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# Proportion & severity of periodontal disease among patients who are tobacco smokers attending Dhaka Dental College & Hospital, Mirpur, Dhaka

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### ABSTRACT

Periodontal disease, a common oral health problem is an inflammation of the supporting structure of tooth which is marked up by the association of several risk factors. Smoking tobacco has been conceded as the most influential risk factor among them. No other risk factors can impair to the extent that smoking alone can do in inducing periodontal disease. The more the duration and intensity of smoking, the more the extent and severity of periodontal breakdown. This study was designed to determine the proportion and severity of periodontal diseases among patients who are tobacco smokers attending Dhaka Dental college and Hospital, Mirpur-14.

It was a cross-sectional study conducted among 115 participants using pretested semi structured questionnaires. Their periodontal status were examined using CPITN index, gingival index of Loe and Silness and periodontal severity index approved by American Academy Of Periodontology. Data analysis was done using appropriate statistical inferences like frequency, percentage, chi square test etc.

Complete data were available of 115 participants of whom all were smokers. Among them, the proportion of periodontal disease was 93% and most of them were affected by moderate periodontitis (33.2%). From the bi-variate analysis done by chi square test, important correlates of periodontal status identified were oral hygiene maintenance practice & preventive knowledge, duration and intensity of smoking, presence of systemic diseases that affect periodontal health, presence of non-smoking tobacco using habit. On the other hand, periodontal severity were significantly associated with age, level of education, monthly income, oral hygiene maintenance practice and preventive knowledge, duration and intensity of smoking, presence of non-smoking tobacco using habits. In stead of having no significant relationship with periodontal status and severity, proportion of the disease was highest (82.6%) among current smokers as well as the cases of severe periodontitis were also highest (18.3%) among them.

Proportion of periodontal disease was very high (93%) among smokers and severity of the disease also raised with increasing duration & intensity of smoking along with the association of other factors like age, level of education, monthly income, oral hygiene maintenance practice, presence of non-smoking tobacco consuming habit etc. The study recommends to quit smoking for rapid improvement of periodontal health. Moreover, education and awareness level of the individuals should be promoted as well as dental health care procedure should be made accessible to people of all socio-economic classes.

**Keywords:** Periodontal diseases, Risk factors, Smoking tobacco, Proportion, Severity, Oral hygiene maintenance practice & preventive knowledge, Non-smoking tobacco habit, Periodontitis, Periodontal Health, Gingiva

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## Introduction:

Periodontal disease is perhaps the most common disease affecting human dentition[1]. In old age, ageing as well as poor oral hygiene contribute to the occurrence of periodontal diseases. This happened because of damage to the periodontal structures. This damage is very serious but it can be preventable [2].

Progressive chronic periodontitis that is sufficiently severe to result in loss of support for the teeth, is essentially an irreversible damage. If left untreated, ultimately it results in “Edentulism”, posing a great negative impact on individual’s quality of life. The global epidemiological data suggests periodontal disease to be one of the major public health burden [3]. To lessen this burden it is essential to know the true prevalence of the diseases as well as the aetiological factors, according to which proper initiatives can be formulated.

However, it is revealed in several studies that there are various factors which contribute to the development of periodontal diseases in human dentition including

heredity, tobacco smoking, diabetes, stress, medication, poor oral hygiene, nutrition and hormonal variation etc. But all the factors are not equally important [4]. Studies found that tobacco smoking accounts for almost half of the periodontal diseases [5].

It is important to study the epidemiology of periodontal diseases in different population not only for determining the prevalence, extent and severity of disease, but also in describing the natural history of the condition and possibly for identifying the risk factors for the disease.

In this study, I had investigated the proportion and severity of periodontal diseases among patients who are tobacco smokers attending Dhaka Dental College & Hospital which is situated in Mirpur -14, Dhaka. The aim of this study particularly was to assess the proportion and severity of periodontal diseases and to describe the distribution of disease among tobacco smokers.

## Background information:

"Perio" means *around*, and "dental" refers to *teeth*. Periodontal diseases are infections of the structures *around the teeth*, which include the gums, periodontal ligament and alveolar bone[6]. In the earliest stage of periodontal disease — gingivitis — the infection affects the gums. In more severe forms of the disease, all of the tissues are involved.

Gingivitis is the mildest form of periodontal diseases which is caused by the bacterial biofilm that accumulates on teeth adjacent to the gum (gingiva). If left untreated, gingivitis may progress to periodontitis, a chronic inflammatory condition characterized by destruction of the periodontal tissues and resulting in loss of connective tissue attachment, loss of alveolar bone, and the formation of pathological pockets around the diseased teeth [7].

A suitable host, the presence of pathogenic bacteria, and the absence of so called “beneficial bacteria”- these are the main 3 factors responsible for active periodontal disease [8]. Moreover, there are some risk factors that have been identified as potential risk factors for periodontitis including smoking, diabetes, socioeconomic status, behavior and stress. Amongst these, smoking is profoundly associated with the development of periodontal disease [9]. There is accruing evidence that tobacco smokers suffer from greater level of periodontal diseases. It is advised that higher levels of clinical alveolar bone loss, tooth mobility, probing pocket depth and tooth loss appear in smokers than in non-smokers [10].

In Bangladesh, majority of the population are reported as tobacco consumers. Tobacco can be taken in various ways, from smoking to smokeless tobacco chewing. Tobacco leaf or betel quid consumption is responsible for many health hazards still most of the population is unaware of that hazards [11]. Tobacco smoking, particularly in the form of cigarette smoking, has been acknowledged as the most important environmental risk factor for developing periodontitis[12].

Periodontal diseases shows cyclical patterns of progression and resolution at any particular site [13]. It comes out that smoking may impair the immune response as well as compromises the periodontal tissue's ability to heal, leading a period of disease activity.

Based on the frequency of exposure to tobacco smoking, the impact of smoking on periodontitis also varies [14]. It has been successively reported that nicotine induced gingival vasoconstriction along with heavy gingival keratinization account for less gingival bleeding among smokers [15]. Pocket depth are often higher in smokers due to higher alveolar bone loss [16].

Tobacco smoking may also induce refractory periodontitis [17]. Current smokers are more vulnerable to show severe periodontal damage compared to former smokers. Those who have never smoked have been reported to hold the lowest risk [18]. Tobacco consumption can also impede the success of periodontal treatment. Moreover, smoking bring about negative effects on regenerative therapy, including osseous grafting, guided tissue regeneration, or a combination of these treatments [19].

A number of studies have been conducted in Bangladesh focusing the effect of smokeless tobacco on oral and periodontal health. However, there is no such study or data on periodontal diseases among smoking tobacco users in Bangladesh.

In Bangladesh, oral health is one of the most neglected issues. People hardly pay any attention on oral diseases as they do for any other diseases. Lack of awareness is the main reason behind this. But it is vital to change this type of attitude. Because oral health is an inseparable part of general health and it has a direct impact on the quality of life. Oral diseases are important public health concern due to the prevalence, socio-economic aspects, expensive treatment and lack of awareness [20].

Tobacco smoke comprises more than 7000 chemicals of which about 70 are reported as

carcinogens [21]. These damages the entire body system, causes many diseases and increases the risk of death from any of the diseases for the smokers and also the non-smokers around him.

Smoking tobacco is the number one risk factor for lung cancer – nowadays most of the people know this. But many people are still unaware of the fact that it is the main culprit for oral cancer too. Every year thousands of people die all over the world as well as in Bangladesh from this fatal disease brought on by smoking [22].

Another hazardous effect of smoking on oral health is periodontal disease, which is till now regarded as the second most important cause of tooth loss in adults. Moreover, it is now investigated as a potential risk factor for many systemic diseases. Smokers show a higher prevalence of periodontal diseases than non-smokers [23].

Besides, length and frequency of smoking are also very important factors that identify the extent of harm. Furthermore, it is revealed in several studies that quitting smoking has favorable effects on both periodontal health and success of periodontal therapy. So, by prolongation of smoking abstinence the negative effects can be subsided gradually [24].

There are no study showing the proportion and severity of periodontal diseases among tobacco smokers in Bangladesh. Therefore, I had selected this study with a view to determining the detrimental effects of tobacco smoking on periodontal health and the importance of early diagnosis and timely referral. The aim of this study was to confirm the possible relationship between tobacco smoking and periodontal diseases and to study the correlation between intensity of smoking and disease severity.

Periodontitis among tobacco smokers has been reported in several studies in the past indicating greater prevalence and severity of the disease among them. It is the most common dental disease resulting from inflammation of the gum. This inflammation of the gum is caused by

harmful bacteria that adhere on the tooth surface along with residual food debris forming a layer of dental plaque. Symptoms usually occurs in the form of redness, swelling and a tendency to bleed during tooth brushing Although being a part of the body's defense system, this inflammatory response can lead to serious damage. If remained untreated, the inflammation can affect the gums and the roots of the teeth, causing destruction of the periodontal ligament and the supporting bone. This eventually results in the loosening and potential loss of the teeth [45].

Eke et al studied the prevalence, severity, and extent of periodontitis in the adult and provided direct evidence for a high burden of periodontitis in the adult [46].

Bergstrom et al stated that it is revealed in several studies that environmental and lifestyle factors are mostly associated with the onset and progression of periodontal diseases and tobacco smoking is such a factor with which no other known factor can match so strongly in causing harm to the periodontium [47].

Kamran et al found in a study that chronic periodontitis had a high prevalence among smokers[48].

Jerome et al studied that smokers are a high risk group for periodontitis and smoking may be the single most important environmental risk factor for periodontitis [49].

Dr. Scott et al suggested that a large proportion of adult periodontitis may be preventable through prevention and cessation of cigarette smoking [50].

Bergstrom et al found increased prevalence and severity of periodontitis among smokers [51].

Much of the literature has also indicated that smokers suffering from periodontitis respond less satisfactorily to both non-surgical, surgical, and regenerative periodontal treatments. Dental implants also fails frequently in smokers [52]. Moreover, long term studies have shown that smoking was responsible for recurrence of

periodontitis during the period of periodontal maintenance.

Maurizio et al found that the indication that previous smokers have lower levels of risk for periodontitis compared to current smokers is considered to be the strongest available evidence that smoking cessation will result in improved periodontal health and he also suggested smoking cessation as an integral part of periodontal therapy [53].

Preber et al observed that periodontal disease behaves like several other chronic diseases and, further, that tobacco should be considered a major risk factor for chronic periodontal disease [54].

Gloria et al studied that the effects of smoking on periodontal tissues depend on the number of cigarettes smoked daily and the duration of the habit [55].

Haffajee et al showed significantly more loss at maxillary lingual sites and lower anterior teeth suggesting the possibility of a local effect of cigarette smoking [56].

Previously mentioned studies reported on one or two of the following variables: age, frequency and duration of cigarette smoking, level of education, current status and practice of oral hygiene, presence of any systemic diseases etc. However, there was no study that combined all of those variables as a multi-variable interaction.

It is important to maintain the periodontal status as it increases the quality of life, which requires strict avoidance of the risk factors specially tobacco smoking. A healthy periodontium holds and supports the teeth in the socket, thereby maintains a stable dentition which aids in food digestion and prevents other systemic effects caused by periodontitis.

The aim of this study was to evaluate if there is an association between periodontal condition and tobacco smoking along with several other variables like income, patient education level, oral hygiene status, and age etc.

## **Materials & Methods**

This was a cross sectional study. Study locale was Dhaka Dental College & Hospital which is situated in Mirpur-14 of Dhaka city. It is the most renowned and largest institution for dental care in Bangladesh. The study period was 6 months (from March 2018 to August 2018). Study population was the patients attending the Periodontology Department of Dhaka Dental College & Hospital. 115 patients were selected from the target population within the study. Sample size calculation- At 95% confidence interval and 5% error, sampling size was calculated by using the formula

$$n = z^2pq/d^2$$

where,

n = sample size

Z = z- score usually set at 1.96 which correspondent to 95% confidence level

p = Proportion of the target population with certain characteristic/ condition i.e. 63.5% or

0.635

q = Proportion of the target population without certain characteristic/ condition (1-p) i.e.

0.365

d = degree of accuracy, usually set at 5% = 0.05

$$p + q = 1$$

$$q = 1 - p = 1 - 0.635 = 0.365$$

Now required sample size was

$$n = (1.96)^2 \times 0.635 \times 0.365 / (0.05)^2 = 356$$

But for the accuracy of result, 20% of total sample size were added.

So, the required sample size will be (356+20% of 356) = 427.2

But, due to time constraint and limited resources, 115 samples were taken for the study.

### **Eligibility criteria:**

#### **Inclusion criteria :**

- Patients who were tobacco smoker attending Dhaka Dental College & Hospital was included.
- Those who were present during the period of data collection.

- Those who were willing to take part in the interview.

#### **Exclusion criteria :**

- No other patient was included except Dhaka Dental College & Hospital
- Patients who were not willing to give interview.

#### **Development of research instrument :**

- Pretested semi-structured Interview/Questionnaire
- Both open ended and close ended question were used
- English questionnaire was used only because the data were collected by the interviewer herself.
- Dental Caries Probe, dental mirror and periodontal probe were used for clinical examination
- The instruments were researcher friendly and user friendly.

#### **Data collection:**

- Before data collection , the nature and purpose of the study were explained to the respondents
- Face to face interview by using Pretested semi-structured Interview/Questionnaire
- Everyday 10-15 interviews were conducted
- For each interview, 15-30 minutes were spent

#### **Data analysis:**

- The specific objectives were measured by using appropriate statistical tests.
- The descriptive statistics- frequency, percentage were used.
- Chi-square test was done for the different variables (Bi variate) using SPSS

#### **Data presentation and interpretation:**

- By tables
- By graphs
- Statistical inferences

#### **Data quality management:**

- By supervision and spot check in the field.
- Use of relevant variables
- Matching with raw data and printed data.
- Checking the consistency of data.
- Data entry in the computer two times and comparing the data.
- Validity and reliability check of the instrument.

### Ethical issues:

- Before conducting the study, consent was taken from the Ethical Review Board of AIUB
- Following the WHO and Bangladesh Medical Research Council (BMRC) guideline of ethical consideration, informed consent was taken before the interview
- Privacy, confidentiality and anonymity were maintained
- Nature and purpose of the study were explained to both respondent and the authority of the hospital
- The respondent had freedom to take part in the interview.
- The respondent had freedom to refrain from answering any question.
- It was assured to the respondents that the research will do well rather than any harm.

### Results

This chapter presents the study findings as obtained from the field by the researcher. The study was carried out in the Periodontology Department of Dhaka Dental College, Mirpur-14 to determine the prevalence and severity of periodontal diseases among patients who are tobacco smokers attending Dhaka Dental College & Hospital, Mirpur-14, Dhaka. The study covered a population of 115 respondents. To obtain data from the field, 115 questionnaires were used for taking interview of the respondents. For easy analysis and interpretation of collected data different responses were captured and categorized into different themes and tabulations and then they

were calculated as demonstrated in the following sections of the chapter.

Figure-01 shows that the periodontal status of 7% of the participants were healthy while 93% of them were affected by periodontal diseases which indicates proportion of periodontal diseases among them.

Table : 01 shows that among the total participants of 115, 2.6% were in the age group of >20 years old, 33.9% in the age group of 20-40 years old, 39.1% in the age group of 41-60 years old, 21.7% in 61-80 years old and 2.6% in the age group of 81 years old to onwards

Table-02 shows that of the total subjects, 19.1% had completed graduation level of education followed by 35.7% of higher secondary level, 24.3% of secondary level, 11.3% of primary level and 9.6% were either illiterate or had not completed the primary level of education.

Figure-02 shows that 19.1% of the total participants monthly income were 0-5000 tk, 15.7% were 5000-15000 tk, 15.7% were 15000-25000 tk, 22.6% were 25000-35000 tk, 21.7% were 35000-45000 tk and 5.2% of the participants monthly income were 45000 tk to onwards.

Figure-03 illustrates that there is no participants who possesses excellent oral hygiene maintenance practice & preventive knowledge. On the other hand, 31.3% of the participants stand on the category "good", 48.7% on "average" and 20% of the participants stands on the category "neglected".

The mentioned table (Table-03) shows that 7.8% of the total participants practice smoking for 6 months-1 year, 12.2% for 1-5 years, 17.4% for 5-10 years and the most of the participants, 62.6% practice this habit for more than 10 years. But there is no participants who practice smoking for less than 6 months.

Figure-04 shows that 35.7% participants consume more than 1 pack cigarettes per day, 27.8% consume 1 pack, 24.3% consume 4/5 to less than 1 pack and 12.2% consume 2/3 cigarettes per day.

From the mentioned table (Table-04), it can be found that 89.6% of the total subjects were current smokers while 10.4% of them were past smokers.

Figure-05: Based on the presence of any systemic disease that affects periodontal health, number of individuals in each category is shown.

Table-05 illustrates that 42.6% of total participants have non-smoking tobacco using habit followed by 57.4% not having the habit.

Table-06 shows that among the total sample population, 0.9% were affected by mild gingivitis, 6.1% by moderate gingivitis, another 6.1% by severe gingivitis, 28.7% by mild periodontitis, 32.2% by moderate periodontitis and 19.1% by severe periodontitis. On the other hand, 7% of them had healthy gum. That means moderate periodontitis was prevalent among the participants.

Figure-05 shows that 40% of the total participants possess systemic diseases that affects periodontal diseases while the rest 60% don't have.

Table-07 reveals the prevalence of periodontal diseases in different age group. The maximum disease prevalence is seen in 41-60 years old age group. Of the 45 subjects in this age group, 38.3% were having periodontal diseases. Chi-square test shows negative association between age group and periodontal diseases ( $p$  value $>0.05$ ).

Table-08 shows periodontal disease severity according to different age group. Healthy gum were maximum among  $>20$  years of age group (4.3%). Mild gingivitis were seen only among  $>20$  years old age group. Severe gingivitis were 2.6% among both 20-40 and 41-60 years old age group and mild periodontitis 10.4% among both 20-40 and 41-60 years old age group. Maximum level of moderate periodontitis, 13% were seen among 41-60 years old age group and 11.3% of severe periodontitis among 41-60 years old age group. The data points on the fact that moderate periodontitis were maximum among the total participants. As the  $p$  value $<0.05$ , so there is

significant association between age group and periodontal severity.

Table-09 illustrates the association between the subjects' level of education and periodontal status. The  $p$  value indicates that there is no association between these two variables.

The mentioned table (Table-10) justifies that there is positive association between level of education and periodontal severity ( $p$  value $<0.05$ ).

Table-11 shows that  $p$  value $>0.05$ , so there is no association between monthly income and periodontal status of the participants.

Table-12 shows positive association between the participants' monthly income and periodontal disease severity because here the  $p$  value ( $0.035$ ) $< 0.05$ .

Table-13 shows significant relationship between oral hygiene maintenance practice and periodontal status of the participants.

Table-14 shows that oral hygiene maintenance practice & preventive knowledge is significantly associated with periodontal disease severity.

From the above mentioned table (Table-15), it can be clearly said that there is significant association between the subjects' duration of smoking habit and their periodontal status.

Table-16 shows that  $p$  value  $<0.05$ , so there is significant relationship between duration of habit and periodontal severity.

Table-17 points on the fact that intensity of smoking and periodontal status are positively associated ( $p$  value $<0.05$ ).

Table-18 illustrates that there is significant relationship between intensity of smoking and periodontal severity.

It can be clearly said from Table-19 that there is negative association between smoking status (Current/Past smoking) and periodontal status of the participants.

Table-20 shows negative association between smoking status (current /past smoking) and periodontal severity of the participants.



Table-21 shows that p value is less than 0.05, so there is positive association between these 2 variables.

Table-22 shows that there is negative association between presence of any systemic disease that affects periodontal health and periodontal disease severity of the participants as p value is more than 0.05.

Table-23 shows that p value is less than 0.05, so presence of non-smoking tobacco using habit

and periodontal status of the subjects are positively associated.

Table-24 shows positive relationship between non-smoking tobacco using habit and periodontal disease severity of the patient.

Table-25 shows that there is significant association between age and smoking status of the participants.

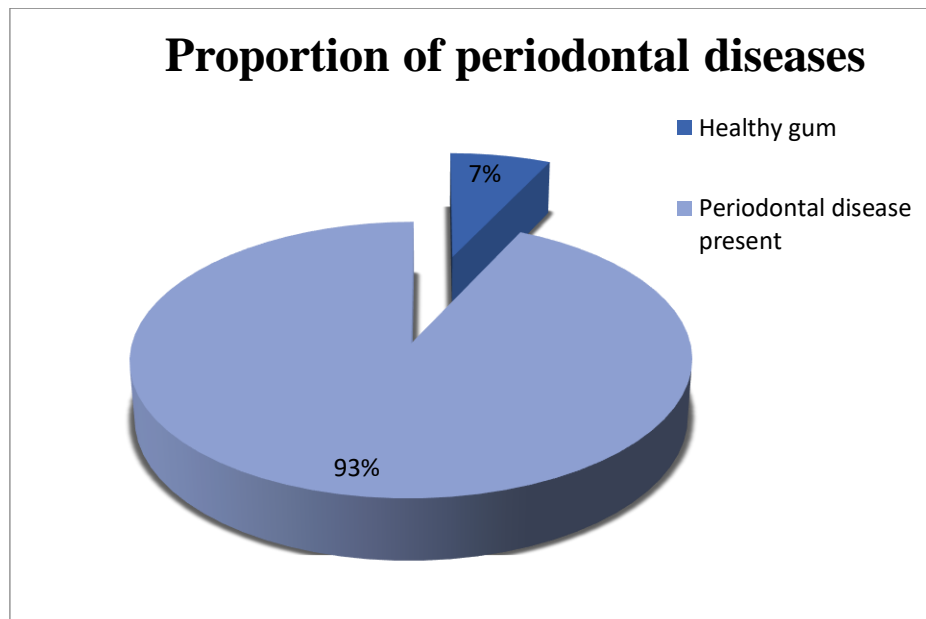


Figure-01: Distribution of respondents on the basis of their periodontal status/ Prevalence of periodontal disease among the participants

Table : 01 Distribution of sample according to age group

SL NO	Age	Frequency	Percentage (%)
1	<20 years old	3	2.6
2	20-40 years old	39	33.9
3	41-60 years old	45	39.1
4	61-80 years old	25	21.7
5	81 years old to onwards	3	2.6
	Total	115	100.0

Table-02 : Based on the level of education, the number of individuals in each category is shown in the table below.

SL NO	Level of education	Frequency	Percentage
1	No education – Primary incomplete	11	9.6
2	Primary complete	13	11.3
3	Secondary complete	28	24.3
4	Higher secondary complete	41	35.7
6	Graduation complete	22	19.1
	Total	115	100.0



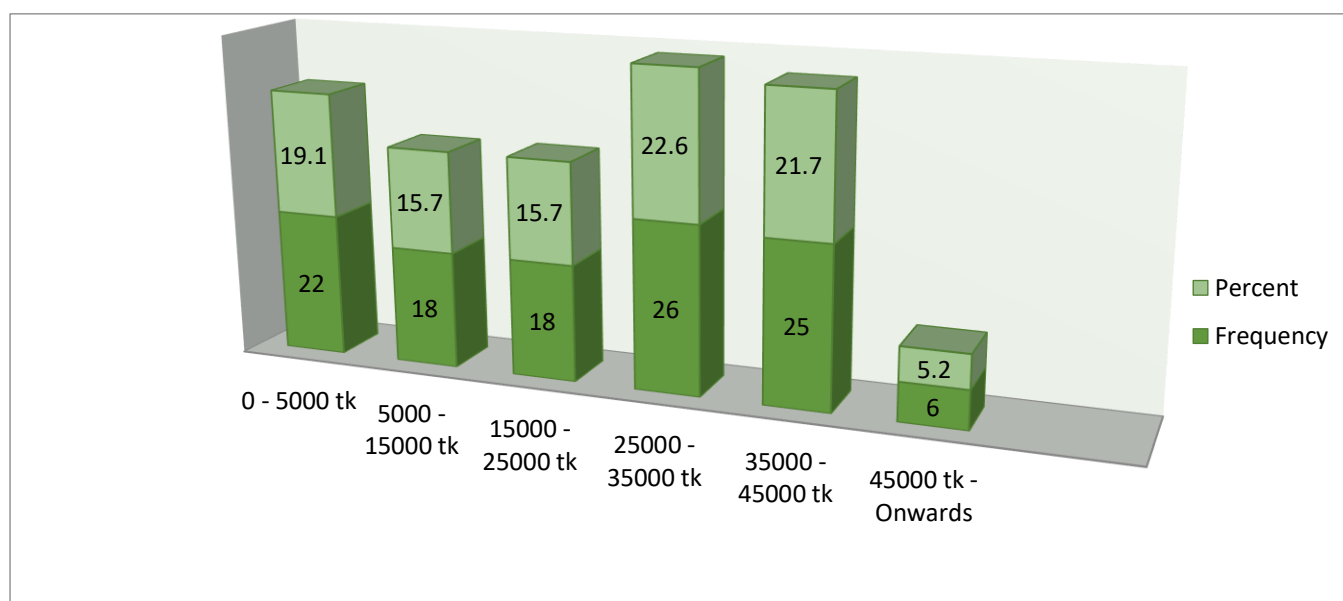


Figure-2 : Monthly income distribution of the sample

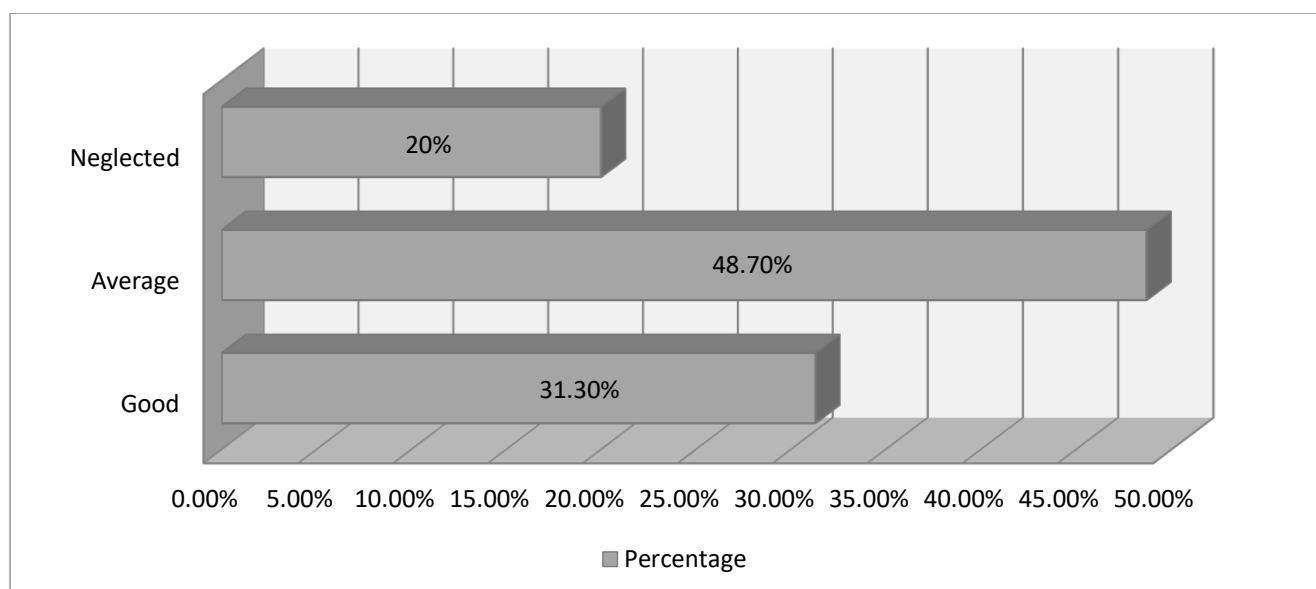


Figure-03 : Distribution of the subjects according to oral hygiene maintenance practice and preventive knowledge.

Table-03: Distribution of the subjects according to duration of their smoking habit.

SL NO	Duration of smoking habit	Frequency	Percentage
1	<6 months	0	0
2	6 months-1 year	9	7.8
3	1-5 years	14	12.2
4	5-10 years	20	17.4
5	>10 years	72	62.6
	Total	115	100

Table-04: Distribution of the participants based on the smoking status (Current smoking/Past smoking)

SL NO	Smoking status (Current/Past smoking)	Frequency	Percentage
1	Current smoker	103	89.6
2	Past smoker	12	10.4
	Total	115	100

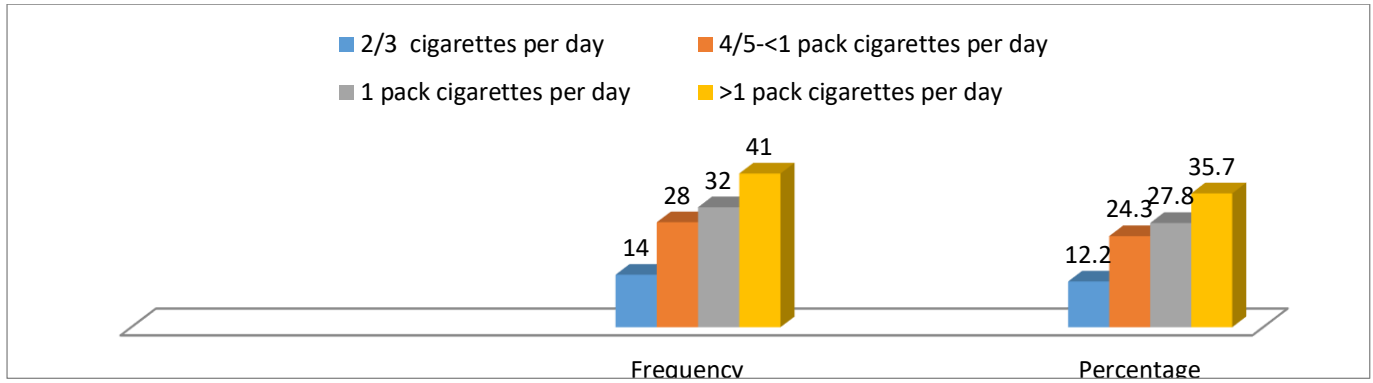


Figure-04: Based on the intensity of smoking, the participants are divided into following 4 groups.

### Presence of systemic disease that affects periodontal health

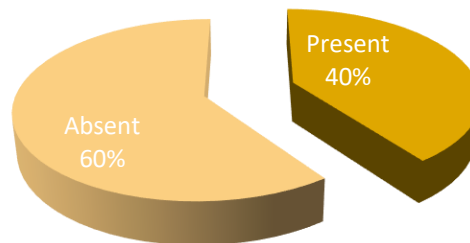


Table-05: Distribution of total participants according to presence of non-smoking tobacco using habit.

SL NO	Non-smoking tobacco using habit	Frequency	Percentage
1	Present	49	42.6
2	Absent	66	57.4
	Total	115	100

Table-06 Periodontal severity of the participants

SL NO	Periodontal severity	Frequency	Percentage
1	Healthy gum	8	7
2	Mild gingivitis	1	0.9
3	Moderate gingivitis	7	6.1
4	Severe gingivitis	7	6.1
5	Mild periodontitis	33	28.7
4	Moderate periodontitis	37	32.2
5	Severe periodontitis	22	19.1
	Total	115	100

Table-07: Age periodontal status cross-tabulation

SL NO	Age	Healthy gum	Periodontal disease present	Total	X <sup>2</sup>	P value
1	>20 years old	1 (0.9%)	2 (1.7%)	3 (2.6%)		
2	20-40 years old	5 (4.3%)	34 (29.6%)	39 (33.9%)		
3	41-60 years old	1 (0.9%)	44 (38.3%)	45 (39.1%)	7.417	0.115
4	61-80 years old	1 (0.9%)	24 (20.9%)	25 (21.7%)		
5	81 years old-onwards	0 (0%)	3 (2.6%)	3 (2.6%)		
	Total	8 (7%)	107 (93%)	115 (100%)		

Table-08: Periodontal disease severity among age group

Age	Healthy gum	Mild gingivitis	Moderate gingivitis	Severe gingivitis	Mild Periodontitis	Moderate periodontitis	Severe periodontitis	Total	X <sup>2</sup>	P value
>20	1	1	0	0	1	0	0	3		
	.9%	.9%	0.0%	0.0%	.9%	0.0%	0.0%	2.6%		
20-40	5	0	6	3	12	12	1	39		
	4.3%	0.0%	5.2%	2.6%	10.4%	10.4%	.9%	33.9%		
41-60	1	0	1	3	12	15	13	45	66.9 %	0.000000 02
	.9%	0.0%	.9%	2.6%	10.4%	13.0%	11.3%	39.1%		
61-80	1	0	0	1	7	8	8	25		
	.9%	0.0%	0.0%	.9%	6.1%	7.0%	7.0%	21.7%		
81-Onwards	0	0	0	0	1	2	0	3		
	0.0%	0.0%	0.0%	0.0%	.9%	1.7%	0.0%	2.6%		
Total	8	1	7	7	33	37	22	115		
	7.0%	.9%	6.1%	6.1%	28.7%	32.2%	19.1%	100.0 %		

Table-09: Level of education and periodontal status

SL NO	Level of education	Healthy	Periodontal disease present	Total	X <sup>2</sup>	P value
1	No education-Primary incomplete	0 0.0%	11 9.6%	11 9.6%		
2	Primary complete	0 0.0%	13 11.3%	13 11.3%		
3	Secondary complete	1 0.9%	27 23.5%	28 24.3%	6.581	0.161
4	Higher secondary complete	3 2.6%	38 33%	41 35.7%		
5	Graduation complete	4 3.5%	18 15.7%	22 19.1%		
	Total	8 7%	107 93%	115 100%		

Table-10: Association between level of education and periodontal severity

Level of education	Healthy gum	Mild gingivitis	Moderate gingivitis	Severe gingivitis	Mild Periodontitis	Moderate periodontitis	Severe periodontitis	Total	X <sub>2</sub>	P value
No education- primary incomplete	0	0	0	0	1	5	5	11		
	0.0%	0.0%	0.0%	0.0%	0.9%	4.3%	4.3%	9.6%		
Primary complete	0	0	0	0	1	9	3	13		

	0.0%	0.0%	0.0%	0.0%	0.9%	7.8%	2.6%	11.3%		
Secondary complete	1	0	2	1	12	5	7	28		
	0.9%	0.0%	1.7%	0.9%	10.4%	4.3%	6.1%	24.3%	56.48	0.00001
Higher secondary complete	3	0	1	1	14	16	6	41		
	2.6%	0.0%	0.9%	0.9%	12.2%	13.9%	5.2%	35.7%		
Graduation complete	4	1	4	5	5	2	1	22		
	3.5%	0.9%	3.5%	4.3%	4.3%	1.7%	0.9%	19.1%		
Total	8	1	7	7	33	37	22	115		
	7.0%	0.9%	6.1%	6.1%	28.7%	32.2%	19.1%	100%		

Table-11: Monthly income and periodontal status

SL NO	Monthly income	Healthy gum	Periodontal disease present	Total	X <sup>2</sup>	P value
1	0 - 5000 tk	3	19	22		
		2.6%	16.5%	19.1%		
2	5000 - 15000 tk	0	18	18		
		0.0%	15.7%	15.7%		
3	15000 - 25000 tk	0	18	18		
		0.0%	15.7%	15.7%		
4	25000 - 35000 tk	2	24	26	5.146	0.398
		1.7%	20.9%	22.6%		
5	35000 - 45000 tk	2	23	25		
		1.7%	20.0%	21.7%		
6	45000 tk - Onwards	1	5	6		
		0.9%	4.3%	5.2%		
	Total	8	107	100%		

Table-12: Association between monthly income and periodontal severity

Monthly income	Healthy gum	Mild gingivitis	Moderate gingivitis	Severe gingivitis	Mild periodontitis	Moderate periodontitis	Severe periodontitis	Total	X <sup>2</sup>	P value
0-5000 tk	3	1	2	0	3	5	8	22		
	2.6%	0.9%	1.7%	0.0%	2.6%	4.3%	7.0%	19.1%		
5000-15000 tk	0	0	2	0	5	6	5	18		
	0.0%	0.0%	1.7%	0.0%	4.3%	5.2%	4.3%	15.7%		
15000-25000 tk	0	0	1	0	6	10	1	18		
	0.0%	0.0%	0.9%	0.0%	5.2%	8.7%	0.9%	15.7%		

25000-35000 tk	2	0	0	2	8	8	6	26		
	1.7%	0.0%	0.0%	1.7%	7.0%	7.0%	5.2%	22.6%	37.905	0.035
35000-45000 tk	2	0	1	5	9	6	2	25		
	1.7%	0.0%	0.9%	4.3%	7.8%	5.2%	1.7%	21.7%		
45000 tk - onwards	1	0	1	0	2	2	0	6		
	0.9%	0.0%	0.9%	0.0%	1.7%	1.7%	0.0%	5.6%		
Total	8	1	7	7	33	37	22	115		
	7.0%	0.9%	6.1%	6.1%	28.7%	32.2%	19.1%	100%		

Table-13: Association between oral hygiene maintenance practice &amp; periodontal status

SL NO	Oral hygiene maintenance practice & preventive knowledge	Healthy gum	Periodontal diseases present	Total	X <sup>2</sup>	P value
1	Good	6	30	36	7.955	0.019
2	Average	2	54	56		
3	Neglected	0	23	23		
	Total	8	107	115		
		7.0%	93.0%	100.0%		

Table-14: Association between oral hygiene maintenance practice and periodontal severity

Oral hygiene maintenance practice & preventive knowledge	Healthy gum	Mild gingivitis	Moderate gingivitis	Severe gingivitis	Mild Periodontitis	Moderate periodontitis	Severe periodontitis	Total	X <sup>2</sup>	P value
Good	6	1	4	5	13	4	3	36		
	5.2%	0.9%	3.5%	4.3%	11.3%	3.5%	2.6%	31.3%		
Average	2	0	3	2	20	22	7	56		
	1.7%	0.0%	2.6%	1.7%	17.4%	19.1%	6.1%	48.7%		
Neglected	0	0	0	0	0	11	12	23	50.58	0.000031
	0.0%	0.0%	0.0%	0.0%	0.0%	9.6%	10.4%	20.0%		
Total	8	1	7	7	33	37	22	115		
	7.0%	0.9%	6.1%	6.1%	28.7%	32.2%	19.1%	100.0%		

Table-15: Association between duration of smoking habit and periodontal status

SL No	Duration of smoking habit	Healthy gum	Periodontal disease present	Total	X <sup>2</sup>	P value
1	6 months-1 years	6	3	9	57.615	0.0000000021
2	1-5 years	2	12	14		
3	5-10 years	0	20	20		
4	>10 years	0	72	72		
	Total	8	107	115		
		7.0%	93.0%	100.0%		

Table-16: Duration of smoking habit and periodontal severity

Duration of smoking habit	Healthy gum	Mild gingivitis	Moderate gingivitis	Severe gingivitis	Mild Periodontitis	Moderate periodontitis	Severe periodontitis	Total	X <sup>2</sup>	P value
6 months-1year	6	0	0	0	3	0	0	9		
	5.2%	0.0%	0.0%	0.0%	2.6%	0.0%	0.0%	7.8%		
1-5 years	2	1	3	0	6	2	0	14		
	1.7%	0.9%	2.6%	0.0%	5.2%	1.7%	0.0%	12.2%		
5-10 years	0	0	1	2	4	10	3	20	83.81	0.00006
	0.0%	0.0%	0.9%	1.7%	3.5%	8.7%	2.6%	17.4%		
>10 years	0	0	3	5	20	25	19	72		
	0.0%	0.0%	2.6%	4.3%	17.4%	21.7%	16.5%	62.6%		
Total	8	1	7	7	33	37	22	115		
	7.0%	0.9%	6.1%	6.1%	28.7%	32.2%	19.1%	100.0%		

Table-17: Association between intensity of smoking and periodontal status

SL NO	Intensity of smoking	Healthy gum	Periodontal disease present	Total	X <sup>2</sup>	P value
1	2-3 cigarettes/day	3	11	14		
		2.6%	9.6%	12.2%		
2	4/5 - <1 pack cigarettes/day	4	24	28		
		3.5%	20.9%	24.3%		
3	1 pack cigarettes/day	1	31	32	10.645	0.014
		0.9%	27.0%	27.8%		
4	>1 pack cigarettes/day	0	41	41		
		0.0%	35.7%	35.7%		
	Total	8	107	115		
		7.0%	93.0%	100.0%		

Table-18: Association between intensity of smoking and periodontal severity

Intensity of smoking	Healthy gum	Mild gingivitis	Moderate gingivitis	Severe gingivitis	Mild Periodontitis	Moderate periodontitis	Severe periodontitis	Total	X <sup>2</sup>	P value
2/3 cigarettes/day	3	1	5	1	3	1	0	14		
	2.6%	0.9%	4.3%	0.9%	2.6%	0.9%	0.0%	12.2%		
4/5-<1 pack cigarettes/day	4	0	2	3	11	3	5	28		
	3.5%	0.0%	1.7%	2.6%	9.6%	2.6%	4.3%	24.3%		
1 pack cigarettes/day	1	0	0	1	9	12	9	32	60.69	0.00001

	0.9%	0.0%	0.0%	0.9%	7.8%	10.4%	7.8%	27.8%		
>1 pack cigarettes/day	0	0	0	2	10	21	8	41		
	0.0%	0.0%	0.0%	1.7%	8.7%	18.3%	7.0%	35.7%		
Total	8	1	7	7	33	37	22	115		
	7.0%	0.9%	6.1%	6.1%	28.7%	32.2%	19.1%	100.0%		

Table-19: Smoking status (Current/Past smoking) and periodontal status

SL NO	Smoking status(Current/Past smoking)	Periodontal_status		Total	X <sup>2</sup>	P value
		Healthy gum	Periodontal disease present			
1	Current smoking	8	95	103	1.002	0.317
		7.0%	82.6%	89.6%		
2	Past smoking	0	12	12		
		0.0%	10.4%	10.4%		
	Total	8	107	115		
		7.0%	93.0%	100.0%		

Table-20 : Association between smoking status (Current/Past smoking) and periodontal severity

Smoking status	Periodontal_severity							Total	X <sup>2</sup>	P value
	Healthy gum	Mild gingivitis	Moderate gingivitis	Severe gingivitis	Mild Periodontitis	Moderate periodontitis	Severe periodontitis			
Current smoking	8	1	7	7	29	30	21	103	6.446	0.375
	7.0%	0.9%	6.1%	6.1%	25.2%	26.1%	18.3%	89.6%		
Past smoking	0	0	0	0	4	7	1	12		
	0.0%	0.0%	0.0%	0.0%	3.5%	6.1%	0.9%	10.4%		
Total	8	1	7	7	33	37	22	115		
	7.0%	0.9%	6.1%	6.1%	28.7%	32.2%	19.1%	100.0%		

Table-21 : Association between presence of any systemic disease that affects periodontal health and periodontal status.

SL NO	Presence of any systemic disease that affects periodontal health	Periodontal_status		Total	X <sup>2</sup>	P value
		Healthy gum	Periodontal disease present			
1	Present	0	46	46	5.732	0.017
		0.0%	40.0%	40.0%		
2	Absent	8	61	69		
		7.0%	53.0%	60.0%		
	Total	8	107	115		
		7.0%	93.0%	100.0%		



Table-22 : Association between presence of periodontal disease that affects periodontal health and periodontal severity

Presence of systemic disease	Periodontal severity							Total	X <sup>2</sup>	P value
	Healthy gum	Mild gingivitis	Moderate gingivitis	Severe gingivitis	Mild Periodontitis	Moderate periodontitis	Severe periodontitis			
Present	0 0.0%	0 0.0%	1 0.9%	4 3.5%	13 11.3%	18 15.7%	10 8.7%	46 40.0%	10.2 17	0.116
Absent	8 7.0%	1 0.9%	6 5.2%	3 2.6%	20 17.4%	19 16.5%	12 10.4%	69 60.0%		
Total	8 7.0%	1 0.9%	7 6.1%	7 6.1%	33 28.7%	37 32.2%	22 19.1%	115 100.0%		

Table-23 : Non-smoking tobacco using habit and periodontal status

SL NO	Non-smoking tobacco using habit	Periodontal status		Total	X <sup>2</sup>	P value
		Healthy gum	Periodontal disease present			
1	Present	0 0.0%	49 42.6%	49 42.6%	6.383	0.012
2	Absent	8 7.0%	58 50.4%	66 57.4%		
	Total	8 7.0%	107 93.0%	115 100.0%		

Table -24 : Association between non-smoking tobacco using habit and periodontal disease severity

Non-smoking tobacco using habit	Periodontal severity							Total	X <sup>2</sup>	P value
	Healthy gum	Mild gingivitis	Moderate gingivitis	Severe gingivitis	Mild Periodontitis	Moderate periodontitis	Severe periodontitis			
Present	0 0.0%	0 0.0%	0 0.0%	0 0.0%	11 9.6%	17 14.8%	21 18.3%	49 42.6%	43.530	0.000 041
Absent	8 7.0%	1 0.9%	7 6.1%	7 6.1%	22 19.1%	20 17.4%	1 0.9%	66 57.4%		
	8 7.0%	1 0.9%	7 6.1%	7 6.1%	33 28.7%	37 32.2%	22 19.1%	115 100.0%		

Table-25: Association between age and smoking status (Current/Past smoking)

SL NO	Age	Current smoking or Past smoking		Total	X <sup>2</sup>	P value
		Current smoking	Past smoking			
1	>20 years	3 2.6%	0 0.0%	3 2.6%	40.185	0.0000096
2	20-40 years	38 33.0%	1 0.9%	39 33.9%		
3	41-60 years	44 38.3%	1 0.9%	45 39.1%		
4	61-80 years	18 15.7%	7 6.1%	25 21.7%		
5	81 years-Onwards	0 0.0%	3 2.6%	3 2.6%		
		103 89.6%	12 10.4%	115 100.0%		

## Discussion :

The study was designed to assess the proportion and severity of periodontal diseases among patients who are tobacco smokers attending Dhaka Dental College & Hospital, Mirpur-14, Dhaka. It was a cross-sectional study.

The objective of the study was to determine the proportion and severity of periodontal diseases among patients who are smokers attending Dhaka Dental College & Hospital, Mirpur-14 and also to identify if there is any relationship between intensity of smoking and severity of periodontal diseases.

The study was carried out from March 2018 to August 2018. A total of 115 participants were interviewed using face-to-face interview method. Among them 107(93%) were found to have periodontal disease and most of the total subjects (32.2%) were affected with moderate periodontitis.

In this study, Community Periodontal Index Of Treatment Needs (CPITN), Gingival Index of Loe and Silness and Periodontitis severity index according to American Academy Of Periodontology were used for diagnosing the periodontal status and severity of the participants. The CPITN is an ideal index for conducting epidemiological studies because of its use of accepted clinical criteria, partial mouth examination and a comparatively simple recording procedure which allows a rapid periodontal assessment of the individuals. Besides it also determines the essential treatment needed for them according to their periodontal condition and severity.

Gingival index of Loe and Silness and Periodontitis severity index describe the severity of gingivitis and periodontitis respectively.

From the bivariate comparisons used to find out association between periodontal condition and selected variables, the statistically significant associations are between age and periodontal severity and smoking status, level of education and periodontal severity, monthly income and periodontal severity, oral hygiene maintenance

practice and preventive knowledge with periodontal status and severity of the participants respectively, duration and intensity of smoking with periodontal status and severity respectively, presence of systemic diseases that affect periodontal health with periodontal disease severity and presence of non-smoking tobacco using habit with periodontal status and severity respectively.

### Age group and periodontal severity

When considering the periodontal disease severity among different age group, it was found that progression of periodontal disease generally occurs with increasing age. In this study, severe periodontitis were highest (11.4%) among 41-60 years old age group followed by moderate periodontitis which was also highest (13%) among the same age group. But after these ages, periodontal severity gradually decreased here which may be due to the contribution of smoking cessation among the participants. Table-25 shows clearly that the history of past smoking increased with age among the participant particularly in that age group where progression of periodontal disease decreased with age suddenly (61-80 years old). From these findings it can be said that the progression of periodontal diseases occurs with advancing age. But it can also be slowed down with increasing age due to cessation of smoking along with some other undetermined factors.

### Level of education and periodontal severity

Among the total participants, 41 (35.7%) had completed the higher secondary level of education (the largest sample group). Of them, 12.2% had mild periodontitis, 13.9% had moderate periodontitis and 5.2% had severe periodontitis. Moderate periodontitis was highest (32.17%) among the total participants. Severe periodontitis was lowest among the participants who were graduate. The decreasing severity of periodontal disease with highest level of education may be due to awareness among them about the disease and access to dental health care facilities.

### **Monthly income and periodontal severity**

Severe periodontitis is highest (7%) among the lowest income group and no cases of severe periodontitis was found among the highest income group. The reason for decrease in periodontal disease severity with increase in income may be due to affordability of the participants of highly expensive dental treatment procedure which was not affordable to the lowest socio-economic class.

### **Oral hygiene maintenance practice & preventive knowledge with periodontal status and disease severity**

The data from the study (Table-13) says that there was no case of healthy gum in the participants who possesses neglected oral hygiene maintenance practice and preventive knowledge. On the other hand, disease prevalence increases with worsening status of oral hygiene maintenance practice.

While considering periodontal severity, severe periodontitis was highest (10.4%) among participants having neglected oral hygiene maintenance practice & preventive knowledge and lowest (2.6%) among those having good one.

### **Duration of smoking habit with periodontal status and disease severity**

Table-15 shows that prevalence of periodontal disease increased with increasing duration of smoking habit among the participants and was highest (62.5%) among the subjects practicing smoking for more than 10 years. This trend was also seen between disease severity and duration of smoking habit. Severe periodontitis was highest (16.5%) among participants practicing smoking for more than 10 years and no cases were found among those having duration of smoking habit for 6 months-1 year or 1-5 years.

### **Intensity of smoking with periodontal status and severity**

The findings of the present study revealed that the subjects' periodontal status and disease severity are closely associated with their

intensity of smoking (number of cigarette smoked per day). Periodontal condition worsened with increased intensity of smoking. Prevalence of periodontal disease was highest (35.7%) among the group who consume >1 pack cigarettes per day and lowest (12.2%) among those who consume 2/3 cigarettes per day. Besides, disease severity also increases with intensity of smoking. No cases of severe periodontitis was found among the participants who consumes 2/3 cigarettes per day and lowest among those who consume 1 pack or >1 pack cigarettes per day.

### **Presence of systemic diseases that affect periodontal health and periodontal status**

The present study found that there was a statistically significant relationship between presence of systemic diseases like diabetes mellitus, cardiovascular disease etc and the prevalence of periodontal disease among the participants. Individuals having these systemic diseases have an impaired immune response system which allows colonization of periodontal pathogens and results in progressive periodontal breakdown.

### **Presence of non-smoking tobacco using habit with periodontal status and severity**

It was revealed in the study that the prevalence of periodontal disease is lowest (42.6%) among the subjects who had non-smoking tobacco using habit whereas it was highest (50.4%) among those the habit was absent.. The exact reason behind this findings are unknown. It may occur because during chewing tobacco salivary flow increases which provides a physical cleaning action and inhibits the activity of periodontal pathogens from exerting any destructive changes in the periodontium.

On the other hand, the present study also shows that severity of periodontal disease was also associated with presence of non-smoking tobacco using habit. Severe periodontitis is highest (18.3%) among participants having this habit. Smoking tobacco and other environmental factors may be the reason behind this finding.

Though there was no significant association between smoking status (current/past smoking) and periodontal condition of the participants, the prevalence of periodontal disease was highest (82.6%) among current smokers. Beside this, severe periodontitis was also found to be higher among current smokers (18.3%) compared to past smokers (0.9%). These findings indicate that smoking cessation inhibits the progression of periodontal disease and results in a better periodontal health.

### **Conclusion :**

The current study shows a very high proportion of periodontal disease among tobacco smokers. The severity of the disease also increases with increasing duration and intensity of smoking. Other factors like age, level of education, monthly income, oral hygiene maintenance practice, presence of systemic diseases and non-smoking tobacco using habits also contribute to the high proportion and severity of periodontal disease among the smokers. The study also marked out smoking cessation as an important factor for preventing disease progression and improving overall periodontal health.

### **Recommendations :**

- The detrimental effects of tobacco smoking on periodontal health should be explained among the individuals through different dental public health education programs.
- The benefits of smoking cessation should be brought out to encourage people so that they quit smoking and protect themselves from being affected with severe periodontal disease in the long run.
- Awareness should be raised among the individuals for maintaining good oral hygiene practice and preventing the development of periodontal diseases.
- Highest priority should be given to improve the educational status of the people and to discourage tobacco use at young age.

- Dental treatment procedures in our country are very expensive which results in inaccessibility of them to the poorest group. These problems should be solved and dental treatment procedures should be made affordable to people of lower income group.
- Screening, treatment and awareness to prevent the development of systemic diseases should be encouraged and made accessible to the primary health care level to inhibit the progression of periodontal diseases.

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