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Research Article

ALTERATION IN THE SALIVARY FLOW, PH, MICROBIAL FLORA AND ITS INFLUENCE ON ORAL HYGIENE USING ORAL HYGIENE INDEX ON SMOKERS

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A B S T R A C T

The aim is to understand the alteration in the slaivary flow, pH, microbial flora and oral hygiene in patients having the habit of smoking. **Objective:** change in the whole mouth salivary flow rate, pH and microbial flora content plays a significant role in pathogensis of various oral conditions. Factors such as smoking may affect the oral and dental health. The primary purpose of this study is to determine the effect of smoking on SFR, pH, microbial flora content on oral and dental health. **Background:** Saliva is a complex and important body fluid which is essential for oral health. Its functions are protection of the oral mucosa, teeth remineralization, digestion, taste sensation and phonation. Reason: To evaluate the effect of smoking on the saliva and microbial flora in the oral cavity.

INTRODUCTION

Saliva plays a significant role in maintaining oral health, helping to build and maintain the health of soft and hard tissues. When saliva flow is reduced, oral health problems such as dental caries and oral infections can develop [1]. Being complex fluid, which influences oral health through specific and nonspecific physical and chemical properties [2]. Change in the whole-mouth salivary flow rate (SFR), pH and microbial flora content play a significant role in patho-genesis of various oral conditions. Factors such as smoking may affect the oral and dental health. The primary purpose of this study is to determine the effect of smoking on SFR, pH, microbial flora content and oral and dental health. [3]. The smoke of tobacco spreads to about all parts of the oral cavity and therefore, the taste receptors, a primary receptor site for salivary secretion, are constantly exposed to this smoke during the smoking process. It has been discovered that smoking increases the activity of salivary glands and indeed, this observation has been made by everyone who begins smoking. It has also been observed that some tolerance develops to the salivatory effects of smoking because habitual smokers do not salivate as do novice smokers in response to smoking. [4]

The pH in the saliva plays an important role in the life, growth and multiplication of oral bacteria. The number of acidophilic bacteria is increased when the pH in the saliva is very low, whereas the number of the acid-sensitive bacteria is decreased.

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The increased number of acidophilic bacteria in the dental plaque and saliva above 10^5 colony forming unit colonies, as well as a low pH and caries risk test-buffer capacity of the saliva, can indicate a high risk of caries [5].

Therefore, altered whole-mouth SFR has an important role in the pathogenesis of oral and dental diseases [6]. Alterations in salivary function may lead to impairment of oral tissues and have a large impact on the patient's quality of life. A higher incidence of dental caries, oral mucositis, dysphagia, oral infections and altered taste has been reported in individuals with reduced salivary flow [7].

MATERIALS AND METHODS

A cross-sectional study was conducted in the Department of General Medicine of Saveetha Medical College and Hospitals, Chennai, Tamil Nadu, India. A total convenience sample of 11 men aged between 24 and 54 years was selected. Subjects with any systemic diseases and complaint of xerostomia were excluded from the study.

The study protocol was in compliance with the Helsinki Declaration and an approval was obtained from the institution's ethical committee. An oral informed consent was obtained from all participants prior to the study procedure. The intraoral examination was conducted by a single examiner under favorable lighting conditions using a sterile mouth mirror, diagnostic probe, and explorer. The clinical findings were recorded and the oral hygiene index was obtained to determine the prevalence of oral hygiene. The saliva sample collection procedure was standardized prior to the study. The collection of unstimulated whole saliva was

performed under resting conditions between 9.30 am and 11.30 am. The subjects were advised to rinse their mouth several times with (distilled) water and then relax for 5 min before the procedure. The subjects were asked to sit comfortably with head tilted slightly forward and expectorate the saliva accumulated in the floor of the mouth into disposable plastic containers for duration of 30 seconds. The salivary samples were quantified volumetrically using graduated measuring cylinder. The salivary flow rate was expressed as ml/min. The saliva samples were cultured under culture media for 24hrs to analyze streptococcus mutants content. The collected fluid was also used to measure salivary pH using a pH strip.

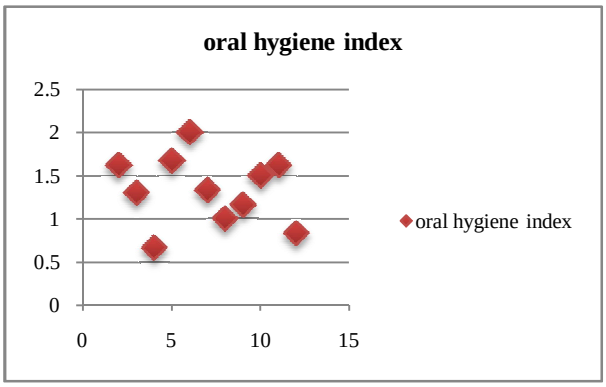
The Statistical analysis was done using the MS Excel software.

RESULTS

The Oral Hygiene index, pH, microbial flora and the salivary flow (SFR) were analyzed from the collected saliva samples.

Oral Hygiene Index

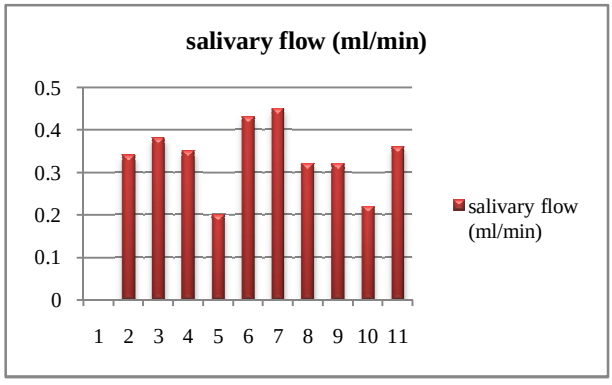
The mean value of the oral hygiene index in smokers were about 1.98 [graph 1].



Graph 1 Oral hygiene index in smokers

Salivary Flow Rate

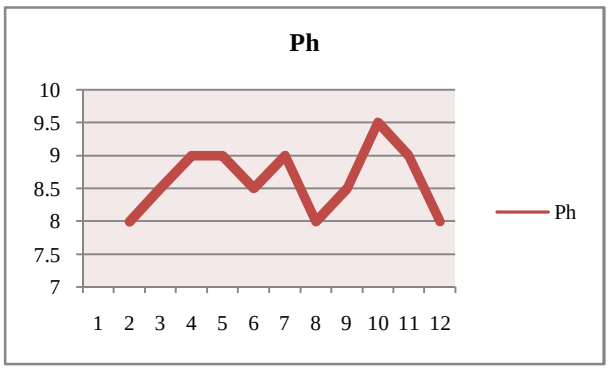
The mean value of the salivary flow in smokers was 0.23ml/min [graph 2]. This is comparatively lesser when compared to non smoker's salivary rate which is 0.3-0.4 ml/min [7].



Graph 2 Distribution of the salivary flow rate.

Ph

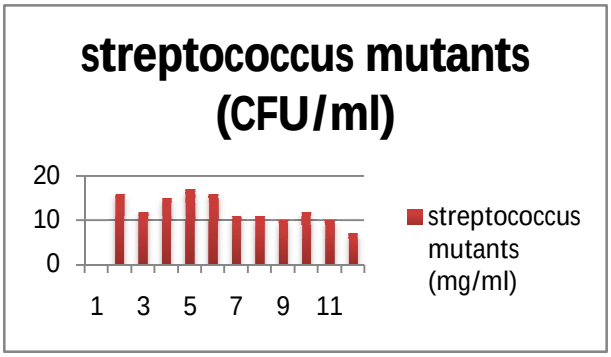
The average ph value measured using a pH strip was 8.63[graph 3]. This is more alkaline when compared to healthy non smokers which is 5.6-7.9 [8].



Graph 3 distribution of the pH in smokers

Streptococcus Mutant Content

When the saliva was cultured under specific culture media for 24 hrs, the streptococcus mutant content in smokers had no significant change when compared with non smokers (SFR: $12.33*10^4$ CFU/ml) with a mean value of $12.45*10^4$ CFU/ml [Graph 4].



Graph 4 streptococcus mutants in the saliva of smokers

DISCUSSION

Change in the whole-mouth salivary flow rate (SFR), pH and microbial flora content play a significant role in patho-genesis of various oral conditions. Factors such as smoking may affect the oral and dental health. In the short term smoking increases the flow rate of the parotid gland [9, 10].This study showed comparatively lesser salivary flow rate value when compared to non-smokers. [Graph 2]. However, the data on long-term effects on salivary flow rates shows no difference between smokers and non-smokers [11, 12, and 13].

The pH of saliva rises in smokers significantly [graph3]. A study showed that over longer time periods smokers have a lower pH in stimulated whole saliva, [14] however another report showed no difference. Buffer capacity was found to be lower in smokers [11, 14] although this was not confirmed in another study [13]. The exact mechanisms by which smoking affects the periodontal tissues are not known. [Graph 4] shows that when the saliva was cultured under specific media for 24 hours, there was no significant change in the streptococcus mutants in between smokers and non smokers. Many epidemiological and clinical studies have reported smokers to harbour more supragingival plaque than non-smokers. However, clinical studies have not reported any differences in plaque accumulation rate between smokers and non-smokers [15]. Thereby indicating smoker's excess amount of plaque is probably caused by an inferior oral hygiene. One recent study reported that smokers harbored significantly higher levels

of *B. forsythus* than non-smokers, although other studies on patients with periodontal disease have not reported any differences in the composition of the subgingival periopathogenic microflora [16,1 7,18].

The mean OHI-S was higher in the smokers, which shows that smokers generally had poorer oral hygiene than the non-smokers [graph 1]. This finding is similar to that of previous studies [19-23], where it was reported that the mean OHI score was higher among smokers compared with the non-smokers. This finding can be explained by the fact that cigarette smoking causes staining of teeth, which roughens the surface of the teeth and encourages more rapid plaque accumulation. However, there are some contrary studies that reported that smokers do not necessarily have poorer oral hygiene in comparison with their non-smoking counterparts [24-26]. Alexander [24] reported that accumulation of bacterial plaque was not associated with tobacco smoking among a group of students, a report that was corroborated by the report of Bastiaan and Waite [25] among young adults.

CONCLUSION

In conclusion there is a significant decrease in the salivary flow rate in smokers when compared to healthy non smokers theoretically. There is an increase in the oral hygiene index in smokers due to increase in calculus and plaque accumulation in the oral cavity. The ph of the saliva seems more alkaline in nature with the mean pH of 8.63 in smokers when compared to non smokers. But there is no significant change in the streptococcus mutant content in the saliva

Reference

1. BDJ TEAM, Saliva A review of its role in maintaining oral health and preventing dental disease; Michael DoddsSimon RolandMichael Edgar & Martin Thornhill; BDJ Team 2, Article number: 15123, 2015
2. *J Nat Sci Biol Med.* 2011 Jan-Jun; 2(1): 53-58;doi: 10.4103/0976-9668.82322; PMCID: PMC3312700; Science behind human saliva; Manjul Tiwari
3. *J Indian Soc Periodontol.* 2012 Jul-Sep; 16(3): 350-353.; doi: 10.4103/0972-124X.100909; Effect of smoking on salivary composition and periodontal status; Abhay P. Kolte and Rajashri A. Kolte,
4. Khan GJ, Javed M, Ishaq M. Effect of smoking on salivary flow rate. IJMS 2010; 8:221-5. 5.J eong SJ, Apostolska S, Jankulovska M, Angelova D, Nares S, Yoon M, et al. Dental caries risk can be predicted by simply measuring the pH and buffering capacity of saliva. *J Dent Hyg Sci* 2006; 6:159-62.
5. Rad M, Kakoie S, Niliye Brojeni F, Pourdamghan N. Effect of long-term smoking on whole-mouth salivary flow rate and oral health. *J Dent Res Dent Clin Dent Prospect*s 2010; 4:110-4.
6. Mojabi KB, Esfahani M, Hashemi HJ. Evaluation of unstimulated salivary flow rate and oral symptoms in menopausal women. *JDT* 2007;4:103-6.
7. *J Indian Soc Periodontol*. 2013 Jul-Aug; 17(4): 461-465, Salivary pH: A diagnostic biomarker, Sharmila Baliga
8. Fatemeh Ahmadi-Motamayel, Comparison of Salivary pH, Buffering Capacity and Alkaline Phosphatase in Smokers and Healthy Non-Smokers, sult an Qaboos *Univ Med J*. 2016 Aug; 16(3): e317-e32
9. Barylko-Pikielna N, Pangborn R M, Shannon I L. Effect of cigarette smoking on parotid secretion. *Arch Environ Health* 1968; 17: 731-738.
10. Pangborn R M, Sharon I M. Visual deprivation and parotid response to cigarette smoking. *Physiol Behavior* 1971; 6: 559-561.
11. Heintze U. Secretion rate, buffer effect and number of lactobaccilli and streptococcus mutans of whole saliva of cigarette smokers and non-smokers. *Scand J Dent Res* 1984; 92: 294-301.
12. Parvinen T. Stimulated salivary flow rate, pH and lactobacillus and yeast concentrations in non-smokers and smokers. *Scand J Dent Res* 1984; 92: 315-318.
13. Olsen B L, McDonald J L, Gleason M J et al. Comparison of various salivary parameters in smokers before and after the use of a nicotine-containing chewing gum. *J Dent Res* 1985; 64: 826-830.
14. Wikner S, Söder P O. Factors associated with salivary buffering capacity in young adults in Stockholm. *Scand J Dent Res* 1994; 102: 50-53.
15. Bergström J, Preber H. The influence of cigarette smoking on the development of experimental gingivitis. *J Periodont Res* 1986; 21: 668-676.
16. Zambon J J, Grossi S G, Machtei E E, et al. Cigarette smoking increases the risk for subgingival infection with periodontal pathogens. *J Periodontol* 1996; 67: 1050-1054.
17. Preber H, Bergström J, Linder L E. Occurrence of periopathogens in smoker and nonsmoker patients. *J Clin Periodontol* 1992; 19: 667-671.
18. Renvert S, Dahlen G, Wikström M. The clinical and microbiological effects of non-surgical periodontal therapy in smokers and non-smokers. *J Clin Periodontol* 1998; 25: 153-157.
19. Brandtzaeg P, Jamison HC. A study of periodontal health and oral hygiene in Norwegian army recruits. *J Periodontol.* 1964; 35:403-8.
20. Kristoffersen T. Periodontal conditions in Norwegian soldiers. An epidemiological and experimental study. *Scand J Dent Res.* 1970; 78:34-53. [PubMed]
21. Savage KO, Afolabi BM, John MO. Assessment of periodontal status of Nigerian factory workers in relation to cigarette smoking in Lagos. *Nig Quart J Hosp Med.* 1999; 9:198-201.
22. Nwhator SO, Ayanbadejo P, Savage KO, Jeboda SO. Oral hygiene status and periodontal treatment needs of Nigerian male smokers. *TAF Prev Med Bull*. 2010; 9:107-12.
23. Nwhator SO, Olagundoye O. Do smokers benefit from dental hygiene oral prophylaxis? A Nigerian pilot study. *East Mediterr Health J*. 2009; 15:976-82. [PubMed]
24. Alexander AG. The relationship between tobacco smoking calculus and plaque accumulation and gingivitis. Dent Health. 1970; 9:6-9. [PubMed]

25. Bastiaan RJ, Waite IM. Effects of tobacco smoking on plaque development and gingivitis. *J Periodontol*. 1978 49:480-2. [PubMed]

26. Feldman RS, Bravacos JS, Rose CL. Association between smoking different tobacco products and periodontal disease Indexes. J Periodontol. 1983; 54:481-7. [PubMed]

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