



ISSN Print: 2394-7489  
ISSN Online: 2394-7497  
IJADS 2022; 8(1): 555-557  
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[www.oraljournal.com](http://www.oraljournal.com)  
Received: 01-01-2022  
Accepted: 05-02-2022

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## A comparative analysis of efficiency between passive-self ligating brackets and conventional bracket system

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DOI: <https://doi.org/10.22271/oral.2022.v8.i1h.1662>

### Abstract

**Background:** One main difference between self ligating brackets and conventional brackets is elastic ligature, it is not used in self ligating brackets. The present study was conducted to know and compare efficiency between passive self-ligating bracket and conventional bracket system.

**Materials & Methods:** Study was conducted on 30 patients. Two groups were formed. 15 patients of both gender in each group. Patients selected were of moderate dental crowding. First group patients (group I) was treated with self-ligating pre-adjusted edgewise brackets (MBT 0.022) and second group (group II) with conventional pre-adjusted edgewise brackets (MBT 0.022).

**Results:** Among the 30 patients 17 females and 13 males were selected. In group I male female ratio was 7:8 and in group II it was 6:9. Irregularity index (mm) in maxilla at T0 in group I was 2.65 and in group II was 3.15, at T1 was 0.56 in group I and

1.04 in group II and at T2 was 0.0 in both groups. The difference was significant ( $P < 0.05$ ). Irregularity index (mm) in mandible at T0 in group I was 3.62 and in group II was 4.76, at T1 was 1.18 in group I and 1.72 in group II and at T2 was 0.0 in both groups. The difference was significant ( $P < 0.05$ ).

**Conclusion:** We found in our study that self-ligating pre-adjusted edgewise brackets were superior to conventional pre-adjusted edgewise brackets

**Keywords:** Self-ligating bracket, arch wire, malocclusion

### Introduction

Permanently mounted movable components are utilized by self-ligating brackets to secure arch wire<sup>[1]</sup>. In orthodontic practice self ligating brackets are commonly used these days. First person to describe self ligating brackets was Stolzenberg. He described it more than 30 years ago<sup>[2]</sup>.

Self-ligation refers to ability of orthodontic brackets to engage itself to the arch wire. These brackets are modified to have a mechanical device to close off the slot. Self-ligating brackets are of two types- active and passive. Self-ligating active brackets have a spring clip which presses actively against the arch wire. While passive self-ligating brackets have self ligating clip which closes the slot creating a tube<sup>[3]</sup>. In passive self-ligating brackets, clip do not press against the wire actively. Self-ligating brackets have less friction, it produces more physiologically harmonious tooth movement as less force is applied due to less friction so periodontal blood supply is not interrupted. Some more advantages of self ligating brackets are less chair side time as ligation as well as removal is faster, less chair side assistance. The present study compares efficiency between self-ligating brackets and conventional bracket system.

### Materials and Methods

Forty patients were selected from department of orthodontics and dentofacial orthopaedics IDST Modinagar with moderate irregularity index for dental crowding. Out of forty patients 10 patients refused to participate in study. Out of 30 patients 13 were male and 17 were female. Written consent was taken from every patient.

Patients name, age and sex was recorded. Two groups were formed. 15 patients in each group. First group (group I) was bonded with self-ligating pre-adjusted edgewise. Second group (group II) were bonded with conventional pre-adjusted edgewise. MBT 0.022 slot brackets.

were used in both systems. Study models were formed. All study models were evaluated by using Little’s Irregularity index. Evaluation was done to quantify the alignment of anterior teeth. Sum of tooth widths was calculated. Arch Circumference was recorded from contact point mesial to first molars. Cusp tips of canine was reference point to measure inter canine width on the study models. Mesial and central occlusal pits of mandibular & maxillary first molars was used for Inter-molar widths. Then difference between sum of tooth widths and arch circumference was recorded to know amount of crowding. The total time taken in number of days for completion of alignment was calculated from T0 to T2. Results were tabulated and assessed statistically. P value less than 0.05 was considered significant.

**Results**

**Table 1:** Distribution of patients

Groups	Group I	Group II
Number	15(self- ligating brackets pre-adjusted edgewise)	15(conventional pre-adjusted edgewise)
M:F	7:8	6:9

Table 1 shows that group I had 7 males and 8 females and group II had 6 males and 9 females.

**Table II:** Assessment of irregularity index in maxilla at different time interval

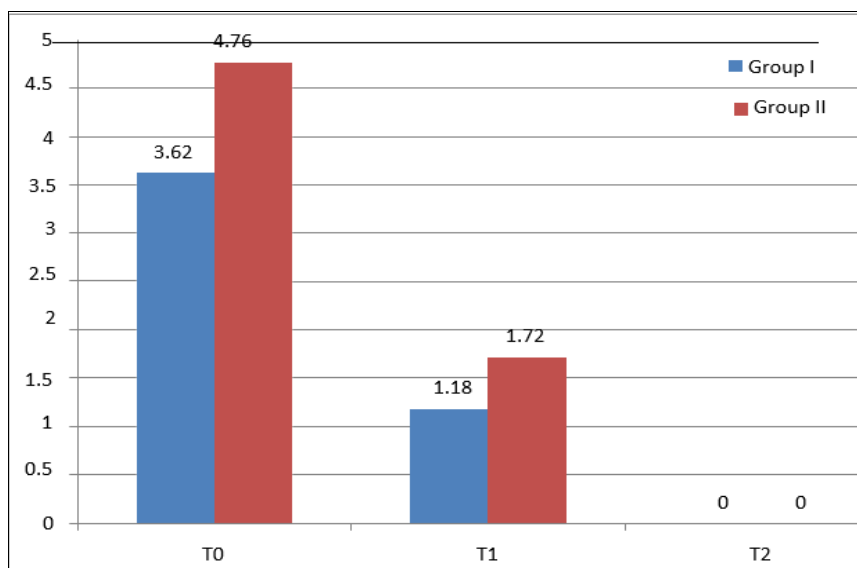
Parameters (mm)	Group I	Group II	P value
T0	2.65	3.15	0.04
T1	0.56	1.04	0.02
T2	0.0	0.0	0

Table II, graph II shows that irregularity index (mm) in maxilla at T0 in group I was 2.65 and in group II was 3.15, at T1 was 0.56 in group I and 1.04 in group II and at T2 was 0.0 in both groups. The difference was significant ( $p<0.05$ ).

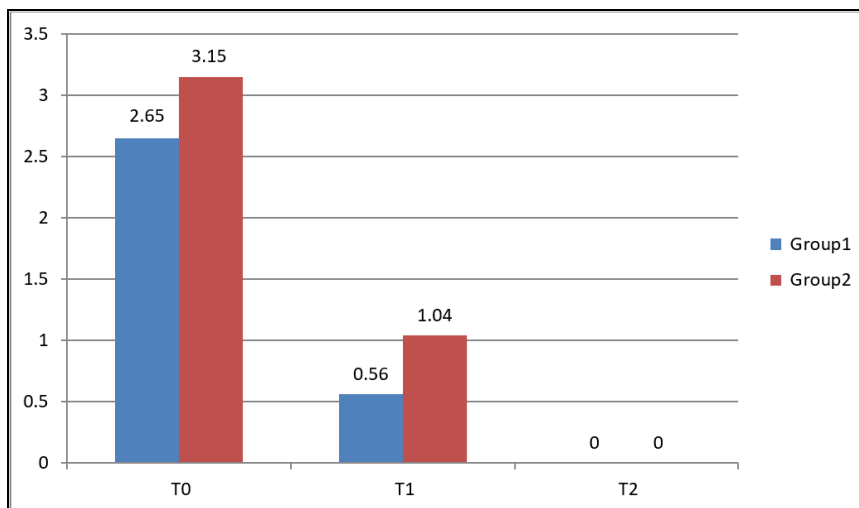
**Table III:** Assessment of irregularity index in mandible at different time interval

Parameters (mm)	Group I	Group II	P value
T0	3.62	4.76	0.05
T1	1.18	1.72	0.04
T2	0.0	0.0	0

Table III, graph I shows that irregularity index (mm) in mandible at T0 in group I was 3.62 and in group II was 4.76, at T1 was 1.18 in group I and 1.72 in group II and at T2 was 0.0 in both groups. The difference was significant ( $P < 0.05$ ).



**Graph I:** Assessment of irregularity index in mandible at different time interval



**Graph II:** Assessment of irregularity index in maxilla at different time interval

## Discussion

Other name of self-ligating brackets is ligature less bracket system. To close off the edgewise slot they have mechanical device built into the brackets [7]. Arch wire is secured by cap in bracket slot. So there is no need of steel/elastomeric ligature to hold arch wire. Movable fourth wall of brackets is used to convert slot into a tube [8]. Main advantage of self ligating bracket over conventional bracket is reduced friction in self ligating brackets [9]. Due to reduced friction sliding mechanics is achieved and thereby facilitating alignment, interval between appointments is increased and overall treatment duration is reduced [10]. The present study comparatively analysed efficiency between passive self-ligating brackets and conventional bracket system.

Fleming *et al.* [11] observed and reported approx 1mm more inter-molar width when self-ligating brackets were used.

We found that irregularity index (mm) in maxilla at T0 in group 1 was 2.65 and in group 2 was 3.15, at T1 was 0.56 in group 1 and 1.04 in group 2 and at T2 was 0.0 in both groups. Eberting *et al.* [12] found in his study that after case was finished both conventional and self-ligating brackets are equivalent in terms of reducing occlusal discrepancies as measured by irregularities index and PAR, ABO scores were better in cases treated with SL brackets, and treatment time was also less in SL brackets.

We found that irregularity index (mm) in mandible at T0 in group 1 was 3.62 and in group 2 was 4.76, at T1 was 1.18 in group 1 and 1.72 in group 2 and at T2 was 0.0 in both groups. Shivapuja *et al.* [13] reported for arch closure and anterior arch alignment for maxillary and mandibular arch. He found that there was no statistical significant difference between self-ligating brackets and conventional brackets in terms of anterior arch alignment and closure in maxillary and mandibular arch. Johnson *et al.* [14] reported his study when he evaluated inter molar and inter canine distances on study cast in patients treated with and without extractions. An average increase found in both inter-molar distance and inter canine distance (0.8mm for inter-molar and 0.3mm for inter-canine). For one case without extraction maximum increase was 1.5mm, no change was found in inter-canine distance.

Limitation of study was its small sample size.

## Conclusion

Authors found in this study that pre-adjusted self-ligating brackets are better in terms of duration of treatment, less chairside time over conventional pre-adjusted edgewise.

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### How to Cite This Article

Baby J, Melethil MR, Bhat JM. A comparative analysis of efficiency between passive-self ligating brackets and conventional bracket system. *International Journal of Applied Dental Sciences.* 2022;8(1):555-557.

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