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Original Research

Periodontal health of patients during treatment with the Invisalign system and with Fixed Orthodontics Appliances- A Comparative Study

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ABSTRACT:
Background: The demand for orthodontic treatment has increased in both adult and young patients. In modern orthodontics, fixed appliances are the most widely utilized and conventional treatment approach. The present study was conducted to compare periodontal health of patients during treatment with the Invisalign system and with fixed orthodontics appliances. **Materials & Methods:** 50 patients undergoing fixed orthodontics of both genders were divided into 2 groups of 25 each. Group I were given aligners and group II were given fixed lingual appliances were examined at three consecutive control visits for their periodontal status. Periodontal health was evaluated with modified Gingiva, modified Plaque and modified Papillary Bleeding Index. **Results:** The mean gingival index at T1, T2 and T3 in group I was 0.73, 0.62 and 0.48 and 1.03, 1.01 and 0.97 respectively. The difference was significant (P< 0.05). The mean papillary bleeding index (PBI) at T1, T2 and T3 in group I was 0.35, 0.30 and 0.24 and 0.61, 0.59 and 0.57 respectively. The difference was significant (P< 0.05). The mean plaque index (PI) at T1, T2 and T3 in group I was 0.45, 0.42 and 0.29 and 0.86, 0.94 and 0.88 respectively. The difference was significant (P< 0.05). **Conclusion:** During Invisalign® treatment, the periodontal risk is lower than with fixed lingual appliances, despite the fact that all of the teeth and portions of the keratinized gingiva are covered for almost the entire day.
Keywords: Invisalign, fixed orthodontics, plaque index

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INTRODUCTION

The demand for orthodontic treatment has increased in both adult and young patients. In modern orthodontics, fixed appliances are the most widely utilized and conventional treatment approach.[1] However, it is typically more difficult to remove plaque properly when orthodontic brackets and bands are placed.[2] If patients are unable to maintain proper oral hygiene, the rise in food deposits and dental plaque frequently results in gingival irritation and enamel demineralization. On the other hand, because clear aligners are removable, they offer benefits including comfort, convenience for maintaining good oral hygiene, and aesthetics.[3,4]

Clear aligners, which have been available since 1999, have become increasingly popular. Clinicians have considered them to be safe, esthetic, and comfortable orthodontic appliances for patients.[5] The advantage of clear aligners over traditional fixed appliances on periodontal conditions, however, is still under debate. Investigators have reported that clear aligners allowed adequate oral hygiene and reduced the risk of developing negative periodontal complications compared with fixed appliances.[6] Nevertheless, all users of lingual appliances seem to have been aware from the start that oral hygiene is critical with that treatment modality.[7] The present study was conducted to compare periodontal health of patients during treatment with the Invisalign system and with fixed orthodontics appliances.

MATERIALS & METHODS

The study was carried out on 50 patients undergoing fixed orthodontics of both genders. All gave their

written consent to participate in the study.
Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 25 each. Group I were given aligners and group II were given fixed lingual appliances were examined at three consecutive control visits for their periodontal status. Periodontal health was evaluated with modified Gingiva, modified Plaque and modified Papillary Bleeding Index. All indices were recorded buccally in the 1st and 3rd quadrants, and lingually in the 2nd and 4th quadrants from central incisor to first molar. The sulcus probing depth was measured mesially, distally, buccally and lingually in each quadrant's first molar and first premolar. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Comparison of Gingiva Indices (GI)

Group	T1	T2	T3	P value
Group I	0.73	0.62	0.48	0.04
Group II	1.03	1.01	0.97	0.05

Table I shows that mean gingival index at T1, T2 and T3 in group I was 0.73, 0.62 and 0.48 and 1.03, 1.01 and 0.97 respectively. The difference was significant (P< 0.05).

Table II Comparison of Papillary Bleeding Index (PBI)

Group	T1	T2	T3	P value
Group I	0.35	0.30	0.24	0.03
Group II	0.61	0.59	0.57	0.05

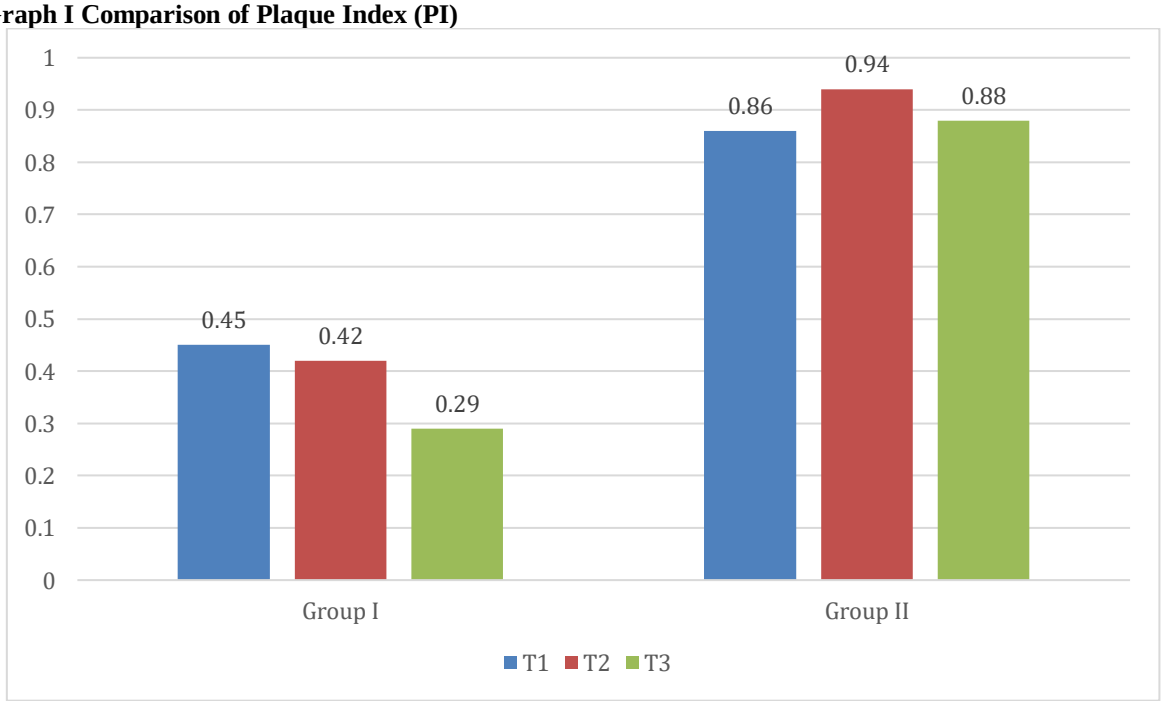
Table II shows that mean papillary bleeding index (PBI) at T1, T2 and T3 in group I was 0.35, 0.30 and 0.24 and 0.61, 0.59 and 0.57 respectively. The difference was significant (P< 0.05).

Table III Comparison of Plaque Index (PI)

Group	T1	T2	T3	P value
Group I	0.45	0.42	0.29	0.03
Group II	0.86	0.94	0.88	0.05

Table III, graph I shows that mean plaque index (PI) at T1, T2 and T3 in group I was 0.45, 0.42 and 0.29 and 0.86, 0.94 and 0.88 respectively. The difference was significant (P< 0.05).

Graph I Comparison of Plaque Index (PI)



DISCUSSION

Fixed orthodontic appliances can promote plaque accumulation and impair gingival health because orthodontic brackets, bands, and ligating devices can impede toothbrushing severely and decrease natural self-cleansing by the saliva and tongue.[8,9] If patients cannot maintain good oral hygiene, the accumulated plaque could cause enamel demineralization and gingivitis.[10] In contrast, removable appliances, which can be taken out of the mouth for toothbrushing and prophylaxis, are associated with a reduced risk of developing caries and gingivitis in patients undergoing orthodontic treatment. Clear aligners, a type of removable appliance, may have an advantage over fixed appliances for oral hygiene and periodontal health.[11,12] The present study was conducted to compare periodontal health of patients during treatment with the Invisalign system and with fixed orthodontics appliances.

We found that mean gingival index at T1, T2 and T3 in group I was 0.73, 0.62 and 0.48 and 1.03, 1.01 and 0.97 respectively. Miethke RR et al[13] in their study thirty patients each with aligners or fixed lingual appliances were examined at three consecutive control visits for their periodontal status. The patients' periodontal health was evaluated in reference to a modified Gingiva, modified Plaque and modified Papillary Bleeding Index; we also measured the sulcus probing depth. Each control visit was concluded with detailed, individualized instructions in oral hygiene. Results: Overall, the Invisalign® patients demonstrated significantly better modified indices. However, the sulcus probing depths were very similar in both treatment groups.

We found that mean papillary bleeding index (PBI) at T1, T2 and T3 in group I was 0.35, 0.30 and 0.24 and 0.61, 0.59 and 0.57 respectively. Jaing et al[14] compared periodontal health in patients undergoing orthodontic treatment with clear aligners with that of those undergoing orthodontic treatment with fixed appliances. The authors included 9 studies in the quantitative synthesis analysis. Clear aligners were better for periodontal health, including plaque index, gingival index and probing depth than were fixed appliances. However, the trial sequential analysis outcome indicated a false-positive meta-analysis result for probing depth. The authors downgraded the level of the evidence because of the risk of bias and inconsistency.

We found that mean plaque index (PI) at T1, T2 and T3 in group I was 0.45, 0.42 and 0.29 and 0.86, 0.94 and 0.88 respectively. Lin et al[15] assessed the impact of wearing fixed orthodontic appliance (FOA) or clear-aligner, on daily performance in adult patients. The Oral Impacts on Daily Performance (OIDP) index was assessed in 152 adults aged 25–35 years at baseline (T0), 6 months after bonding (T1), and 12 months after bonding (T2). Participants were randomly divided into two groups: CA group (participants treated with clear-aligner) and a control group (FOA group; participants treated with FOA). Baseline malocclusion severity was assessed using the Index of Orthodontic Treatment Need. There were no significant differences in sociodemographic variables and OIDP scores at baseline between the two groups. Significant changes in OIDP total and subscale scores were observed while wearing FOA: OIDP total score and subscale scores of eating, cleaning teeth, smiling, and social relation at T1 and T2 were significantly higher than at baseline ($P<0.05$ or $P<0.01$). However, only OIDP total score was significantly increased at T1 compared to the baseline in the CA group. OIDP total score and subscale scores of eating, cleaning teeth, smiling, and social relation were significantly higher in patients wearing FOA than in patients wearing clear-aligner at T1 and T2 ($P<0.05$ or $P<0.01$).

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that during Invisalign® treatment, the periodontal risk is lower than with fixed lingual appliances, despite the fact that all of the teeth and portions of the keratinized gingiva are covered for almost the entire day.

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