ORIGINAL ARTICLE

Frequency of Gingivitis and its Associated Factors in 16–60-Year-Old Patients Reporting at the Dental Hospital: A Cross-Sectional Study

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ABSTRACT

Background: Gingivitis is one of the most prevalent noncommunicable diseases which affecting people in Pakistan. For the preservation of great overall health, dental health must be maintained. So, there is need to determine the prevalence, socioeconomic impact, and educational status of gingivitis with the associated factors amongst widespread age group.

Objective: This research focused on the frequency of gingivitis and its associated factors between the age group of 16–60-year-old patients.

Study Design: Cross sectional study

Study Setting: This study was conducted at department of Dentistry Avicenna Medical & Dental College Hospital Lahore from April 2022 to September 2022.

Methodology: In the present study, a non-probability/convenient sampling technique was used. The 115 patients who had a gingival index scoring from 1-3 were included in the study. Patients with no plaques were excluded from the study. The WHO oral health assessment with some modifications was included as a part of the questionnaire. During the preliminary screening of the subjects, the demographic characteristics including age, gender, BMI, marital, socio-economic, and educational status were noted. A mouth mirror and a pointed explorer technique were used to diagnose caries which helps to fulfil the data of gingival index, plaque index, decayed missing filled teeth index, oral hygiene index simplified. Continuous and categorical data were analyzed by using SPSS version 20.

Results: Out of 115 participants, there were 55 (47.8%) males and 60 (52.17%) females enrolled in the study with an average age of 39.51 ± 9.72 years. In this study, the overall BMI of the participants was 39.0 ± 22.3 kg/m^2. Study results showed that the DMFT and OHI-S were significantly different ($p<0.05$). The DMFT and OHI-S showed the highest value amongst the patients suffering from moderate gingivitis.

Conclusion: This study concluded that gingivitis and its associated factors played a major role in poor oral health. Amongst the age group between 16 to 60 years old, the 30-40 years were more prevalent to gingivitis. The DMFT and OHI-S were significantly different in mild moderate, and severe gingivitis. This study also indicated that the married, low-income status and the graduated patient had achieved bad oral hygiene. The study revealed that the ages between 30 to 40 years were their prime time for social and economic burden on males and also this is the post menstrual age in female, and by this time their health was already severely impaired. This may be a contributing factor to the increased incidence of gingivitis. However, the GI, DMFT, and OHI-S must have an access to fluoride and sealant programs as soon as possible to reduce the prevalence of tooth decay.

Keywords: Gingivitis, DMFT, OHI-S, Factors, Dental Hospital, periodontal disease, risk factors/indicators

INTRODUCTION

The bleeding gums from gingivitis, an inflammatory dental condition that affects the gingiva. It is well-known that dental problems have the highest treatment costs [1]. Worldwide, between 5% and 20% of middle-aged persons suffer from a severe periodontal disease that ultimately results in tooth loss [2, 3]. This makes the periodontal disease the most frequent oral illness due to the prevalence, socioeconomic impact, high cost of care, and general lack of information [1]. The prevalence of oral health issues can be attributed to a wide range of factors, such as the lifestyles and routines of the people in the community, the environment, and the socioeconomic circumstances. Gingivitis is a disease that mostly affects young people all over the world. Gingivitis often develops in early infancy and worsens with age [4, 5].

Plaque deposits, made up of microorganisms such as rods, cocci, fusiform, filaments, and spirochetes, are the primary cause of periodontal disease [6]. As gingivitis progresses, the percentage of gram-positive bacteria in plaque increases, while the proportion of gram-negative bacteria decreases. In more than 75% of the world's population, plaque causes gingivitis, the most prevalent type of periodontal disease [7]. Therapeutic methods help manage oral illness together with personalized treatment regimens that emphasize behavioral changes. General dentists handle dental emergencies which includes diagnosing dental sickness and oral pathology, treating dental infections, performing restorative operations for caries and injuries, and performing oral surgery on

teeth, bone, and soft tissues [8]. When plaque builds up in the crevices between teeth and the gums, an inflammatory reaction is triggered, resulting in the loss of gingival tissues and bleeding when a probe or toothbrush is used to clean the area [9, 10]. Food consistency and its remains, diabetes, immunodeficiencies, teeth concretion, poor oral hygiene, and inefficient help from a dentist or hygienist are all contributors to gingivitis [11].

Gingival inflammation is measured clinically by the Loe and Silness Gingival Index. Gingival inflammation was categorized by Loe and Silness as mild, moderate, and severe. Mild, treatable gingivitis affects a sizable percentage of the population [12]. Clinical symptoms of gingivitis, including red, swollen, tender, and painful gums as well as bleeding gums and bad breath (halitosis), appear 12-21 days after dental plaque accumulation and resolve within one week after proceeding with oral hygiene procedures and other intensive preventative measures [13].

Additionally, it has been seen that the prevalence rates of decayed missing filled teeth index (DMFT), Oral Hygiene index simplified (OHI-S) have significantly increased over the most recent several decades. Hence, gingivitis is one of the most common noncommunicable diseases affecting people in today's society and maintaining a state of oral health. This is a tremendous stress on the people as a result the oral health of the Pakistani population has been neglected [14-16].

This research aimed to the frequency of gingivitis and its associated factors between the age group of 16–60-year-old patients.

MATERIAL AND METHOD

Study Design: The cross-sectional study

Study Setting: This study was conducted at department of Dentistry Avicenna Medical & Dental College Hospital Lahore from April 2022 to September 2022.

Sample Size Calculation: On the WHO sample size calculator, a total of 115 patients between the ages of 16 to 60 years old subjects were chosen based on a prevalence of 33.4% and a margin of error of 8%.

Sample Collection: In the present study, a non-probability/convenient sampling technique was used. The patients who had a gingival index scoring from 1-3 were included in the study. Patients with no plaques were excluded from the study. A total of 200 males and females participated in this study and selected only 115. 85 patients were excluded due to zero scoring of the gingival index. During the preliminary screening of the subjects, the following factors were evaluated: demographic including age, gender, BMI, marital, socio-economic, and educational status were noted, GI = Gingival index, PI = plaque index, DMFT = Decayed missing filled teeth index, OHI-S= Oral Hygiene index simplified. A mouth mirror and a pointed explorer were used to diagnose caries. The questionnaire was developed in English and then validated by two independent local reviewers for validation. The patients were checked by a regular mouth mirror, probe, and an adequate regular torch light while performing the procedure. The demographic information, oral hygiene practices and habits, oral health status, and treatment requirements were gathered through in-person interviews and clinical examinations. The WHO oral health assessment with some modifications was included as a part of the questionnaire.

• Age, gender, educational level, and marital status were some demographic factors that included generic information.

• The oral health state and treatment requirements, including dental caries, gingivitis, periodontitis, missing teeth, mobility, missing teeth, mobility, and teeth that require extraction.

Statistical Analysis: The data analysis for this study was carried out using version 20.0 of the IBM-SPSS. Descriptive analysis was performed on demographic factors such as age, gender, country, and participants' ratings of their oral health state. Calculations were made to determine the mean and standard deviation of index scoring. If the p-value was lower than 0.05, the data were statistically significant.

Table 1: Scoring Criteria of Gingival index (GI)

Score	Gingival index
0	Absence of inflammation or normal gingival.
1	Mild inflammation, slight change in color & edema, but no bleeding on probing
2	Moderate inflammation with redness, edema, glazing, hypertrophy & bleeding on probing.
3	Severe inflammation with marked redness & hypertrophy ulceration & tendency for spontaneous bleeding.

RESULTS

Out of 115 participants, there were 55 (47.8) males and 60 (52.17) females enrolled in the study with an average age of 39.51 ± 9.72 years. In this study, the overall BMI of the participants was 39.0 ± 22.3 kg/m². Overall, 101 (87.8%) and 14 (12.2%) were married and non-married respectively. The 89 (77.4%) participants with low-income status, 25 (21.7%) with middle-income status, and 1 (0.9%) with high-income status. However, the educational status varied 17 (14.8%) were non-matric, 13 (11.3%) passed matriculation, 13 (11.3) passed intermediate, 41 (35.7%) were graduated and 31 (27.0%) were doing post-graduation. The patients in our study had a higher rate of caries prevalence as well. 37% of the participants admitted that they do not clean their teeth, and 23% of those individuals admitted that they do not brush their teeth very frequently.

In table 2, the demographic characteristics including age, gender, BMI, marital status, and socioeconomic and educational status were calculated based on the gingival index. The scoring criteria of the gingival index are presented in table 1. In the table 2, the highest frequency of mild gingivitis patients was found in between 30-40 years at 34.9%, moderate with 8% between 30-40 years. However, there is a general same distribution of severe patients in all age groups. In mild gingivitis, the frequency of females is high at 43.5% as compared to the male with 37.4%. Contrary, patients with moderate gingivitis had a low frequency in the female group at 6.1% with a high in females at 6.1%. Overall, the highest frequency of the mild patient had BMI between 18.5 - 23 Kg/m2 and then 23 - 27.5 Kg/m2. The moderate patients showed an equal frequency of both BMI categories. In severe gingivitis, 3.5% of patients showed a 23 - 27.5kg/m2 BMI category.

Table 2: Distribution of Parameters Based on Demographic Characteristics.

Demographic Characteristics		Gingival Index		
		Mild n (%)	Moderate n (%)	Severe n (%)
Age in Years	10-20 yrs.	3 (3.1)	0	0
	20-30 yrs.	12 (10)	2 (2.2)	1 (1.2)
	30-40 yrs.	40 (34.9)	9 (8)	1 (1.2)
	40-50 yrs.	27 (22.9)	3 (3.1)	2 (1.2)
	50-60 yrs.	11 (10)	3 (3.1)	2 (2.2)
Gender	Male	43 (37.4)	10 (8.7)	2 (1.7)
	Female	50 (43.5)	7 (6.1)	3 (2.6)
BMI (Kg/m²)	<1.8.5	19 (16.5)	3 (2.6)	0
	18.5 - 23	34 (29.6)	6 (5.2)	1 (0.9)
	23 - 27.5	29 (25.2)	6 (5.2)	4 (3.5)
	>27.5	11 (9.6)	2 (1.7)	0
Marital Status	Married	83 (72.1)	14 (12.1)	4 (3.4)
	Non-Married	10 (8.6)	3 (2.6)	1 (0.8)
Socio-Economic Status	Low Income	70 (60.8)	14 (12.)	5 (4.3)
	Middle Income	22 (19.2)	3 (2.6)	0
	High Income	1 (0.8)	0	0
Educational status	Non-Matric	13 (11.3)	2 (1.7)	2 (1.7)
	Matric	10 (8.7)	3 (2.6)	0
	Intermediate	9 (7.8)	2 (1.7)	2 (1.73)
	Graduate	36 (31.3)	4 (3.4)	1 (0.8)
	Postgraduate	25 (21.7)	6 (5.2)	0

The data are presented as frequency (n) and percentage (%).

In table 3 dependent variables included the Decayed missing filled teeth index (DMFT), Oral Hygiene index-simplified (OHI-S), and Plaque Index (PI) which are associated risk factors of Gingival Index (GI). Study results showed that the DMFT and OHI-S were significantly different. However, PI showed no significant difference amongst mild, moderate, and severe gingivitis patients. The DMFT and OHI-S showed the highest value amongst the patients suffering from moderate gingivitis.

Table 3: Association of Gingival Index with Risk Factors.

Gingival Index	DMFT	OHI-S	PI
Mild	13.6 ± 3.2	1.3 ± 0.464	0.98 ± 0.635
Moderate	15.3 ± 3.06	1.80 ± 0.59	0.75 ± 0.45
Severe	12.6 ± 2.70	1.38 ± 0.33	1.044 ± 0.51
P value	0.098	0.001	0.433

The data are presented as mean and standard deviation (SD). The result was analyzed by using an independent t-test. GI = Gingival index, PI = plaque index, DMFT = Decayed missing filled teeth index, OHI-S= Oral Hygiene index simplified. The p<0.05 is significant.

DISCUSSION

This study's findings revealed the frequency of mild, moderate, and severe gingivitis patients with their BMI, gender, and other demographic characteristics. So that the study focused on the frequency of gingivitis and its associated factors in 16–60-year-old patients reporting at the dental hospital. Caries were prevalent in a study conducted at a rate of 92.3%. Patients in our research also exhibited a greater frequency of dental caries. 37% of the participants acknowledged to not cleaning their teeth, and 23% of those persons admitted to not brushing their teeth often. In this study the age group between 30-40 years are more prevalent of gingivitis. From a total of 115 patients, we found that male and

female both had high frequency of mild gingivitis with 43% and 50% respectively. Similarly, people everywhere suffer from periodontal disease, and although the elderly are more likely to be affected [17, 18]. In adults, 50-100% of the population has gingivitis, according to the study conducted by Scannapieco FA, et al [19]. Gingivitis, reported in other research, appeared in young children and worsens throughout puberty [20]. In 2003, the World Health Organization collaborated with the Pakistani government to conduct a nationwide oral health survey across 21 Lahore districts. The results of this survey revealed that only 28% of Pakistani children aged 12 and older have healthy gums, while 93% or more of those aged 65 and up suffer from some form of gingival or periodontal disease. According to these findings, the prevalence of periodontal disease is greater among the country's rural population [21].

Also, there were significant differences between the DMFT and OHI-S. In comparison, of these patients in our research required tooth removal. The DMFT value of male school children aged 12 to 14 years old was the lowest, making the average indices record the lowest possible value [22, 23]. Also Inoue Y, et al demonstrated that the usage of one hundred standardized dentin slabs derived from bovine incisor roots, the researchers observed a rise in the amount of erosion on the roots of the dentin, which is indicative of a rise in the prevalence of caries in the population. This finding was made possible by the researchers using bovine incisor roots as the source of the dentin slabs [24]. Consuming foods and beverages with high sugar content, such as those predominantly present in sweets, beverages, etc., can even affect restorations because they create an acidic environment within the body. This can be the case because sugars cause the body to become more acidic [10]. The other research was conducted on 877 tribal members who participated in the study.

The majority of them were males between the ages of 35 and 44. Daily wage job was discovered to be their primary source of revenue. According to research done by Jones CL, et al that agriculture was identified as the primary source of income, where the majority of the study population of 576 (65%) utilized brick powder for tooth brushing, and only 10% used neem sticks, the majority of the current study population chose neem sticks. Most study participants used different types of tobacco. Research conducted among the "gypsies" indicated that 64.55 percent of the adult population used tobacco, with smokeless tobacco being the most prevalent form [4]. Compared to a survey completed by Lamont T, et al among employees in South Australia, a greater proportion of participants in the current study listed dental prophylaxis and tooth restoration as the most prevalent perceived needs for oral health care [25]. This finding is consistent with other studies that underscore the need for routine dental examinations and treatments to preserve oral health. Most participants in the present study were unaware of the relationship between dental health and general health concerns, comparable to the findings of another study conducted on healthcare professionals [26]. In contrast to the findings of the present investigation, a previous study conducted in Korea found that most participants lacked knowledge regarding the cause of dental caries [27].

Oral hygiene products are an effective way to prevent biofilm from forming. The vast majority of dental plaque is made up of bacteria that are enclosed in a cellular matrix on the surface. Plaque is resistant to washing and can only be removed by spraying. Oral prophylaxis is one type of dental cleaning done by a professional [28]. There is a possibility that the acidic pH of teeth-whitening toothpaste will cause hypersensitivity. When the pH drops below 5.2, research shows that enamel demineralization and root resorption can occur [29]. It was noticed that herbal dentifrice was just as effective as chemical dentifrice for controlling plaque and gingivitis. Most of the respondents' female counterparts believe that they ought to be educated to make use of the most efficient aids and approaches for plaque control. The current research shows that the total number of infected patients of the age between 30-40 years old are more prone to gingivitis and

demographic data may have an impact on the suggested results of the frequency and severity of gingivitis, and that females have a higher rate of severe gingivitis than males. Ages 30 to 40 years were their prime time for social and economic burden on males and also this is the post menstrual age in female, and by this time their health was already severely impaired. This may be a contributing factor to the increased incidence of gingivitis [30, 31].

Limitations: This research was limited by the small sample size. There are limits to our research; first, the data compiled on practices and procedures may be limited. Lastly, there were no data found on oral health awareness, attitudes, and behaviors regarding the intake of sugary foods and beverages. This study helps to the monitoring offices that there is a major need to implement preventative measures of oral unhygienic conditions across various age groups in Pakistan.

CONCLUSION

The participants in this study concluded that gingivitis and its associated factors played a major role in poor oral health. Ages 30 to 40 years were their peak years for imposing a social and economic burden on males and this is also the postmenstrual period for females, hence, by this time their health was seriously compromised. This may be a role in the increasing prevalence of gingivitis. The DMFT and OHI-S were significantly different in mild moderate, and severe gingivitis. It has been demonstrated that the level of dental health in Pakistan is insufficient. This study also indicated that the married, low-income status and the graduated patients had achieved bad oral hygiene. However, the GI, DMFT, and OHI-S must have access to fluoride and sealant programs as soon as possible to reduce the prevalence of tooth decay. Excellent dental health is not only vital for good overall health and freedom from the pain and suffering of oral disease, but it also influences self-esteem, quality of life, and academic and occupational performance. Therefore, the public health community must recognize the importance of oral health.

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