The Detrimental Impact of Smoking on Periodontal Health: A Comparative Study

Hira Butt[1], Zainab Waheed[2], Mashal Zahra[1], Emaan Fatimah[1], Muhammad Zirgham Ul Haq[1], Amna Nauman Khan[3], Nauman Rauf Khan[1], Muttahid Shah[4]

1. Department of Oral Pathology, Sharif Medical and Dental College, Lahore, Pakistan
2. Department of Psychiatry, Kabir Medical College, Peshawar, Pakistan
3. Department of Community & Preventive Dentistry, Sharif Medical and Dental College, Lahore, Pakistan
4. Research Cell, Rehman College of Dentistry Hayatabad Peshawar, Pakistan

Abstract

Objectives: To evaluate the detrimental impact of smoking on oral health.

Methodology: A Cross sectional comparative study was carried out on 100 patients, 50 smokers and 50 non-smokers, visiting Sharif Medical and Dental College, Lahore from June 2019 to July 2020. Intra-oral examination was done using the Community Periodontal Index of Treatment Needs (CPITN). Recorded data was coded, entered and analyzed using SPSS statistical Package version 23.

Results

The periodontal health was significantly associated with status of smoking ($p \leq 0.001$). The most prevalent periodontal problems of smokers were periodontal pockets of 4 to 5 mm (19%) while the least (4%) had bleeding on probing. Majority of the non-smokers (32%) had bleeding on probing. The number of cigarettes smoked in a day and periodontal health status were significantly associated ($p \leq 0.004$). Light smokers (1 to 10 cigarettes/day) had periodontal pockets of 4 to 5mm as their biggest periodontal problems (38%) while the least (8%) had bleeding on probing. The periodontal problem that intermittent smokers (11 to 15 cigarettes/day) predominantly had was periodontal pockets of 6 mm or more (8%) and same was the case with heavy smokers (2%).

Conclusion: The main periodontal problem of smokers was periodontal pockets of 4 to 5 mm while the least was bleeding on probing. Most of the non-smokers had bleeding on probing while none of the non-smokers had periodontal pockets. Light smokers (1 to 10 cigarettes/day) mainly had periodontal pockets of 4 to 5mm as their main concern. The periodontal problem that intermittent and heavy smokers mainly had were periodontal pockets of 6 mm or more.

Keywords: Oral health, Smokers, Non-smokers, Community Periodontal Index of Treatment Needs (CPITN).

Introduction:

Periodontal diseases affect a great number of people and affect the function and appearance of teeth by causing an increase in periodontal pockets, bleeding, gum recession and ultimately tooth loss[1]. Smoking is one of the causative factors for the development of periodontal disease[2]. Smoking impacts the oral health by causing gingival recession and bone loss which results in more smokers losing their teeth as compared to non-smokers which in turn causes a deterioration of the overall life quality of the individual[3].

Corresponding Author
Hira Butt
Department of Oral Pathology,
Sharif Medical and Dental College, Lahore Pakistan
Email: hira.ah.butt@gmail.com

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Periodontal disease comprises of episodes of increase and decrease in disease severity in various tooth structures[4]. Smoking alters the host`s immune response and reduces their ability to ward off pathogens which in turn impairs the process of tissue healing.[4]

Periodontal problems like alveolar bone loss, recession of the gingiva and tooth mobility are more common in smokers than non-smokers.[5] Literature supports that there is a strong association between deterioration of periodontal health and tobacco use.[6]

The quantity of tobacco that the smoker has consumed determines the severity of periodontal disease as well as development of other oral diseases including oral cancer.[7] Vasoconstriction caused by Nicotine leads to a decrease in gingival bleeding in smokers.[8] Nicotine also causing an increase in periodontal pockets as it causes the loss of alveolar bone.[9-10]

The tobacco in smoke in addition to its causes in addition to its detrimental impact on the periodontal health also makes the host resistant to periodontal therapy and treatment and halts the process of healing.[11-12] The duration of smoking also effects the severity of periodontal disease making a person who has never smoked less susceptible to the development and progression of periodontitis in comparison to a person who has smoked for a longer duration.[13] It has been reported previously that quitting smoking leads to a better host response to periodontal therapy.[14] The aim of this study was to evaluate the detrimental impact of smoking on oral health.

Methodology:

A Cross sectional comparative study was carried out on 100 patients, 50 smokers and 50 non-smokers, visiting Sharif Medical and Dental College, Lahore from June 2019 to July 2020. The study was conducted after ethical approval from Sharif Medical Research Centre (SMRC). The sample size was calculated keeping the prevalence of periodontitis in smokers to be 96.7%, precision 5% and 95 % confidence level, the sample size was calculated to be 5015. The study was conducted on 100 patients, 50 smokers and 50 non-smokers.

The sampling technique used was non- probability convenience. All smokers 18 years of age and above irrespective of their gender were included in the study. Smokers with any systemic illness were excluded from the study. Inclusion criteria for non-smokers was all individuals 18 years of age and above irrespective of their gender. Exclusion criteria for non-smokers was presence of any systemic illness. Informed consent was taken from the participants. Intra-oral examination was done using the Community Periodontal Index of Treatment Needs (CPITN). Recorded data was coded, entered and analyzed using SPSS statistical Package version 23.0. P value of 0.05 or less was considered significant. Chi square test was used to find the statistical association between smoking and periodontal health. Fisher exact test was used to find the association of periodontal health with number of cigarettes smoked and the frequency of smoking.

Results

A study was conducted based on data collected from 100 patients (50 smokers and 50 non smokers) visiting the dental OPD of College of Dentistry, SMDC, Lahore. The mean age of the participants was 33.36 ± 14.11 out of which 62 % were males and 38% were females. The mean CPITN scores for smokers was found to be 2.82±0.919 which was higher than that in non smokers which was 1.36±0.485. The association between periodontal health of smokers and non-smokers has been shown in Table 1.

Table 1: Periodontal health of smokers and non-smokers

Parameter of periodontal health	Smoker n(%)	Non-smoker n(%)	P value
Bleeding	4(4%)	32(32%)	p≤0.001
Calculus	14 (14%)	18(18%)	
Periodontal pocket depth 4 to 5mm	19 (19%)	0(0%)	
Periodontal pocket depth 6mm or more	13 (13%)	0(0%)	

Furthermore, it was seen that the periodontal health varied among light, intermittent and heavy smokers. Periodontal health was significantly associated with the number of cigarettes smoked in a day (p≤0.004) as shown in Table 2.

Table 2: Periodontal problems and number of cigarettes smoked per day

Parameter of periodontal health	Light smoker (1 to 10 cigarettes/day) n(%)	Intermittent smoker (11 to 15 cigarettes/day) n(%)	Heavy smoker (1 pack/day) n(%)	P value
Bleeding	4(8%)	0(0%)	0(0%)	0.004
Calculus	14 (28%)	0(0%)	0(0%)	
Periodontal pocket depth 4 to 5mm	19(38%)	0(0%)	0(0%)	
Periodontal pocket depth 6mm or more	8(16%)	4(8%)	1(2%)	

The frequency of smoking was also found to have an impact on the periodontal health of smokers. It was seen that the biggest periodontal problem in smokers who smoked more than 5 times a day was formation of periodontal pocket of 6mm or more while for those who smoked 1 to 5 times a day had periodontal pocket formation which were 4 to 5 mm deep as shown in Table 3.

Table 3: Periodontal problems and frequency of smoking

Parameter of periodontal health	1 to 5 times/day n(%)	More than 5 times/day n(%)	P value
Bleeding	4(8%)	0(0%)	0.181
Calculus	14(28%)	0(0%)	
Periodontal pocket depth 4 to 5mm	18(36%)	1(2%)	
Periodontal pocket depth 6mm or more	10(20%)	3(6%)	

Discussion

A cross sectional comparative study was conducted on smokers and non-smokers visiting dental OPD College of Dentistry, Sharif Medical and Dental College, Lahore for dental treatment, to study the implications of smoking on periodontal health.

Literature supports that the higher the intensity, frequency and time duration of smoking the worse is the periodontal health of the individual which is caused due to release of inflammatory mediators induced due to long term and high level of tobacco use by smokers.[15] According to our study the mean CPITN score for smokers (2.82±0.919) was higher in comparison to non-smokers (1.36±0.485).

Similar results were reported by Petrovic et al in 2013 where it was seen that the mean CPITN scores for non-smokers (1.83±0.52) was lower than that of smokers (1.89±0.46).[16] According to our study light smokers (1 to 10 cigarettes/day) had periodontal pockets of 4 to 5mm as their biggest periodontal problems (38%) while the least (8%) had bleeding

on probing. The periodontal problem that intermittent smokers (11 to 15 cigarettes/day) predominantly had was periodontal pockets of 6 mm or more (8%) and same was the case with heavy smokers (2%).

Heavy and intermittent smokers in our study had no other periodontal problems. Saribas et al[17] in their study reported that light smokers mainly suffered from calculus deposition (48.7%) followed by bleeding on probing (20.5%), periodontal pockets depths 4 to 5 mm (12.8%) while the least had periodontal pocket depths of 6mm or more (2.6%). The study also reported that intermittent and heavy smokers also had calculus deposition as their main periodontal problem (46.2 % and 46.7% respectively) and bleeding on probing as their second most prevalent periodontal problem (21.2% and 26.7% respectively).[17]

The deterioration of periodontal health in heavy smokers can be attributed to many factors which includes the release of chemical mediators that initiate inflammation, alteration in the proliferation of fibroblasts and suppressed immune response to pathogens causing periodontitis due to change in neutrophil function.[15]

According to our study the most prevalent periodontal problem of smokers was periodontal pockets of 4 to 5 mm (19%), 14% had calculus deposition, 13% had periodontal pockets of 6mm or more while the least (4%) had bleeding on probing.

Majority of the non-smokers in our study (32%) had bleeding on probing and 18% had calculus deposition while none of the non-smokers had periodontal pockets. In a study reporting the periodontal health of smokers and non- smokers, jogezai et al reported that a higher percentage of non-smokers (53.5%) had bleeding on probing in comparison to smokers (31.7%) but more smokers (89.4%) had calculus deposits as compared to non-smokers (65.6%).[18]

Ruslan et al reported that majority of the non-smokers had calculus deposits (40.5%) while the least had periodontal pockets of 6 mm or more (14.3%) with an equal percentage (21.4% each) had bleeding on probing and periodontal pockets of 4 to 5 mm.[19]

The study cited above[19] also reported that the smokers predominantly had calculus deposition (57.1%) followed by periodontal pockets 4 to 5mm (27.1%), periodontal pocket 6 mm or more (9%) while the least prevalent periodontal problem was bleeding on probing (4%).

The rationale behind reduced bleeding in smokers is the vasoconstriction due to Nicotine compounds and more fibrous tissue in the periodontium of smokers that results in thickened gums.[20] The inflammation process that ensues due to smoking causes a development of periodontal pockets and bone loss in smokers.[21]

Smoking, mostly in the form of cigarettes is recognized as the important environmental risk factor for the development of periodontitis and majority of the people are not aware of the health hazards which has increased the need for development of proper awareness programs to educate people and to eliminate this detrimental habit from the society.[22]

Limitation

A larger sample size and a multicenter study would have helped us cover a broader sphere of smokers which could have yielded more findings.

Conclusion

The most prevalent periodontal problems of smokers were periodontal pockets of 4 to 5 mm followed by calculus deposition, periodontal pockets of 6mm or more and then bleeding on probing. Most of the non-smokers had bleeding on probing followed by calculus deposition while none of the non-smokers had periodontal pockets. Light smokers (1 to 10 cigarettes/day) mainly had periodontal pockets of 4 to 5mm as their main concern while the least had bleeding on probing.

The periodontal problem that intermittent and heavy smokers mainly had were periodontal pockets of 6 mm or more. The periodontal problem in smokers who smoked more than 5 times a day was formation of periodontal pocket of 6mm or more while for those who smoked 1 to 5 times a day was periodontal pocket formation which were 4 to 5 mm deep.

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Author Contributions

1. Hira Butt- Concept & Design, Data Acquisition, Data Analysis/ Interpretation, Drafting and Manuscript, Critical review, supervision and final approval
2. Mashal Zahra- Concept & Design, Data Acquisition, Data Analysis/ Interpretation and drafting Manuscript
3. Zainab Waheed- Concept & Design, Data Acquisition, Data Analysis/Interpretation, Drafting Manuscript, Critical review, supervision and final approval
4. Emaan Fatimah- Concept & Design, Data Acquisition, Data Analysis and draft Manuscript
5. Muhammad Zirgham Ul Haq- Concept & Design, Data Acquisition, Data Analysis/ Interpretation and drafting Manuscript
6. Amna Nauman Khan- Concept & Design, Critical review, supervision and final approval
7. Nauman Rauf Khan- Concept & Design, Data analysis/ Interpretation, Critical review, supervision and final approval
8. Muttahid Shah- Critical review and final approval