Journal of Research in Medical and Dental Science
2022, Volume 10, Issue 10, Page No: 235-238

Available Online at: www.jrmds.in
eISSN No.2347-2367: pISSN No.2347-2545

Impact of Tobacco on Salivary Flow Rate and Salivary pH

Fazail Ahmad*, Aarati Panchbhai

Department of Oral Medicine and Radiology, Sharad Pawar Dental College and Hospital, DMIMS (Deemed To Be University), Sawangi (Meghe), Wardha, Maharashtra, India

ABSTRACT

Saliva is a unique oral cavity secretion that will get exposed to possibly dangerous tobacco product components. Tobacco usage may cause alternations in the Salivary Flow Rate (SFR) and salivary PH. The Salivary Flow Rate (SFR) and salivary pH were evaluated in patients who smoked or used a smokeless tobacco product. A number of papers were reviewed to analyse the salivary flow rate and pH in tobacco users, the previous studies included subjects in various groups as who smoked, used smokeless tobacco, or had a combination of smoking and smokeless tobacco habits. SFR and pH were determined using Schirmer tear strips, pH strips, and other devices. A statistically significant decline in SFR was seen in the habit groups when compared to the control groups. Only in the smokeless tobacco consumption group was a statistically significant fall in salivary pH detected when compared to the control group. Subjects with lesions had a considerable decrease in SFR and a borderline decrease in PH.

Based on present review work, it is possible to infer that long-term tobacco either smoke or smokeless use considerably lowers salivary flow rate or salivary pH, the changes in these measures may be an early indicator of oral mucosal degeneration.

Key words: Salivary flow rate, Salivary pH, Tobacco, Saliva, Dry mouth, Oral health

HOW TO CITE THIS ARTICLE: Fazail Ahmad, Aarati Panchbhai, Impact of Tobacco on Salivary Flow Rate and Salivary pH, J Res Med Dent Sci, 2022, 10 (10): 235-238.

Corresponding author: Dr. Fazail Ahmad
E-mail: fazailahmad46@gmail.com
Received: 29-Jul-2022, Manuscript No. JRMDS-22-49665;
Editor assigned: 01-Aug-2022, PreQC No. JRMDS-22-49665 (PQ);
Reviewed: 16-Aug-2022, QC No. JRMDS-22-49665;
Revised: 03-Oct-2022, Manuscript No. JRMDS-22-49665 (R);
Published: 13-Oct-2022

INTRODUCTION

Saliva is a vital oral fluid made up of ninety nine percent water, one percent organic and inorganic molecules, and a variety of antimicrobial compounds. It is a muco serous exocrine secretion that is clear and somewhat acidic. Saliva is a multifarious combination of liquids produced by the salivary glands' major and minor glands. The functional aspects of salivary glands can be determined by measurement of salivary flow rate. In addition, the salivary pH may reflect the composition of saliva. The well-being of the oral cavity and the dentition is dependent upon the normal functioning of salivary glands in term of flow rate and pH of saliva. The major salivary glands are the paired parotid glands opposite the maxillary first molars, as well as the submandibular and sublingual glands on the mouth floor although minor salivary glands located at various sites intra orally may contribute to salivary secretions. Saliva is necessary for lubrication of the alimentary bolus, protection against viruses, germs, and fungus, protection of the oral mucosa, tooth remineralisation, digestion, taste sensation, PH balancing, and phonation [1-3]. Alterations in any saliva attribute, such as pH or flow rate, may be linked to oral, dental and systemic disorders, and inflammatory or malignant changes [4]. Saliva may be seen in several metrics such as Salivary Flow Rate (SFR), salivary pH, and buffer capacity of saliva." Un-stimulated saliva is a combination of secretions that enter the mouth without any external stimulus [5]. Each day around 0.5 L of saliva is being secreted. SFRs are 0.3 ml/min when un-stimulated and 1.5–2.0 ml/min when stimulated, however flow rate is insignificant at night [6-10].

Tobacco is widely established to have a negative impact on dental and oral health [11,12]. Tobacco usage by the patients can be in the smokeless and smoked form. Tobacco contains nicotine, which activates cholinergic receptors in the brain and other organs, resulting in neuronal activity and altered salivary production [6,8]. Tobacco usage has been linked to oral mucosa, gingival disorders, and dental abnormalities, to name a few of the negative impacts of cigarette smoking and other types of tobacco [7]. Tobacco, regardless of whether it is smoked or not, is one of the most common SP. Tobacco products that are smoked are cigarettes, cigars and loose cigarette [13]. Smoked Tobacco usage is in the form of beedies, cigarettes, pipe or cigar smoking [4]. Smoke free tobacco is conventional betel quid and flavoured variants such as khaini, zarda, mishri [14,15]. According to Bouquot and Schroeder, smoking induces a short-term increase in salivary production; the long-term consequences of

tobacco usage remain unknown. Around 40% of minor salivary glands located in vicinity of tobacco quid showed the degenerative alterations in habitual tobacco users in smokeless form [16]. The current study sought to investigate the effects of tobacco on pH and salivary flow rate.

LITERATURE REVIEW

The present review work was carried out with the purpose of quantitative and qualitative analysis of saliva in relation to the SFR and pH in tobacco users so as to evaluate the deleterious effect on tobacco on the said parameters which may in turn affect the oral health. A research was conducted by Shubha G, et al. for 437 participants aged 20 to 50 divided into groups as, smokeless tobacco user, smoked tobacco users and or a combination and compared these groups with healthy people who do not have any habits which served as controls. This survey aided in the subjective assessment. A study groups demonstrated a clinically significant decline in flow rate in comparison to control group. In addition, when compared for salivary pH, only Group with smokeless tobacco habit showed a significant drop [17-21]. Chakrabarty S, et al. conducted similar research for 60 subjects divided into three groups as smoke and non-smoke form and compared them with 30 healthy individuals SFR was measured in ml/min for 5 minutes after extracting un-stimulated whole mouth saliva from each patient, and salivary pH was assessed using specific salivary pH strips [13]. Similar to the previous data, a substantial reduction in Salivary flow rate and salivary pH was found. Kanwar A, et al. conducted a research of, 60 people were separated into three groups (20 each) for obtaining salivary flow rate and salivary pH, Group A: Smoked form of tobacco Group B: smoke free form of tobacco healthy control Group C. The findings demonstrate substantial drop in pH in saliva and flow rate in group A and B when compared with C. Rehan F, et al. inspected salivary flow rate and salivary pH in 210 patients which were separated into three groups, as Each group had 70 subjects: Tobacco Users in smokeless form were belonged to Group A, smoked form in Group B, and Group C the control group without habit of tobacco chewing. The study found that the control group of non-tobacco users had the greatest salivary flow rate. The greatest incidence seen in group A was 27.1% among participants with 0.20 ml/min mean resting mouth salivary flow rate. In group B, the greatest proportion with a mean SFR of 0.30 ml/min was 25.7%. The greatest frequency of patients in Group C was 25.7%, with a mean SFR of 0.20 ml/min, whereas the second highest frequency of subjects, 24.3%, had a salivary flow rate of 0.5 ml/min. As a result, there was significant decrease in SFR and salivary PH.

Singh, et al, 2015, investigated 70 males (35 smokers and 35 nonsmokers). After that, the pH of the saliva was determined using the Indikrom Paper as a PH indicator. Andin a graduated test tube, resting saliva was extracted and the indicator strip was submerged in the saliva for 30 seconds. Before being compared to the manufacturer's standard colour chart. Similar outcomes were obtained and when smokers were matched to non-smokers, there was a substantial drop in salivary PH. Grover N, et al. conducted a study comprised of 60 people divided into three groups of 20 people each. Individuals in Group A use smoked tobacco (15 men and 5 females), whereas subjects in Group B use a smokeless tobacco product (15 males and 5 females), and subjects in Group C are well-being controls (15 males and 5 females) [20-25]. The pH values of saliva were greatest in the control group and lowest in the tobacco chewers group, according to the mean pH scores of saliva in three independent groups [26].

Secretion of saliva in the oral cavity is an intricate procedure performed by salivary gland whose flow and content fluctuate considerably depending on the local and systemic circumstances [17]. In the absence of external stimulation, resting entire Saliva is a group of fluids that enter the mouth [5]. Basal SFR is reflected in un-stimulated whole saliva serves to preserve the oral mucosa and stays in the oral cavity for prolonged period protects oral tissues. While stimulated saliva remains for short while till stimulus is there and thus get secreted on physiologic stimulation such food consumption. As a result, studying non stimulated salivary production is an accurate way for analysing salivary gland health, although stimulating saliva is good for studying functional reserve [18]. Tobacco has a negative impact on oral health, according to clinical and epidemiological studies [19]. Cigarette smoking and other forms of tobacco use have a number of detrimental consequences and tobacco use has been associated to abnormalities in the gingiva, oral mucosa, and teeth [2].

Cigarette smoke comprises around 4000 bioactive chemicals as well as 300 harmful components. Nicotine in cigarettes stimulates cholinergic receptors in the brain. Causing neuronal activation and hence enhancing SFR for a shorter period of time. Furthermore, long-term tobacco use increases the epinephrine effect or causes nicotine to inactivate taste receptors, decreasing the salivary response or causing salivary gland degeneration [27]. The salivary flow rate in individuals with habit decreased significantly in our study. In investigations done by Rad, et al. lower SFR in participants who smoked was noted, which is consistent with our findings [1]. In investigations done by Rehan, et al. a rise in salivary flow rate was reported in smokers having habit for short period of time [28].

Lately, the tobacco is being consumed in smoked form more as compared to smokeless form. According to research, different types of non-smoking tobacco have distinct effects on salivary flow rate, the chewed tobacco ghutka, panmasala, and khainin various studies that have been reviewed. The combination of areca nut products and cigarettes impact the autonomic nervous system by increasing plasma adrenaline and nor epinephrine levels resulting in a reduction in SFR [1]. SFR in Group II individuals was much lower than in other habit groups. The SFR was lowered in Kanwaer et al study [26] on the

contrary, Siddabasappa, et al. revealed a rise in SFR [29,30].

The present review demonstrated a substantial decrease in salivary pH in the smokeless tobacco group. The pH varies according on the SFR, greater the SFR result in greater buffering capacity and neutral or basicsaliva [31]. Additionally, SFR also affect the bicarbonates composition of saliva. Previous research has found that frequency and longevity of tobacco use are connected to a reduction in salivary PH. The findings of investigation were consistent with those of Kanwar, et al. [26]. In a research conducted by Rooban, et al. the salivary pH was raised. Besides, Dyasanoor and Saddu's could not found significant fall in salivary PH [13].

DISCUSSION

Overall, the review suggests the substantial decrease in salivary flow rate and a marginal decrease in salivary PH in tobacco users. The oral mucosa is more prone to alterations due to variations in the amount and quality of saliva, as well as chronic irritation. Nicotine is an element that is easily absorbed by the mucous membrane; once absorbed, it produces acid metabolites that cause more cell division. Prolonged irritation of the oral mucosa caused by smokeless tobacco is mostly due to the combination of areca nut and lime [31]. Lime induces breakdown of bicarbonate, which decreases the salivary PH and causes free radical damage, which causes structural changes in oral mucosal membrane [29]. Due to consumption of smoke or smokeless tobacco there is abnormal change in salivary flow rate and salivary pH which affects the salivary defence mechanism. Tobacco habit is associated to a various mucosal changes, ranging from benign to permanent abnormalities in the oral mucosa. As a result, amount and qualitative saliva analysis in people with a tobacco habit helps in the early diagnosis of oral mucosal derangement. Smoking or using a smokeless tobacco has a considerable influence on decreasing salivary flow rate and saliva PH, according to our data. Non-smoking tobacco is more hazardous since the salivary flow rate and salivary PH are changed more because of it. Salivary flow rate measurement using modified Schirmer tear strips is a convenient and economical way of for testing dry mouth that easily distinguishes between normal person and those with severe xerostomia and hypo salivation as a result of tobacco use. As a consequence, early pathogenic changes in the oral mucosa can be detected by SFR and pH measurements.

CONCLUSION

As evident from the present review work tobacco users had a visible drop in salivary flow rate and a slight fall in salivary PH. The long-term cigarette use affects salivary flow rate and salivary pH substantially. There is a substantial negative connection between salivary flow rates and smoking among tobacco users, implying that greater chewable tobacco use followed by smoking results in a considerable drop in salivary flow rate and PH. These changes might be an early symptom of oral mucosal degradation. As a result, salivary flow rate and pH measurements can be utilised as non-invasive chair side diagnostics to identify pathological alterations. In oral mucosa linked to the vulnerable effects in people addicted to these harmful habits, and early detection can prevent morbidity and mortality caused by oral potentially malignant disorder and malignancy. Extended research using a long-term study design and broader sample is required to analyse SFR and pH changes in persons with and without smoking behaviours and with tobacco-related oral lesions.

REFERENCES

1. Rad M, Kakoie S, Niliye Brojeni F, et al. Effect of longterm smoking on wholemouth salivary flow rate and oral health. J Dent Res Dent Clin Dent Prospects 2010; 4:110114.
2. Khan GJ, Javed M, Ishaq M. Effect of smoking on salivary flow rate. IJMS 2010; 8:221225.
3. Singh M, Ingle NA, Kaur N, et al. Effect of long-term smoking on salivary flow rate and salivary pH. J Indian Assoc Public Health Dent 2015; 13: 11.
4. Garrett JR. The proper role of nerves in salivary secretion: A review. J Dent Res 1987; 66:387-397.
5. Rooban T, Mishra G, Elizabeth J, et al. Effect of habitual arecanut chewing on resting whole mouth salivary flow rate and pH. Indian J Med Sci 2006; 60:95-105.
6. Winn DM. Tobacco use and oral disease. J Dent Educ 2001; 65:306-312.
7. Meraw SJ, Mustapha IZ, Rogers RS 3rd. Cigarette smoking and oral lesions other than cancer. Clin Dermatol 1998; 16:625-631.
8. RoobanT,VidyaK,JoshuaE, et al. Tooth decay in alcohol and tobacco abusers. J Oral Maxillofac Pathol 2011; 15:14-21.
9. Edgar WM. Saliva: its secretion, composition and functions. Br DentJ 1992; 172:305-312.
10. RothG, CalmesR, editors. Salivary glands and saliva. In: Oral biology. St Louis: CV Mosby 1981:196-236.
11. Fahad K, Aziz A, Shahab S, et al. Laboratorial and clinical impacts of tobacco on periodontal health: A systematic review. Int Dent J Student's Res 2015; 3:72-78.
12. Kanwar A, Sah K, Grover N, et al. Long-term effect of tobacco on resting whole mouth salivary flow rate and pH: An institutional based comparative study. Eur J Gen Dent 2013; 2:296.
13. Rooban T, Rao A, Joshua E, et al. Dental and oral health status in drug abusers in Chennai, India: A cross-sectionalstudy. J Oral Maxill acPathol 2008; 12:16-21.
14. Boyle P, Ariyaratne MA, Barrington R, et al. Tobacco: Deadly in any form or disguise. Lancet 2006; 367:1710-1712.
15. Gupta B, Johnson NW. Systematic review and meta-analysis of association of smokeless tobacco and of betel quid without tobacco with incidence of

oral cancer in south Asia and the pacific. PLoS One 2014; 9:113385.

16. Bouquot DJ, Schroeder K. Oral effects of tobacco abuse. J Am Dent Inst Cont Educ 1992; 43:3.
17. Gudkina J, Brinkman A. Caries experience in relation to oral hygiene, salivary cariogenic microflora, buffer capacity and secretion rate in 6 year olds and 12 year olds in Riga. Balt Dent Maxillofac J 2008; 10:7680.
18. Mojabi KB, Esfahani M, Hashemi HJ. Evaluation of un-stimulated salivary flow rate and oral symptoms in menopausal women. JDT 2007; 4:103106.
19. Millar WJ, Locker D. Smoking and oral health status. J Can Dent Assoc 2007; 73:155.
20. Khan GJ, Mehmood R, Din SU, et al. Secretion of calcium in the saliva of longterm tobacco users. JAyub Med Coll Abbottabad 2005; 17:6062.
21. ShubhaG, FasalkarSS, PraveenBN, et al. Assessment of salivary flow rate and salivary pH in subjects with smoking and smokeless formoftobaccohabits. J Med Radiol Pathol Surg 2018; 5:11-15.
22. Chakrabarty S, Patil S, Bandalore SR, et al. A comparative study of long-term effect of tobacco on resting whole mouth salivary flow rate and pH. J Indian Acad Oral Med Radiol 2015; 27:549-552.
23. Rehan F, Khan RS, Khurshid Z, et al. Analysis of Resting Mouth Salivary Flow Rate and Salivary pH of Tobacco Chewers and Smokers. J Pak Dent Assoc 2016; 25:158-163.
24. Singh M, Ingle NA, Kaur N, et al. Effect of long-term smoking on salivary flow rate and salivary pH. J Indian Assoc Public Health Dent 2015; 13:11-13.
25. Grover N, Sharma J, Sengupta S, et al. Long-term effect of tobacco on unstimulated salivary pH. J Oral Maxillofac Pathol 2016; 20:16-19.
26. Kanwar A, Sah K, Grover N, et al. Long-term effect of tobacco on resting whole mouth salivary flow rate and pH: An institutional based comparative study. Eur J Gen Dent 2013; 2:296-299.
27. Rehan F, Khan BR, Memon MS, et al. Analysis of resting mouth salivary flow rate and salivary pHof tobacco chewers and smokers. J Pak Dent Assoc 2016; 4:159-163.
28. Dyasanoor S, Saddu SC. Association of xerostomia and assessment of salivary flow using modified schirmertestamong smokers andhealthy individuals: A Preliminutesary study. J Clin Diagn Res 2014; 8:211-213.
29. Rooban T, Mishra G, Elizabeth J, et al. Effect of habitual areca nut chewing on resting whole mouth salivary flow rate and pH. Indian J Med Sci 2006; 60:95-105.
30. Sidbasappa S, Ashok L, Sujatha G. Estimation of unstimulated salivary flow rate, pH, copper and iron in ghutka chewers with and without oral submucous fibrosis a preliminary study. Res J Pharm Biol Chem Sci 2014; 5:300-306.
31. Qamar A, Baig S, Ali A, et al. Resting salivary flow rate and pH decreases in chew able to baccousers. Br J Med Med Res 2016; 3:1-9.