

Assessment Of Oral Hygiene In Patients Undergoing Fixed Orthodontic Treatment

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ABSTRACT

Aim: The objective of the study was to assess the changes in oral hygiene of the patients undergoing fixed orthodontic treatment.

Methods: 20 subjects undergoing fixed orthodontic treatment were recruited for the study.

Gingival index, plaque index and oral hygiene index-simplified were recorded for patients.

Measurements were collected before bonding(T1), 7 days post bonding(T2) and 1 month post bonding(T3).

Results: A significant rise was seen in PI, GI and OHI-S scores from time period T1 to T3.

Conclusion: A deterioration in oral hygiene was seen during the study period, highlighting the importance of assessing the oral health during fixed orthodontic treatment. Thus, prompting the necessity to remind the patients about the crucial role of maintaining optimal oral health.

Keywords: Oral hygiene, Fixed orthodontic treatment, Indices, Plaque, Gingiva

Introduction

Malocclusions are defined as abnormalities in the dentition and disturbed relationships between the dental arches. Fixed orthodontic therapy is the main approach for addressing malocclusions. While orthodontic treatment aims to enhance periodontal health in individuals with malocclusions, it is important to note that the procedure can potentially elevate the risk of gingival recession, bleeding and plaque retention [1]. Use of orthodontic appliances in malocclusion patients may contribute to increased plaque accumulation, potentially leading to gingival inflammation due to the strong association between coarseness of the surface and high surface tension with plaque maturation and build-up [2].

Halitosis is derived from the Latin term “halitus”, signifying “breath”, coupled with the Greek suffix “osis”, denoting a state or the process of a pathological condition [3]. Up to 50% of the population is thought to experience halitosis, which can vary in severity and etiology. Halitosis can have negative societal impacts and its presence might indicate more significant local or systemic issues. Various internal and external factors,

such as systemic illnesses and conditions of the upper or lower respiratory tracts might contribute to halitosis. Halitosis is referred to as oral malodour when it develops from the oral cavity. Usually, dental plaque, saliva, or the microbial metabolism of the tongue is responsible for this [3].

Oral malodour primarily consists of volatile sulphide compounds (VSCs), with hydrogen sulphide, dimethyl sulphide and methyl mercaptan being the key constituents. Most of these compounds arise from the proteolytic breakdown of sulphur-based peptides and amino acids that are present in saliva, blood, interdental plaque, shed epithelial tissue, particles from food, gingival crevicular fluid, and post nasal drip by oral microbes [4]. Research has demonstrated a relationship between the extent of pockets of periodontal tissues and the amount of volatile sulphur compounds present in the mouth. Moreover, an increase in the number, depth, and propensity for bleeding in periodontal pockets is associated with elevated VSC concentrations in breath [4].

As a result, maintaining adequate plaque management is crucial for maintaining dental health throughout fixed appliance therapy [5]. In addition to serving as a focal point for plaque buildup and impediments to its removal, brackets, archwires, and other appliance components also encourage gingivitis [6]. Additionally, plaque contains cariogenic bacteria that may cause hard tissue injury, particularly near the bracket borders. In light of this, it is reasonable to anticipate that the inflammation will go away after the fixed appliances have been removed [5]. This study's objective is to assess the oral hygiene of patients undergoing fixed orthodontic treatment.

Methodology

This was a prospective cohort study that was conducted at SRM Kattankulathur Dental college and hospital, from May 2023 to July 2023. This study involved 20 participants. Inclusion criteria incorporated healthy volunteers (with no history of systemic disorders) undergoing fixed orthodontic treatment. Study population includes the ages between 18 to 35 years, volunteers without a history of orthodontic treatment or orthognathic surgery and patients who have all index teeth required for calculating the indices were selected. Patients with motor function disorder and loss of manual dexterity, immunocompromised patients and patients with missing index teeth were excluded. If the patients were eligible for inclusion, they were informed in writing and given a detailed description of the study. Also, a written consent was acquired from the patients. All patients underwent a standard bonding procedure. The subjects received guidance on maintaining appropriate oral hygiene.

The following were recorded: (1) gingival index (GI), (2) plaque index (PI), and (3) Simplified Oral hygiene index (OHI-S). Evaluation was done during the start of the treatment (T1), 7 days post bonding (T2), 1 month post bonding (T3).

During the first visit, each patient underwent an assessed and the T1 measurements were taken. The patients were advised to keep up with their usual dental hygiene regimen, including brushing their teeth twice daily. Subsequently, the study group received bonding immediately after the initial appointment. Indices scores were then recorded at T2. Furthermore, assessments were conducted at T3, making a four-week period after individuals had managed their own dental care.

The purpose of PI is to assess the level and rate of plaque formation. The tools employed for PI measurement included a mouth mirror and a plain probe. The scoring criteria for PI were established as follows: 0 - absence of plaque, 1 - thin film of plaque along the free gingival margin, 2 - Moderate accumulation with plaque in the sulcus, 3 - large amount of plaque in the sulcus or pocket along the free gingival margin.

GI was recorded in facial margin, disto-facial papilla, mesio-facial papilla and lingual margin using the periodontal probe. GI was scored as follows: 0 - normal gingiva, 1 - mild inflammation, slight change in color, slight edema, and no bleeding on probing, 2 - moderate inflammation, redness, edema and glazing, and bleeding on probing and 3 - severe inflammation, marked redness and edema, ulceration, and tendency to spontaneous bleeding. OHI-S was recorded in 6 index teeth using mouth mirror and No. 23 explorer. Scoring criteria includes both debris index-simplified and calculus index-simplified.

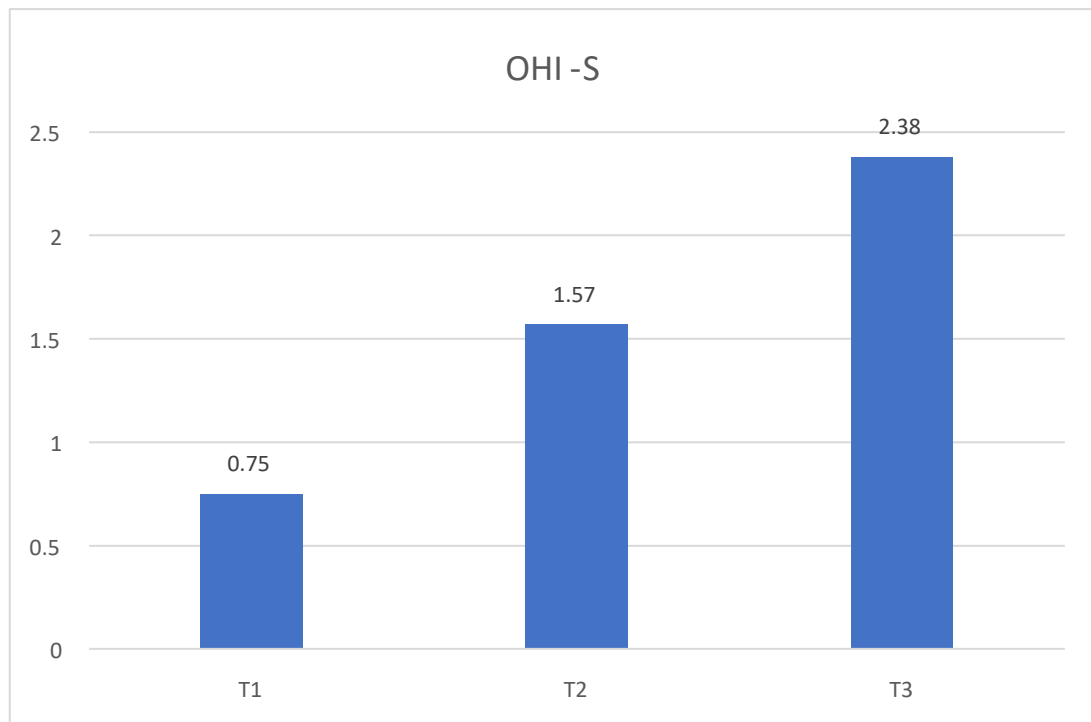
The individual scores were evaluated by summing up the scores for each teeth divided by the total number of teeth scored.

Results

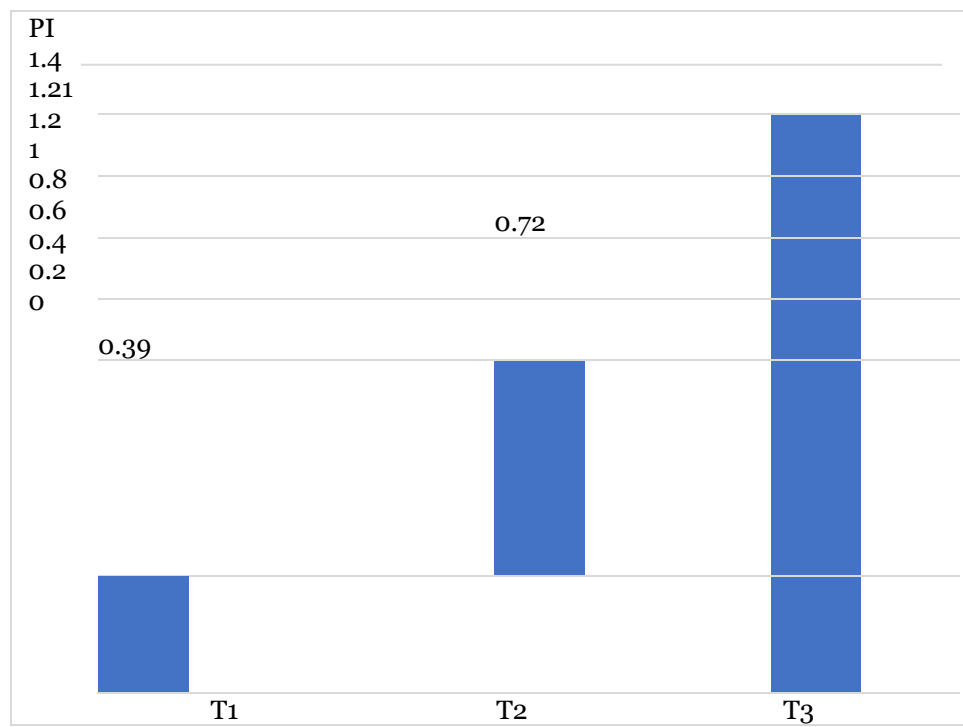
The mean values of PI, GI and OHI-S is shown in Table 1. Statistical analysis was done using ANOVA and p value <0.05 implied statistical significance. Graphical representation of OHIS, PI AND GI across the three time periods are shown in Graph 1, Graph 2 and Graph 3 respectively.

Table 1 - Mean values of PI, GI and OHI-S at different time intervals

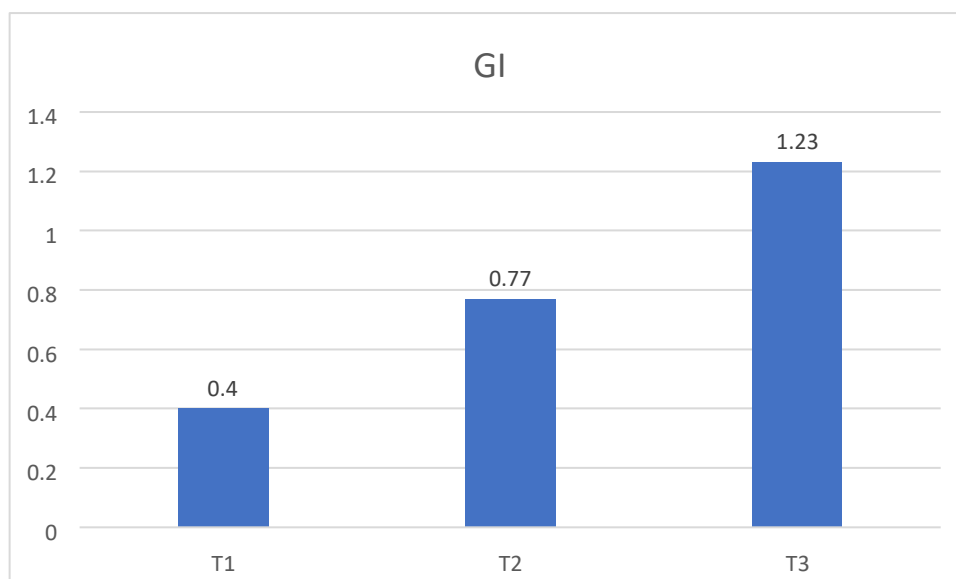
PARAMETERS	T1	T2	T3	P VALUE
OHI-S	0.75±0.16	1.57±0.34	2.38±0.41	0.000*
PI	0.39±.09	0.72±.06	1.21±.14	0.000*
GI	0.40±.12	0.77±.05	1.23±.12	0.000*



Graph 1 - Graphical representation of OHI-S across the three time periods



Graph 2 - Graphical representation of PI across the three time periods



Graph 3 - Graphical representation of GI across the three time periods

Intra group evaluation was also done using POST-HOC ANALYSIS (Bonferroni test)(Table 2)

Table 2. Intra group evaluation of OHI-S, PI and GI

	POST-HOC analysis	Mean Difference	P Value
OHI-S	T1 vs T2	-.813*	.000*
	T1 vs T3	-1.622*	.000*
	T2 vs T3	-.809	.000*
PI	T1 vs T2	-.332*	.000*
	T1 vs T3	-.822*	.000*
	T2 vs T3	-.490*	.000*
GI	T1 vs T2	-.376*	.000*
	T1 vs T3	-.833*	.000*
	T2 vs T3	-.456*	.000*

For PI, GI and OHI-S scores, the study group showed significant increase from time T1 to T2, from T1 to T3 and from T2 to T3.

Discussion

In our study, we assessed the oral hygiene and periodontal changes over a period of 1 month in the patients undergoing fixed appliances treatment. The introduction of brackets led to a rise in PI, GI and OHI-S scores, indicating that the placement of brackets was associated with an increase in plaque retention. Our clinical observations shows that fixed orthodontic therapy increases the accumulation of dental plaque, gingival inflammation, and periodontal pocket depths (PPDs). Patients frequently struggle to properly clean the tooth surfaces around the attachments. Previous research demonstrated an increased risk of cavities and gingivitis with fixed appliance orthodontic therapy [6].

In our study, we observed that the oral malodour can be considered as an additional risk factor. There was an observed increase in oral malodour subsequently after the bonding process. Findings suggest that the microorganisms found in dental plaque or within periodontal pockets could be a contributing factor to halitosis [7]. Plaque deposits mature for eight to fourteen hours before releasing VSCs. Considerable Odors were produced by protected plaque in interproximal areas, which is related to total VSC levels [3]. According to Neiders and Ramos, halitosis can occur due to microbial fermentation on the dorsal surface of tongue as well as in the periodontal pockets [7].

In their studies, Buckley [8] and Bollen [9] discovered that periodontal disease and irregular dentition had a direct link. Compared to subjects with normal occlusions, individuals with malocclusions are more likely to develop PPDs, gingival inflammation, and dental plaque. Due to fixed appliances, the tongue's ability to remove the food debris from the oral cavity decreases significantly [7]. Carbohydrates causes the teeth to experience a prolonged acid challenge, which promotes the growth of streptococcus mutans and lactobacillus [1]. Dental plaque may contribute to bad breath. Fixed orthodontic treatment has been associated with the development of plaque and calculus, contributing to compromised periodontal health. It is crucial to communicate this

information to patients and provide clear instructions on adopting effective oral hygiene practices. By educating patients about the potential consequences of inadequate oral care during orthodontic treatment, we aim to empower them to take proactive measures. Implementing proper oral hygiene methods is essential to mitigate the accumulation of plaque over the course of treatment and maintain optimal periodontal health.

Conclusion

PI, GI and OHI-S score exhibited an immediate increase following the bonding process. A strict plaque-control regimen is essential due to the prolonged treatment period of fixed orthodontic appliances for two years or more. Effective oral hygiene practices performed at home must be combined with frequent professional tooth cleanings.

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