The effect of smoking on periodontal health status salivary composition

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ABSTRACT

Background: The purpose of this study was to evaluate the effect of smoking on periodontal status and the salivary composition.

Materials and Methods: The study groups include 25 healthy subjects, 13 smokers and 12 non-smokers. Periodontal parameter included PL.I, G.I, C.I.S and B.O.P was recorded. Five ml of unstimulated whole saliva was collected before clinical measurement. Biochemical analysis of saliva was carried out which include thiocyanate, sodium, calcium, magnesium and potassium.

Results: The smokers exhibited significant difference in mean of PL.I and C.I.S (1.47, 1.44) respectively in comparison to non smoker (1.19, 0.82) respectively. The non smoker exhibited higher percentage of B.O.P (39%) in comparison to smoker (27%) which is significantly difference. There was no difference in the mean of G.I for smoker in compare to non smoker (1.21, 1.29) respectively. The biochemical analysis of saliva showed that sodium values were significantly greater in non smoker (13.89 mEq/l) when compared to smoker (8.99mEq/l). Like wise non smoker exhibited greater calcium level (7.09 mg/100ml) when compared to smoker (3.43 mg/100ml) and for magnesium was (0.81mEq/l) for non smoker compared to smoker (0.47mEq/l). On contrary smoker showed higher level of thiocyanate and potassium (1.33 mM, 18.89mEq/l) respectively in comparison with non smoker (0.56 mM, 13.79mEq/l) respectively.

Conclusion: Smoker exhibited low level of oral hygiene and greater disease level but reduced calcium, sodium and magnesium concentration in compare to non smoker

Key words: Smoking, periodontal parameter, saliva and chemistry. (J Bagh Coll Dentistry 2008; 20(1) 49-51)

INTRODUCTION

There is accumulating evidence that smokers have higher level of periodontal disease than non-smokers (1-3). A meta analysis of 6 studies has revealed that the risk for periodontitis in smokers increases with an odd ratio of 2.8 (4). Axelsson et al (5) studied the caries status in a randomized sample of 1.093 subjects representing periodontal and different age categories ranging from 35 to 75 years. They found that smoking was significant risk indicator for tooth loss, attachment loss and dental caries.

Impairment of the host immune system may be one factor that explains the higher occurrence and the severity of periodontitis among cigarette smokers. Indeed, it has been shown that polymorph nuclear leukocyte functions such as chemotaxis, phagocytosis, and oxidative burst are decreased by substances in cigarette smoke (6, 7), although over stimulation of salivary neutrophils has also been reported (8).

Based on the observation that smokers may present with low level of gingival inflammation, it has been speculated that the gingival blood flow in smokers may be less in composition to non-smokers (9). This would also induce decreased local host deference.

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The effect of smoking on salivary composition has seldom been studied. MacGregor and Edgar (10) examined fresh whole saliva in smokers, who exhibited greater plaque and calculus formation also had shown elevated calcium concentration and elevated calcium phosphate (Ca/ P) ration in plaque. Sew et al (11) found higher calcium concentration in periodontitis affected subjects; data were not available in regard to the effect of smoking on calcium level in those patients.

MATERIAL AND METHODS

The study group included twenty-five subjects referred to periodontal department in the college of dentistry, Baghdad University, with range age 18- 36 years (average 27 years).

Thirteen of the subjects were smokers for at least four years and not less than 15 cigarettes per day, while the other twelve subjects were not smokers or used tobacco in any way for minimum 3 years before the examination. All subjects were in good general health and were not using any medications.

The clinical examinations

The following clinical variables were recorded:- plaque index (PL.I) according to sinless and Loe 1964 (12) Gingival index (G.I) according to Loe and silences 1963 (13) Bleeding on probing B.O.P which was given as the number of bleeding sites in percentage as a total, and the simplified calculus index (C.I.S) (14)
Biochemical analysis

Five ml of saliva samples were collected before clinical measurement usually between 8 a.m and 11 a.m. Subjects were instructed not to consume any food or drink 2 hours before sample collection. Non-stimulated whole saliva was collected from the oral cavity where it was allowed to accumulate at the floor of the mouth and transferred to a steel glass tube. The procedure was repeated for approximately 10 minutes. The saliva was stored in small bottles in deep freezer at temperature-20 °C.

The concentration of salivary thiocyanate was estimate by using a calorimetric methods (Powell 1945) (15), and the other inorganic institute which include sodium, potassium calcium and magnesium were measured by atomic absorption spectrophotometer.

Statistical analysis

The clinical parameters which include (PL.I, G.I, CI.S) and biochemical salivary composition were compared between group (smokers versus non-smokers) using two-tailed student t. lest. For the B.O.P, chi-square was used.

RESULT

Periodontal finding

Table 1 showed that the overall mean PL.I for smoker was 1.47 ±0.70 (mean ± SD) and that for non-smoker 1.19±0.73. The difference was statistically significant (p<0.05). On the other hand, for the gingival status the mean and S.D for smoker was 1.21±0.66 and 1.29±0.72 for non-smoker. The difference was not significant p>0.05. The CI.S for smoker was 1.44 ±0.62 and for non-smoker was 0.82 ± 0.50 which was significant (P<0.05).

The percentage of P.O.P for smoker and non smoker was 27% and 39% respectively (Table 2). There was significant difference P<0.05.

Biochemical analysis

The mean and SD for the concentration of the all inorganic constituent of the pooled saliva in smoker and non-smoker are shown in table 3. The thiocyanat concentrates was significantly higher in smoker (1.33±0.21) in comparison to non-smoker (0.56±0.14). Also significant difference was found in the potassium concentration for smoker and non smoker (P<0.05).

The concentration of sodium was higher for non-smoker (13.86 ±0.08) in comparison to smoker (8.99±0.35). There was significant deference between both groups. Like was non-smoker exhibited 50% greater salivary calcium level (7.09 ±0.08) compared to (3.43 ±0.06) in smoke (P< 0.05). The overall salivary magnesium was relatively low (0.64 m Eq/I). However smoker exhibited much lower concentration of magnesium (0.47±0.02) compared to (0.81±0.05) in non smoker, which was statistically significant p<0.05.

| Table 1: The mean and standard division of PL.I, G.I and CI.S for smokers and non-smokers |
|---------------------------------|---------------------------------|
| PL.I                           | G.I                            |
| 1.47±0.70 Sm                   | 1.21±0.66 Sm                   |
| 1.19±0.73 Non.sm               | 1.29±0.72 Non.sm               |
| CI.S                           |                                |
| 1.44±0.62 Sm                   | 0.82±0.50 Non.sm               |

Sm = smoker Non sm = non smoker
* = significant P< 0.05

| Table 2: The percentage of B.O.P for smokers and non smokers |
|---------------------------------|---------------------------------|
| B.O.P                          |
| 27% Sm                         | 39% Non Sm                     |

Sm = smoker Non sm = non smoker
* = significant P< 0.05

| Table 3: The mean and SD of concentration of inorganic constituent of saliva in smokers and non-smokers |
|---------------------------------|---------------------------------|
| Ione                           | Conc. |
| Thiocyanate mM                 | 1.33±0.21 Sm                   |
| Sodium mEq/I                   | 8.99±0.35 Sm                   |
| Ca mg/100ml                    | 13.86±0.7 Non.sm               |
| Potassium mEq/I                | 18.98±2.2 Sm                   |
| Magnesium mEq/I                | 13.79±2.1 Non sm               |

Sm = smoker Non sm = non smoker
* = significant P< 0.0

DISCUSSION

The result showed that mean PL.I and CLS were significantly higher in smoker in comparison to non- smoker and this agree with other studies (16-18) who found that there is higher level of plaque and calculus in smoker than non- smoker. The result showed a reduction in clinical signs of gingivitis which had been reported in smoker and this effect had been shown to be independent of plaque level and this agrees with Bergstrom etal and Bergstrom and Floderns (19, 20). The study showed that smoker had less bleeding on probing in comparison to non-smoker (27%, 37% respectively) and this agrees with Van Winkehoff
and this suggests that nicotine could mediate its vasoactive effect on local basis and impaired vascularisation (22) and an inhibition of collagen and fibronectin production associated with smoking (23).

This study showed thiocyanat level which is considered as chemical indicator of cigarette smoking (24) was higher in smokers (1.33 ±0.21) in comparison to non smokers (0.56±0.14) and it was statistically significant difference. This finding agrees with other studies (24-26). The potassium concentration for smoker was (18.98 ±2.21) and for non smokers was (13.79 ±2.09) and there is significant difference between them and this agree with Dogon etal (25).

The other inorganic constituent who includes sodium, magnesium and calcium showed greater mean value of non-smokers in comparison to smokers and this agree with Zubai etal (27). This can be explained that during gingival inflammation, greater cervical gingival fluid (C.G.F.) flow was recorded. This increase in C.G.F secretion may account for the increase salivary protein and electrolytes of mixed saliva where C.G.F is one of its sources. (28, 29), and smokers showed reduced amount of C.G.F. (29).

REFERENCES