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To analyse and evaluate the gingival problems occurring in patients undergoing fixed orthodontic treatment: A questionnaire survey

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Abstract

Background: Fixed orthodontic treatment significantly improves dental aesthetics and function but can also predispose patients to gingival problems due to challenges in maintaining oral hygiene. This study aims to analyze and evaluate the prevalence and types of gingival problems among patients undergoing fixed orthodontic treatment.

Materials and Methods: A questionnaire-based survey was conducted among 200 patients undergoing fixed orthodontic treatment at a tertiary dental care center. The questionnaire assessed oral hygiene practices, awareness of gingival health, and the prevalence of symptoms such as gingival swelling, bleeding, and discomfort. Clinical examination data, including plaque index and gingival index, were recorded to correlate self-reported symptoms with clinical findings.

Results: Out of 200 participants, 75% reported at least one gingival symptom, with 40% experiencing gingival swelling and 30% reporting bleeding gums. The average plaque index score was 2.1 ± 0.3 , and the gingival index score was 1.8 ± 0.4 , indicating moderate gingival inflammation in most patients. Patients with poor oral hygiene practices were significantly more likely to exhibit severe gingival issues ($p < 0.05$).

Conclusion: Gingival problems are highly prevalent among patients undergoing fixed orthodontic treatment, largely due to inadequate oral hygiene. Regular professional care and enhanced patient education on oral hygiene maintenance are crucial in minimizing these complications.

Keywords: Fixed orthodontic treatment, gingival problems, oral hygiene, plaque index, gingival inflammation, questionnaire survey

Introduction

Fixed orthodontic treatment is a widely used modality to correct malocclusions, improve dental aesthetics, and enhance functional efficiency. However, these appliances can pose significant challenges to maintaining oral hygiene due to their intricate design and increased plaque-retentive surfaces [1, 2]. Consequently, patients undergoing fixed orthodontic treatment are at a higher risk of developing gingival problems such as inflammation, swelling, and bleeding gums [3].

Gingival inflammation during orthodontic treatment often results from an imbalance between microbial accumulation and the patient's ability to maintain adequate oral hygiene [4]. Factors such as bracket design, the use of elastics, and patient compliance with hygiene instructions contribute to the severity of gingival issues [5, 6]. Prolonged gingival inflammation, if left untreated, can progress to periodontal disease, leading to irreversible damage to the supporting structures of the teeth [7].

Despite advancements in orthodontic materials and hygiene aids, gingival problems remain a common concern for both patients and clinicians. Understanding the prevalence and contributing factors is essential for devising effective preventive and management strategies. This study aims to analyze and evaluate the gingival problems encountered by patients undergoing fixed orthodontic treatment through a questionnaire-based survey, emphasizing the importance of oral hygiene maintenance in reducing these complications.

Materials and Methods

This cross-sectional study was conducted to evaluate gingival problems in patients undergoing fixed orthodontic treatment. Ethical clearance was obtained from the institutional ethics committee, and written informed consent was obtained from all participants.

Study Population

A total of 200 patients undergoing fixed orthodontic treatment at a tertiary dental care center were enrolled in the study. Inclusion criteria included patients aged 12-40 years who had been undergoing orthodontic treatment for at least six months. Patients with pre-existing periodontal disease, systemic conditions affecting gingival health, or those on medications influencing gingival status were excluded.

Study Design

A structured questionnaire was developed to assess patients' oral hygiene practices, knowledge of gingival health, and self-reported symptoms such as swelling, bleeding, or discomfort. The questionnaire included both closed-ended and Likert scale-based questions.

Clinical Examination

A single trained examiner conducted clinical assessments to ensure consistency. Gingival health was evaluated using the Plaque Index (PI) and Gingival Index (GI), which were recorded for six representative teeth: one molar, one premolar, and one incisor from each quadrant. These indices provided objective measures of plaque accumulation and gingival inflammation.

Data Collection

Participants were asked to complete the questionnaire, and clinical evaluations were conducted during routine orthodontic appointments. Data on the duration of treatment, oral hygiene aids used, and frequency of professional cleaning were also collected.

Statistical Analysis

The data were compiled and analyzed using statistical software. Descriptive statistics were used to summarize the findings, and inferential tests, including chi-square and independent t-tests, were performed to identify associations between gingival problems and contributing factors. A p-value

of less than 0.05 was considered statistically significant.

Results

Demographic Distribution

A total of 200 participants were included in the study, with 120 females (60%) and 80 males (40%). The age distribution ranged from 12 to 40 years, with the majority of participants (65%) in the 15-25 age group. The mean duration of fixed orthodontic treatment was 12±3 months.

Self-Reported Gingival Symptoms

The majority of participants (75%) reported at least one gingival problem during orthodontic treatment. Among these, gingival swelling was the most commonly reported symptom (40%), followed by bleeding gums (30%) and discomfort (25%) (Table 1).

Table 1: Self-Reported Gingival Symptoms

Symptom	Frequency (n)	Percentage (%)
Gingival swelling	80	40
Bleeding gums	60	30
Discomfort	50	25
No symptoms	40	20

Clinical Parameters

The mean plaque index (PI) among participants was 2.1±0.3, and the mean gingival index (GI) was 1.8±0.4, indicating moderate plaque accumulation and gingival inflammation. Patients with poor oral hygiene practices exhibited significantly higher PI and GI scores compared to those with good oral hygiene ($p < 0.05$, Table 2).

Table 2: Clinical Parameters Based on Oral Hygiene Practices

Oral Hygiene Practice	Mean PI (±SD)	Mean GI (±SD)
Good	1.5±0.2	1.3±0.3
Moderate	2.0±0.3	1.7±0.3
Poor	2.4±0.2	2.2±0.4

Relationship between Duration of Treatment and Gingival Problems

Participants undergoing orthodontic treatment for more than 12 months had a higher prevalence of gingival swelling (55%) and bleeding gums (40%) compared to those treated for less than 12 months ($p < 0.05$, Table 3).

Table 3: Prevalence of Gingival Symptoms Based on Duration of Treatment

Duration of Treatment	Gingival Swelling (%)	Bleeding Gums (%)	Discomfort (%)
< 12 months	30	20	15
> 12 months	55	40	35

The results indicate a high prevalence of gingival problems among patients undergoing fixed orthodontic treatment, with symptoms worsening with longer treatment durations and poorer oral hygiene practices (Tables 1-3). These findings emphasize the importance of regular professional care and patient education.

Discussion

The results of this study reveal a high prevalence of gingival problems among patients undergoing fixed orthodontic treatment, consistent with previous research highlighting the challenges of maintaining oral hygiene during orthodontic therapy [1, 2]. Gingival swelling and bleeding gums were the most commonly reported symptoms, which align with studies

identifying plaque accumulation as a primary contributor to gingival inflammation [3, 4]. The intricate design of orthodontic brackets and wires creates niches for plaque retention, exacerbating the risk of periodontal complications [5]. Our findings showed a significant association between oral hygiene practices and the severity of gingival problems. Participants with poor oral hygiene had higher plaque index (PI) and gingival index (GI) scores, corroborating previous studies that underline the critical role of effective oral hygiene in preventing gingival inflammation during orthodontic treatment [6, 7]. Regular use of interdental brushes, floss, and mouth rinses has been shown to mitigate plaque accumulation and gingival problems, yet compliance remains a challenge for many patients [8, 9].

Duration of orthodontic treatment was another key factor influencing gingival health. Patients treated for more than 12 months exhibited a higher prevalence of gingival swelling and bleeding compared to those with shorter treatment durations. Similar observations have been reported in studies suggesting that prolonged exposure to orthodontic appliances increases the likelihood of gingival complications, particularly in patients with inadequate oral hygiene^[10, 11].

The clinical implications of these findings are significant. Gingival inflammation, if left unaddressed, can progress to more severe periodontal conditions, potentially jeopardizing the outcomes of orthodontic treatment. Studies have highlighted that early intervention through professional cleaning and patient education can substantially reduce the risk of periodontal disease^[12, 13]. This underscores the importance of integrating periodontal assessments and hygiene reinforcement into routine orthodontic care.

The results also emphasize the need for patient-centered strategies to enhance compliance with oral hygiene instructions. Behavioral interventions, including personalized oral hygiene plans, motivational interviewing, and the use of digital reminders, have demonstrated effectiveness in improving patient adherence to hygiene protocols^[14, 15].

This study is not without limitations. Being a cross-sectional study, it provides a snapshot of gingival health at a single point in time, limiting the ability to establish causality. Longitudinal studies are needed to evaluate the progression of gingival problems over the course of orthodontic treatment. Additionally, incorporating microbiological analyses could provide a deeper understanding of the microbial dynamics influencing gingival health in orthodontic patients.

Conflict of Interest

Not available

Financial Support

Not available

Conclusion

This study highlights the high prevalence of gingival problems among orthodontic patients and underscores the importance of effective oral hygiene maintenance and professional care. Enhanced patient education and integration of periodontal management into orthodontic treatment protocols are crucial in minimizing gingival complications and ensuring optimal treatment outcomes.

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