

## Estimation and Comparison of Salivary Calcium Levels in Smokers and non Smokers

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### **Abstract:**

**Objective:** The purpose of this study was to compare salivary calcium (Ca) level in smokers and non-smokers .

**Materials and Methods:** 140 subjects were included in the study and were grouped as follows: The study group consisted of 80 subjects group I (tobacco smoking users), 60 subjects group II (non tobacco smoking users). Clinical measurements and non-stimulated whole saliva samples were obtained and analyzed for Ca levels by ion-selective electrolyte analyzer.

**Results:** When salivary Ca values were compared between the groups, they showed statistically significant values ( $P < 0.001$ ) with the highest mean Ca level in Group I .

**Conclusions:** The present study showed that smokers have higher salivary calcium levels estimated by ion-selective electrolyte analyzer.

**Keywords:** calcium, smokers,non smokers, saliva.

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### I. Introduction

Saliva is a complex and important body fluid which is very essential for oral health. Saliva is required for protecting the oral mucosa, teeth remineralization, digestion, taste sensation, pH balance and phonation. It includes a variety of electrolytes, peptides, glycoproteins, and lipids which have antimicrobial, antioxidant, tissue repair, and buffering properties<sup>1</sup>. Therefore, altered whole-mouth salivary flow rate (SFR) has an important role in the pathogenesis of oral and dental diseases. 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.

The effects of tobacco on the oral tissues have been an area of interest to researchers for a long time [1]. Tobacco is addictive, and its use is harmful to health in many ways<sup>2</sup>. Lack of awareness of the effects of tobacco use and the difficulty to discontinue the habit (psychology and nicotine dependence of an individual) has led to the increased incidence of tobacco use<sup>3</sup>. Tobacco habit encountered around the world is mainly in the form of tobacco smoking, tobacco chewing and tobacco snuff use but in India, tobacco is used in the form of bidis (34%), cigarettes (30%), chewing tobacco (19%), hookah (9%), cigars and cheroots (5%), and snuff (2%)<sup>4</sup>. Tobacco was responsible for an estimated three million annual deaths in the world during early 1990s and with the current consumption trends it is expected to rise to ten million annual deaths during the 2020s. About 70% of these deaths are expected to occur in developing countries<sup>5,6</sup>. A potentially dangerous association exists between tobacco smoking and health. Smoking is a complex external and internal stimulus consisting of visual, tactile, mechanical (mouth movement), olfactory, gustatory, and irritational factors<sup>7</sup>. Tobacco smoke contains a major class of organic chemical compounds that includes chemical asphyxiants, irritants, ciliastatic compounds, carcinogens and co-carcinogen. There are clinical and epidemiological evidences regarding the adverse effects of tobacco on oral health. Numerous studies have shown that tobacco use would lead to an increased incidence and severity of periodontal diseases and a higher rate of tooth loss. The adverse effects of cigarette smoking and other forms of tobacco are numerous and tobacco use has been associated with gingival, oral mucosa and dental alteration.

### II. Method

A comparative descriptive cross-sectional study was conducted in the Department of Oral Pathology and Microbiology, Govt. Dental College & Hospital, Srinagar, India. complete and detailed explanation about the nature of study and its objective, written consent was obtained from all subjects recruited for the study. The study population was selected from consecutive patients between the period as and when they presented and as long as they satisfied the inclusion criteria. The study group consisted of 80 subjects group I (tobacco smoking users), 60 subjects group II (non tobacco smoking users). In the study, tobacco smoking was defined as use of cigarettes or bidis (a small quantity of shredded, sun-cured tobacco which is hand rolled into a piece of dried tendu or temburni leaf) or a combination of both. The demographic data were entered into a pro forma after seating the subject on a well-illuminated dental chair. Duration, frequency and type of tobacco use habit were recorded. Only male subjects above 20 years with the habit of tobacco smoking for a minimum of five years

were included in the study. Subjects who had the habit tobacco smoking , overt salivary gland dysfunction and salivary flow rate of less than 2 ml/10 minutes were excluded from the study. The study was carried out over six-month period. The data and saliva sample collection were carried out by the first author (BRD) with the assistance of the second author (SP)

**Saliva Collection Procedure**

Unstimulated whole saliva samples were collected .All subjects were advised to gargle their mouth with water before collection of saliva and had not been eating, drinking or smoking for at least one hour in order to avoid the contamination of saliva sample with local factors such as food debris, tobacco and other particles. The saliva sample was collected at one occasion under resting conditions in the outpatient department during the morning hours, between 9 am and 12 noon, to minimise the effects of circadian rhythms. Subjects were asked to collect saliva in their mouths for ten minutes and then spit into a sterile wide mouthed calibrated cup . The concentration of salivary calcium is influenced by stimulation . The samples were transferred to wide mouth sterile containers, which were capped and stored at -20°C until used for the assay. Samples were then assessed by ion-selective electrolyte analyzer for Ca ion.

**III. Results**

**Statistical Analysis:**

Data were expressed as means and standard deviations. Statistical significance of differences between the groups (groups I–II) was tested according to analysis of variance (ANOVA) using Tukey–Kramer multiple comparison test. Mean values for age and sex were calculated. The level of statistical significance was set at  $P < 0.05$ .

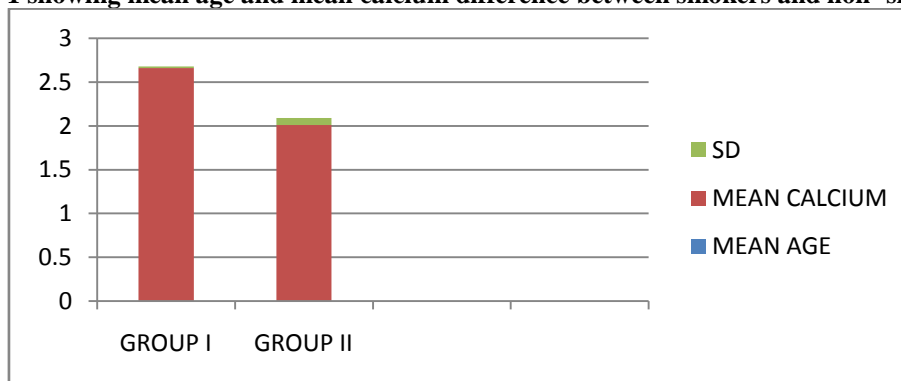
A total of 140 subjects were enrolled in this study, with a mean age of 32.25 ( $\pm 10.05$ ) years in Group I, 39 ( $\pm 3.46$ ) years in Group II.(Table 1 and Graph 1)

**Table 1:**

S.No	Groups	Total Number	Age,Years Mean $\pm$ Sd
1.	Group I	80	32.25( $\pm 10.05$ )Years
2.	Group li	60	39( $\pm 3.46$ )Years

ANOVA test results for salivary Ca using Tukey–Kramer multiple comparisons test between the groups were calculated. Overall, the  $P$  values for salivary Ca level showed statistically significant correlations. Salivary Ca levels varied considerably between the groups. Highest values of salivary Ca were seen in smokers (Group I) with the mean salivary Ca value being  $2.66 \pm 0.02$  , followed by non-smokers (GroupI I) with the salivary Ca value being  $2.01 \pm 0.08$  .

**Table 1 showing mean age and mean calcium difference between smokers and non- smokers:**



When groups I was compared with group II for salivary Ca, groupI showed statistically significant difference values ( $P < 0.001$ ) and the highest mean Ca levels were found in smokers.

**IV. Discussion**

Our results showed that the mean calcium in smokers was significantly higher than that in non-smokers ( $p < 0.0001$ ).

Salivary composition for Ca has been studied several times and different techniques have been used, such as atomic absorption spectrophotometry, flame photometry, and by inductively coupled plasma-atomic emission spectrophotometry technique. To our knowledge, this is the first time where salivary Ca has been studied using ion-selective electrolyte analyzer.

Salivary Ca may be important with regard to dental and gingival health by way of its effect on mineralization of plaque. An elevated level of salivary Ca has been reported as a characteristic of periodontally diseased patients.<sup>1</sup>

Smoking is reported to independently increase salivary Ca levels by decreasing skeletal bone density.<sup>5,11</sup> Moreover, the constant exposure of taste receptors to tobacco presumably affects the salivary reflex and, in turn, salivary Ca levels.

In the present study, the concentration of salivary calcium in unstimulated whole saliva revealed an increase in tobacco smokers when compared to non smokers, which is highly significant statistically. This difference in the results can be explained in the following ways. Smoking markedly increases the flow rate of saliva leading to increased calcium levels in the oral cavity during smoking.<sup>10</sup>

## **V. Conclusion**

In the group studied, salivary calcium levels were higher in tobacco smokers than in non-tobacco smokers. This finding suggests that smoking has a greater effect on the mucosal immune system than non smokers.

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