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Original Research

Assessment of IL- IB and IL- 8 level in patients undergoing orthodontic treatment

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ABSTRACT:

Background: The key to success of orthodontic treatment needs periodontal health, oral hygiene, and optimal orthodontic forces. The present study was conducted to assess IL- IB and IL- 8 level in patients undergoing orthodontic treatment. **Materials & Methods:** 30 patients requiring orthodontic treatment of both genderswere divided into 2 groups of. Each group comprised of 15 patients. Group I was vibrational and fixed appliance group and group II was fixed appliance group only. Collection of unstimulated whole saliva in a sterile test tube was done and the targeted biomarkers such as IL1band IL18 were analyzed using ELISA assay test. **Results:** Group I had 6 males and 9 females and group II had 7 males and 8 females. Irregularity index at time point T0 was 8.5 in group I and 9.7 in group II, at T1 was 5.4 in group I and 5.9 in group II, at T2 was 2.5 in group I and 2.7 in group II and at T3 was 1.2 in group I and 1.0 in group II. The difference was significant (P< 0.05). The mean IL- IB level at T0 was 42.5 and 81.5, at T1 was 27.3 and 56.4, at T2 was 30.7 and 105.3 and at T3 was 27.8 and 130.5. The difference was significant (P< 0.05). The mean IL- 8 level at T0 was 260.4 and 245.5, at T1 was 185.7 and 173.2, at T2 was 193.2 and 256.5 and at T3was 291.4 and 380.2 in group I and II respectively. **Conclusion:** There was no difference in the expression of IL- IB and IL- 8 between both groups.

Key words: biological markers, IL- IB, IL- 8

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INTRODUCTION

The key to success of orthodontic treatment needs periodontal health, oral hygiene, and optimal orthodontic forces.[1] New methods have been developed to shorten treatment times, reduce side effects such as pain, periodontal diseases, and minimize iatrogenic damages such as root resorption and the subsequent development of nonvital teeth.[2]

Tooth movement induced by orthodontic force application is characterized by remodeling changes in the dental and periodontal tissues. Two interrelated processes involved in orthodontic tooth movement (OTM) are bone bending remodeling of the periodontal tissues, including the dental pulp, periodontal ligament (PDL), alveolar bone, and gingiva.[3] The applied force causes the compression of the alveolar bone and the PDL on one side (pressure), while on the opposite side the PDL is stretched (tension).The application of mechanical vibration to the dentition has also been hypothesized to increase the rate of tooth movement by affecting the expression of key biological factors involved in bone remodeling.[4,5]Several important biomarkers have been identified clinically and in animal studies that mediate orthodontic tooth movement. Among these, the osteoprotegerin (OPG)/receptor activator of nuclear factor kappa-B ligand (RANKL) system in bone modelling has been mentioned in studies performed on animals and recently on humans during orthodontic treatment.[4] Matrix metalloproteinases (MMPs) play a key role in collagen breakdown, tissue modelling, and degradation of the extracellular matrix. Multiple studies have shown increased expression of certain metalloproteinases during orthodontic treatment. Lastly, tumour necrosis factoralpha (TNF-α) and interleukins are cytokines that increase with orthodontic force application in rats and human.[5]The present study was conducted to assess IL- IB and IL-8level in patients undergoing orthodontic treatment.

MATERIALS & METHODS

The present study comprised of 30 patients requiring orthodontic treatment of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of.Each group comprised of 15 patients. Group I was vibrational and fixed appliance group and group II was fixed appliance group only. All patients were bonded with passive self-ligating brackets featuring 0.022"X0.025" slot and MBT prescription from second premolar to second premolar as well as a bonded tube on first molars. At the bonding appointment (T0), an 0.014" Cu-NiTi wire was inserted on the lower arch and was kept until the T2 appointment. At T2, bracket position was assessed and repositioning was performed. At this same appointment, the wire was changed for 0.014"X0.025" Cu-NiTi. All subjects were seen for orthodontic adjustments every 5-6 weeks. Collection of unstimulated whole saliva in a sterile test tube was done and the targeted biomarkers such as IL1band IL18 were analyzed using ELISA assay test. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I: Distribution of patients

Groups	Group I	Group II
Method	Vibrational and fixed appliance	Fixed appliance
M:F	6:9	7:8

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

Table II: Assessment of irregularity index in both groups

Time points	Group I	Group II	P value
T0	8.5	9.7	0.91
T1	5.4	5.9	0.94
T2	2.5	2.7	0.92
T3	1.2	1.0	0.82

Table II, graph I shows that irregularity index at time point T0 was 8.5 in group I and 9.7 in group II, at T1 was 5.4 in group I and 5.9 in group II, at T2 was 2.5 in group I and 2.7 in group II and at T3 was 1.2 in group I and 1.0 in group II. The difference was significant (P< 0.05).

Graph I: Assessment of irregularity index in both groups

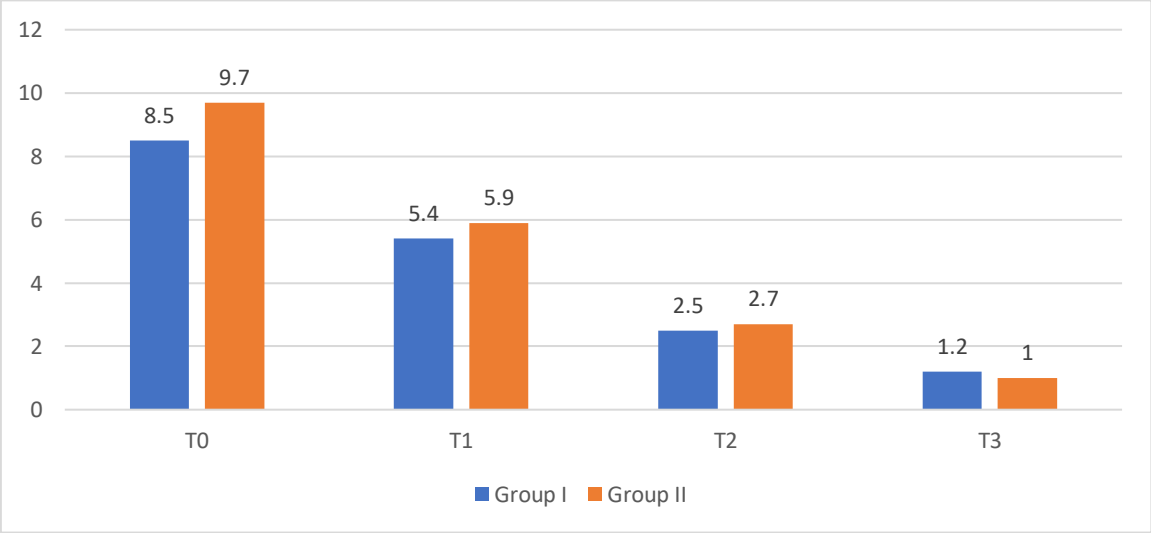

Table III: Assessment of IL- IB level

Time points	Group I	Group II	P value
T0	42.5	81.5	0.02
T1	27.3	56.4	0.05
T2	30.7	105.3	0.01
T3	27.8	130.5	0.02

Table III shows that mean IL- IB level at T0 was 42.5 and 81.5, at T1 was 27.3 and 56.4, at T2 was 30.7 and 105.3 and at T3 was 27.8 and 130.5. The difference was significant (P< 0.05).

Table IV: Assessment of IL- 8 level

Time points	Group I	Group II	P value
T0	260.4	245.5	0.94
T1	185.7	173.2	0.11
T2	193.2	256.5	0.05
T3	291.4	380.2	0.04

Table IV shows that the mean IL- 8 level at T0 was 260.4 and 245.5, at T1 was 185.7 and 173.2, at T2 was 193.2 and 256.5 and at T3 was 291.4 and 380.2 in group I and II respectively.

DISCUSSION

On average, comprehensive orthodontic treatments last approximately 21-27 months in non-extraction cases and 25-35 months when extractions are considered in the treatment plan.[6] Longer treatment time has been associated with multiple detrimental effects such as white spot lesions, root resorption, gingival inflammation and dental caries. Additionally, increased treatment time often leads to the exhaustion of the patient's compliance.[7] It is then in the patient's and in the clinician's interest to identify methods to increase the speed and efficiency of treatment. It has been estimated that normal tooth movement occurs at a rate of 0.8-1.2 mm/month.[8]

We found that group I had 6 males and 9 females and group II had 7 males and 8 females.Grieve WG et al[9] found that examine gingival crevicular fluid (GCF) levels of two potent bone resorbing mediators, prostaglandin E (PGE) and interleukin-1 beta (IL-1 beta), during human orthodontic tooth movement. The study included 10 patients, each having one treatment tooth undergoing orthodontic movement and a contralateral control tooth. The GCF was sampled at control sites and treatment (compression) sites before activation and a 1, 24, 48, and 168 hours. Prevention of plaque-induced inflammation allowed this study to focus on the dynamics of mechanically stimulated PGE and IL-1 beta GCF levels. The PGE and IL-1 beta levels were determined with radioimmunoassay. At 1 and 24 hours, mean GCF IL-1 beta levels were significantly elevated at treatment teeth (8.9 +/- 2.0 and 19.2 +/- 6.0 pg, respectively) compared with control teeth (2.0 +/- 1.1 pg, p = 0.0049, and 2.9 +/- 1.0 pg, p = 0.0209, respectively). The GCF levels of PGE for the treatment teeth were significantly higher at 24 and 48 hours (108.9 +/- 11.9 and 97.9 +/- 7.3 pg) than the control teeth (61.8 +/- 7.2 pg, p = 0.0071, and 70.8 +/- 7.4 pg, p = 0.0021, respectively). The GCF levels of PGE and IL-1 beta remained at baseline levels throughout the study for the control teeth, whereas significant elevations from baseline in GCF IL-1 beta (24 hours) and PGE levels (24 and 48 hours) were observed over time in the treatment teeth (p < or = 0.05).

We found that irregularity index at time point T0 was 8.5 in group I and 9.7 in group II, at T1 was 5.4 in group I and 5.9 in group II, at T2 was 2.5 in group I and 2.7 in group II and at T3 was 1.2 in group I and 1.0 in group II. Floréz-Moreno et al[10] investigated salivary levels of RANKL, OPG, and the RANKL/OPG ratio during orthodontic tooth movement.Basaran et al[11] using gingival crevicular fluid instead of saliva. This difference in 26 the protocol could affect some biomarker detection, especially ones found to be expressed in lower concentrations in the GCF.Ogasawara[12] research focusing on tumornecrosis factor alpha (TNF-α) and interleukins concentration have shown increased values when orthodontic force was applied.

We found that mean IL- IB level at T0 was 42.5 and 81.5, at T1 was 27.3 and 56.4, at T2 was 30.7 and 105.3 and at T3 was 27.8 and 130.5. We found that mean IL- 8 level at T0 was 260.4 and 245.5, at T1 was 185.7 and 173.2, at T2 was 193.2 and 256.5 and at T3was 291.4 and 380.2 in group I and II respectively.Uematsu et al[13] in their study twelve patients were used as subjects. An upper canine of each patient having one treatment for distal movement served as the experimental tooth, whereas the contralateral and antagonistic canines were used as controls. The GCF around the experimental and the two control teeth was taken from each subject immediately before activation, and at 1, 24, and 168 hr after the initiation of tooth movement. Cytokine levels were determined by ELISAs. The concentrations of interleukin (IL)-1 beta, IL-6, tumor necrosis factor-alpha, epidermal growth factor, and beta 2-microglobulin were significantly higher in the experimental group than in the controls at 24 hr after the experiment was initiated. All the cytokines remained at baseline levels throughout the experiment for the two control groups. In contrast to cytokine alteration, the amount of total protein in the GCF exhibited a gradual increase, but no significant difference was observed between the control and experimental groups.

CONCLUSION

Authors found that there was no difference in the expression of IL- IB and IL- 8 between both groups.

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