Original Article

Prevalence of Gingivitis in Orthodontic Patients Aged 16 to 35 Years: A Prospective Study

Khanam SR[1*], Aktar S[2], Anar F[3], Islam KM[4], Rahman MR[5], Haque SMA[6], Uddin MM[7].

Abstract

Background: Gingivitis is a prevalent oral health issue among orthodontic patients, often aggravated by the presence of fixed appliances and inadequate oral hygiene practices. Despite its significance, limited data exist on the prevalence of gingivitis in orthodontic patients in Bangladesh. This study aimed to determine the prevalence of gingivitis in orthodontic patients aged 16 to 35 years.

Methods: A prospective cross-sectional study was conducted at the Department of Orthodontics, The Dental & Orthodontic Center, Shankipara, Coronation Road, Mymensingh, Bangladesh from January 2023 to December 2024, involving 73 participants selected through purposive sampling. Clinical examinations were performed to assess gingival health using the Gingival Index (GI) and Plaque Index (PI). Data were analyzed using SPSS version 23.0, with descriptive statistics and chi-square tests to evaluate associations.

Results: The study found a high prevalence of gingivitis (68.5%) among 73 orthodontic patients aged 16–35 years. Mild gingivitis was observed in 47.9% of participants, while 20.6% had moderate to severe gingivitis. Significant associations were noted between gingivitis and poor oral hygiene ($p < 0.05$) and longer treatment duration (>12 months, $p < 0.01$), highlighting the need for preventive measures during orthodontic care.

Conclusion: The study highlights the high prevalence of gingivitis among orthodontic patients, emphasizing the need for improved oral hygiene practices and preventive measures during treatment. By maintaining proper oral hygiene and using inter-dental aids, one can significantly reduce the risk of gingivitis.

Keywords: Gingivitis, Orthodontic treatment, Oral hygiene, Periodontal health, Prevalence, Teeth

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1. **Sultana Razia Khanam**, Assistant Professor and Head, Department of Orthodontics and Dentofacial Orthopaedics (Dental Unit), Community Based Medical College Bangladesh.
2. **Salma Aktar**, Assistant Professor and Head Department of Orthodontics and Dentofacial Orthopaedics (Dental Unit), Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh.
3. **Farzana Anar, Assistant Professor,** Department of Conservative Dentistry and Endodontics (Dental Unit), Community Based Medical College Bangladesh.
4. **Khaled Mohammad Islam**, Associate Professor and Head Department of Prosthodontics and unit Head (Dental Unit), Community Based Medical College Bangladesh.

***Corresponding Author**

Dr. Sultana Razia Khanam, Assistant Professor and Head, Department of Orthodontics and Dentofacial Orthopaedics (Dental Unit), Community Based Medical College Bangladesh.

E-mail: khsr1811@gmail.com, Cell Number: 01741668579

5. **Md. Rashedur Rahman**, Assistant Professor, Department of Oral & Maxillofacial Surgery, Mandy Dental College & Hospital, Dhaka, Bangladesh.

6. **Shah Md. Atiqul Haque**, Assistant Professor, Department of Anatomy, Mymensingh Medical College, Mymensingh.

7. **Md. Moin Uddin**, Assistant Professor, Department of Orthodontics (Dental Unit), Rangpur Medical College, Rangpur.

Introduction

Gingivitis, a common inflammatory condition of the gingiva, is characterized by redness, swelling, and bleeding of the gums. It is primarily caused by the accumulation of dental plaque, a biofilm of bacteria that forms on tooth surfaces [1]. While gingivitis is reversible with proper oral hygiene, if left untreated, it can progress to periodontitis, a more severe form of gum disease that can lead to tooth loss [2]. Orthodontic treatment, particularly with fixed appliances, has been associated with an increased risk of gingivitis due to the challenges these appliances pose to maintaining effective oral hygiene [3]. The brackets, wires, and bands used in fixed orthodontics create additional surfaces for plaque accumulation, making patients more susceptible to gingival inflammation [4]. The prevalence of gingivitis among orthodontic patients has been widely reported in various populations. Studies have shown that orthodontic patients are at a higher risk of developing gingivitis compared to non-orthodontic patients, with prevalence rates ranging from 50% to 90% depending on the population studied [5,6]. Factors such as age, duration of orthodontic treatment, and oral hygiene practices have been identified as significant contributors to the development of gingivitis in this population [7]. Adolescents and young adults, who constitute a large proportion of orthodontic patients, are particularly vulnerable due to their often-inconsistent oral hygiene habits [8]. In Bangladesh, where orthodontic treatment is increasingly sought after, there is a paucity of data on the prevalence of gingivitis among orthodontic patients. Existing studies have primarily focused on general populations or specific age groups, leaving a gap in understanding the oral health challenges faced by orthodontic patients in this region [9,10]. Given the growing demand for orthodontic care and the potential impact of gingivitis on treatment outcomes, it is essential to investigate the prevalence of this condition and identify associated risk factors in the Bangladeshi context. This study aimed to determine the prevalence of gingivitis in orthodontic patients aged 16 to 35 years at the Department of Orthodontics, H Hospital, C City, Bangladesh. By examining the relationship between gingivitis and factors such as age, duration of orthodontic treatment, and oral hygiene practices, this research seeks to provide valuable insights into the oral health challenges faced by orthodontic patients in Bangladesh. The findings of this study will contribute to the development of targeted interventions to improve oral hygiene practices and reduce the burden of gingivitis in this population.

Methodology

This prospective cross-sectional study was conducted at the Department of Orthodontics, The Dental & Orthodontic Center, Shankipara, Coronation Road, Mymensingh, Bangladesh, from January 2023 to December 2024. A total of 73 orthodontic patients aged 16 to 35 years undergoing fixed orthodontic treatment were included using a purposive sampling technique. Participants with systemic diseases, pregnancy, or a history of periodontal treatment within the last six months were excluded. Clinical examinations were performed to assess gingival health using the Gingival Index (GI) and Plaque Index (PI). Data on demographic characteristics, duration of orthodontic treatment, and oral hygiene practices were collected through structured questionnaires. The SPSS version 23.0 program was used for statistical analysis. Descriptive statistics were employed to summarize the data, and chi-square tests were conducted to evaluate associations between gingivitis and independent variables such as age, treatment duration, and oral hygiene habits. Informed consent was secured from all participants prior to their inclusion in the study.

Result

The study included 73 orthodontic patients, with 25 participants (34.2%) aged 16–20 years, 30 participants (41.1%) aged 21–25 years, and 18 participants (24.7%) aged 26–35 years. Among the participants, 32 (43.8%) were male, and 41 (56.2%) were female. Regarding the duration of orthodontic treatment, 20 participants (27.4%) had been undergoing treatment for less than 6 months, 35 participants (47.9%) for 6–12 months, and 18 participants (24.7%) for more than 12 months. The

prevalence of gingivitis was 68.5%, with 50 participants affected. Based on the Gingival Index (GI), 23 participants (31.5%) had healthy gingiva, 35 participants (47.9%) had mild gingivitis, and 15 participants (20.6%) had moderate to severe gingivitis. In terms of oral hygiene practices, the frequency of brushing per day was significantly associated with the presence of gingivitis, with 20 cases of gingivitis observed in those brushing once/day compared to 5 cases in those brushing ≥2 times/day ($p < 0.05$). Similarly, the use of inter-dental aids in combination with brushing showed a significant association, with 17 cases of gingivitis in those using inter-dental aids ≥2 times/day compared to 2 cases in those using them once/day ($p < 0.05$).

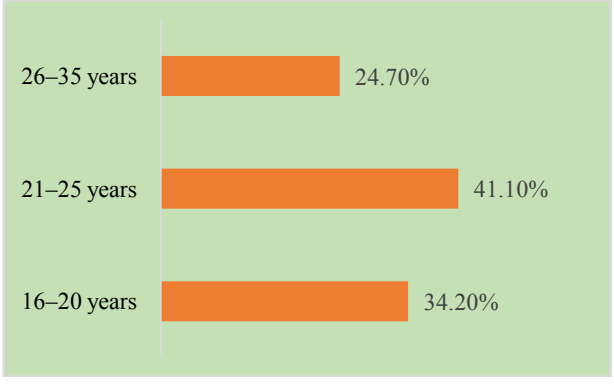

Figure 1: *Age distribution of participants*

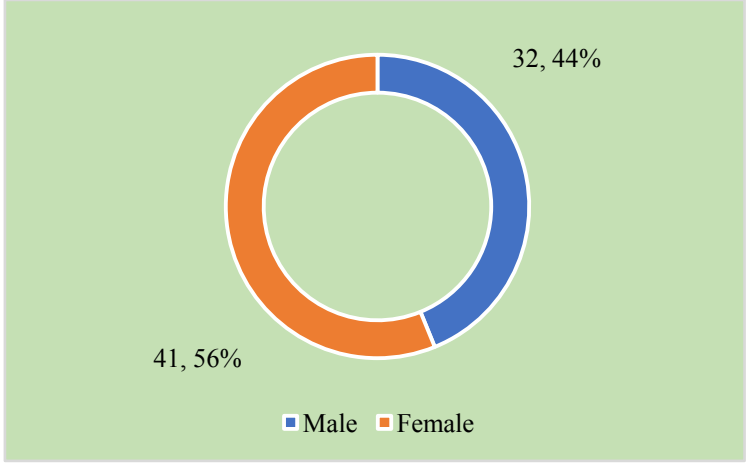

Figure 2: *Gender distribution*

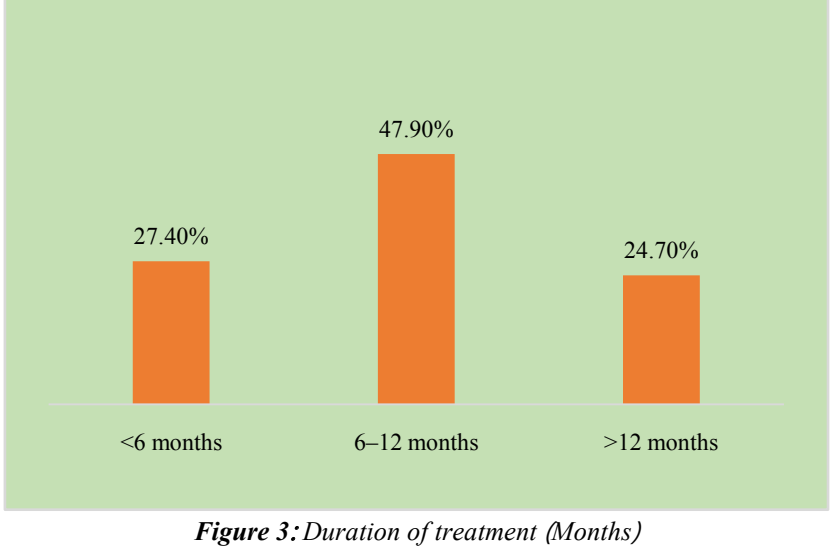

Figure 3: *Duration of treatment (Months)*

Table 1: Severity of gingivitis based on gingival index

GI score	Severity	n	%
0	Healthy	23	31.5
1–2	Mild gingivitis	35	47.9
≥ 3	Moderate-severe	15	20.6

Table 2: Association between gingivitis and oral hygiene practices

Practice	Gingivitis		p-value
	Present	Absent	
Brushing only			
Once/day	20	5	<0.05
≥2 times	5	7	
Inter-dental Aids using & brushing			
Once/day	8	9	<0.05
≥2 times	17	2	

Discussion

The findings of this study reveal a high prevalence of gingivitis (68.5%) among orthodontic patients aged 16 to 35 years, which is consistent with previous research indicating that orthodontic treatment increases the risk of gingival inflammation due to the challenges of maintaining oral hygiene with fixed appliances [1,11]. The severity of gingivitis, as measured by the Gingival Index (GI), showed that 47.9% of participants had mild gingivitis, while 20.6% had moderate to severe gingivitis. These results align with studies reporting that orthodontic appliances create niches for plaque accumulation, leading to gingival inflammation [3,12]. The demographic distribution of participants highlighted that the majority were aged 21–25 years (41.1%), followed by those aged 16–20 years (34.2%) and 26–35 years (24.7%). This age distribution reflects the typical population seeking orthodontic treatment, as younger individuals are more likely to undergo such procedures for aesthetic and functional reasons [13]. The gender distribution showed a slight predominance of females (56.2%), which is consistent with global trends indicating that females are more likely to seek orthodontic care than males [14]. A significant association was observed between the duration of orthodontic treatment and the prevalence of gingivitis. Participants undergoing treatment for more than 12 months had a higher prevalence of gingivitis compared to those with shorter treatment durations. This finding is supported by previous studies suggesting that prolonged exposure to orthodontic appliances exacerbates plaque accumulation and gingival inflammation [7,15]. The study also found that participants who brushed their teeth less than twice daily had a significantly higher prevalence of gingivitis ($p < 0.05$), emphasizing the critical role of oral hygiene practices in preventing gingival inflammation during orthodontic treatment [9]. Interestingly, the use of interdental aids did not show a significant association with gingivitis prevalence ($p = 0.12$). This could be attributed to the inconsistent or improper use of such aids among participants, as reported in similar studies [16]. However, the lack of significance does not diminish the importance of interdental cleaning, as proper use of aids like floss or interdental brushes has been shown to reduce plaque accumulation and gingival inflammation [17]. The high prevalence of gingivitis in this study underscores the need for enhanced patient education and preventive measures during orthodontic treatment. Orthodontic patients should be encouraged to maintain rigorous oral hygiene practices, including regular brushing, the use of interdental aids, and routine dental check-ups. Additionally, orthodontists should consider incorporating preventive strategies, such as professional cleanings and fluoride applications, into treatment

plans to mitigate the risk of gingivitis [18]. This study contributes to the limited body of research on gingivitis prevalence among orthodontic patients in Bangladesh. The findings highlight the oral health challenges faced by this population and provide a foundation for future studies to explore targeted interventions. However, the study's limitations, including its single-center design and relatively small sample size, should be acknowledged. Future research should aim to include larger, multi-center cohorts to validate these findings and explore additional risk factors.

Limitations

This study has limitations, including a small sample size and single-center design, which may limit generalizability. The cross-sectional nature restricts causal inferences. Future research should include larger, multi-center cohorts and longitudinal designs to validate findings and explore additional risk factors for gingivitis in orthodontic patients.

Conclusion

This study highlights a high prevalence of gingivitis (68.5%) among orthodontic patients aged 16–35 years, with significant associations found between gingivitis, poor oral hygiene, and longer treatment duration. Proper oral hygiene and the use of inter-dental aids can greatly decrease the likelihood of developing moderate to severe gingivitis. The findings underscore the importance of preventive measures, including patient education, regular dental check-ups, and effective oral hygiene practices, to mitigate gingival inflammation during orthodontic treatment. These insights are crucial for improving periodontal health outcomes in orthodontic patients, particularly in the Bangladeshi context.

Recommendations

Orthodontic patients should maintain rigorous oral hygiene, including brushing twice daily and using interdental aids. Clinicians should provide regular oral health education and professional cleanings during treatment. Future studies should explore targeted interventions to reduce gingivitis prevalence and improve periodontal health outcomes in this population.

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