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RESEARCH ARTICLE

A COMPARATIVE EVALUATION OF EXTERNAL APICAL ROOT RESORPTION IN PATIENTS TREATED WITH DAMON BRACKET SYSTEM AND CONVENTIONALMBT BRACKET SYSTEM- A RETROSPECTIVE STUDY

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Abstract

Background: Resorption of the external apical root is a common iatrogenic side effect of orthodontic therapy (EARR). The loss of cementum and dentine is caused by root resorption, which can be a normal or pathologic process. A complicated combination of individual biology and mechanical forces is assumed to be the cause.

Aims &Objectives: The purpose of this research was to assess the degree of external apical root resorption (EARR) in patients treated with the Damon self-ligating bracket system to those treated with the conventional MBT bracket system.

Methods: For the study, twenty patients were divided into two groups. Ten patients were treated with MBT equipment in Group I. Damon self-ligating appliances were used to treat ten patients in Group 2. The Levander and Malmgren scores were used to assess root resorption on periapical radiographs of the maxillary incisors at the completion of orthodontic therapy. The chi-square test was used to compare root resorption between groups.

Results: There was no significant difference in the degree of root resorption between the two groups, according to the findings.

Conclusion: Non-extraction therapy with Damon self-ligating or standard preadjusted equipment resulted in similar root resorption, according to the findings.

Introduction:-

External root resorption occurs 14 to 20 days after orthodontic force is applied and can last for the duration of the force. It starts near a hyalinization zone and is more likely to develop in severe, long-term compression. Cells and blood vessels from the surrounding periodontium are invaded to remove the hyalinized compressed tissue. During root resorption, the cementoid and mature collagen, which is found next to the cementum, are both lost. During orthodontic treatment, a number of factors have been linked to the onset and progression of external root resorption. Host factors, local factors, age, gender, trauma, malocclusion, dental root anatomy, and agenesis can all play a role in the development of EARR. Trauma and secondary hyperparathyroidism were very well causes of root resorption. Many studies have been carried out to investigate the consequences of mechanotherapy on EARR in standard edgewise, straight wireand Begg appliances and have concluded that EARR exists in all of them. The role of continuous tooth movement, also called "tooth jiggling." Intermaxillary elastics were used in the development of EARR, which has been emphasised. EARR was more common with nickel-titanium wires and stainless steel arch wire. The Damon system employs a passive self-ligating bracket and extremely elastic nickel-titanium wires

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(Ormco, Glendora, CA). It's important to note that this technique, which uses low-friction brackets, only uses light forces to move the teeth. Root resorption with this technique is comparable to traditional preadjusted edgewise bracket systems during the initial levelling and alignment step.

The main objective of this retrospective study was to compare the degree of EARR in patients treated with the Damon self-ligating system to those treated with conventional brackets after orthodontic treatment was completed.

Aims And Objectives:-

1.To determine how the MBT bracket system affects maxillary incisor external apical root resorption.
2.To investigate how the Damon bracket system affects external apical root resorption in maxillary incisors.
3.To identify and analyse variations in maxillary incisor external apical root resorption in patients treated with the MBT and Damon bracket systems.

Method And Materials:-

The sample size was made up of pre-treatment and post-treatment IOPAR of 20 patients who had obtained orthodontic treatment and were picked from the Department of Orthodontics' record section at the Coorg Institute of Dental Sciences Before the subjects were chosen, a complete medical history was collected. IOPAR was measured before and after treatment in ten individuals who were fitted with self-ligating Damon Q Brackets. IOPAR pre- and post-treatment IOPAR from 10 patients treated with conventional ligating brackets were included in Group B (MBT). At two intervals, T0-at the commencement of therapy and T1-at the end of treatment, IOPA radiographs were collected at two intervals. Before and after treatment, IOPA radiographs were collected to measure the extent of external apical root resorption according to LEVANDER and MALMGREN's EARR classification.

Results:-

For MBT Brackets, Left Max CI and Left Max LI were observed to be statistically significant. For MBT brackets, the right max CI and right max LI were found to be statistically insignificant. (Table 1 and Fig 1-4)

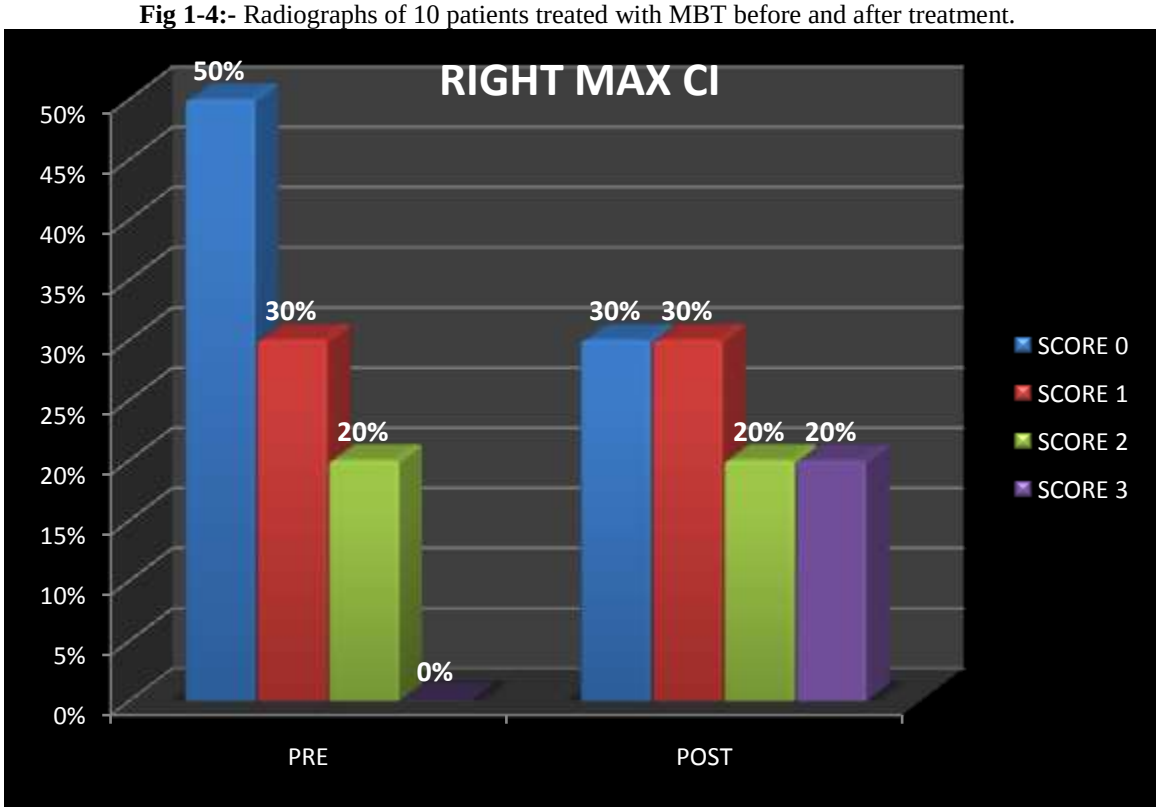
For Damon prescription brackets as well, Left Max CI and Left Max LI were observed to be statistically significant. Damon prescription brackets' right max CI and right max LI were found to be statistically insignificant. (Table 2 and Fig 5-8)

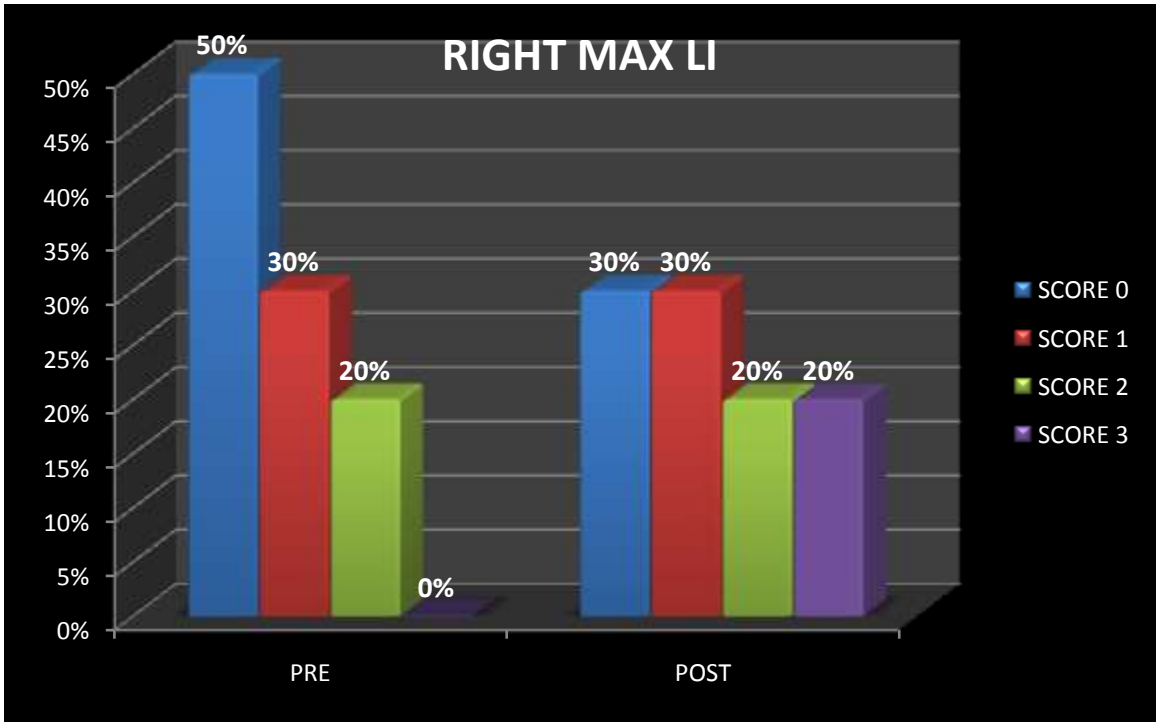
The p-value was greater than 0.05 when comparing changes in external apical root resorption of maxillary incisors in MBT and Damon bracket patients. Therefore, it was found to be statistically insignificant. (Table 3 and Fig 9)

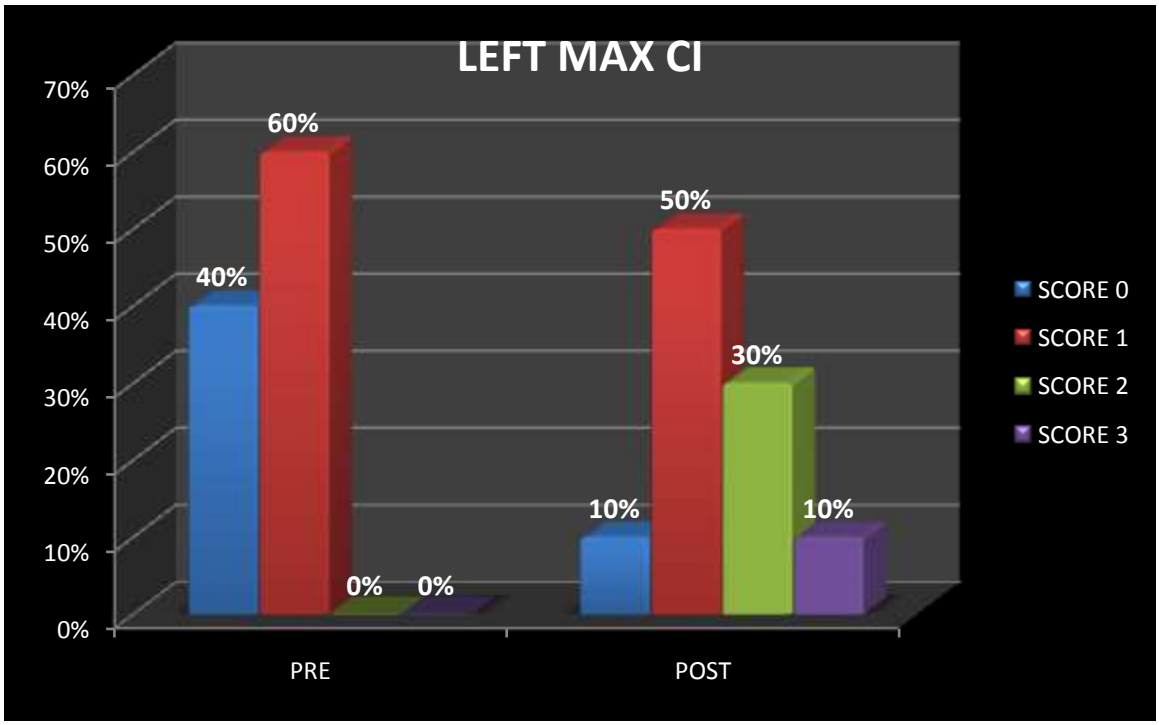
Table 1:- IOPA radiographs of 10 patients treated with the MBT bracket before and after therapy.

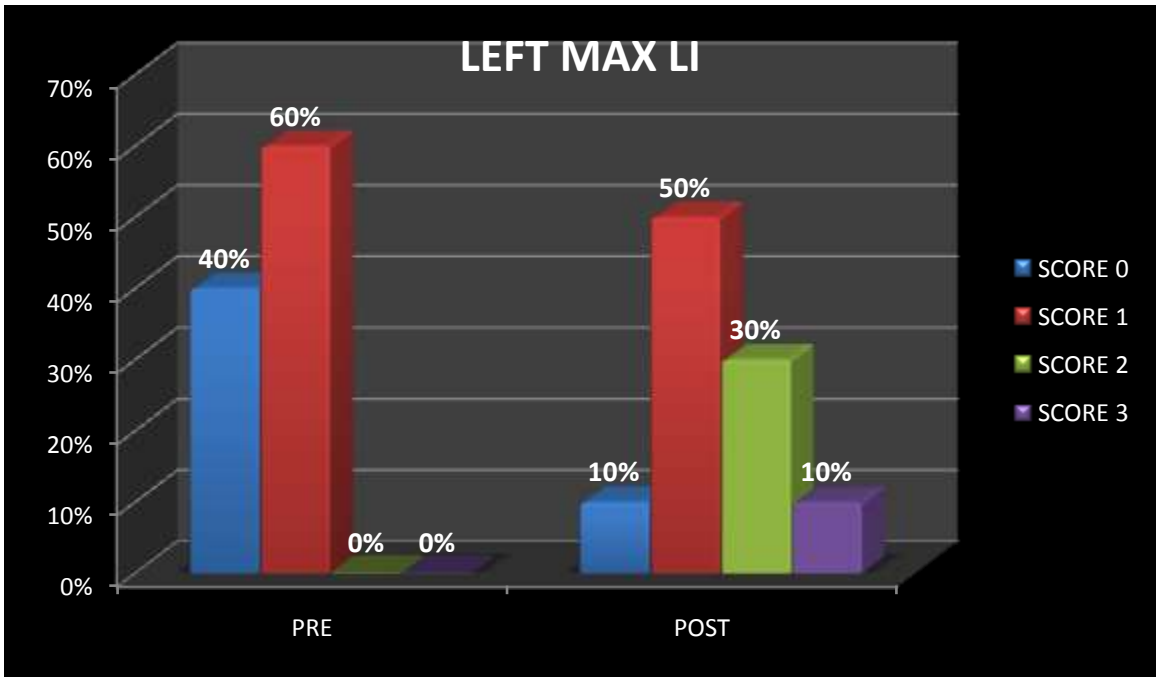
							Chi square value	Sig.
			0	1	2	3		
MBT	Right max CI	Pre	5(50)	3(30)	2(20)	0(0)	2.500	0.475(N.S)
		Post	3(30)	3(30)	2(20)	2(20)		
	Left max CI	Pre	4(40)	6(60)	0(0)	0(0)	5.891	**0.024(S)**
		Post	1(10)	5(50)	3(30)	1(10)		
	Right Max LI	Pre	5(50)	3(30)	2(20)	0(0)	2.500	0.475(N.S)
		Post	3(30)	3(30)	2(20)	2(20)		
	Left Max LI	Pre	4(40)	6(60)	0(0)	0(0)	5.891	**0.024(S)**
		Post	1(10)	5(50)	3(30)	1(10)		

Fig 1-4:- Radiographs of 10 patients treated with MBT before and after treatment.









The results obtained for Right Max CI and Right Max LI were observed to be same. Similarly, the results obtained for Left Max CI and Left Max LI were observed to be same.

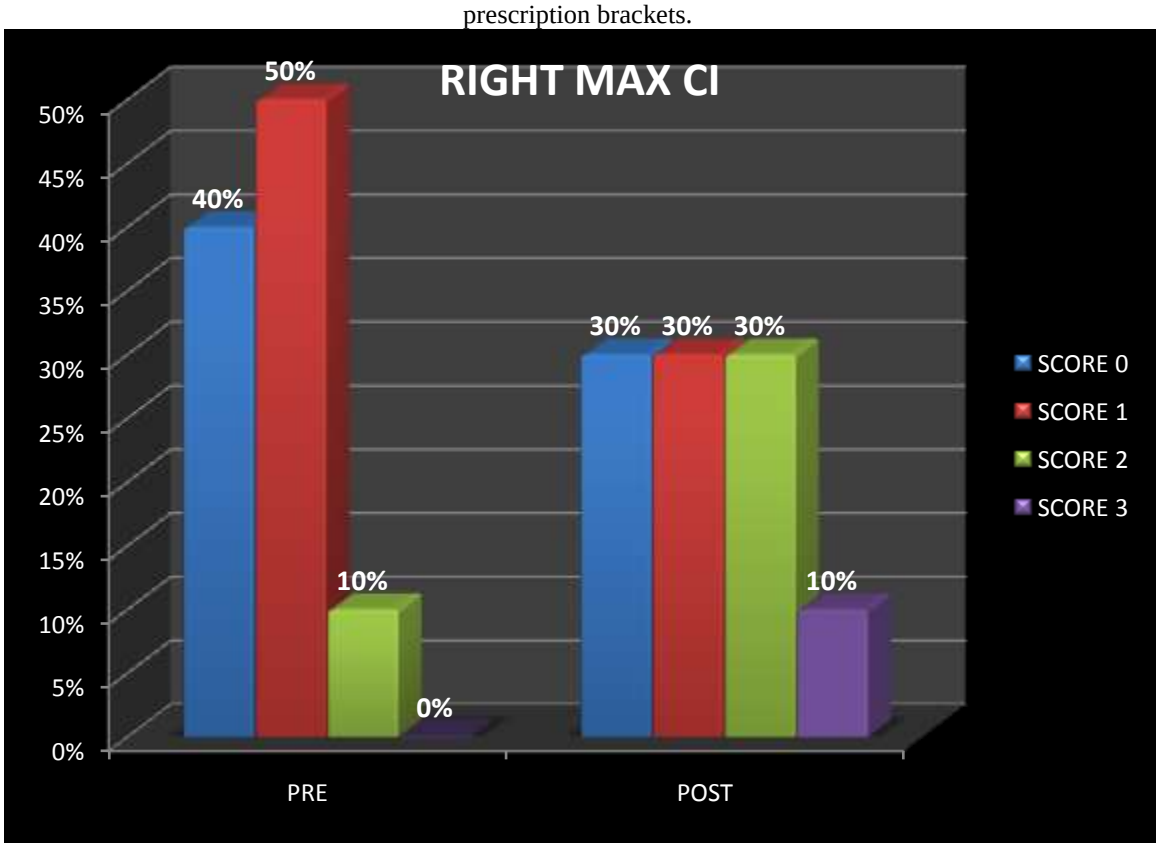
P-values was observed to be less than 0.5 for Left Max CI and Left Max LI. As a result, the null hypothesis was rejected and the alternate hypothesis was accepted. As a result, the Left Max CI and LI were found to be statistically significant.

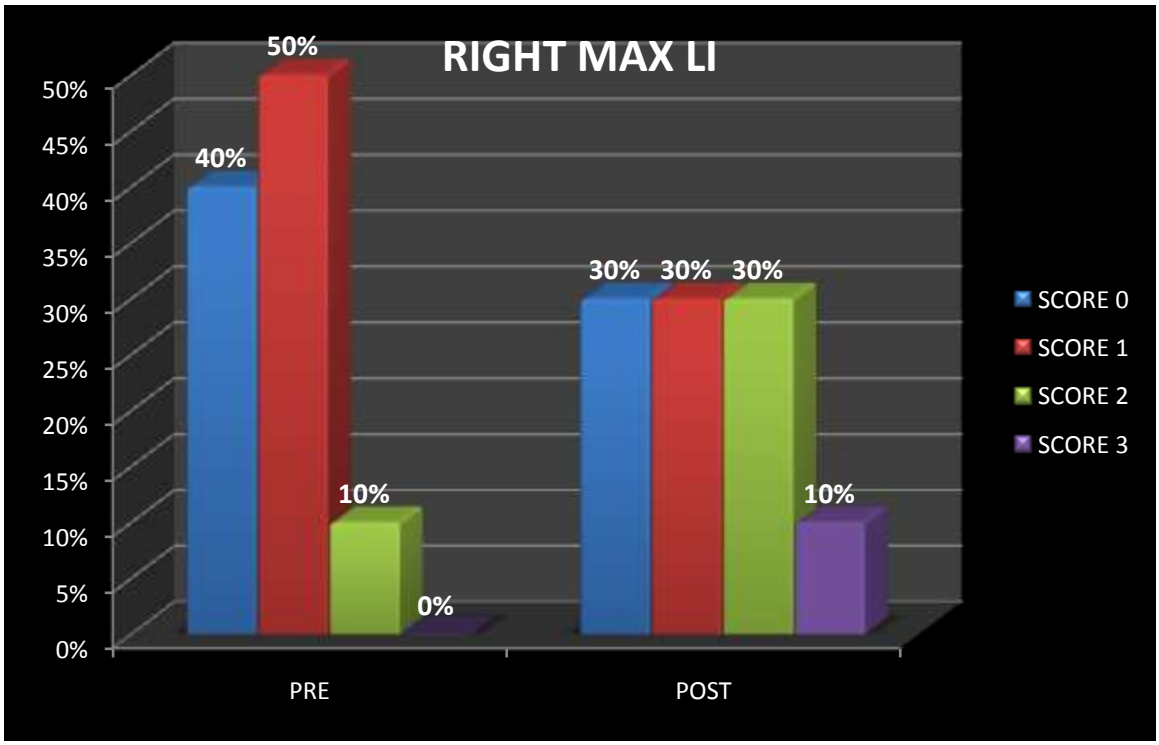
P-value for Right Max CI and Right Max LI was however observed to be greater than 0.5. Hence, we failed to reject the null hypothesis. Therefore, Right Max CI and Right Max LI were observed to be statistically insignificant

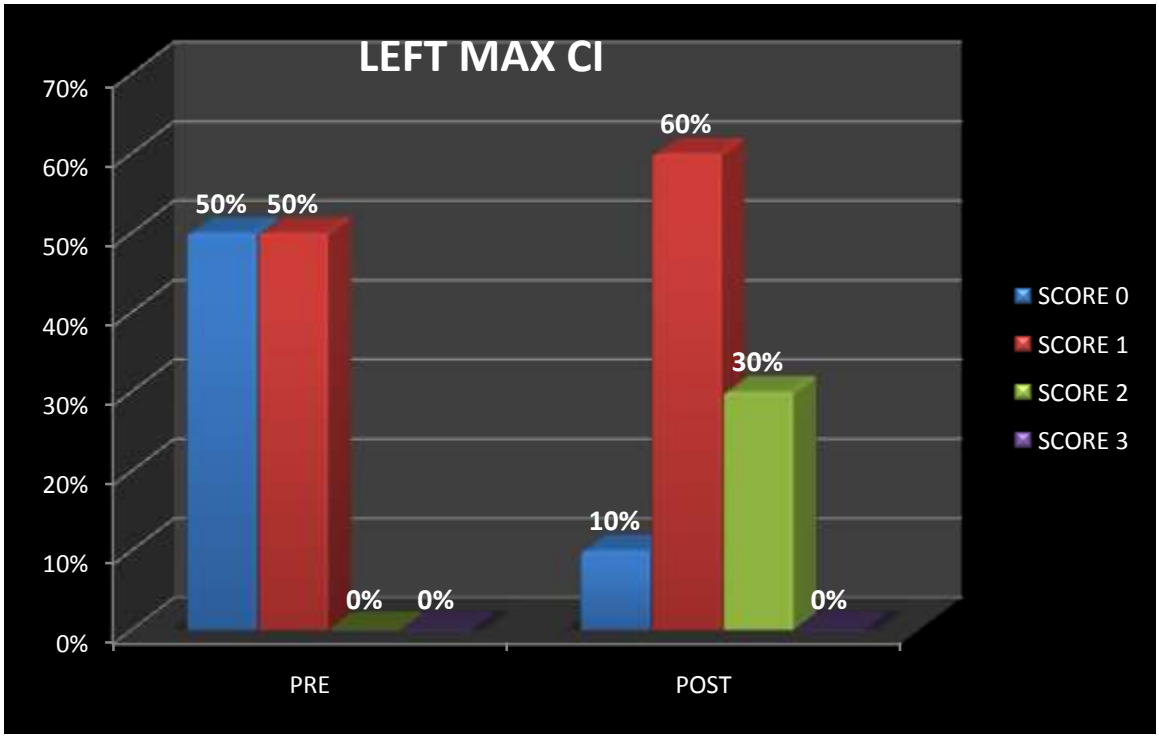
Table 2:- Pre and post treatment IOPA radiographs of 10 patients who undergone treatment with Damon prescription brackets.

							Chi square value	Sig.
			0	1	2	3		
Damon	Right max CI	Pre	4(40)	5(50)	1(10)	0(0)	2.643	0.450(N.S)
		Post	3(30)	3(30)	3(30)	1(10)		
	Left max CI	Pre	5(50)	5(50)	0(0)	0(0)	5.758	**0.020(S)**
		Post	1(10)	6(60)	3(30)	0(0)		
	Right Max LI	Pre	4(40)	5(50)	1(10)	0(0)	2.643	0.450(N.S)
		Post	3(30)	3(30)	3(30)	1(10)		
	Left Max LI	Pre	5(50)	5(50)	0(0)	0(0)	5.758	**0.020(S)**
		Post	1(10)	6(60)	3(30)	0(0)		

Fig 5-8:- Pre and post treatment IOPA radiographs of 10 patients who undergone treatment with Damon prescription brackets.




RIGHT MAX LI
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
40%
50%
10%
0%
30%
30%
30%
10%
PRE
POST
SCORE 0
SCORE 1
SCORE 2
SCORE 3


LEFT MAX CI
70%
60%
50%
40%
30%
20%
10%
0%
50%
50%
0%
0%
10%
60%
30%
0%
PRE
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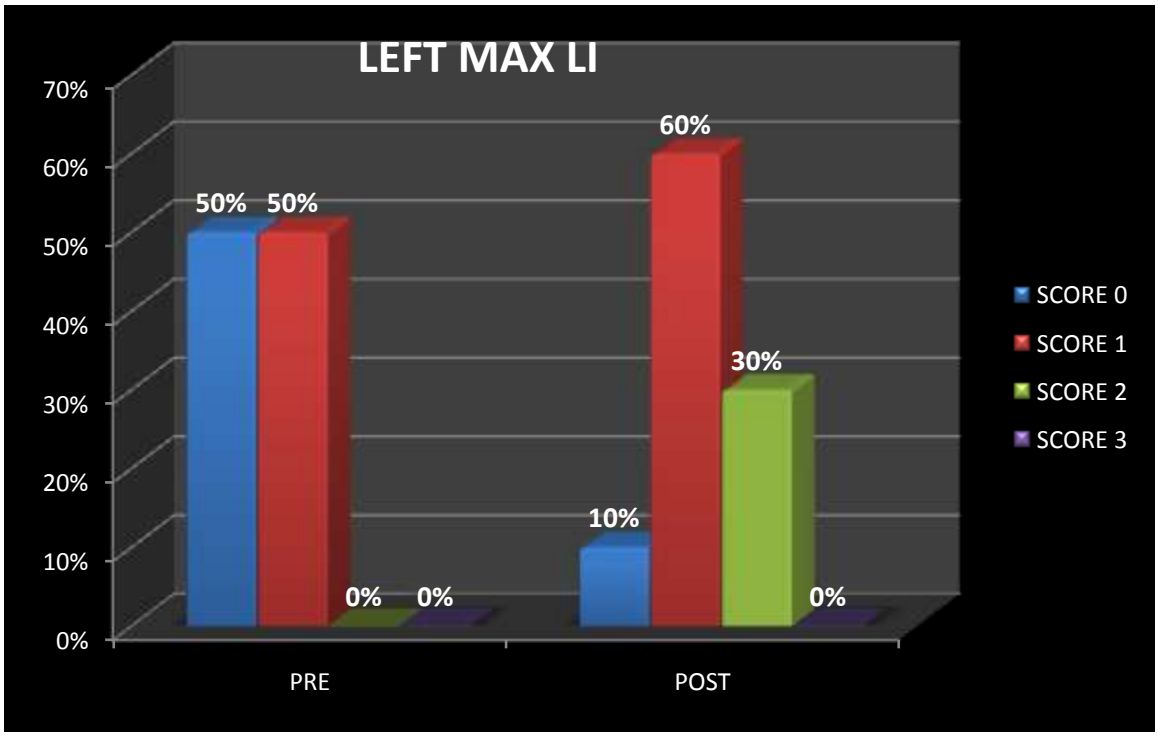
SCORE 0
SCORE 1
SCORE 2
SCORE 3



The results obtained for Right Max CI and Right Max LI were observed to be same. Similarly, the results obtained for Left Max CI and Left Max LI were observed to be same.

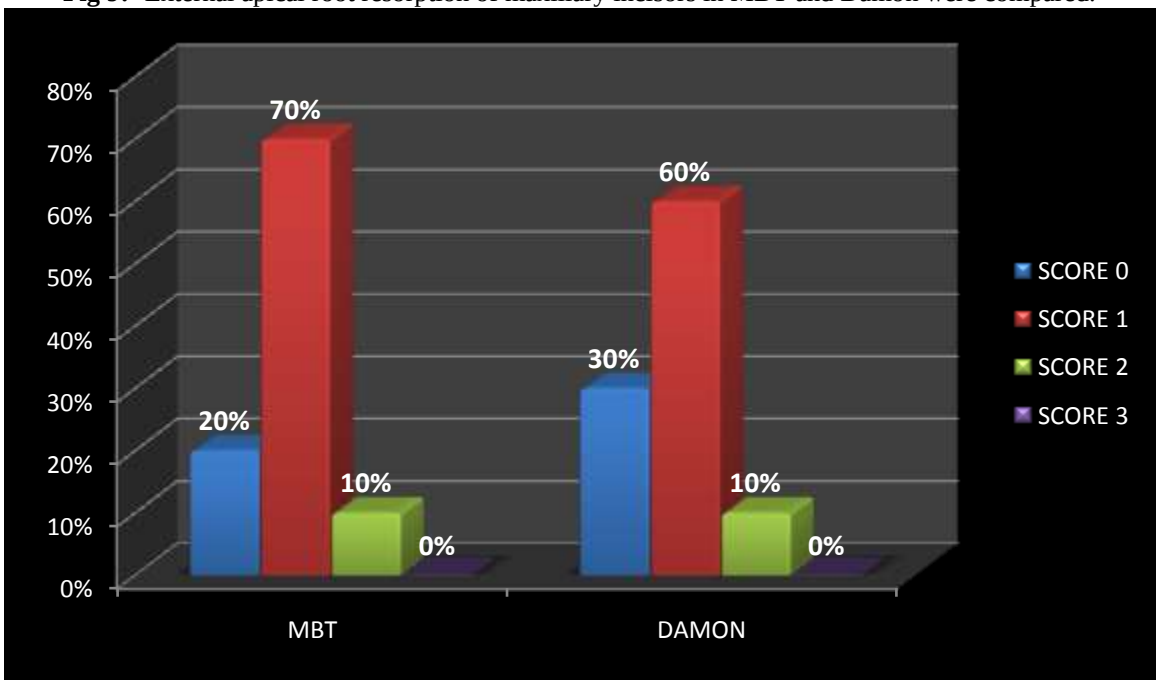
P-values was observed to be less than 0.5 for Left Max CI and Left Max LI. As a result, we rejected the null hypothesis and accepted the alternate hypothesis. So, Left Max CI and Left Max LI were found to be statistically significant.

P-value for Right Max CI and Right Max LI was however observed to be greater than 0.5. Hence, we failed to reject the null hypothesis. Therefore, Right Max CI and Right Max LI were observed to be statistically insignificant.

Table 3:- Comparison of external apical root resorption in maxillary incisors treated with MBT and Damon bracket system.

					Chi square value	Sig.
	0	1	2	3		
MBT	2(20)	7(70)	1(10)	0(0)	0.277	0.871(N.S)
DAMON	3(30)	6(60)	1(10)	0(0)		

Fig 9:- External apical root resorption of maxillary incisors in MBT and Damon were compared.



The trend in both the MBT brackets and Damon brackets were same. The highest was observed in Score 1, followed by Score 0, and then by Score 2. The lowest was observed in Score 3 in both MBT brackets and Damon brackets.

The p-value was greater than 0.05 when comparing changes in maxillary incisor external apical root resorption in patients treated with MBT and Damon bracket systems. Statistically insignificant it was thus determined.

Discussion:-

One of the major consequences of orthodontic treatment is external apical root resorption, and it is this with which the orthodontists are concerned. This study was intended for intra-practitioner correlations, and not to think about one clinician against the other. The purpose was threefold: First, the clinical changes in maxillary incisor external apical root resorption in patients treated with the MBT bracket system will be evaluated. Second, the Damon bracket system was used to assess changes in patients with maxillary incisor external apical root resorption Third, to assess and compare changes in maxillary resorption of the incisor external apical root in individuals treated with the MBT and Damon bracket systems.

The obtained results for Right Max CI and Right Max LI were observed to be same for both the MBT and Damon brackets. Similarly, the results obtained for Left Max CI and Left Max LI were observed to be same for both the MBT and Damon brackets. Significant changes were observed in Left Max CI and Left Max LI for both the MBT and Damon brackets. On the other hand, no significant changes were observed in Right Max CI and Right Max LI for both the MBT and Damon brackets. The results were 70% in Score 1 MBT bunch whereas it was just 60% in Score 1 Damon gathering. On the other hand, the results were 20 % of Score 0 in MBT bunch whereas it was 30% in Score 0 Damon gathering. The Score 2 results for both the MBT brackets and Damon brackets are 10%. In both the MBT and Damon brackets, the results for Score 3 were 0%. The results for Score 3 were 0% in both MBT and Damon brackets. Similarly, it was found that External apical root resorption (EARR) was also found to be increasing while using Damon brackets as well. During the intragroup comparisons, in both study groups, it was observed that lateral incisors had more root resorption than central incisors.i.e., MBT and Damon brackets. During the comparison between the MBT brackets and Damon brackets, root resorption was found to be observed in both the groups. MBT and Damon brackets showed similar amount of root resorption.

There is no difference in EARR between appliance systems when compared. EARR was not reliably predicted by age, gender, or extraction method, although there was a positive connection between EARR and treatment duration.

The findings of this studycan be used to fulfill the following clinically relevant objectives:

1. Help the clinician to assess and evaluate effects of MBT brackets on EARR.
2. Help the clinician to assess and evaluate effects of Damon brackets on EARR.
3. Help the clinician in evaluating and comparing the effects of MBT and Damon brackets on EARR after treatment.

Conclusion:-

When using both the MBT and Damon brackets External apical root resorption is shown to be increasing. During intragroup comparisons, it was discovered that lateral incisors had more root resorption than central incisors in both study groups, i.e., MBT and Damon brackets. Root resorption was observed in both groups when the MBT brackets were compared to the Damon brackets. Root resorption was found to be comparable in both the MBT and Damon brackets.

Similar resorption levels are seen in non-extraction treatment with Damon self-ligating or standard preadjusted appliance

Figures:-

Figure 1:- Damon Q non-extraction Study model.

Figure 2:- MBT non-extraction Study model.

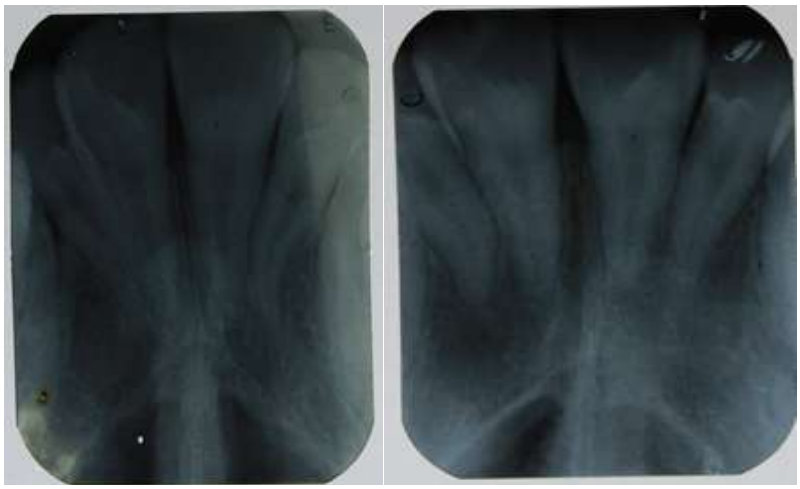


Figure 3:- IOPA of maxillary incisors pre and post treatment in MBT bracket.

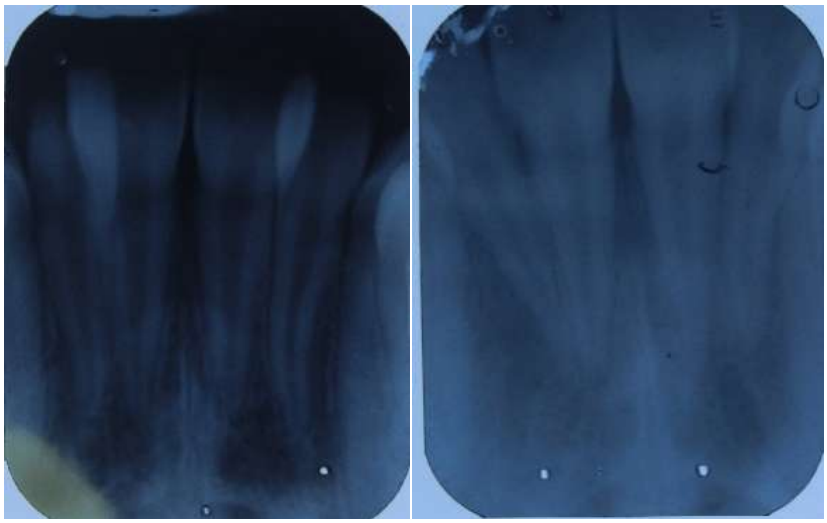


Figure 4:- IOPA of maxillary incisors pre and post treatment in Damon.

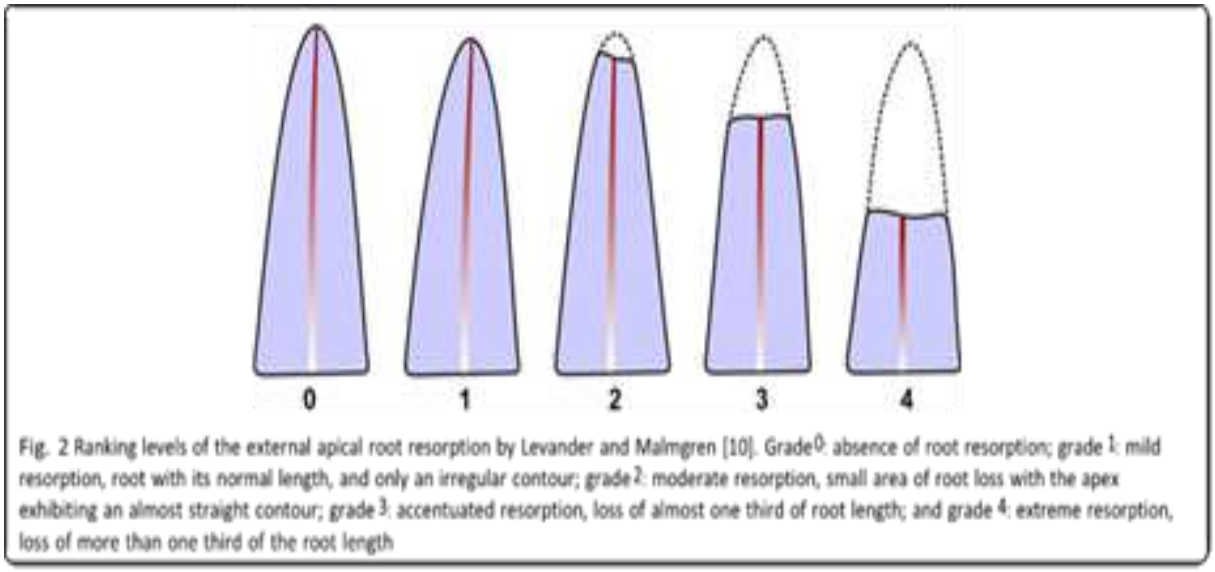


Fig. 2 Ranking levels of the external apical root resorption by Levander and Malmgren [10]. Grade 0: absence of root resorption; grade 1: mild resorption, root with its normal length, and only an irregular contour; grade 2: moderate resorption, small area of root loss with the apex exhibiting an almost straight contour; grade 3: accentuated resorption, loss of almost one third of root length; and grade 4: extreme resorption, loss of more than one third of the root length

Figure 5:- Ranking levels of EARR by Levander and Malmgren.

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