



CODEN [USA]: IAJ PBB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.1323242>Available online at: <http://www.iajps.com>

Research Article

**A CROSS-SECTIONAL RESEARCH ON COMPARISON &
CONTRAST OF ROOT RESORPTION FREQUENCY IN
CROWDING AND NON-CROWDING ORTHODONTICS
PATIENTS**¹Dr. Urooj Sadiq, ²Dr. Madiha Akram, ³Dr. Saira Quyyum¹WMO 32/2R Okara²WMO in THQ Jaranwala³DHQ Okara**Abstract:**

Objective: The aim of this study was to compare and contrast the amount and frequency of root resorption after six months treatment of fixed orthodontic in non-crowding and crowding orthodontic patients.

Methods: Our cross-sectional research was carried out at Mayo Hospital, Lahore in Orthodontics Department (June to December 2016). The sample was divided into two groups, 30 patients in each group. Thirty patients of crowding in maxillary anterior teeth were included in Group A. Thirty patients of non-crowding cases of maxillary anterior teeth were the part of Group B. non-probability purposive sampling was used to collect the data. During preorthodontic stage, apical root resorption was calculated as a differentiation between tooth length at pre-treatment (T1) in contrast to stage two (Post orthodontic stage) that is root length 06 months in the aftermath of orthodontic treatment (T2). By using apical root resorption index, subjective scoring of resorption was carried out from zero to four. Comparison of root resorption was executed between 2 groups. Predesigned questionnaire was used to record the data.

Results: Apical root resorption of less than two millimetres was observed in twenty-seven (ninety percent) cases in crowding group. In non-crowding group, the percentage of such cases was seventy (21 cases). In stage two, when the comparison of the tooth length was made, the overall tooth length was considerably greater in non-crowding group in comparison to crowding group. We noted considerable disparity in mean tooth length at T2 than mean T1 length of tooth in crowding group. When non-crowding and crowding groups were compared, we gauged mean reduction of disparity in length of T2 and T1.

Conclusion: Amount and frequency of root resorption is prevalent excessively in the cases of crowding. After 06 months of orthodontic treatment, a considerable variation was observed in terms of mean length of the root of tooth in non-crowding and crowding subjects.

Keywords: Orthodontics, crowding, periapical, root resorption

*** Corresponding author:****Dr. Urooj Sadiq,**

WMO 32/2R,

Okara

QR code



Please cite this article in press Urooj Sadiq et al., A Cross-Sectional Research on Comparison & Contrast of Root Resorption Frequency in Crowding and Non-Crowding Orthodontics Patients., Indo Am. J. P. Sci, 2018; 05(07).

INTRODUCTION:

In some cases, an unwanted sequela of orthodontic therapy is often termed as apical root resorption. It can bring loss to the structure of tooth from the root apex permanently. The studies have authenticated the fact that after the forces of orthodontic being applied, all the teeth of human beings tend to establish resorption lacunae on the pressure area of the root surface. When the forces are removed, cementum has tendency to repair them [1]. According to these studies, lateral incisor is the worst affected teeth which are parts of maxillary anterior teeth [2]. A research carried out by Marques et al has indicated that after the execution of orthodontic treatment radiographically, incisors apical root resorption was 14.5 percent [3]. 1.5 millimetres was the mean resorption in case of all 6 anterior teeth. Generalized resorption was greater than three millimetres in case of four percent of subjects. Two percent of adolescents and five percent of adults are tended to possess minimum 01 tooth which resorbs greater than five millimetres in the aftermath of orthodontic treatment [4, 5]. Upon the removal of active appliances, the process of resorption is hampered. Numerous biological and mechanical elements can pave the ways to root resorption [6, 7]. In order to lessen the occurrences of root resorption, the awareness of such elements on the part of orthodontists and dentists carries poignant significance. Periapical Tomography and radiographs are frequently used to monitor resorptive changes in the roots [8].

METHODS:

Our cross-sectional research was carried out at Mayo Hospital, Lahore in Orthodontics Department (June to December 2016). Purposive and non-probability sampling techniques were used. Rao soft software was used to calculate the sample size i.e. sixty (thirty in both groups). It resulted as margin of error five percent, response distribution of fifty percent, confidence level of ninety five percent and population size of seventy. Criteria of inclusion was both gender seeking fixed orthodontic treatment aged eleven years or above. Exclusion criteria were subjects with erstwhile trauma history, use of elastics during treatment, with any dental anomaly, heavy arch wire mechanics and earlier orthodontic treatment. After attainment of verbal consent from selected subjects, relevant procedure was enunciated. Their diagnosis was based on radiological and clinical investigations. Division of two groups was defined on crowding (Group A; thirty patients) and without crowding (Group B; thirty patients). Treatment of all subjects was performed with pre-adjusted, multi-bonded (22x25 bracket slot) fixed

orthodontic appliance. By complying with a standardized paralleling technique, Periapical radiographs were collected at the pre-established treatment stages. At every phase, 3 radiographic projections were ensured in which the ray centred on each lateral incisor and the central ray between the 2 central incisors. Principal investigator developed the collected photographs and every subject through standardized paralleling technique at pre-treatment stages: prior to treatment (stage one) and after 6 months approximately (stage two) for the sake of root resorption assessment. Every photograph was evaluated by the principal investigator. With the help of sharp 3HB drawing pencil, tracing of photos was carried out on acetate tracing paper. After locating 2 landmarks (centre point of the incisal edge and the root apex), measurement of the root length was carried out with the help of millimetric standard ruler (as a distance from midpoint of the incisal edge to the root apex of both maxillary middle incisors in all 03 radiographs). Overall calculation was considered as an ultimate calculation. During preorthodontic stage, apical root resorption was calculated as a differentiation between tooth length at pre-treatment (T1) in contrast to stage two (Post orthodontic stage) that is root length 06 months in the aftermath of orthodontic treatment (T2). Apical root resorption was calculated as a differentiation between root length at pre-treatment phase and root length at orthodontic treatment in mm. As displayed in Figure one, with the help of apical root resorption index, resorption subjective scoring was carried out from zero to four. In the end, the comparison of root resorption was made in crowding and non-crowding group. Software SPSS was used for analysis of data. Standard deviation and mean were calculated for quantitative variables such as length of tooth and age in stage one and two. For apical resorption index score in each group, calculation of percentages was ensured. Percentages and frequency were measured for the sake of qualitative variables such as gender in each group. In order to verify the mean variation in tooth length in each group, Independent t test was utilised. In order to judge the mean tooth length of T2 and T1 in each group after six-month, paired t test was used at five percent significance level.

RESULTS:

Sixty subjects fulfilling the criteria of inclusion were included in this study. They all require orthodontic treatment. 14.12 ± 4.29 years was their mean age. Their ages ranged between ten to thirty-seven years. As per Figure two, female percentage was 61.7(37 females); male percentage was 38.3 (23 males). The sample was divided into two groups, 30 patients in each group. Thirty patients of crowding in maxillary

anterior teeth were included in Group A. Thirty patients of non-crowding cases of maxillary anterior teeth were the part of Group B. Group A consists of 73.3 percent (22 cases) aged as 11 to 17 years. Group B consists of twenty-five cases (83.3 percent) in the same age group. As per Table-1, 13.43 ± 2.06 years

was the average age in case of Group B while 14.80 ± 5.69 years was average age in case of Group A. Female proportion in Group B was twenty-three i.e. 76.7 percent in comparison to male gender. Detailed outcomes have been analysed in the tabular data.

Table – I: Gender Distribution

Gender	Crowding	Non-Crowding
Male	53.3	23.3
Female	46.7	76.7

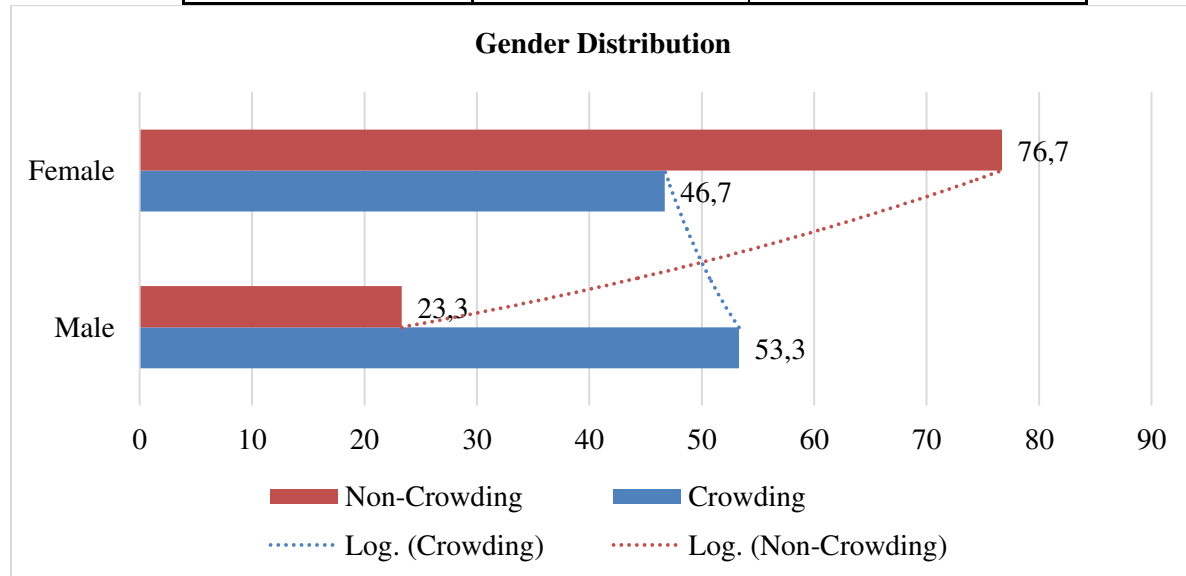


Table – II: Criteria for subjective scoring of root resorption

0	No resorption
1	Irregular root contour
2	Apical root resorption less than 2 mm of original root length.
3	Apical root resorption from 2 mm to 1/3 of original root length
4	Apical root resorption exceeding 1/3 of original root length

Table – III: Age Distribution of the Subjects

Age groups (years)	Crowding (30)		Non-crowding (30)	
	Number	Percent	Number	Percent
≤ 10	3	10	1	3.3
11 to 17	22	73.3	25	83.3
18 to 24	2	6.7	4	13.3
25 to 30	2	6.7	0	0
31 above	1	3.3	0	0
Over all Mean ± S.D.	14.12 ± 4.39			
Mean ± S.D.	14.80 ± 5.69		13.43 ± 2.06	

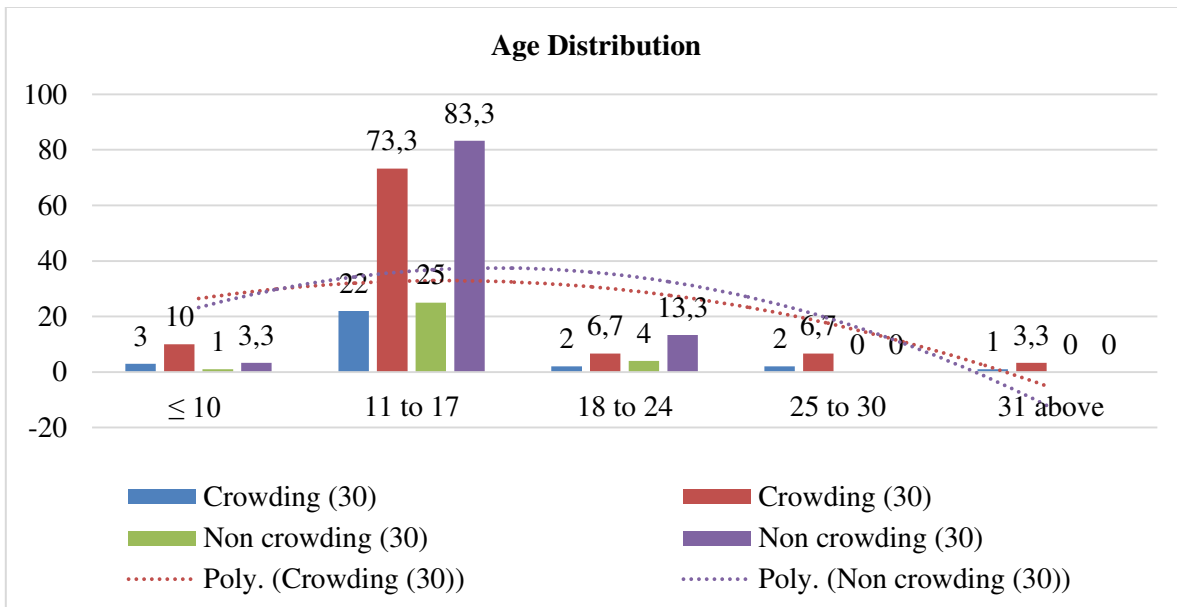


Table – IV: Comparison of apical root resorption through ARI

Apical Root resorption (ARI)	Crowding (30)		Non-crowding (30)	
	Number	Percent	Number	Percent
No resorption	0	0	5	16.7
Irregular root contour	1	3.3	3	10
Root resorption apically < 2mm	27	90	21	70
Root resorption apically from 2mm to one-third of the original root length	2	6.7	1	3.3
Root resorption exceeding one-third of the original root length	0	0	0	0

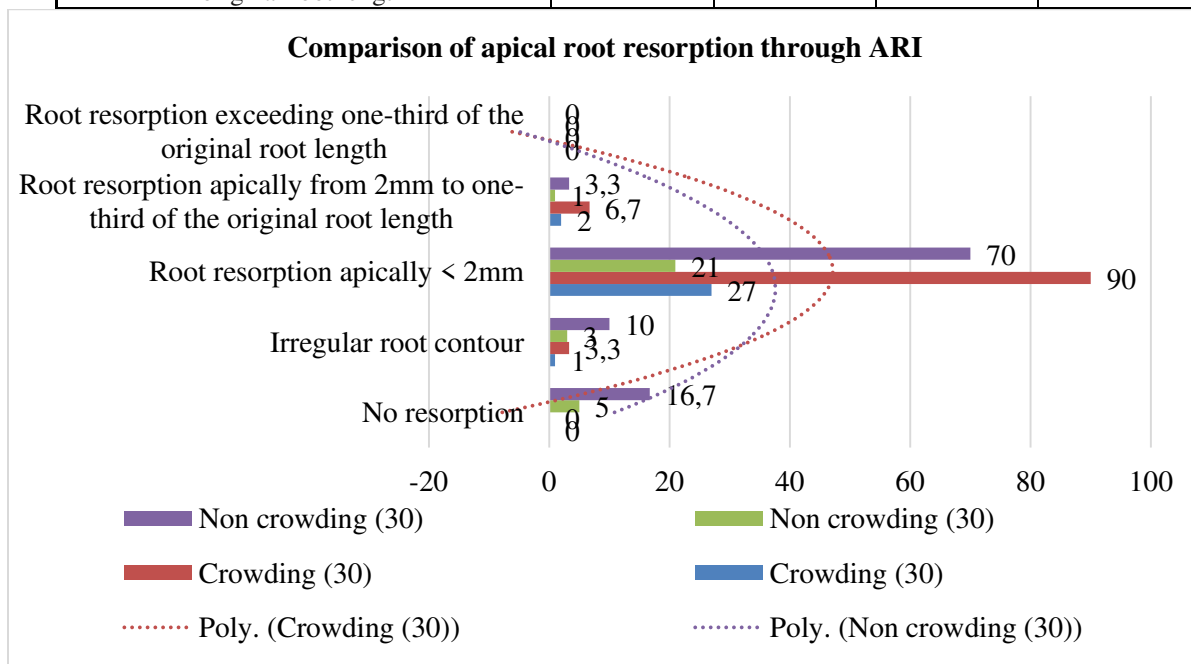


Table – V: Comparison of mean difference (after 6 months)

Group	Mean	± SEM	Df	t-value	p-value
Crowding	0.966	0.116	58	4.017	0
Non-crowding	0.385	0.086			

DISCUSSION:

The frequent finding after orthodontic treatment is root resorption [9]. It may be the outcome of various factors such as age, dentition morphology, gender, orthodontic mechanics, systematic conditions, intensity of orthodontic force, trauma history and type of tooth movement. Mean age of our study stands at 14.12 + 4.29 years. This is not matched with a Karachi based study in which mean age was 18.76 + 3.66 years [13]. Such inconsistency may be due to the fact that complete root formation teeth had undergone further root resorption in comparison with incomplete root formation teeth [14,15]. The formation of all incisors in teenagers was complete. Resultantly, more root resorption was noted in these teeth in contrast to other teeth undergoing apexogenesis phase until now. Nonetheless, another study conducted in 2013 has verified the reality that age does not play a significant role on root resorption rate in the aftermath of orthodontic treatment [16]. The dominant group under study was non-crowding and in case of male's gender crowding group. A research from Brazil has indicated the fact that susceptibility of root resorption is seen more in males in comparison with female genders. It stated that males have more tendency of more dilacerated and pipette shaped root apices in maxillary central incisors that can be comparatively susceptible to resorption [17]. In contrast numerous other studies have stated that females have more predilections for root resorption after orthodontic treatment [18, 19]. We cannot ignore the function of tooth crowding in root resorption, however. Our research revealed that greater frequency of root resorption was observed in crowding in comparison with non-crowding cases. In addition, much retrospective approach has resulted that previous history of trauma, morphology of teeth and status of crowding are unlikely factors to be a reason of root resorption in the aftermath of orthodontic treatment [11].

The study has concrete evidence that apical root resorption occurs in crowding cases in contrast to the cases of non-crowding. Abnormal alignment and tooth shape can be a potential reason for such occurrences as they may lead to abnormal immunopathological inflammatory response thus paving the way for root resorption [20, 21].

CONCLUSION:

Amount and frequency of root resorption is prevalent excessively in the cases of crowding. After 06 months of orthodontic treatment, a considerable variation was observed in terms of mean length of the root of tooth in non-crowding and crowding subjects. It is the prime responsibility of Orthodontist to trace out the factors causing root resorption and they should look for advanced strategies to avoid such cases.

REFERENCES:

1. Ehsan AA, Iqtadar S. Frequency of root resorption after first six months of active orthodontic treatment. *Pakistan Orthodontic journal* 2010; 2:19-28.
2. Brezniak N, Wasserstein A. Orthodontically induced inflammatory root resorption. Part II: The clinical aspects. *Angle Orthod* 2002; 72:180-4.
3. Lopatiene K, Dumbravaite A. Risk factors of root resorption after orthodontic treatment. *Stomatologija* 2008; 10:89-95.
4. Krieger E, Drechsler T, Schmidtmann I, Jacobs C, Haag S, Wehrbein H. Apical root resorption during orthodontic treatment with aligners? A retrospective radiometric study. *Head Face Med* 2013; 9:26.
5. Martins-Ortiz MF, Franzolin SDOB. Analysis of predictors of root resorption in orthodontic treatment. *J Dent Oral Hyg* 2011; 3:46-52.
6. Kjaer I. Morphological characteristics of dentitions developing excessive root resorption during orthodontic treatment. *Eur J Orthod* 1995; 17:25-34.
7. Hartsfield JK Jr, Everett ET, Al-Qawasmii RA. Genetic factors in external apical root resorption and orthodontic treatment. *Crit Rev Oral Biol Med* 2004; 15:115-22.
8. Savoldi F, Bonetti S, Dalessandri D, Mandelli G, Paganelli C. Incisal Apical Root Resorption Evaluation after Low-Friction Orthodontic Treatment Using Two-Dimensional Radiographic Imaging and Trigonometric Correction. *J Clin Diagn Res* 2015; 9:70-4.
9. Topkara A, Karaman AI, Kau CH. Apical root resorption caused by orthodontic forces: A brief review and a long-term observation. *Eur J Dent* 2012; 6:445-53.

10. Jung YH, Cho BH. External root resorption after orthodontic treatment: a study of contributing factors. *Imaging Sci Dent* 2011;411:17-21.
11. Zawawi KH, Malki GA. Radiographic comparison of apical root resorption after orthodontic treatment between bidimensional and Roth straight wire techniques. *J Orthod Sci* 2014; 3:106-10.
12. Weltman B, Vig KW, Fields HW, Shanker S, Kaizar EE. Root resorption associated with orthodontic tooth movement: A systematic review. *Am J Orthod Dentofacial Orthop* 2010; 137:462-76.
13. Linge L, Linge BO. Patient characteristics and treatment variables associated with apical root resorption during orthodontic treatment. *Am J Orthod Dentofacial Orthop* 1991; 99:35-43.
14. Kuroi J, Moll O, Lundgren D. Reabsorção radicular apical em adultos tratados ortodonticamente. *Dental Press Ortodon.* 1997; 2:46-7.
15. Apajalahti S, Peltola JS. Apical root resorption after orthodontic treatment - a retrospective study. *The European Journal of Orthodontics* 2007; 29:408-12.
16. Nimeri G, Kau CH, Corona R, Shelly J. The effect of photo bio modulation on root resorption during orthodontic treatment. *Clin Cosmet Investig Dent* 2014; 6:1-8.
17. Årtun J, Van't Hullenaar R, Doppel D, Kuiipers-Jagtman AM. Identification of orthodontic patients at risk of severe apical root resorption. *Am J Orthod Dentofacial Orthop* 2009; 135:448-55.
18. Liou EJ, Chang PM. Apical root resorption in orthodontic patients with en-masse maxillary anterior retraction and intrusion with mini screws. *Am J Orthod Dentofacial Orthop* 2010; 137:207-12.
19. Marques LS, Ramos-Jorge ML, Rey AC, Armond MC, Oliveira Ruellas AC. Severe root resorption in orthodontic patients treated with the edge wise method: prevalence and predictive factors. *Am J Orthod Dentofacial Orthop* 2010; 137:384-8.
20. McMullin AM, Fleming PS, Dibiasi AT. Idiopathic generalized apical root resorption: a report of three cases. *Int J Paediatr Dent* 2008; 18:312-6.
21. LopatieneK, Dumbravaite A. Risk factors of root resorption after orthodontic Treatment. *Stomatologija* 2008; 3:89-95.