Original Article

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ESTIMATION OF SALIVARY PH IN GUTKA CHEWERS AND NON CHEWERS – A COMPARATIVE STUDY

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ABSTRACT

Introduction: Saliva is a biofluid that is easily accessible by a non-invasive method and is important in the maintenance of oral health. The habit of chewing gutka is rapidly increasing in younger generations. Studies have shown that resting whole mouth salivary pH levels play a significant role in the pathogenesis of oral lesions. However in the literature there is a paucity of influence of gutka chewing on the salivary parameters. **Materials & Methods:** Study group comprised of age and sex matched 30 gutka chewers and 30 non chewers. 3ml of unstimulated whole saliva was collected and pH was estimated using pH meter. Data was statistically analyzed using student "t" test. $p < 0.05$ is considered as statistically significant. **Results:** Mean salivary pH of non chewers was 7.009± 0.32 and for chewers 8.15±0.48. The results were statistically significant ($p< 0.0001$). **Conclusion:** Our study results showed that there was an increase in the salivary pH of the gutka chewers. These results were similar to that obtained by Stich and Rosin (1985). Slaked lime content causes increased alkalinity which in turn results in the escape of intracellular mucus leading to inflammatory and proliferative changes in the tissue. Hence the complex action of gutka chewing may be reflected as variation in pH.

KEYWORDS: Saliva; gutka; estimate

INTRODUCTION

Saliva, a multi constituent oral biological fluid, has high potential for the surveillance of general health & disease as it is exposed to numerous toxic composition responsible for structural & functional changes.[1] Saliva has a pH range of 6.5-7.5. Bicarbonates are the most important buffer present in saliva resisting changes in salivary pH by neutralizing bacterial and cariogenic acids. The pH of saliva is affected by relative Oxygen pressure, bacterial, fungal population, penetration of food, drinks, exposure to thermal and chemical irritants.[2] The use of gutka is becoming more & more common in India. Approximately it is estimated that 5 million youngsters in India under the age of 15 years are addicted to gutka & these products have been strongly implicated in the incidence of potentially malignant disorders.[3] It is suggested that alteration in salivary pH may predict the changes towards development of carcinoma. Recently the use of saliva as diagnostic aid is gaining immense popularity due to close anatomic proximity of saliva to pre-malignant & malignant neoplasm making it ideal for screening of these lesions.[4] Hence the present study was undertaken to estimate the salivary pH in gutka chewers & non gutka chewers.

MATERIALS AND METHODS

Study group comprised of 30 gutka chewers and 30 non chewers within the age group of 20–40 years and all being males. The subjects included in the study were the individuals attending the outpatient department of Navodaya Dental College and Hospital, Raichur. Saliva collection

Table 1: The age distribution of gutka chewers and non-chewers

Age	Chewers (%)	Non-chewers (%)
≤ 20	5 (16.7)	2 (6.7)
21-30	21 (70)	27 (90)
31-40	4 (13.3)	0
> 40	0	1 (3.3)

Table 2: Range and mean pH in gutka chewers and non chewers

Group	Mean ± SD	95 % CI	t-value	p-value
Chewers	8.15 ± 0.48	7.97 – 8.33	10.78	p<0.0001
Non-chewers	7.009 ± 0.32	6.89 – 7.13		

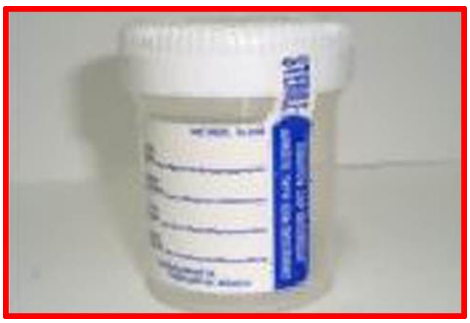

Fig. 1

Fig. 2

was done between 9am to 12pm to avoid diurnal variation. Each subject was requested not to eat, drink or perform oral hygiene during entire study. 3ml of unstimulated whole saliva was collected in a sterile container and pH was estimated using pH meter. Data was statistically analyzed using student "t" test. $p < 0.05$ is considered as statistically significant.

RESULT

The study group comprised of 30 chewers and 30 non chewers. The age distribution of the study population is given in Table 1. It was observed that 70% of chewers were in the age group of 21-30 years. The mean salivary pH of non chewers was 7.009±0.32 and for chewers 8.15±0.48. There was a statistically significant difference on comparison between chewers and non chewers ($p < 0.0001$) Table 2.

STATISTICAL ANALYSIS

Data were expressed in Mean ± SD. Student t test was employed to find the statistical significance of difference in mean pH between chewers and non-chewers. 'p' value of < 0.05 was considered as statistically significant.

DISCUSSION

Gutka is dry mixture of crushed areca nut, tobacco, catechu, lime, aromas and flavorings as well as other additives.[5] 40 percent of the tobacco consumed in India is in the smokeless form (Pan, Pan masala, Zarda, Gutkha).[3] The extensive marketing of gutkha has led to a widespread addiction amongst school going children. Nair *et al*., 2004 has estimated that about 5 million young Indians are suffering from oral submucous fibrosis as a result of increased popularity of habits of chewing gutkha and pan masala.[3] Jyoti *et al*., 2011 have reviewed a large number of studies revealing genotoxicity of pan masala and gutkha. Areca nut which constitutes 70-80 percent of gutkha contains some specific alkaloids. Arecoline, the most important alkaloid is present in 1 percent dry weight and is found to be genotoxic.[3,6,7] Lime, another component of gutkha causes local irritation to mucosa and hyperplasia has been observed following application of lime to cheek pouch of hamsters.[3,7] Catechu, another important ingredient contains 2-10 percent catechin (IARC 2004) and has hepatoprotective effects. On the other hand, it has been reported that catechu in the presence of lime at an alkaline pH is the most reactive producer of reactive oxygen species (ROS) which are considered to be important in the process of mutagenesis.[3] Thus, gutkha represents a complex mixture of harmful constituents. Few studies have been done on the

influence of gutka chewing on the salivary parameters including salivary pH. Hence the present study was undertaken to observe the alterations of salivary pH in gutka chewers. In the present study pH in gutka chewers ranged from 7.5 to 8 with the mean pH of 8.15± 0.48 whereas in non chewers the pH ranges was between 6.7±7 with the mean pH of 7.009±32. On comparison with non chewers there was increase in pH in gutka chewers. These results were similar to that obtained by Stich and Rosin (1985).[6] There was statistically significant difference when pH was compared between chewers and non chewers. These changes may reflect an alteration in the electrolyte constituent of saliva in gutka chewers thus making it more alkaline. Auto-oxidation of polyphenols in areca nut and catechu generates the superoxide anion, especially at the high pH of slaked lime and by the presence of the transition metals, copper and iron.[7-11] Thus calcium hydroxide content and pH were highly correlated with generation of ROS. These results suggest that the calcium hydroxide content of lime in the presence of areca nut is a major factor responsible for the formation of ROS which cause oxidative damage. Decreasing the slaked lime content of gutka should therefore reduce its toxicity.[3.7.10,11] The harmful effects induced by the ingredients of gutka like alteration in salivary pH leading to precancerous and cancerous conditions has been well understood. Thus it is important to look into the genotoxic potential of gutka. Hence the present investigation was carried out on gutka consumers.

CONCLUSION

The present study results showed that salivary pH of gutka chewers was elevated when compared to non chewers. The complex action of harmful constituents of gutka is thus reflected as variation in salivary pH. Thus the alteration in salivary pH may be one of the factors responsible for the causation of precancerous and cancerous lesions. Hence further extensive studies needs to be undertaken to know the exact role of salivary pH in pathogenesis of these lesions.

CONFLICT OF INTEREST & SOURCE OF FUNDING

The author declares that there is no source of funding and there is no conflict of interest among all authors.

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