Comparative Study of Chronic Gingivitis among Adults Attending at Rajshahi Medical College Hospital

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ABSTRACT

Background: Chronic gingivitis, a common plaque-induced gum inflammation, is marked by redness, swelling, and bleeding without tissue loss. Its prevalence is influenced by age, gender, oral hygiene, and socioeconomic factors. This study aimed to assess its prevalence and associated risk factors among adults attending Rajshahi Medical College Hospital. **Methods & Materials:** A cross-sectional study of 150 adults was conducted at Rajshahi Medical College Hospital from January 2025 to December 2025. Data on demographics, oral habits, and hygiene were collected via questionnaire, and gingivitis was clinically assessed and graded. Analysis was done using SPSS, and ethical approval and consent were obtained. **Results**: Among 150 adults, most were >40 years (39.3%) and male (58.7%). Oral habits showed 64.0% had never visited a dentist, 28.0% smoked, 38.7% chewed betel nut, and 30.7% used tobacco. More than half of the participants reported brushing their teeth once per day (54.7%), with the majority using a toothbrush and toothpaste (64.0%). Nearly half (48.0%) spent 1–2 minutes on each brushing session. Chronic gingivitis was present in 65.3%, mostly mild (44.9%) or moderate (36.7%). Prevalence was higher in older adults, males, and those with lower education. Smoking, tobacco use, infrequent dental visits, and inadequate brushing were significantly associated with gingivitis. **Conclusion**: Chronic gingivitis affected 65.3% of adults, mostly mild to moderate. Higher prevalence was associated with older age, male sex, lower education, smoking, tobacco use, infrequent dental visits, and poor brushing habits. These findings underscore the need for oral health education, behavioral change, and regular dental check-ups to prevent and manage gingivitis.

Keywords: *Chronic Gingivitis, Young Adults, Oral Habits, Oral Hygiene practices*

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Introduction

Oral health is a vital part of overall health, influenced by various physiological and hormonal changes throughout life [1]. The gingiva is the pink, keratinized tissue around the teeth, supplied by carotid branches and trigeminal nerves, and forms part of the supportive periodontium [2].

Gingivitis is a painless, site-specific gum inflammation caused by plaque, with redness and swelling but no tissue loss, often unnoticed by patients [3]. Common clinical types of gingivitis are acute and chronic, distinguished by their duration and progression [4]. Chronic gingivitis is a long-standing inflammation of the gums caused by plaque, characterized by redness, swelling, and bleeding on probing, but without pain, attachment loss, or bone destruction [5].

In a multi-centre cross-sectional study in North Jordan, about 76 % of adults examined had gingivitis, highlighting a high prevalence of gum inflammation in this adult population. Factors such as age and oral hygiene habits were significantly associated with gingivitis [6]. A meta-analysis of periodontal disease prevalence in Indian adults reported that approximately 46.6 % of adults had gingivitis, showing a substantial burden of gingival inflammation across diverse regions of India [7].

A large multi-center study in South American adults (Brazil, Argentina, Chile) found gingival inflammation in about 96 % of participants, with most showing moderate inflammation, and risk indicators including plaque levels and socioeconomic factors [8]. In a Saudi adult population study of 385 subjects aged 18–40 years, 100 % exhibited some degree of gingival inflammation, with males having more severe signs and higher bleeding on probing than females [9].

A large community survey of slum dwellers (3,904 participants) reported a high prevalence of gingivitis and significant plaque accumulation, reflecting poor periodontal health in socioeconomically disadvantaged populations in Bangladesh [10]. A study of included 227 elderly dental outpatients in Dhaka, Bangladesh. Oral hygiene practices were suboptimal, with many participants cleaning their teeth irregularly and few using interdental aids. Over half had poor oral hygiene, and a similar proportion showed signs of chronic gingivitis, which was significantly associated with age, gender, education, occupation, income, and oral hygiene habits [11].

In Bangladesh, there is a lack of large-scale studies specifically on chronic gingivitis, with limited data on its prevalence, risk factors, and awareness among adults. The aim of this study was to assess the prevalence and clinical characteristics of chronic gingivitis among adults attending Rajshahi Medical College Hospital and to identify associated demographic and oral hygiene-related risk factors, providing insights for improved prevention and management strategies.

Methods & Materials

Study Design and Setting

This was a hospital-based cross-sectional study conducted at the at Rajshahi Medical College Hospital, Bangladesh, over a period of January 2025 to December 2025.

Study Population

The study population consisted of adult patients attending at Rajshahi Medical College Hospital during the study period. The study comprised a total of 150 participants.

Inclusion Criteria

- Adult patients aged 18 years and above
- Patients who agreed to participate and provided informed consent

- Patients attending the dental outpatient department during the study period

Exclusion Criteria

- Patients with a history of periodontal treatment within the last 6 months
- Patients with systemic conditions known to affect periodontal health (e.g., uncontrolled diabetes, immunocompromised states)
- Pregnant women
- Patients unwilling to participate

Sampling Technique

A purposive sampling technique was used to select the study participants based on the inclusion and exclusion criteria.

Data Collection Procedure

Data were collected using a structured, interviewer-administered questionnaire, which included information on:

- Socio-demographic characteristics
- Oral habits and dental visit history
- Oral hygiene practices

Clinical oral examination was performed to assess the gingival status of each participant. The diagnosis of chronic gingivitis and its severity (mild, moderate, severe) was made based on standard clinical criteria, including signs of gingival inflammation such as redness, swelling, and bleeding on probing.

Preparation for Oral Examination

Oral examinations were conducted in the Dental Outpatient Department (OPD) under adequate natural and artificial illumination. Prior to examination, participants were seated comfortably in a dental chair. Each participant was informed about the examination procedure to ensure cooperation and minimize anxiety.

Infection Control Measures

Strict infection control protocols were maintained throughout the examination process. The examiner used disposable gloves, face mask, and protective apron. Sterilized instruments were used for each participant, and proper hand hygiene was maintained before and after every examination.

Instruments Used

The oral examination was carried out using:

- Mouth mirror
- WHO periodontal probe
- Disposable gauze
- Adequate light source

Examination Procedure

The examination was performed systematically following a sextant-wise approach. The gingival tissues surrounding all erupted teeth were assessed for signs of inflammation.

The following clinical parameters were evaluated:

- **Color of gingiva** (normal pink or reddish)
- **Contour and consistency** (firm or swollen)
- **Presence of gingival bleeding** on gentle probing
- **Edema and loss of stippling**
- **Bleeding on probing (BOP)** using a WHO periodontal probe with light pressure

Assessment of Chronic Gingivitis

Chronic gingivitis was diagnosed based on clinical signs of gingival inflammation without loss of periodontal attachment or alveolar bone involvement. The diagnosis was made when one or more of the following features were present:

- Redness and swelling of the gingiva
- Bleeding on probing
- Soft and edematous gingival tissue

Severity Grading of Gingivitis

The severity of gingivitis was categorized based on the extent and intensity of inflammation:

- **Mild gingivitis:** Slight color change, mild edema, bleeding on probing in limited areas
- **Moderate gingivitis:** Redness, edema, and bleeding on probing involving several sites
- **Severe gingivitis:** Marked redness, swelling, spontaneous bleeding, and generalized involvement

Statistical Analysis

Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) software. Descriptive statistics were used to summarize the data in terms of frequency and percentage.

The chi-square (χ^2) test was applied to assess the association between chronic gingivitis and selected socio-demographic factors, oral habits, and oral hygiene practices.

A p-value < 0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethical Review Committee of Rajshahi Medical College Hospital. Written informed consent was obtained from all participants prior to data collection, and confidentiality of information was strictly maintained.

Results

A total of 150 adult patients attending Rajshahi Medical College Hospital were included in the study.

Socio-demographic Characteristics

The socio-demographic characteristics of the participants are presented in *Table I*. The largest proportion of participants belonged to the age group >40 years (39.3%), followed by 31–40 years (30.0%). Males constituted 58.7% of the study population, while females accounted for 41.3%.

Regarding educational status, 36.0% of the participants had secondary-level education, followed by 30.7% with primary education, 18.6% with graduate or higher education, and 14.7% with no formal education. In terms of occupation, housewives (28.7%) formed the largest group, followed by businessmen (24.6%), students (20.0%), service holders (18.7%), and others (8.0%).

Table I
Socio-demographic Characteristics of the Study Participants (n = 150).

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	≤20	18	12.0
	21–30	28	18.7
	31–40	45	30.0
	>40	59	39.3
Sex	Male	88	58.7
	Female	62	41.3
Education level	No education	22	14.7
	Primary	46	30.7
	Secondary	54	36.0
	Graduate & above	28	18.6
Occupation	Student	30	20.0
	Housewife	43	28.7
	Business	37	24.6
	Service	28	18.7
	Others	12	8.0

Oral Habits and Dental Visit Pattern

As shown in *Table II*, the majority of the participants (64.0%) had never visited a dentist, while only 36.0% reported regular dental visits (once per year). Smoking was reported by 28.0% of the participants, while 38.7% had a habit of betel nut chewing. Tobacco use in any form was present among 30.7% of the study participants.

Table II
Oral Habits and Dental Visit Pattern of the Participants (n = 150).

Variable	Category	Frequency (n)	Percentage (%)
Dental visit history	Never visited	96	64.0
	Regular (once/year)	54	36.0
Smoking habit	Yes	42	28.0
	No	108	72.0
Betel nut chewing	Yes	58	38.7
	No	92	61.3
Tobacco use	Yes	46	30.7
	No	104	69.3

Oral Hygiene Practices

The oral hygiene practices of the participants are summarized in *Table III*. More than half of the participants (54.7%) brushed their teeth once daily, while 37.3% brushed twice daily and only 8.0% brushed more than twice daily. The predominant oral cleaning method was the use of a toothbrush with toothpaste (64.0%), followed by a toothbrush with tooth powder (18.7%). Smaller proportions reported using Miswak/Neem sticks (10.6%) or cleaning with a finger using paste or powder (6.7%). Regarding brushing duration, 48.0% brushed for 1–2 minutes, whereas 32.0% brushed for less than one minute and 20.0% brushed for more than two minutes. Most participants (58.7%) brushed their teeth only in the morning, while 30.7% brushed both in the morning and at night.

Table III
Oral Hygiene Practices of the Participants (n = 150).

Variable	Category	Frequency (n)	Percentage (%)
Frequency of tooth brushing	Once daily	82	54.7
	Twice daily	56	37.3
	> Twice daily	12	8.0
Cleaning aid used	Toothbrush & toothpaste	96	64.0
	Toothbrush & tooth powder	28	18.7
	Miswak/Neem stick	16	10.6
	Finger with paste/powder	10	6.7
Duration of brushing	< 1 minute	48	32.0
	1–2 minutes	72	48.0
	> 2 minutes	30	20.0
Timing of brushing	Morning only	88	58.7
	Morning & night	46	30.7
	After meals	16	10.6

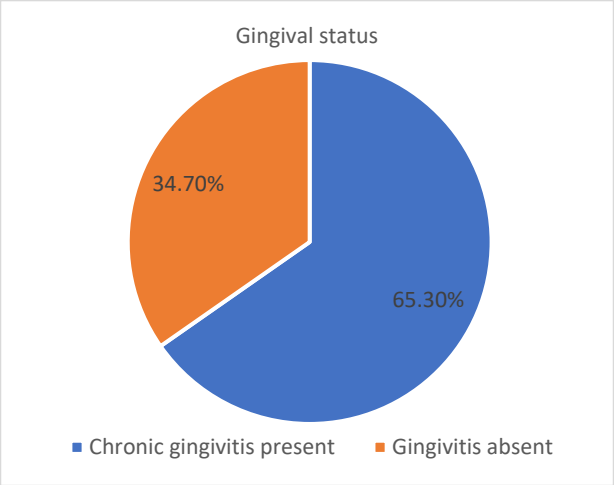

Figure 1(A): Prevalence of Chronic Gingivitis

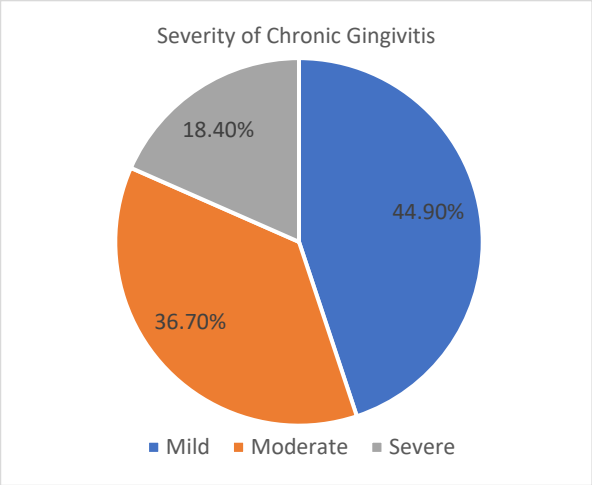

Figure 1(B): Severity of Chronic Gingivitis

Prevalence and Severity of Chronic Gingivitis

The prevalence and severity of chronic gingivitis are shown in *Figure 1*. Chronic gingivitis was present in 98 participants (65.3%), while 34.7% had no signs of gingivitis(Figure I-A).

Among the participants with chronic gingivitis, 44.9% had mild, 36.7% had moderate, and 18.4% had severe gingivitis (Figure I-B).

Association between Socio-demographic Variables and Chronic Gingivitis

The association between socio-demographic variables and chronic gingivitis is presented in *Table IV*. A statistically significant association was observed between age group and chronic gingivitis (χ^2 = 12.84, p = 0.002). The prevalence of gingivitis increased with advancing age, being highest among participants aged >40 years (74.6%).

Sex was also significantly associated with chronic gingivitis (χ^2 = 5.21, p = 0.022), with a higher prevalence among males (72.7%) compared to females (54.8%). Educational status showed a strong association with gingivitis, where participants with primary or no education had a significantly higher prevalence (79.4%) compared to those with secondary or higher education (53.7%) (p < 0.001). However, occupation did not show a statistically significant association with chronic gingivitis (χ^2 = 1.92, p = 0.166).

Table IV

Association between Socio-demographic Variables and Chronic Gingivitis (*n* = 150).

Variable	Category	Gingivitis Present n (%)	Gingivitis Absent n (%)	χ^2 value	*p* value
Age group (years)	≤30 (n=46)	22 (47.8)	24 (52.2)	12.84	0.002
	31–40 (n=45)	32 (71.1)	13 (28.9)		
	>40 (n=59)	44 (74.6)	15 (25.4)		
Sex	Male (n=88)	64 (72.7)	24 (27.3)	5.21	0.022
	Female (n=62)	34 (54.8)	28 (45.2)		
Education level	≤ Primary (n=68)	54 (79.4)	14 (20.6)	14.36	<0.001
	≥ Secondary (n=82)	44 (53.7)	38 (46.3)		
Occupation	Non-service* (n=122)	84 (68.9)	38 (31.1)	1.92	0.166
	Service (n=28)	14 (50.0)	14 (50.0)		

**Non-service = student, housewife, business, others*

Association of Oral Habits and Oral Hygiene Practices with Chronic Gingivitis

The relationship between oral habits, oral hygiene practices, and chronic gingivitis is presented in *Table V*. Smoking was significantly associated with chronic gingivitis, with a higher prevalence observed among smokers (81.0%) than non-smokers (59.3%) (χ^2 = 6.54, p = 0.011). Tobacco use was also significantly linked to the presence of gingivitis (χ^2 = 4.87, p = 0.027). In addition, participants who had never visited a dentist exhibited a significantly greater prevalence of chronic gingivitis (72.9%) compared with those who attended regular dental check-ups (51.9%) (χ^2 = 5.12, p = 0.024). With respect to oral hygiene practices, the frequency of tooth brushing demonstrated a significant association with chronic gingivitis. Participants brushing once daily had a higher prevalence of gingivitis (75.6%) compared to those brushing twice or more daily (52.9%) (p < 0.01). Short brushing duration (<1 minute) was also significantly associated with gingivitis (χ^2 = 4.21, p = 0.040). Although higher prevalence of gingivitis was observed among participants using cleaning aids other than toothbrush and toothpaste and among those brushing only in the morning, these associations were not statistically significant (p = 0.221 and p = 0.089, respectively).

Table V

Association of Oral Habits and Oral Hygiene Practices with Chronic Gingivitis (*n* = 150).

Variable	Category	Gingivitis Present n (%)	Gingivitis Absent n (%)	χ^2 value	*p* value
Smoking habit	Yes (n=42)	34 (81.0)	8 (19.0)	6.54	0.011
	No (n=108)	64 (59.3)	44 (40.7)		
Betel nut chewing	Yes (n=58)	42 (72.4)	16 (27.6)	2.31	0.128
	No (n=92)	56 (60.9)	36 (39.1)		
Tobacco use	Yes (n=46)	36 (78.3)	10 (21.7)	4.87	0.027
	No (n=104)	62 (59.6)	42 (40.4)		
Dental visit history	Never visited (n=96)	70 (72.9)	26 (27.1)	5.12	0.024
	Regular visit (n=54)	28 (51.9)	26 (48.1)		
Frequency of brushing	Once daily (n=82)	62 (75.6)	20 (24.4)	9.87	<0.01
	≥ Twice daily (n=68)	36 (52.9)	32 (47.1)		
Type of cleaning aid	Toothbrush + toothpaste (n=96)	58 (60.4)	38 (39.6)	3.02	0.221
	Others* (n=54)	40 (74.1)	14 (25.9)		
Duration of brushing	< 1 minute (n=48)	36 (75.0)	12 (25.0)	4.21	0.040
	≥ 1 minute (n=102)	62 (60.8)	40 (39.2)		
Timing of brushing	Morning only (n=88)	62 (70.5)	26 (29.5)	2.88	0.089
	Morning & night / after meals (n=62)	36 (58.1)	26 (41.9)		

**Others = Tooth powder, Miswak/Neem stick, finger with paste/powder*

Discussion

In our study, most participants were >40 years (39.3%) and 31–40 years (30.0%), reflecting higher periodontal disease prevalence with age; a meta-analysis reported 79.3% prevalence in adults ≥65 years [12]. Male participants constituted 58.7% of the study sample compared to 41.3% females, suggesting male predominance; consistent with epidemiological data showing higher periodontal disease prevalence in males (37.4%) than females (28.1%) in a meta-analysis of over 50,000 subjects [13]. Most participants had secondary (36.0%) or primary (30.7%) education. Previous evidence indicates that lower educational attainment is associated with inadequate oral hygiene practices and an increased risk of periodontal disease, with individuals having low education showing nearly 1.86 times higher odds of developing chronic periodontitis [14]. In the present study, nearly one-third of participants were housewives (28.7%), followed by businesspersons (24.6%) and students (20.0%). Earlier research has demonstrated that extended working hours adversely affect oral health behaviors, as individuals working ≥55 hours per week are less likely to attend regular dental check-ups and brush twice daily [15].

In this study, the majority of participants (64.0%) had never visited a dentist, whereas only 36.0% reported routine annual dental visits. This finding is consistent with previous research showing that approximately 30.4% of adults had never sought dental care, reflecting low utilization of preventive oral health services [16]. Harmful oral habits were also common in the present population, including smoking (28.0%), betel nut chewing (38.7%), and tobacco use (30.7%). These findings align with those of Sujatha et al. (2012), who reported significantly higher rates of oral mucosal lesions among tobacco smokers, tobacco chewers, and areca nut users, highlighting a strong association between these habits and adverse oral health outcomes [17].

Regarding oral hygiene practices, more than half of the participants brushed their teeth once daily (54.7%), while only 37.3% brushed twice daily. Comparatively, Melo et al. (2017) reported better oral hygiene behaviors, with approximately 70% of individuals brushing at least twice daily and over 64% using toothpaste. Furthermore, only one-fifth of participants in the present study brushed for more than two minutes, compared with nearly 60% reported in the Portuguese population, indicating comparatively poorer oral hygiene practices [18].

The prevalence of chronic gingivitis in this study was 65.3%, with mild, moderate, and severe forms accounting for 44.9%, 36.7%, and 18.4% of cases, respectively. This substantial burden of plaque-induced gingival inflammation is consistent with findings by Murakami et al. (2018), who reported that 70–80% of adults in populations with inadequate oral hygiene exhibit gingival inflammation, with mild cases being most common, followed by moderate and severe forms [19].

An increasing trend in chronic gingivitis prevalence was observed in this study with advancing age, rising from 47.8% among participants aged ≤30 years to 74.6% among those older than 40 years. Male participants exhibited a higher prevalence compared to females (72.7% vs. 54.8%), and individuals with primary-level education showed greater prevalence than those with secondary or higher education (79.4% vs. 53.7%). Occupation, however, was not significantly associated with gingivitis. These findings are consistent with previous studies reporting higher gingivitis prevalence among older individuals, males, and those with lower educational status, emphasizing the influence of sociodemographic factors on gingival health [6].

Additionally, smoking and tobacco use were significantly associated with chronic gingivitis. Smokers demonstrated a higher prevalence (81.0%) compared to non-smokers (59.3%), similar to findings reported by Sujatha et al. (2012), where approximately 80% of smokers exhibited gingival inflammation [17]. Tobacco users also showed higher prevalence than non-users (78.3% vs. 59.6%), which aligns with findings from Guo et al. (2013) [20]. Participants who had never visited a dentist exhibited a markedly higher prevalence of gingivitis compared to those who attended regular dental check-ups (72.9% vs. 51.9%), consistent with prior studies demonstrating a strong association between lack of preventive dental care and gingival inflammation [18]. Regarding oral hygiene, once-daily brushing (75.6%) and brushing <1 minute (75.0%) were associated with higher gingivitis compared with ≥ twice daily (52.9%) and ≥1 minute (60.8%), consistent with Murakami et al. (2018), who found that inadequate brushing frequency and duration increased plaque-induced gingival inflammation by ~70% [18,19].

Conclusion

Chronic gingivitis was highly prevalent among adult patients attending at the Rajshahi Medical College Hospital, affecting 65.3% of participants. Most cases were of mild to moderate severity, indicating a substantial burden of preventable periodontal disease. Older age, male sex, lower educational status, smoking, tobacco use, irregular dental visits, low brushing frequency, and short brushing duration were significantly associated with gingivitis. These findings highlight the importance of oral health education, behavioral modification, and regular dental check-ups to prevent and control chronic gingivitis in adults.

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