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Effects of Processed Arecanut Chewing and Smoking in Salivary Flow Rate and Salivary Ph-A Biochemical Analysis

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Aim: The aim of the study is to analyze and compare the long term effect of tobacco on salivary Flowrate and pH among tobacco Chewers, Smokers and Controls.

Method: In this study, unstimulated saliva of 207 subjects (69 smokers, 69 processed arecanut chewers, 69 controls.) was collected. Saliva was collected and flow rate was measured.and salivary pH was calculated in pH meter. Salivary obtained data was analyzed by statistical software SPSS-17 through Anova test .

Results: Result showed that a decreased level of mean salivary flow rate and salivary pH were seen in subjects who were habituataed to processed arecanut chewing and smoking while comparing with control group.The mean (±SD) SFR was found to be 0.2420 (±0.6040) ml/min for group A(Smokers), 0.2406 (±0.6490) ml/min for group B(processed arecanut chewers), and 0.3590 (±0.773) ml/min for group C(control), The mean (±SD) pH was found to be 5.993 (±0.433) for group A, 6.167 (±0.651) for group B, and 7.00 (±0.00) for group C .On comparing the groups,a significant value is obtained when smokers is compared with control ($p<0.001$ vhs),and and processed arecanut chewers group is compared with control ($p<0.001$ vhs).A non-significant relation is obtained when processed arecanut chewers is compared with smokers (p value is 0.991).**Interpretation & Conclusion:**The habits like processed arecanut chewing and smoking significantly reduces the salivary flowrate and salivary pH. A significant negative association is found on comparing smokers, processed arecanut chewers and controls for salivary flowrate and salivary pH suggesting that a notable decrease in salivary flowrate in processed arecanut chewers followed by smokers and smokers followed by processed arecanut chewers in salivary pH occurs. Alterations in these parameters could be an early sign of oral mucosal deterioration. Hence salivary flow rate and salivary pH measurements can be used as a chair side, non-invasive measures for assessing the pathological changes in oral mucosa linked to the vulnerable effects among people addicted to these adverse habits thereby early recognition can prevent morbidity and mortality caused by Oral Potentially Malignant Disorder and Malignancy.

Key Words: Saliva;Salivary flow rate;,Salivary ;Processed arecanut chewers**.**

I. INTRODUCTION

Tobacco consumption is considered as one of the most important public health problems worldwide. The use of tobacco products has been considered as the most important etiological factor in the development of oral cancer.

The International agency for research of cancer has stated that there is sufficient evidence to show that tobacco is carcinogenic. The incidence rate of oral squamous cell carcinoma varies widely worldwide. In India it is the common cancer with an annual incidence rate of 27/100,000 in males, accounting for over 50% of all cancers.

The complex interaction of various components of tobacco is vital in determining its hazardous effect. The net physiological effect is a result of individual components of tobacco, their ratio, bioavailability, frequency of intake, duration of habit, and exposure time per use. All these can result in an alteration in the quantity and quality of saliva.[1]

Processed arecanut forms contain chemically of naturally cured arecanut mixed with catechu,saffron,artificial flavouring and sweetening agents (supari) and lime (panmasala) along with tobacco. The main ingredient of tobacco is nicotine, whichacts on certain cholinergic receptors in the brain and other organs causing neural activation leading to altered salivary secretion.[2]Smoking is one of the major health problems in the world, especially in developing countries. Based on World Health Organization (WHO) data in 2012, there are 1 billion smokers in the world with a global smoking prevalence of 21%, 790 million of whom are from countries with low and middle-income economies.

The use of saliva for the diagnostic purpose is gaining wide momentum in recent years. Saliva is a clinically informative, biological fluid that is useful for novel approaches to prognosis, laboratory or clinical diagnosis.[4]

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The salivary flow rate is a modulator of salivary acidity (pH), thus, if the salivary flow rate is small, a small amount of bicarbonate then will be produced, resulting in low salivary pH.

Therefore, salivary flow rate and salivary pH can be considered as factors that play an important role in maintaining oral health.

Hence this study was carried out to assess the effects of processed arecanut chewing and smoking on salivary flow rate and salivary pH.

II. MATERIALS AND METHODS

STUDY SETTING:

Present study was conducted in the Department of Oral medicine and Radiology, A.J Institute of Dental Sciences, Mangalore, after obtaining clearance from the Institutional Ethical Committee Board.

STUDY SUBJECTS:

Data was collected from out patients visiting to the Department of Oral medicine and Radiology A.J institute of Dental Sciences, Mangalore. Total of 207 subjects who were habituated to processed arecanut chewing and smoking for more than 6 months were included in the study. Salivary flow rate and salivary pH were measured.

Study population consists subjects aged between 20-55yrs which includes total of 207 patients.

Study design consists of 3 groups:

Group 1; Controls-69 subjects without any deleterious habits.

Group 2; Processed Arecanut chewers- 69 subjects habituated to processed Arecanut chewing.

Group 3; Smokers- 69 subjects habituated to smoking.

Ethical clearance and patient consent was taken.

EQUIPMENT AND MATERIALS USED.

- Instruments used for clinical examination-

Dental chair, illumination light, kidney trays, sterile mouth mirror, straight probes tweezers, sterile gauze pieces, a pair of sterile gloves and a mouth mask**.**

- Materials used for assessment of salivary flow rate-

Sterile Container to collect saliva

Graduated tube for measurement of salivary flow rate.

- Materials used for assessment of salivary pH Meter

METHODOLOGY

INCLUSION CRITERIA

For group 1

1. Subjects in the age group of 20 to 55 years without any deleterious habits.

For group 2

1. Patients in the age group of 20 to 55 years who were habituated to processed arecanut chewing daily for more than 6 months.

For group 3

1. Patients in the age group of 20 to 55 years who were habituated to smoking daily for more than 6 months.

EXCLUSION CRITERIA

- Subjects suffering from systemic illness.
- Subjects undergoing radiotherapy.
- Subjects undergoing Chemotherapy.
- Patients with potentially malignant disorders.
- Patients under medication.
- Pregnant and post-menopausal women.
- Patients with salivary gland disorders.
- Patients with any lesions in oral cavity.
- Chronic alcoholic

Saliva collection

Patients visiting the Department of Oral Medicine and Radiology A.J. Institute of Dental Sciences, Mangalore, for any relevant reason. Saliva collection was carried out between 9.00 am and 12.00 pm to avoid diurnal variation. Each subject was requested not to eat, drink or perform oral hygiene or chew or smoke 60 min before and during the entire procedure**.**

Evaluation of salivary flow rate:

After collecting saliva, the salivary flow rate was measured and expressed in ml/minutes.

Transport and storage-

The containers containing whole saliva were labelled with patient detail and taken to the Biochemistry lab of A.J.Institute of Medical Sciences, for further analysis.

Evaluation of salivary pH:

Saliva was collected in a plastic graduated tube and stored in refrigerator at 4 degrees Celsius until the analysis. Within 2 hours of collection saliva was analysed using a pH Meter in the Department of Biochemistry.

RESULTS

Statistical Analysis

Data was entered in the Excel spread sheet. Obtained data was analysed using ANOVA(Analysis of variance).Tukey'S HSD(Honestly significant difference) test,was used for the comparison of three groups. Descriptive statistics like mean,standard deviation and percentages were calculated using SPSS

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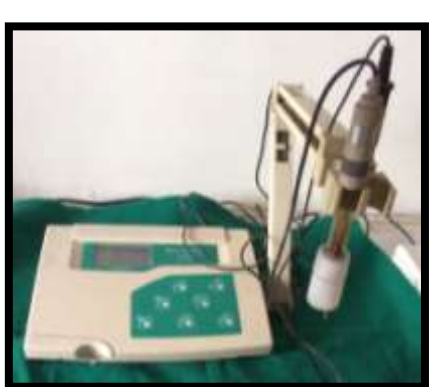
(Stastical Package for Social Science)version 17.0. P value <0.05 was considered significant.

Diagnostic instruments

CONTAINER

Graduated tube



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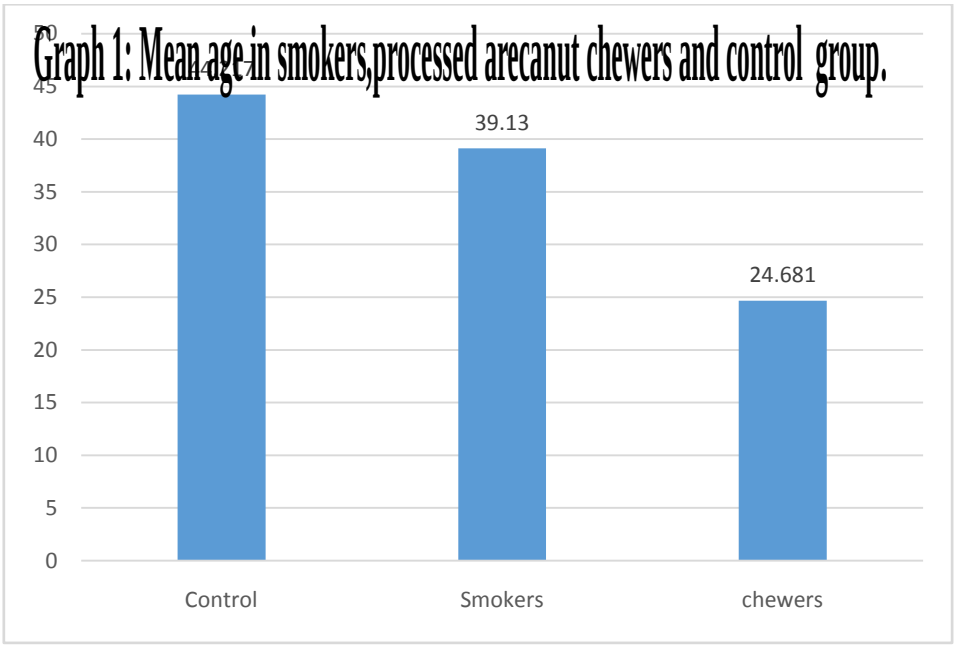
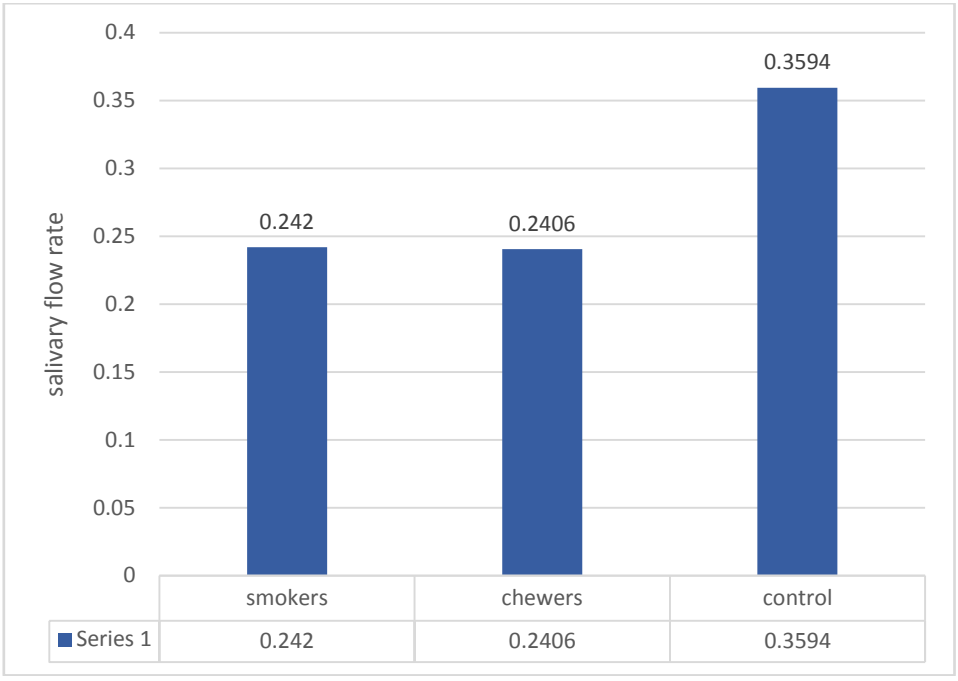
III. RESULTS





AVERAGE SALIVARY FLOW RATE SMOKERS,PROCESSED ARECANUT CHEWERS AND CONTROL GROUP

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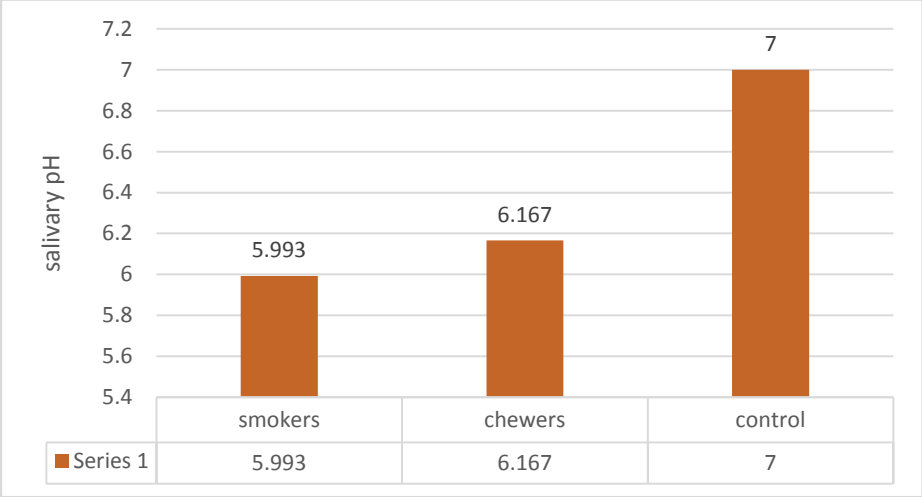

Average salivary pHin smokers,processed arecanut chewers and control group.

IV. DISCUSSION

Saliva plays an important role in oral health monitoring, regulating, and maintaining the integrity of oral mucosa. Salivary diagnosis is an increasingly important field in dentistry as it is an easily obtainable, non-invasive diagnostic medium. It is necessary for protection, lubrication of oral mucosal tissues, remineralization of teeth, digestion, taste sensation, stimulation, washed out eff ect, pH balance, and phonation.[1] Saliva is the first biological fluid that is exposed to cigarette smoke, which contains numerous toxic compositions responsible for structural and functional changes in saliva.[5]

im of the study is to compare the effects of processed Arecanut chewing and smoking on salivary flow rate and salivary pH. This present study was carried out on a total of 207 subjects visiting the department of Oral medicine and Radiology at our institution. The patients were further divided equally into three groups as processed arecanut chewers and smokers and a control group

In present study the mean (±SD) SFR was found to be 0.2420 ±0.6040 ml/min for group A(Smokers), 0.2406 ±0.6490 ml/min for group B(processed arecanut chewers), and 0.3590 ±0.773 ml/min for group C(control),

On comparison of three groups, a significant value is obtained when smokers is compared with control ($p<0.001$ vhs), and and processed arecanut chewers group is compared with control ($p<0.001$ vhs).

A non-significant relation is obtained when processed arecanut chewers is compared with smokers (p value is 0.991)

This decrease in salivary flow rate is observed when smokers is compared with control group, due to the effect of nicotine on the taste nerve Apparatus

Khan et al. observed that some individuals develop tolerance to the salivary effects of smoking in the long term use. A number of studies have shown that cigarette smoking would typically cause a noticeable short term increase in Salivary Flowrate, which is still unclear (Khan et al., 2010).

It has also been observed that some individuals develop tolerance to the salivary effects of smoking in the long-term use. (Maryam Rad et al.)

A study conducted by Rad et al in which the mean Salivary Flowrate was lower in smokers that is, 0.38 ± 0.13 ml/min as compared to non-smokers that is, 0.56 ± 0.16 ml/min

On the contrary, in the study conducted by Fenoll-Palomares et al. (2004). The mean Salivary Flowrate was in which the mean Salivary Flowrate was lower in smokers that is, 0.38 ± 0.13 ml/min as compared to non-smokers

Similarly, Khan et al. showed that Salivary Flowrate was 0.46 ± 0.05 ml/min in smokers while 0.43 ± 0.05 ml/min in non-smokers. There was no statistically significant difference was observed[6]

A no. of studies shown that while cigarette smoking would typically cause a noticeable short-term increases in salivary flowrate because it increases the activity of salivary glands in anyone who begins smoking, but in long-term use it has been observed that some individuals develop tolerance to the salivary effect of smoking so it reduces salivary flowrate. And also smoking is one of the risk factors for reducing saliva and xerostomia

Salivary Flow Rate (SFR) in Group 2subjects (processed arecanut chewers) showed a significant reduction than other groups.

In accordance to our study, SFR was reduced in studies done by Kanwar et al.

In contrary, few studies done by Siddabasappa et al. showed an increase in SFR[7]

Barman I et al studies shows that in proceesed arecanut chewers the mean salivary flow rate drops probably due to lime that converts arecoline to arecaidine.[8]

It is generally believed that repeated exposure of a receptor to a stimulus results in inactivation (suppression or adaptation) of the receptor. Most of the methods of tobacco use are linked to the oral cavity where the taste receptors, a primary site for stimulation of salivary secretion, are constantly exposed to tobacco for long time.

It is also observed that the mean (±SD) pH was found to be 5.993 (±0.433) for group A, 6.167 (±0.651) for group B, and 7.00 (±0.00) for group C (Table 4). Salivary p H is found to be lower in smokers.

On comparison of three groups, a significant value is obtained when smokers is compared with control ($p<0.001$ vhs), and and processed arecanut chewers group is compared with control ($p<0.001$ vhs).

A non-significant relation is obtained when processed arecanut chewers is compared with smokers (p value is 0.991)

Study conducted by saraswathi et al it was also observed that the mean (±SD) salivary pH of whole saliva, was 6.12 (±0.5) in the smokers group, 5.47 (±0.61) in the chewers group and 6.97 (±0.11) in the control group. salivary pH was found to be lower (acidic) in tobacco smokers and tobacco chewers than in controls.[8]

Study conducted by Neeraj Groveret al , Group A and B subjects consume tobacco for minimum of around 5 years. The mean pH scores of saliva in three distinct groups showed that pH scores were maximum in the control group while it was least in tobacco chewers group[2]

On the contrary, the studyconducted by Al-Weheb10 showed that the mean salivary pH was higher in smokers that is, 7.32 as compared to nonsmokers that is, 7.27.[8]

According to Alpana Kanwar et al. The mean (±SD) pH for Group A; 6.8 (±0.1), Group B; 6.7 (±0.1) and Group C; 7.04 (±0.1) when compared and a nonsignificant relation was obtained though, lower salivary pH as was observed in Groups A and B[11]

The role of lime in paan and BQ has been a source of concern. Lime (calcium oxide in aqueous forms calcium hydroxide) could cause a free radical injury or the high alkaline content probably reacts with the salivary buffering systems and alters the pH.

Hence it can be concluded that the habits like processed arecanut chewing and smoking significantly reduces the salivary flowrate and salivary pH. A significant negative association is found when smokers and processed arecanut chewers were compared with the control group individually. There was a notable decrease in salivary flowrate in smokers followed by processed arecanut chewers and processed arecanut chewers followed bysmokers in salivary pH.

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