05$).

Inter group comparison

Table 6 is showing the comparison between groups after immediate, 5mins, 10mins and 15mins. The baseline pH was ranging in between 6.9 to 7.3. Highest pH was observed in potato chips i.e. wafers (6.99) and least in fruit juice (6.51) immediate after intake. The p value was highly significant in a group after immediate follow up. Highest pH was seen after 5mins of follow up in wafers group (6.76) and least in chocolate group (6.5) showing significant p value.

	Highest mean pH value	Lowest mean pH value	P value
Immediate	Wafers - 6.99	Fruit juice- 6.51	p <0.001**
After 5mins	Wafers – 6.76	Chocolate- 6.5	p =0.007*
After 10mins	Fruit juice- 6.81	Chocolates- 6.63	p = 0.125
After 15mins	Fruit juice- 6.74	Cold drink- 6.82	p = 0.301

p >0.05 – no significant difference *p<0.05 – significant **p<0.001 – highly significant

Table 6: Group comparison showing highest and lowest mean pH value and p value significance.

IV. DISCUSSION

Saliva performs a multiplicity of roles in the oral cavity. The diverse functions of the oral tissues such as the mastication, deglutition, taste sensation, speech and initial digestion of the carbohydrates would be impossible without the salivary secretions. It is such a complex biological fluid that it is practically impossible to replicate it from individual components[3]. In a healthy state, the pH of saliva is maintained usually in between 6.7 to 7.4. Saliva affords both static protective effects, which act continuously and dynamic effects, which act during the time course of a challenge. Salivary buffering capacity and sugar clearance are important dynamic effects of saliva which prevent demineralization of tooth structure[7]. The present study was conducted to evaluate the change in salivary pH after consumption of different snacks and beverages. The study was carried out on 20 subjects with the mean age of 19-25 year selected among the dental college students of CSMSS dental college, Aurangabad, Maharashtra. In present study all groups showed changes in salivary ph after intake of beverages and eatables but after immediate and 5mins follow up showed significant changes in fruit juice, potato chips and chocolate groups. When a food is consumed, an admixture of saliva and food is formed. The increased flow rate of saliva, as a result of food

consumption, leads to increase in pH of saliva but the overall change depends on the on the sugar content, intrinsic pH, buffering capacity and manner in which the food is consumed[8].

Neha gupta et al conducted a study, "evaluation of change in salivary ph, following consumption of different snacks and beverages and estimation of their oral clearance time" and she observed that the consumption of different snacks and beverages cause an immediate drop in the salivary pH which begin to rise after 4 minutes of food consumption and the pH rise after sometime till it reaches the baseline salivary pH values. The drop in the salivary pH was found below the critical pH after the consumption of apple, citrus fruits and carbonated beverages[1.] Rinki Hans et el conducted a study to determine the Effect of Various Sugary Beverages on Salivary pH, Flow Rate, and Oral Clearance Rate amongst Adult and she observed that though liquids cleared rapidly from the oral cavity, they had a significant cariogenic and erosive potential. They caused a major drop in salivary pH just after their consumption[1]. K. J. Toumba et al also carried out a study to determine Effect on plaque pH of fruit drinks with reduced carbohydrate content and they suggested that reducing the amount of fermentable carbohydrate in a fruit drink to very low levels would lead to a significantly lower acid production in the dental plaque[9]

In this study, on examination, it was found out that lowest mean pH value immediate after intake of fruit juice was 6.51 and highest was 6.99 after wafers consumption. After 5min and 10mins of consumption the lowest mean pH was 6.5 and 6.6 respectively which was found in chocolate group. After 15mins, the lowest mean pH value was 6.74 that was found in fruit juice. pH level below the normal range was found in Group A (chocolate) , Group B (fruit juice). Hence, it is always advised to minimize the consumption of beverages and eatables, especially amongst children and young adults, to maintain a good oral health.

V. CONCLUSION

An experimental study was carried out on 20 subjects to find out the changes in salivary pH after consumption of various beverages and eatables. These beverages and food stuffs are freely available around the schools and colleges and so are commonly consumed by children and young adults. On examination, it was found out that cold drink, fruit juice chocolates have maximum potential to decay a tooth by lowering salivary pH. They caused a major drop in salivary pH just after their consumption. Hence, it is always advised to minimize the consumption of beverages and chocolates, especially amongst children and young adults, to maintain a good oral health.

VI. REFERENCES

1. Hans, Rinki et al. "Effect of Various Sugary Beverages on Salivary pH, Flow Rate, and Oral Clearance Rate amongst Adults." *Scientifica* vol. 2016 (2016): 5027283. doi:10.1155/2016/5027283
2. P. Moynihan, "The interrelationship between diet and oral health," Proceedings of the Nutrition Society, vol. 64, no. 4, pp. 571–580, 2005
3. Gupta, Bhuvan & Gupta, Neha. (2020). Evaluation of change in salivaryPh, following consumption of different snacks and beverages and Estimation of their oral clearance time. International Journal of Preventive and Clinical Dental Research. 2. 11-16.
4. Edgar M, Dawes C, O'Mullane D: Saliva and Oral Health. 3rd ed. London: British Dental Association; 2004
5. 571–580, 2005. [3] N. Takahashi, Microbial Ecosystem in the Oral Cavity: Metabolic Diversity in an Ecological Niche and Its Relationship with Oral Diseases, International Congress Series, Elsevier, 2005
6. M. Demircia, S. Tuncera, and A. A. Yuceokurb, "Prevalence of caries on individual tooth surfaces and its distribution by age and gender in university clinic patients," European Journal of Dentistry, vol. 4, pp. 270–279, 2010.
7. Touger-Decker R, Loveren C. Sugars and dental caries. Am J Clin Nutr 2003;78: 881- 92.

8. Ludwig TG, Bibby BG. Acid production from different carbohydrate foods in plaque and saliva. J Dent Res 1957;36:56-60.
9. Toumba KJ, Duggal MS. Effect on plaque pH of fruit drinks with reduced carbohydrate content. Br Dent J. 1999 Jun 26;186(12):626-9. doi: 10.1038/sj.bdj.4800181. PMID: 10425807.