



CODEN [USA]: IAJ PBB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.2388845>Available online at: <http://www.iajps.com>

Research Article

**COMPARISON OF INVISALIGN® AND FIXED ORTHODONTIC
TREATMENT OF PERIODONTAL HEALTH****Ahmad Farid Atteya¹, Faisal Abdullah Halawani², Amjed Mohammed Alkhamis², Meteib Joraib Al Toubity², Samaher Abdulrahman Bahamdin³, Samiah Adnan Rafiq³, Elaf Abdulrahman Al Nakeeb³**¹Ibn Sina Medical Collage, ²Ministry of Health, ³Batterjee Medical Collage
Ahmad Farid Atteya Mobile: 0544004003, Email: Atteya.af@gmail.com**Abstract:****Introduction:**

With the advancement of aesthetic orthodontic treatment, it has become an important and widely accepted option for both practitioner and adults seeking orthodontic treatment. Fixed orthodontic treatment (FOA) influence the periodontal health of patient temporarily, and hence the use of aligners has become a widely accepted orthodontic treatment modality in the past one decade. The Invisalign system is proven to be extremely useful in aesthetic purpose, periodontally compromised patients and comparatively less complicated orthodontic treatment.

The aim of Work:

This review aims to understand the status of periodontal health in fixed orthodontic treatment when compared to the Invisalign System.

Methodology:

The review is comprehensive research of PUBMED from the year 1972 to 2017. The search terms used were: Invisalign aligner, Fixed orthodontic treatment, Periodontal health, Dental Hygiene.

Conclusion:

Though fixed orthodontic treatment is proven to be better in more complex orthodontic malalignment and Invisalign system indeed showed successful effects in some complex adult treatment, periodontal health status and functional rehabilitation of occlusion. The patient's compliance increased regarding maintenance of oral hygiene along with the easy maintenance of aligners.

Keywords: *Invisalign aligner, Fixed orthodontic treatment, Periodontal health, Dental Hygiene. Periodontal Complication associated with Fixed Orthodontic Appliance.*

Corresponding author:

Ahmad Farid Atteya,
Ibn Sina Medical Collage,
Mobile: 0544004003, Email: Atteya.af@gmail.com

QR code



Please cite this article in press Ahmad Farid Atteya et al., *Comparison Of Invisalign® And Fixed Orthodontic Treatment Of Periodontal Health., Indo Am. J. P. Sci, 2018; 05(12).*

INTRODUCTION:

Fixed Orthodontic treatment limits the patient to maintain proper oral hygiene and thus lead to bacterial plaque accumulation. The brackets and bands used in fixed orthodontic treatment not only makes it impossible to access tooth surface area beneath the appliance making maintenance of oral hygiene a challenging task but also cause white spot lesions, caries and periodontitis subsequently. [1-4]

(A)



(B)



Figure (A) showing dental plaque accumulation in a patient with braces [5] (B) showing white spot lesions. [6]

Orthodontic tooth movement has some adverse effects such as gingival overgrowth, gingival recession, gingival invaginations. [7]

Gingival overgrowth is characterized by gingival enlargement results in pseudo pocket formation with or without loss of attachment. The inflammatory reaction is due to abundant bacterial plaque accumulation. Orthodontic treatment such as chemical irritation by luting material used in banding, mechanical irritation by bands and subsequent food impaction is known to cause gingival overgrowth. [8,9]

Gingival ingrowth or linear invagination is mainly due to orthodontic space closure of extraction site. The intragingival probing depth is nearly 1mm and render plaque control and possibly lead to the occurrence of gingival and periodontal disease. [10-12]



(A)



(B)



(C)

Figure showing (A) Gingival overgrowth(B)Gingival Invagination (C)Gingival Recession [13-15]

METHODOLOGY:

• Data Sources and Search terms

The review is comprehensive research of PUBMED from the year 1972 to 2017. The search terms used were: Invisalign aligner, Fixed orthodontic treatment, Periodontal health, Dental Hygiene.

• Data Extraction

Two reviewers have independently reviewed the studies, abstracted data, and disagreements were resolved by consensus. Studies were evaluated for quality and a review protocol was followed throughout.

The study was approved by the ethical board of King Abdulaziz University Hospital

Invisalign System

It is a new orthodontic modality able to resolve some malocclusion and aesthetic and periodontal problems related to a fixed orthodontic appliance. Clin Check is the real innovation behind this procedure. It is a digital three-dimensional simulation that allows clinicians and the patients to see a film on the computer tracking the movements from beginning to end of the dental treatment. [16]

The aligners are made up of transparent thermoplastic polymer and allow tooth movement of 0.15-0.25mm, to be worn at least 18 hours a day and replaced in 15 days with new aligner. [17] Thus there is effective plaque control and better maintenance of oral hygiene



Figure (A) and (B) showing Invisalign aligner. [18]

Microbiological studies revealed a significant change in the bacterial composition of subgingival plaque with more accumulation on a subgingival plaque in fixed orthodontic appliance than Invisalign aligner. The prevalent bacterial strains such as *Porphyromonas gingivalis*, *Prevotella intermedia*, *Bacteroides forsythus*, *Actinobacillus actinomycetemcomitans*, *Fusobacterium nucleatum*, and *Treponema denticola* were present. [19]

While compared to a fixed orthodontic appliance, use of Invisalign aligner allow adequate oral hygiene and reduce the negative dental and periodontal complication.

The periodontal status of a patient with fixed orthodontic appliance and Invisalign aligner was recorded using following indices in a study. [20]

- Gingival Index (GI)
- Approximal plaque index (API)
- Sulcular bleeding index (SBI)

The study showed the difference in periodontal parameter (API, SBI, GI) of Fixed Orthodontic appliance (FOA) and Invisalign groups before and after treatment in the table as follow. [20]

Clinical parameter	FOA	Invisalign®	P-value
API%- before treatment	19.6±7.0	16.3±9.6	0.068
API%- after treatment	37.7±21.9	27.8±24.6	0.108
Relative difference	18.1±17.2	11.5±17.2	0.170*
SBI%- before treatment	7.2±4.4	6.6±3.3	0.503
SBI%- after treatment	15.2±7.6	7.6±4.1	≤0.001
Relative difference	8.0±6.6	1.0±1.0	≤0.001*
GI%- before treatment	0.29±0.24	0.27±0.25	0.910
GI%- after treatment	0.54±0.50	0.35±0.34	0.072
Relative difference	0.25±0.30	0.07±0.12	0.001*

The analysis showed no major difference in the periodontal state before the start of orthodontic treatment in both FOA and Invisalign group. A

notable difference was present after treatment of both the groups. The API was found to be higher in FOA group than Invisalign. Similarly, GI and SBI were

increased 2-fold in FOA patients whereas there was hardly any increment in the Invisalign group. The subjective data also showed an increased frequency of tooth brushing and less suffer under laugh inhibition. [20]

Various studies compared the plaque accumulation and better oral health in FOA and Invisalign, shown that plaque accumulation is less removable appliances. According to Miethke et. Al. Plaque index was significantly lower in a patient treated with Invisalign than FOA, but other periodontal conditions were similar. [21]

Another study was conducted using indices such as Plaque index (PI), Periodontal disease index (PDI) and Bleeding on probing (BOP) and differences between microbiological biofilm among patients with FOA and Invisalign aligner, showed a statistical significant difference ($P < 0.05$) with Invisalign group scoring lower values than FOA group in all the indices (PI, PDI, BOP) and total biofilm mass.[22]

CONCLUSION:

Various studies conducted largely proves that patients using Invisalign® aligner have significantly better gingival and periodontal health. It is important that careful hygiene measures of aligner must be taken for the overall maintenance of oral hygiene. Though there is no major difference in oral hygiene among the patients with FAO and Invisalign group Invisalign system facilitate oral hygiene procedure easily compared to fixed orthodontic appliance thus reduces plaque accumulation. Patient treated with Invisalign® has better periodontal health and greater treatment satisfaction when compared to FOA.

REFERENCES:

- Zachrisson S, Zachrisson B U (1972):** Gingival condition associated with orthodontic treatment. *The Angle Orthodontist*, 42(1), 26-34.
- Huser M C, Baehni P C, Lang R (1990):** Effects of orthodontic bands on microbiologic and clinical parameters. *American Journal of Orthodontics and Dentofacial Orthopedics*, 97(3), 213-218.
- Bollen A M, Cunha-Cruz J Bakko D W, Huang G J, Hujoel P P (2008):** The effects of orthodontic therapy on periodontal health: a systematic review of controlled evidence. *The Journal of the American Dental Association*, 139(4), 413-422.
- Liu H, J Dong, Y Lu, H Zhou, H Hansen B F, Song X (2011):** Periodontal health and relative quantity of subgingival Porphyromonas gingivalis during orthodontic treatment. *The Angle Orthodontist*, 81(4), 609-615.
- Jakati S V, Gogineni R, Aley M S, Atram H K, Chachada A D (2017):** Cleanliness drive: Straight wire appliance or Begg's appliance? *Indian Journal of Multidisciplinary Dentistry*, 7(1), 8.
- Zarzycka-Kogut K, Pucek M, Szymańska J (2014):** Orthodontic treatment–complications and preventive measures. *Polish Journal of Public Health*, 124(2), 103-106.
- Gorbunkova A, Pagni G, Brizhak A, Farronato G, Rasperini G (2016):** Impact of orthodontic treatment on periodontal tissues: a narrative review of multidisciplinary literature. *International journal of dentistry*, 2016.
- Zanatta F B, Ardenghi T M, Antoniazzi R P, Pinto T M, Rösing C K (2012):** Association between gingival bleeding and gingival enlargement and oral health-related quality of life (OHRQoL) of subjects under fixed orthodontic treatment: a cross-sectional study. *BMC Oral Health*, 12(1), 53.
- Eid H A, Assiri H M, Kandyala R, Togoo R A, Turakhia V S (2014):** Gingival enlargement in different age groups during fixed Orthodontic treatment. *Journal of international oral health: JIOH*, 6(1), 1.
- Robertson P B, Schultz L D, Levy B M (1977):** Occurrence and distribution of interdental gingival clefts following orthodontic movement into bicuspid extraction sites. *Journal of Periodontology*, 48(4), 232-235.
- Circuns A L, Tulloch J C (1983):** Gingival invagination in extraction sites of orthodontic patients: their incidence, effects on periodontal health, and orthodontic treatment. *American journal of Orthodontics*, 83(6), 469-476.
- Reichert C, Gözl L, Dirk C, Jäger A (2012):** Retrospective investigation of gingival invaginations. *Journal of Orofacial Orthopedics/Fortschritte der Kieferorthopädie*, 73(4), 307-316.
- Reichert C, Kutschera E, Nienkemper M, Scharf S, Mengel M, Fimmers R, Braumann B (2013):** Influence of time after extraction on the development of gingival invagination: study protocol for a multicenter pilot randomized controlled clinical trial. *Trials*, 14(1), 108.
- Alkan A, Cakmak O, Ramoglu I, Yagan G, Kiliç B (2013):** Periodontics and orthodontics team-work in the treatment of gingival recession: Two case reports. *Journal of Orthodontic Research*, 1(3), 107.
- Jadhav T, Bhat K M, Bhat G S, Varghese J M (2013):** Chronic inflammatory gingival

- enlargement associated with orthodontic therapy—a case report. American Dental Hygienists' Association, 87(1), 19-23.
16. **Boyd R L, Oh H, Fallah M, Vlaskalic V (2006):** An update on present and future considerations of aligners. Journal of the California Dental Association, 34(10), 793-805.
 17. **Mc Namara JA, Kramer KL, Juenker JP (1985):** Invisible retainers. Journal of Clinical Orthodontics. 19(8):570–578.
 18. **Pagani R, Signorino F, Poli P P, Manzini P, Panisi I (2016):** The Use of Invisalign® System in the Management of the Orthodontic Treatment before and after Class III Surgical Approach. Case reports in dentistry, 2016.
 19. **Petti S, Barbato E, Simonetti A D (1997):** Effect of orthodontic therapy with fixed and removable appliances on oral microbiota: a six-month longitudinal study. The new microbiologica, 20(1), 55-62.
 20. **Azaripour A, Weusmann J, Mahmoodi B, Peppas D, Gerhold-Ay A, Van Noorden C J F, Willershausen, B (2015):** Braces versus Invisalign®: gingival parameters and patients' satisfaction during treatment: a cross-sectional study. BMC Oral Health, 15(1), 69.
 21. **Miethke RR, Vogt S (2005):** A comparison of the periodontal health of patients during treatment with the Invisalign system and with fixed orthodontic appliances. J Orofac Orthop. ;66(3):219–29. doi: 10.1007/s00056-005-0436-1.
 22. **Levrini L, Mangano A, Montanari P, Margherini S, Caprioglio A, Abbate G M (2015):** Periodontal health status in patients treated with the Invisalign® system and fixed orthodontic appliances: A three months clinical and microbiological evaluation. European journal of dentistry, 9(3), 404.