Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 91.86

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Assessment of vertical changes in class II div I malocclusion after premolar extraction

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ABSTRACT:

Background: The extraction of premolars as a practical form of orthodontic therapy has been accepted for many years. The present study was conducted to assess vertical changes in class II div I malocclusion after premolar extraction. **Materials & Methods:** 60 subjects in age ranged 14- 22 years of both genders were divided into 2 groups. Group I was treated with extraction of mandibular first premolars and group II with extraction of mandibular second premolars. Each group consisted of 30 subjects. Maxillary first premolars were extracted in both groups. Parameters such as facial divergence measured by maxillary-mandibular plane angle (MM angle) and ratio of posterior facial height to the total anterior facial height was recorded. **Results:** Out of 60 subjects, males were 25 and females were 35. SNA^o was 80.2 and 79.4, SNB^o was 74.3 and 74.1, ANB^o was 5.2 and 5.9, MM angle was 31.9 and 31.2, MP angle was 29.6 and 27.3, TAFH (mm) was 116.2 and 122.4, LAFH (mm) was 69.6 and 71.5, overjet (mm) was 9.5 and 11.6, overbite (mm) was 1.6 and 0.9, lower arch crowding (mm) was 6.7 and 3.5 and lower arch residual space (mm) was 8.7 and 10.7 in group I and II respectively. Change in TAFH was 7.6 and 6.0, change in LAFH was 4.3 and 3.7, change in PFH was 5.0 and 4.3, change in MP angle was -0.3 and -0.7, change in MM angle was 0.0 and 0.6, change in LAFH/TAFH was -0.1 and 0.2, change in PFH/TAFH was 0.5 and 1.2 and mandibular molar protraction was 2.8 mm and 4.6 mm in group I and II respectively. **Conclusion:** Premolar extraction is not associated with reduction in the vertical dimension in subjects with class II division 1 malocclusion.

Key words: Malocclusion, Premolar, vertical dimension

Received: 19 October, 2021 Accepted: 25 November, 2021

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This article may be cited as: Firdous W, Mohammad M. Assessment of vertical changes in class II div I malocclusion after premolar extraction**.** J Adv Med Dent Scie Res 2021;9(12):144-147.

INTRODUCTION

The extraction of premolars as a practical form of orthodontic therapy has been accepted for many years, but there remains a controversy regarding the effect of premolar extraction on the facial vertical dimension.[1] Some believe that premolar extraction permits the posterior teeth to move forward resulting in decrease in the vertical dimension of occlusion.[2] Few authors have reported an average increase in lower anterior facial height (LAFH) and total anterior facial height (TAFH) values in a group of untreated subjects with class II div 1 malocclusion between ages of 10-14 years.[3]

Balanced maxillary and mandibular molar movement would be wanted to maintain the Class I molar relationship. However, differences exist in tooth movement of maxilla and mandible.[4] Because of thinner cortical bone and richer blood circulation, periodontal reconstruction could be more favourable for tooth movement in maxilla. In other words, if no extra anchorage enhancement was taken into treatment, maxillary molar would move mesially more easily, resulting in Class II molar relationship.[5] To prevent this consequence, Class II elastics would be introduced to retract the maxillary incisors and prevent more mesial movement of molars. However, the adverse effects of long-term Class II elastics should never be underestimated, such as the extrusion of lower molars, exceeding retrusion of maxillary incisors. The position and inclination of incisors influenced the fullness of the lips and aesthetics of profiles.[6] The present study was conducted to assess vertical changes in class II div I malocclusion after premolar extraction.

MATERIALS & METHODS

The material for the present study was collected from the records of 60 subjects in age ranged 14- 22 years of both genders, treated in the Department of Orthodontics, Govt Dental College and Hospital, Srinagar by fixed appliance therapy. Demographic profile of each subject was recorded. They were divided into 2 groups. Group I was treated with extraction of mandibular first premolars and group II with extraction of mandibular second premolars. Each group consisted of 30 subjects. Maxillary first premolars were extracted in both groups. Parameters such as facial divergence measured by maxillary-mandibular plane angle (MM angle) and ratio of posterior facial height to the total anterior facial height was recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of subjects

Total- 60		
Gender	**Male**	**Female**
Number	25	35

Table I shows that out of 60 subjects, males were 25 and females were 35.

Table II Assessment of parameters

Parameters	Group I	Group II	P value
SNA^{o}	80.2	79.4	0.81
SNB^{o}	74.3	74.1	0.93
ANB^{o}	5.2	5.9	0.94
MM angle	31.9	31.2	0.96
MP angle	29.6	27.3	0.15
TAFH (mm)	116.2	122.4	0.06
LAFH (mm)	69.6	71.5	0.12
Overjet (mm)	9.5	11.6	0.17
Overbite (mm)	1.6	0.9	0.24
Lower arch crowding (mm)	6.7	3.5	0.03
Lower arch residual space (mm)	8.7	10.7	0.01

Table II, graph I shows that SNA^{o} was 80.2 and 79.4, SNB^{o} was 74.3 and 74.1, ANB^{o} was 5.2 and 5.9, MM angle was 31.9 and 31.2, MP angle was 29.6 and 27.3, TAFH (mm) was 116.2 and 122.4, LAFH (mm) was 69.6 and 71.5, overjet (mm) was 9.5 and 11.6, overbite (mm) was 1.6 and 0.9, lower arch crowding (mm) was 6.7 and 3.5 and lower arch residual space (mm) was 8.7 and 10.7 in group I and II respectively. The difference was significant (P< 0.05).

Graph I Assessment of parameters

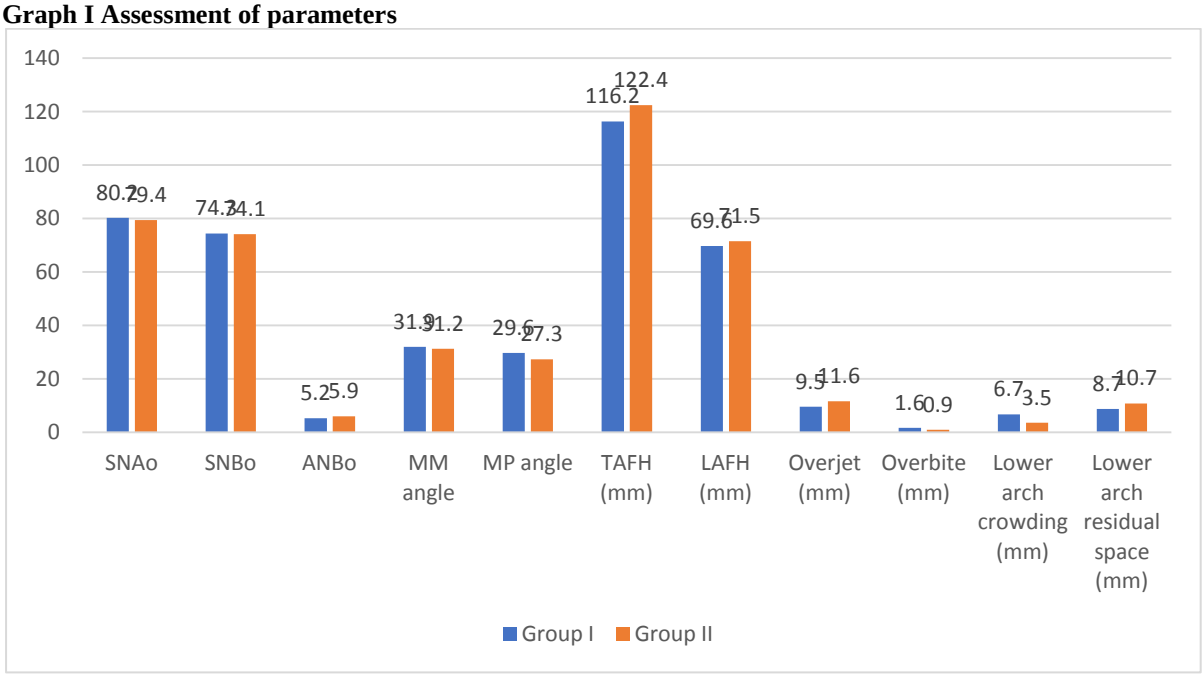
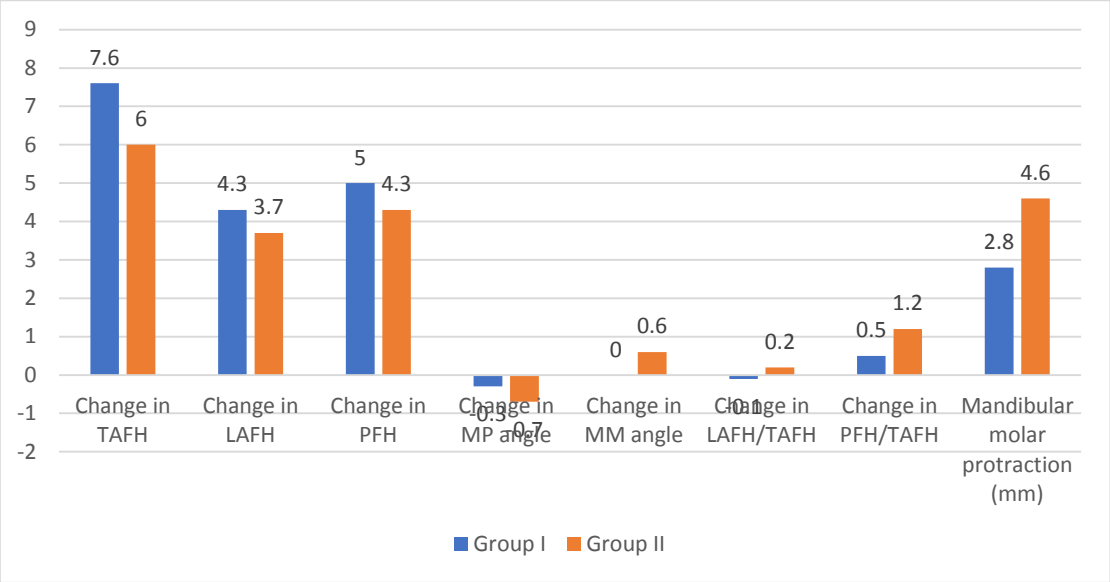


Table III Comparison of the treatment changes

Parameters	Group I	Group II	P value
Change in TAFH	7.6	6.0	0.81
Change in LAFH	4.3	3.7	0.90
Change in PFH	5.0	4.3	0.82
Change in MP angle	-0.3	-0.7	0.14
Change in MM angle	0.0	0.6	0.07
Change in LAFH/TAFH	-0.1	0.2	0.54
Change in PFH/TAFH	0.5	1.2	0.26
Mandibular molar protraction (mm)	2.8	4.6	0.01

Table III, graph II shows that change in TAFH was 7.6 and 6.0, change in LAFH was 4.3 and 3.7, change in PFH was 5.0 and 4.3, change in MP angle was -0.3 and -0.7, change in MM angle was 0.0 and 0.6, change in LAFH/TAFH was -0.1 and 0.2, change in PFH/TAFH was 0.5 and 1.2 and mandibular molar protraction was 2.8 mm and 4.6 mm in group I and II respectively. The difference was non- significant (P> 0.05).

Graph II Comparison of the treatment changes



DISCUSSION

The extraction of premolars as a practical form of orthodontic therapy has been accepted for many years, but there remains a controversy regarding the effect of premolar extraction on the facial vertical dimension.[7,8] In a patient presenting a dolichofacial growth pattern, every care should be taken not to promote undue extrusions, which, in turn, are associated with an increase in the vertical dimensions and worsening of the relationship among lips, teeth and bony structures. In many previous studies, there was increase in the vertical facial dimensions of patients after the treatment.[9] As most of these patients were in their growing age, hence increase in vertical dimension was because of growth and the mechanics involved cannot be ascertained.[10] The present study was conducted to assess vertical changes in class II div I malocclusion after premolar extraction.

In present study, out of 60 subjects, males were 25 and females were 35. Dwivedi et al[11] found that the mean changes resulting from treatment reflected a significant increase in MM angle and SN (Go-Gn) which showed that there was opening up of MP angle. There was also increase in the mean values of LAFH, TAFH and PFH after treatment but the increase was statistically insignificant. The change in ratios LAFH/TAFH and PFH/TAFH between pre and post treatment cephalograms was also found to be insignificant.

We found that SNA^{o} was 80.2 and 79.4, SNB^{o} was 74.3 and 74.1, ANB^{o} was 5.2 and 5.9, MM angle was 31.9 and 31.2, MP angle was 29.6 and 27.3, TAFH (mm) was 116.2 and 122.4, LAFH (mm) was 69.6 and 71.5, overjet (mm) was 9.5 and 11.6, overbite (mm) was 1.6 and 0.9, lower arch crowding (mm) was 6.7 and 3.5 and lower arch residual space (mm) was 8.7 and 10.7 in group I and II respectively. Nimri et al[12] in their study the records of two groups of patients were used: one group was treated with extraction of mandibular first premolars (age: 13.2 ± 1.5 years) and the other group with extraction of mandibular second premolars (age: 13.4 ± 1.4 years). Each group consisted of 26 subjects (16 boys and 10 girls). Maxillary first premolars were extracted in both groups. The two groups were matched by sex, age (within six months), and facial divergence measured by maxillary-mandibular plane angle (MM angle) and ratio of posterior facial height to the total anterior

facial height. Second premolar extraction was associated with more forward movement of the mandibular molars, but there was no significant difference in vertical facial growth between the two groups. In both groups, there was no significant change in the mandibular plane angle and the MM angle.

We found that change in TAFH was 7.6 and 6.0, change in LAFH was 4.3 and 3.7, change in PFH was 5.0 and 4.3, change in MP angle was -0.3 and -0.7, change in MM angle was 0.0 and 0.6, change in LAFH/TAFH was -0.1 and 0.2, change in PFH/TAFH was 0.5 and 1.2 and mandibular molar protraction was 2.8 mm and 4.6 mm in group I and II respectively. Wang et al[13] compared vertical changes occurring in Class I patients after orthodontic treatment with different extraction patterns. Records of 47 patients with extraction of maxillary first premolars and mandibular second premolars (4/5, Group A) and 46 patients with extraction of fourth first premolars (4/4, Group B) were obtained. Pre-treatment and posttreatment cephalograms were digitized, 8 skeletal and 10 dental cephalometric measurements were selected to evaluate vertical changes. Changes of measurements resulting from orthodontic treatment in each group were compared. Before treatment, subjects in Group A showed larger angle formed by the intersection of NA and NB lines, overjet, and overbite than those in Group B. After treatment, both groups showed significant vertical changes after orthodontic treatment without remarkable differences between groups. No differences of vertical change were found between the 2 extraction patterns. The hypothesized wedge effects due to mesial movement of posterior teeth might be balanced by the extrusion of posterior teeth as well as the residual growth potentials.

CONCLUSION

Authors found that premolar extraction is not associated with any significant reduction in the vertical dimension in subjects with class II division 1 malocclusion.

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