Association between third molar impaction and crowding in the dental arches among outpatients in a private dental setup.

[1]Anubhav Das, [2]Nivethigaa Balakrishnan*

[1,2]Department of orthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai - 600077, India.

Abstract

AIM: This study aimed at evaluating the prevalence and gender association between third molar impaction and crowding in the dental arches.

MATERIALS AND METHODS: This was a retrospective study performed in a university setting. Data of patients with third molar impaction was segregated from the records archive and were analyzed for occurrence of crowding. The values were then tabulated. Gender association and statistical significance was found by Pearson's Chi-square test.

RESULTS: In this study there was no statistical significant association between the third molar impaction and crowding among genders with a p value of 0.267 for the upper arch and 0.342 for the lower arch. There was no significant association between third molar impaction and crowding.

CONCLUSION: it can be concluded that third molar impaction doesn't play any role in crowding in the maxillary and the mandibular arch in both the genders. Also, there is no association between third molar impaction on crowding.

KEYWORDS: Bilateral Impaction, Crowding, Dental Arch, Etiology, Innovative Study.

Introduction

Crowding, a typical dental arch finding brought on by the size difference between teeth and jaws (1). The causes of crowding are multifaceted. When the dental arch is comparably narrower or the tooth sizes are comparatively greater, there is a significant relationship between tooth size and arch length that contributes to crowding. In addition, crowding in the anteriors might appear later in the sequence of development, starting with the eruption of the third molars. We refer to this as late anterior crowding. The pathogenesis of anterior crowding is assumed to be mesial drift. Dental migration toward the midline of the teeth within the alveolar bone is known as mesial drift (2). The mesial eruption of teeth and the pressures produced during the chewing process cause this mesial drift, a skeletal growth process. Young and adult dentitions both go through the migration process(3) (2).

Being the final tooth to mature and erupt in the permanent dentition, the many etiologies for third molar impaction are brought on by the delayed eruption (4). Typically, it appears between the ages of 17 and 23. It occasionally doesn't erupt. Third molar impaction in the jaw may have several causes, one of which is inadequate mandibular retromolar growth (4,5). If there is any disparity in this, the ramus of the mandible grows in size via resorption at the anterior and deposition at the posterior surface.

if there is any discrepancy in this, the mandibular third molars don't get space to erupt, which gets them impacted(6).This variation in the pattern of resorption in the ramus of the mandible is correlated with the direction of the growth of the condyles, which in turn affects morphology of the mandible(7),(8),(9),(10). Condylar growth that takes place in a predominantly vertical direction is associated with less resorption at the anterior portion of the ramus and forward growth of the mandible, whereas more backward-directed condylar growth is associated with resorption and posterior growth. Mandibular third molars mostly get impacted if their path of eruption is unfavorable like if the tooth bud is mesially angulated during the stages of calcification(16–20);(21)Longitudinal studies shows that the patients with no history of orthodontic treatment up righting of the third molars during early adolescence(22),(23),(24).The purpose of this study was to see if there is any association for third-molar impaction in The dental arches and to establish anterior arch crowding as a predictive model for mandibular third-molar impaction

Materials and methods

This study was a cross sectional retrospective study which has been undertaken in a university setting. The benefits of undertaking a study in a university setting are easy retrieval of records and the demerits being limited to the number of patients, same ethnicity, same geographical location. Ethical committee approval was taken for this study and samples were retrospectively analysed from which we selected total 973 cases who are having third molar impaction were isolated.The inclusion criteria is patients having third molars impaction and patients who already extracted impacted third molars or no third molar impaction were excluded from this study.Data was tabulated in excel and was then imported to the SPSS software and the variables were defined.In SPSS, chi-square test was performed and descriptive statistics was performed. A p value of 0.005 was considered as the threshold to detect statistically significant differences.In this present study ,descriptive statistical analysis was performed for association of third molar impaction with crowding among gender in both of maxillary and mandibular arches of the included records in SPSS software.

Results

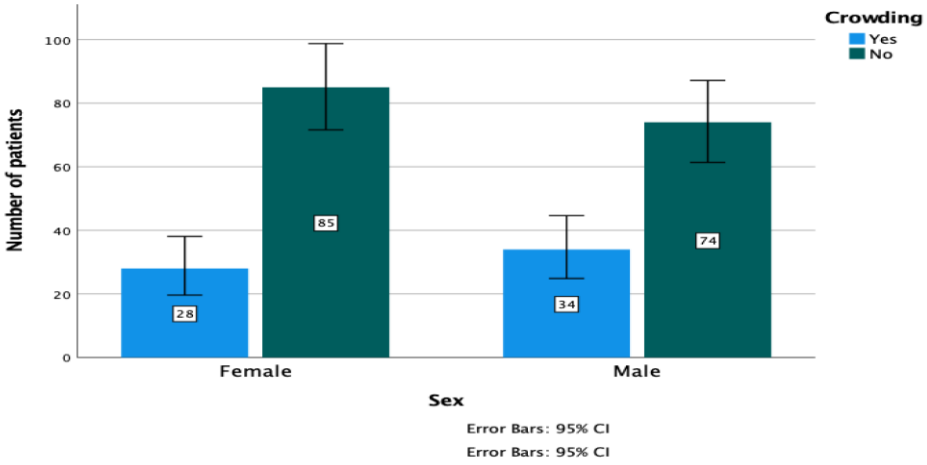

Figure 1: Bar graph represents the gender distribution of crowding in patients with third molar impaction in maxillary arch. X-axis represents the gender and Y-axis represents number of patients with or without crowding. Blue colour denotes presence of crowding and green colour denotes absence of crowding. Chi-square test was done and association was found to be not statistically significant(p value:0.267).

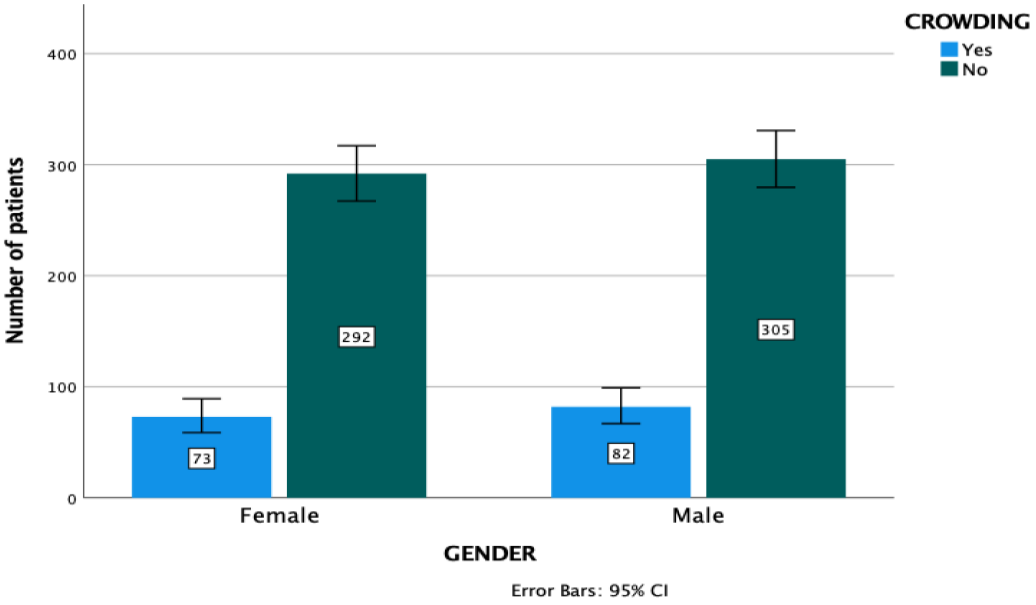

Figure 2: Bar graph represents the gender distribution of crowding in patients with third molar impaction in mandibular arch. X-axis represents the gender and Y-axis represents number of patients with or without crowding. Blue colour denotes presence of crowding and green colour denotes absence of crowding. Chi-square test was done and association was found to be not statistically significant(p value:0.342).

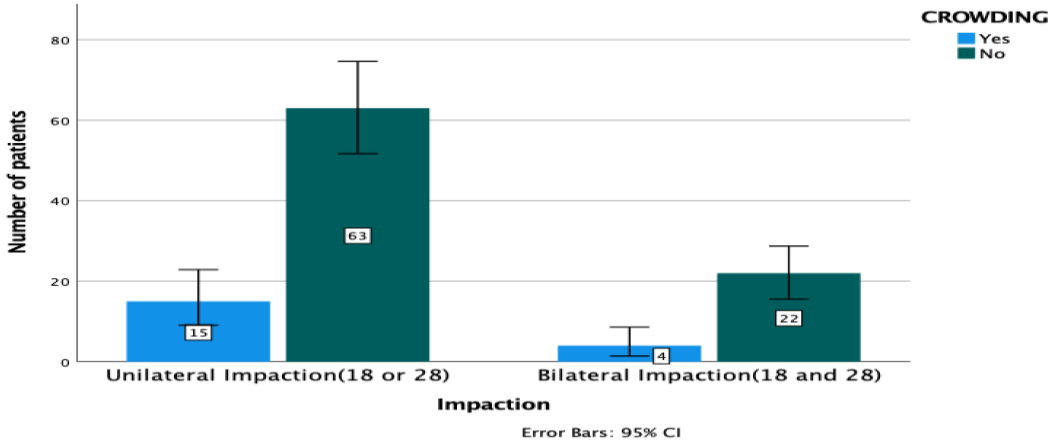

Figure 3: Bar graph represents the association between impaction and occurence of crowding in maxillary arch. X-axis represents the unilateral or bilateral impaction and Y-axis represents number of patients with or without crowding. Blue colour denotes presence of crowding and green colour denotes absence of crowding. Pearson's Chi-square test was done and

association was found to be not statistically significant(p value:0.660).

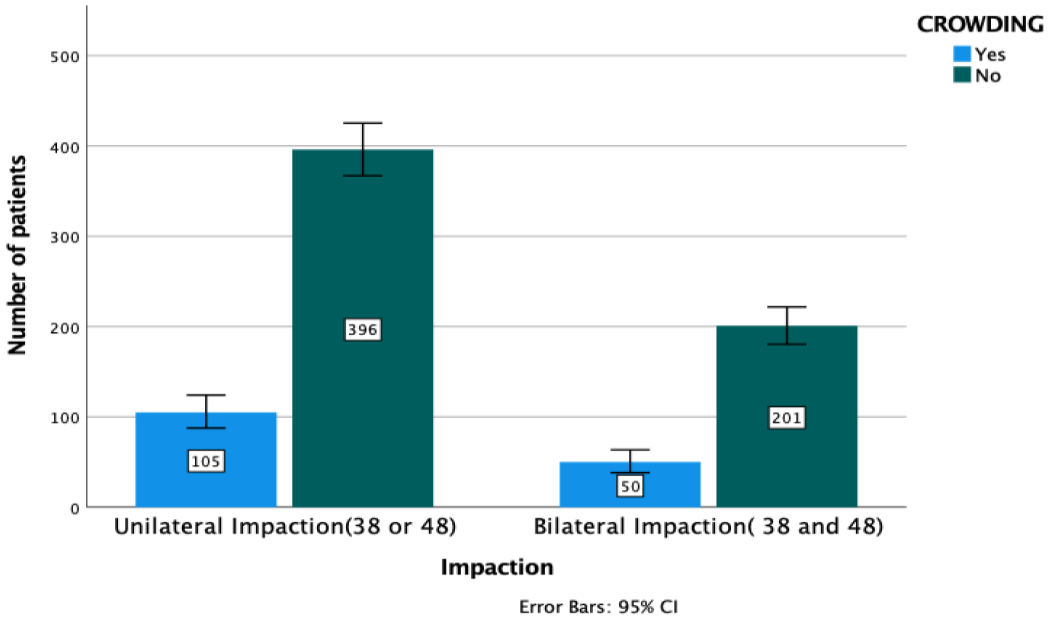

Figure 4: Bar graph represents the association between impaction and occurence of crowding in maxillary arch. X-axis represents the unilateral or bilateral impaction and Y-axis represents number of patients with or without crowding. Blue colour denotes presence of crowding and green colour denotes absence of crowding. Pearson's Chi-square test was done and association was found to be not statistically significant(p value:0.740).

In our study it was seen that out of 221 patients who had third molar/molars impaction in the maxillary arch, 113 (51.13%) were females of which 28(24.77%) had crowding and 85(75.22%) didn't had any crowding. Out of 108 (48.86%) males, 34 (31.48%) of them had crowding and 74(33.48%) of them didn't have crowding (Figure 1).

Out of 752 patients who had third molar/molars impaction in the mandibular arch, 365 (48.53%) were females of which 73(20%) had crowding and 292(80%) didn't have any crowding. Out of 387 (51.46%) males, 82 (21.18%) of them had crowding and 305(78.81%) of them didn't have crowding (Figure 2).

Out of 104 patients who had third molar impaction in the maxillary arch, 26 (25%) of them had bilateral impaction, i.e, both 18 and 28 where impacted, of which 4(15.38%) of them had crowding and 22(84.61%) of them didn't have crowding. The remaining 78(75%) of the patients have unilateral impaction, i.e, 18 or 28 were impacted, of which 15(19.23%) of them had crowding and 63 (80.76%) had no crowding(Figure 3).

Out of 752 patients who had third molar impaction in the mandibular arch, 501 (66.62%) of them had bilateral impaction, i.e, both 38 and 48 where impacted, of which 105(20.95%) of them had crowding and 396(79.04%) of them didn't have crowding. The remaining 251 (33.37%) of the patients have unilateral impaction, i.e, 38 or 48 were impacted, of which 50

(19.92%) of them had crowding and 201 (80.07%) had no crowding(Figure 4).

In a study done by Sidlauskas and Trakiniene (25) of a group of ninety-one subjects crowding was based on the mesiodistal diameter of the teeth in relation to the length of the dental arch. No statistically significant differences were reported in terms of dental arch crowding between the groups with impaction of third molars. They concluded that there is no evidence to implicate third molar impaction as etiologic factors in the dental arch crowding(25). In another study done by Karasawa et al. (26) evaluated three hundred subjects on the presence or absence of third molars impaction and anterior crowding. They also found no statistically significant association between the presence of third molar impaction and anterior teeth crowding. Their conclusions stated that evidence on the role of third molar impaction as an etiologic factor in the crowding is lacking, similarly to the ones of the previous study (26). Some other studies contradicted the findings of our study result(27,28).

(29), in a study of 49 patients who had undergone orthodontic treatment for crowding, compared three groups of subjects, i.e. with bilateral bilateral impaction,unilateral impaction of third molars or developmental absence of the third molars. She found that bilateral impaction of third molars was associated with severe incisor crowding, which was not observed when the teeth were absent. (6) examined 23 male and 29 female patients, with bilateral impaction of the lower third molars and anterior crowding. Unilateral extraction of one of the impacted third molars was carried out and the patients were assessed annually for a period of three years post-extraction. The authors concluded that third molar extraction relieved anterior crowding in 70 per cent of the patients. Richardson,(30) believed that third molar impaction was one of the etiological factors of crowding because anterior crowding was found more frequently in patients with bilateral third molar impaction than in subjects with unilateral third molar impaction (5,31).

When there is disparity in the relationship between tooth size and jaw size which results in crowding of teeth(32),(33). If there is increased anterior arch crowding there is greater chance of having third molar impaction. Third molar Impactions are reported to be associated with complications like dental caries, root resorption, localised periodontitis, pericoronitis and even cyst formation. Similar findings have been observed on untreated patients by (34) and(35)(36). To predict crowding , impaction of third molars plays an important role as an etiology of crowding. If there is any discrepancy between tooth size and arch space in the dental arches there is a greater probability of third molar impaction.However, there is a constant debate about the association of third molar impaction and crowding in the dental arches.

Conclusion

Within the limitations of the study, it was seen that There was no statistical significance between third molar impaction and crowding among genders. It was also seen that there was no statistical significance between the unilateral and bilateral impaction and crowding in both of the dental arches.

AUTHOR CONTRIBUTIONS: Author 1(Anubhav Das), carried out the retrospective study by collecting data and drafted the manuscript after performing the necessary statistical analysis.Author 2(Nivethigaa B) aided in conception of the topic , has participated in the study design, statistical analysis and has supervised in preparation of the manuscript.All of the authors have discussed the results among themselves and contributed to the final manuscript.

CONFLICT OF INTEREST: None to declare.

Source of Funding:
The present study was supported by the following agencies:

- Saveetha Dental College
- Saveetha Institute of Medical and Technical Science
- Sarkav Healthcare services

References:

1. Leak DL, Kent JN, LaVelle W. New method for alveolar ridge augmentation. J Calif Dent Assoc. 1973 Dec;1(6):50–2.
2. Kaifu Y, Kasai K, Townsend GC, Richards LC. Tooth wear and the "design" of the human dentition: a perspective from evolutionary medicine. Am J Phys Anthropol. 2003;Suppl 37:47–61.
3. Yilmaz RS, Darling AI, Levers BG. Mesial drift of human teeth assessed from ankylosed deciduous molars. Arch Oral Biol. 1980;25(2):127–31.
4. Ades AG, Joondeph DR, Little RM, Chapko MK. A long-term study of the relationship of third molars to changes in the mandibular dental arch. Am J Orthod Dentofacial Orthop. 1990 Apr;97(4):323–35.
5. Richardson ME. The role of the third molar in the cause of late lower arch crowding: a review. Am J Orthod Dentofacial Orthop. 1989 Jan;95(1):79–83.
6. Lindqvist B, Thilander B. Extraction of third molars in cases of anticipated crowding in the lower jaw. Am J Orthod. 1982 Feb;81(2):130–9.
7. Khan A, Verpoort F, Asiri AM, Hoque ME, Bilgrami AL, Azam M, et al. Metal-Organic Frameworks for Chemical Reactions: From Organic Transformations to Energy Applications. Elsevier; 2021. 500 p.
8. Alam MK, Alfawzan AA, Haque S, Mok PL, Marya A, Venugopal A, et al. Sagittal Jaw Relationship of Different Types of Cleft and Non-cleft Individuals. Front Pediatr. 2021 May 5;9:651951.
9. Marya A, Venugopal A. The Use of Technology in the Management of Orthodontic Treatment-Related Pain. Pain Res Manag. 2021 Mar 9;2021:5512031.
10. Adel S, Zaher A, El Harouni N, Venugopal A, Premjani P, Vaid N. Robotic Applications in Orthodontics: Changing the Face of Contemporary Clinical Care. Biomed Res Int. 2021 Jun 16;2021:9954615.
11. Sivakumar A, Nalabothu P, Thanh HN, Antonarakis GS. A Comparison of Craniofacial Characteristics between Two Different Adult Populations with Class II Malocclusion-A Cross-Sectional Retrospective Study. Biology [Internet]. 2021 May 14;10(5). Available from: http://dx.doi.org/10.3390/biology10050438

12. Venugopal A, Vaid N, Bowman SJ. Outstanding, yet redundant? After all, you may be another Choluteca Bridge! Semin Orthod. 2021 Mar 1;27(1):53–6.
13. Gopalakrishnan U, Felicita AS, Mahendra L, Kanji MA, Varadarajan S, Raj AT, et al. Assessing the Potential Association Between Microbes and Corrosion of Intra-Oral Metallic Alloy-Based Dental Appliances Through a Systematic Review of the Literature. Frontiers in Bioengineering and Biotechnology. 2021;9:154.
14. Venugopal A, Vaid N, Bowman SJ. The quagmire of collegiality vs competitiveness. Am J Orthod Dentofacial Orthop. 2021 May;159(5):553–5.
15. Marya A, Karobari MI, Selvaraj S, Adil AH, Assiry AA, Rabaan AA, et al. Risk Perception of SARS-CoV-2 Infection and Implementation of Various Protective Measures by Dentists Across Various Countries. Int J Environ Res Public Health [Internet]. 2021 May 29;18(11). Available from: http://dx.doi.org/10.3390/ijerph18115848
16. Ramesh A, Varghese S, Jayakumar ND, Malaiappan S. Comparative estimation of sulfiredoxin levels between chronic periodontitis and healthy patients - A case-control study. J Periodontol. 2018 Oct;89(10):1241–8.
17. Arumugam P, George R, Jayaseelan VP. Aberrations of m6A regulators are associated with tumorigenesis and metastasis in head and neck squamous cell carcinoma. Arch Oral Biol. 2021 Feb;122:105030.
18. Joseph B, Prasanth CS. Is photodynamic therapy a viable antiviral weapon against COVID-19 in dentistry? Oral Surg Oral Med Oral Pathol Oral Radiol. 2021 Jul;132(1):118–9.
19. Ezhilarasan D, Apoorva VS, Ashok Vardhan N. Syzygium cumini extract induced reactive oxygen species-mediated apoptosis in human oral squamous carcinoma cells. J Oral Pathol Med. 2019 Feb;48(2):115–21.
20. Duraisamy R, Krishnan CS, Ramasubramanian H, Sampathkumar J, Mariappan S, Navarasampatti Sivaprakasam A. Compatibility of Nonoriginal Abutments With Implants: Evaluation of Microgap at the Implant-Abutment Interface, With Original and Nonoriginal Abutments. Implant Dent. 2019 Jun;28(3):289–95.
21. Harris EF. A longitudinal study of arch size and form in untreated adults. Am J Orthod Dentofacial Orthop. 1997 Apr;111(4):419–27.
22. Gothandam K, Ganesan VS, Ayyasamy T, Ramalingam S. Antioxidant potential of theaflavin ameliorates the activities of key enzymes of glucose metabolism in high fat diet and streptozotocin - induced diabetic rats. Redox Rep. 2019 Dec;24(1):41–50.
23. Ezhilarasan D. Hepatotoxic potentials of methotrexate: Understanding the possible toxicological molecular mechanisms. Toxicology. 2021 Jun 30;458:152840.
24. Preethi KA, Auxzilia Preethi K, Sekar D. Dietary microRNAs: Current status and perspective in food science [Internet]. Vol. 45, Journal of Food Biochemistry. 2021. Available from: http://dx.doi.org/10.1111/jfbc.13827
25. Sidlauskas A, Trakiniene G. Effect of the lower third molars on the lower dental arch crowding. Stomatologija. 2006;8(3):80–4.
26. Karasawa L-H, Rossi A-C, Groppo F-

C, Prado F-B, Caria P-H-F. Cross-sectional study of correlation between mandibular incisor crowding and third molars in young Brazilians. Med Oral Patol Oral Cir Bucal. 2013 May 1;18(3):e505–9.
27. Vasir NS, Robinson RJ. The Mandibular Third Molar and Late Crowding of the Mandibular Incisors—A Review [Internet]. Vol. 18, British Journal of Orthodontics. 1991. p. 59–66. Available from: http://dx.doi.org/10.1179/bjo.18.1.59
28. Rubin RL, Baccetti T, McNamara JA Jr. Mandibular second molar eruption difficulties related to the maintenance of arch perimeter in the mixed dentition. Am J Orthod Dentofacial Orthop. 2012 Feb;141(2):146–52.
29. Sheneman J. Third molar teeth and their effect upon the lower anterior teeth; a study of forty-nine orthodontic cases 5 years after band removal [Internet]. Vol. 55, American Journal of Orthodontics. 1969. p. 196. Available from: http://dx.doi.org/10.1016/0002-9416(69)90130-4
30. Richardson ME. Late lower arch crowding: facial growth or forward drift? [Internet]. Vol. 1, The European Journal of Orthodontics. 1979. p. 219–25. Available from: http://dx.doi.org/10.1093/ejo/1.4.219-a
31. Richardson ME. Orthodontic implications of lower third molar development. Dent Update. 1996 Apr;23(3):96–102.
32. Chandrasekar R, Chandrasekhar S, Sundari KKS, Ravi P. Development and validation of a formula for objective assessment of cervical vertebral bone age. Prog Orthod. 2020 Oct 12;21(1):38.
33. Arvind P TR, Jain RK. Skeletally anchored forsus fatigue resistant device for correction of Class II malocclusions-A systematic review and meta-analysis. Orthod Craniofac Res. 2021 Feb;24(1):52–61.
34. Lundström A. Changes in crowding and spacing of the teeth with age. Dent Pract Dent Rec. 1969 Feb;19(6):218–24.
35. Sinclair PM, Little RM. Maturation of untreated normal occlusions. Am J Orthod. 1983 Feb;83(2):114–23.
36. Felicita AS. Orthodontic extrusion of Ellis Class VIII fracture of maxillary lateral incisor - The sling shot method. Saudi Dent J. 2018 Jul;30(3):265–9.