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Research Article

EFFECT OF INSTANT NOODLES ON SALIVARY pH AMONG 8-10 YEAR OLD SCHOOL GOING CHILDREN IN DAVANGERE CITY – A PILOT STUDY

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ABSTRACT

Background and Aim of the study: Instant noodles are precooked noodles which are widely used in Asian countries. Consumption of Instant noodles has many adverse effects on general health. Aim of our study was to assess Instant noodles effect on salivary pH at different time intervals among 8-10 years old school going children of Davangere city.

Materials and Methods: Twenty eligible 8-10 year old school children were recruited for the study. Students were refrained from having breakfast or anything in the morning. Saliva was collected from the study participants at baseline and pH was assessed using digital pH meter. Later each student was fed with one bowl of cooked maggi noodles. Saliva was again collected at 10, 20, 30 and 60 minutes and the salivary pH was recorded. Repeated measures ANOVA was used to assess the pH of saliva at different time intervals.

Results: A statistically significant difference ($p < 0.05$) was observed between salivary pH at baseline as compared to salivary pH at different time intervals at 10 and 30 minutes. However the salivary pH didn't reach below the level of critical pH (5.5).

Conclusion: Eating instant noodles is not a risk factor for dental caries and we recommend further large scale research to be conducted to know the cariogenicity of instant noodles

Keywords: Dental caries, Food, Instant noodles, Salivary pH, Stephen's curve.

INTRODUCTION

Instant noodles are steamed, dried, deep-oil fried or precooked noodles which are also known as Ramen in Japan and Ramyon in Korea. Instant noodles originated in Japan in 1950s¹. They are often sold in packets and contain flavoring agents and seasoning oil in addition to the noodles. They are frequently criticized as junk food since they are high in carbohydrates and low in fiber, vitamins and minerals. They have high level of saturated fats and trans fats. They are high calorie snacks having flavoring agents such as monosodium glutamate. Instant noodles are widely consumed in Asian countries. The Korean population consumed the largest quantity of instant noodles in the world during 2008. Noodles are currently produced in over 80 countries¹. As of 2008, approximately 93.6 billion servings of instant noodles have been consumed worldwide. The popularity of instant noodles has been expanding very rapidly during recent decades due to their reasonable price. People typically prefer instant noodles to other convenient foods or fast foods when eating time is a constraint^{2,3}.

Dental caries and related oral diseases like gingivitis and periodontitis are most common oral diseases throughout the world. Dental caries is an important dental public health problem. Its high morbidity has brought this disease into the focus of dental health professionals. The prevalence of dental caries is continuously increasing in developing countries with change in dietary habits of people and increased consumption of refined carbohydrates⁴. The prevalence of dental caries is more than 95% in India⁵. Dental caries is associated with drastic drop in the salivary pH after consuming carbohydrate rich food. By measuring the change in the salivary pH soon after consuming a food substance, one can measure the cariogenic potential of food.

The Toyama Birth Cohort Study in Japan reported that junior high school students who frequently consumed instant noodles showed a higher risk for a lower quality of life⁶. Several studies have been conducted to examine the association between gastric cancer, diabetes, and blood lipid profiles and instant noodle consumption^{7,8,9}. Though there are some studies which explain the relation between instant noodles and systemic diseases but there is a gap in the knowledge to what

is the effect of consuming instant noodles on salivary pH. Hence this study was conducted to assess the effect of Instant noodles on salivary pH at different time intervals among 8-10 year old school going children in Davangere city. Null Hypothesis (H₀) states that there is no change in the salivary pH at different time intervals after consumption of instant noodles.

MATERIALS AND METHODS

The present study is a pretest-post test/without controls experimental and pilot study. Ethical approval was obtained from the institutional review board. Required permission to conduct the study among school going children was obtained from a school head after appraising about the entire study and the purpose of conducting the study. Voluntary written informed consent was obtained from parents of the study participants after explaining the purpose, procedures and pros and cons of the study. Assent was obtained from study participants. They were assured that the information collected from them during the course of the research will be kept confidential.

Healthy children aged 8-10 years were included in the study. Children with systemic diseases, salivary gland diseases, on medication, dental caries, cleft lip or cleft palate, participants who did not like eating maggi noodles and parents' denial to consent for participation of their children were excluded from the study.

The selected students were instructed to assemble at 8:30 A.M in the dining hall of their own school for collection of saliva. They were refrained from having any food and brushing their teeth on the given day until the saliva sample was collected. Unstimulated whole saliva sample was collected from participants at baseline in disposable plastic cups and salivary pH was assessed using digital pH meter. The digital pH meter (pHep® pocket sized pH Meter, Hanna Instruments, Italy) used in the study is a battery operated instrument which can measure pH ranging between 0.0 to 14.0 with a resolution of 0.1 pH and accuracy (@20°C/68°F) at ±0.1 pH. Reading of the salivary pH was noted and the instrument was washed with distilled water and wiped with gauze and cotton. Before measuring the next sample, the pH was brought back to 7.0 by

dipping the bulb of the pH meter in distilled water as mentioned by the manufacturer's guidelines. The pH of the saliva was recorded by a single examiner who had the required expertise to operate the instrument. Students were fed with one bowl of maggi noodles (Nestle company) which was prepared following two minute instant method (Instructions on pack). No other ingredients were added while preparing noodles except for those available in the packet. The unstimulated saliva samples were collected at 10, 20, 30 and 60 minutes respectively in disposable plastic cups after consuming the noodles. Salivary pH was assessed by using a digital pH meter. Spread sheet was prepared and statistical analysis was done using SPSS (version 19). As salivary pH was recorded among the same individuals at different time intervals, repeated measures ANOVA was performed to find out the significant differences between the means.

RESULTS

Table 1 describes the distribution of study participants by gender and age. Table 2 is a descriptive table which describes the mean and standard deviation and Confidence limits of the salivary pH at baseline, 10 minutes, 20 minutes, 30 minutes and 60 minutes. Before the intervention [consumption of instant noodles] the mean salivary pH of children was 7.3. Ten minutes after the consumption of the instant noodles the mean salivary pH dropped to 6.7. At after 20 minutes of intervention mean salivary pH of children was 7.2. Half an hour after the consumption of instant noodles the mean salivary pH of children was 7.5 and after one hour of intervention the mean salivary pH was 7.4.

Table 3 shows inferential statistics as obtained by repeated measures ANOVA test.

There was a statistical significant difference between the mean of salivary pH at baseline and 10 minutes, and 30 minutes. The differences between the means of salivary pH between 10 minutes and 20 minutes; 10 minutes and 30 minutes; 10 minutes and 60 minutes showed a statistical significance at $p < 0.05$.

Statistical significant differences were observed between the means of salivary pH at 20 and 30, and 60 minutes.

Table 1: Demographic details of study participants

Gender	N	Age	N
Males	11	8 years	1
		9 years	5
		10 years	5
Females	9	8 years	2
		9 years	5
		10 years	2

N= number of individuals

Table 2: Mean salivary pH at different time intervals

Time intervals	Mean (95% CI)	Std. Deviation
Baseline	7.33 (7.22-7.5)	0.31
10 minutes	6.78 (6.61-6.92)	0.34
20 minutes	7.26(6.98-7.53)	0.60
30 minutes	7.52 (7.31-7.73)	0.47
60 minutes	7.49 (7.25-7.72)	0.50

Table 3: Comparison of salivary pH at different time intervals using repeated measures ANOVA

Time intervals	Comparison time intervals	Mean difference (95% Confidence Interval)	P value ^a
Baseline	10 min	0.57* (0.43 to 0.69)	0.00*
	20 min	0.09(-0.12 to 0.29)	0.39
	30 min	-0.18* (-0.33 to -0.02)	0.02*
	60 min	-0.14(-0.30 to 0.01)	0.06
10 min	Baseline	-0.56* (-0.69 to -0.43)	0.00*
	20 min	-0.48* (-0.69 to -0.26)	0.00*
	30 min	-0.74* (-0.90 to -0.58)	0.00*
	60 min	-0.71* (-0.91 to -0.50)	0.00*
20 min	Baseline	-0.08(-0.29 to 0.12)	0.39
	10 min	0.48* (0.26to 0.69)	0.00*
	30 min	-0.26* (-0.43 to -0.09)	0.00*
	60 min	-0.23* (-0.37 to -0.08)	0.00*
30 min	Baseline	0.18* (0.02 to 0.33)	0.02*
	10 min	0.74* (0.58 to 0.90)	0.00*
	20 min	0.26* (0.09 to 0.43)	0.00*
	60 min	0.03(-0.14 to 0.21)	0.68
60 min	Baseline	0.14(-0.01 to 0.30)	0.06
	10 min	0.71* (0.50 to 0.91)	0.00*
	20 min	0.23* (0.08 to 0.37)	0.00*
	30 min	-0.03 (-0.21 to 0.14)	0.68

* *significance at p<0.05*

DISCUSSION

Our study results showed a statistically significant difference in the means of salivary pH at baseline with pH at 10 minutes and other time intervals. There was a drop in pH from 7.3 at baseline to 6.7 at 10 minutes. It is interesting to note that though there is high statistical significance but it is not clinically significant. Statistical significance measures how likely that any apparent differences in outcome between treatment and control groups are real and not due to chance¹⁰. Clinical significance refers to the practical or applied value or importance of the effect of an intervention that is, whether the intervention makes a real difference in everyday life of the subjects or to others with whom the subjects interact¹¹.

Noodles are most frequently consumed worldwide and more so in India. Research question aroused out of a thought that noodles contain carbohydrates and they are sticky while we consume, so are noodles cariogenic? To know whether noodles are cariogenic we conducted an experimental study. Measuring the incidence of dental caries would take many years. Thus we relied on measuring the salivary pH which is a surrogate marker for dental caries.

A thorough literature search revealed no studies were conducted to measure the prevalence of noodles eating in India. We observed in our daily life that school going children were more fond of eating noodles and among them children aged 8-10 years were frequently involved in eating noodles. Thus we included school going children aged 8-10 years.

Stephen's curve describes the change in dental plaque pH in response to a challenge over a period of time. Characteristically the curve reveals a rapid drop in plaque pH that is attained. It normally takes at least 20 minutes for the plaque pH to reach its resting value. Based on the concept of

Stephen's curve and studies by Thaweboon et al and Azrak B et al^{12,13} we choose 10,20,30and 60 minutes time intervals to check the changes in salivary pH.

To the best of our knowledge, this was the first study of its kind. Hence there was no basis for scientific calculation of sample size. It is said that 'when there is no prior information to base a sample size on, the recommendation is 12 per group is the thumb rule'¹⁴.

We used a convenient sample for our study and Protocol deviations are the limitations of our study. It was planned to carry out the experiment in the oral pathology department as there was a fixed standard pH meter available. Later we could access a very sensitive reliable portable pen pH meter which could make the job easier. Thus we changed the experiment location from dental college to school of the participants. School setting had an added advantage that the subjects could be at ease and comfortable.

CONCLUSION

Our study results clearly showed a statistical significant difference in the pH before and after consuming instant noodles. However it is very important to note that this difference is not clinically significant. Thus it may indicate that eating instant noodles is not a risk factor for dental caries. We recommend further large scale researches to be conducted to know the cariogenicity of instant noodles.

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