Severity of mandibular arch crowding in different sagittal malocclusions

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Abstract

Mandibular anterior crowding is caused by a variety of factors. Mandibular incisor crowding can be caused by a number of causes including incisor and molar inclination, early loss of deciduous molars, mandibular growth, and oral musculature. The study was aimed to perform an association of the lower anterior crowding severity with gender and type of malocclusion. The current study was performed in a hospital setup and data about mandibular arch crowding patients were collected from the Records management system of a Private Dental Hospital in Chennai city. All the patient data on Mandibular arch crowding were sourced and tabulated after which statistical analysis with SPSS-IBM was done. Data collection was done over a period from June 2019 to February 2021. The entire study sample size was 634 case records. The result obtained from the statistical analysis was found that nearly 46% of the patients were found to have Mandibular arch crowding with female predilection (50%). The most commonly associated age groups were children than adults (63.2%) associated with mild type of crowding (65.1%). The most commonly involved malocclusion was found to be Class 1 (88.4%) Mild imbrications of the lower arch were common and were seen mainly in subjects with Class I malocclusion. Female subjects presented with more prevalence of mandibular arch crowding when compared to male subjects. Children were more affected by crowding than adults.

Key words: Age, gender, innovative methods, malocclusion, type of crowding

INTRODUCTION

Dental crowding is characterized as a mismatch between the size of the teeth and the size of the jaw, resulting in dental imbrication and rotation.[1] It's a medical condition that affects the appearance, function, and health of the teeth.[2] Crowding is characterized as a lack of tooth size and arch length that limits the amount of space available for permanent dental eruption.[3] In comparison to maxillary arch crowding, mandibular arch crowding is more common in individuals.[4] Crowding more than 3–4 mm of the mandibular incisors can be classified as moderate lower incisor crowding. In normal circumstances space for the eruption of mandibular incisors into perfect alignment can be obtained by a modest increase in the intercanine width, labial positioning of the permanent incisors relative to the primary incisors, and also slight backward migration of the canines in cases with slight crowding.[5,6]

The causes of mandibular arch crowding were found to be several. Mandibular arch crowding can be because of

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deficient mandibular arch length, early loss of primary molars, incorrect incisor and molar inclinations, and aberrant oral musculature.[7] During early stages of mixed dentition during the ages of 8 and 12 years, alterations in lower arch alignment can be seen.[8] After the eruption of the second permanent molars, crowding can become severe. Furthermore, a lack of space in the arch might result in incomplete tooth eruption and dental crowding. Furthermore, arch length has an impact on mandibular arch crowding.

Extensive knowledge and experience in research of our team have led us to publish quality publications.[9-28] The present study was focused to evaluate the severity of crowding in subjects with different sagittal skeletal malocclusions.

MATERIALS AND METHODS

The current investigation was executed as a retrospective evaluation performed in a hospital setting where case records of subjects between 18 and 35 years reported to the Dental Hospital were collected and the investigation was done. The Institutional Review Board of Saveetha University provided the Approval for the Study (IHEC/SDC/ORTHO/21/231). The sample for the study included subjects with crowding of dental arches and periodontally sounds dentition. Records of subjects in the age range of 18–35 years who visited the clinic from the month of June 2019 to February 2021 were collected and data regarding crowding severity and the associated malocclusion was gathered. Incomplete case records, subjects with associated craniofacial anomalies and medically compromised individuals were excluded From the study.

The data collected from the case records included the demographic details of subjects, type of malocclusion associated, and the severity of crowding. The severity of crowding was mentioned in the case record and is usually based on the amount of marginal ridge discrepancy as given in Little's irregularity index.

The data obtained were entered in a methodological manner and it was tabulated into Microsoft Excel sheet. The tabulated data were imported and compiled for statistical analysis using SPSS software IBM SPSS (version 20.0; SPSS, Chicago, Ill), descriptive and inferential statistics were done for data summarization and presentation. Chi-square test was performed to carry out the various associations.

RESULTS AND DISCUSSION

Prevalence of crowding in the mandibular arch was found to be nearly 46% in patients reporting to a private dental hospital. Children were found to have more crowding than adults (63%). The most predominant type of crowding was mild (65.1%) followed by moderate (18.5%) and

severe (15.3%). The most predominant type of malocclusion associated was class 1 (88.4%), followed by class 3 (8.1%) and Class 2 (2.7%) (Standard deviation [SD] = 1.01) [Table 1]. Figure 1 shows the Chi-square tests for association between severity of crowding and age groups involved. Mild, moderate, and severe crowding was more prevalent among children than adults (40.66%) (12.82%) (10.44%). Figure 2 shows the Chi-square tests for association of gender with the severity of crowding. Mild and moderate crowding was more common in females than males (33.86%) (9.34%). Severe crowding was more in males than females (8.54%) (SD = 1.03) Figure 3 gives the association bar chart for severity of crowding and type of malocclusion. In subjects with mild crowding, Class 1 malocclusion (59.65%) is the most common followed by Class 3 (4.27%) and Class 2 (1.90%). In subjects

Table 1: Malocclusion demographic

	Frequency (%)
Age	
Children	404 (63.2)
Adults	230 (36.0)
Gender	
Male	316 (49.5)
Female	318 (49.8)
Severity of crowding	
Mild	416 (65.1)
Moderate	118 (18.5)
Severe	98 (15.3)
Type of malocclusion	
Class 1	565 (88.4)
Class 2	17 (2.7)
Class 3	52 (8.1)
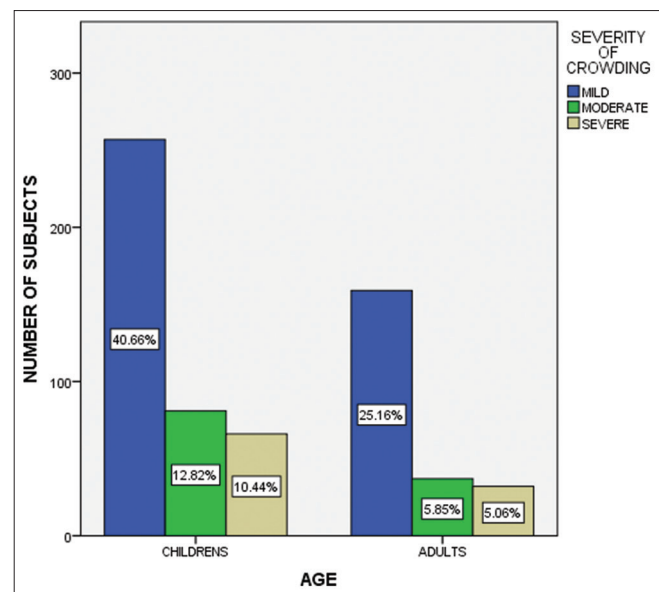
Figure 1: Bar graph representing the association of crowding severity with age groups. No significant association between age and crowding severity was noted. Chi-square test - *P* = 0.291 (not significant)
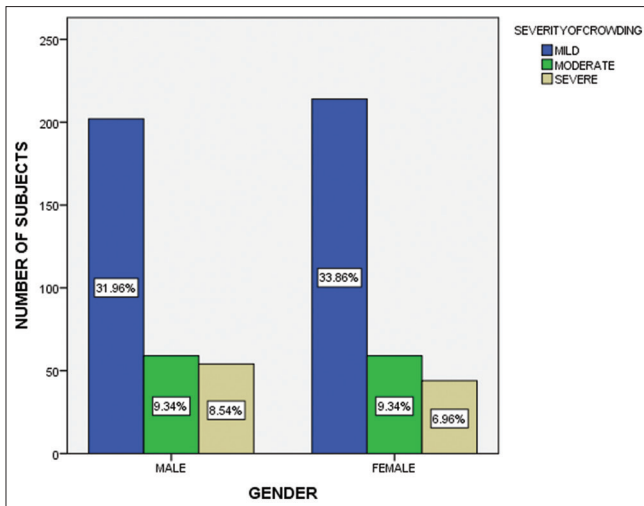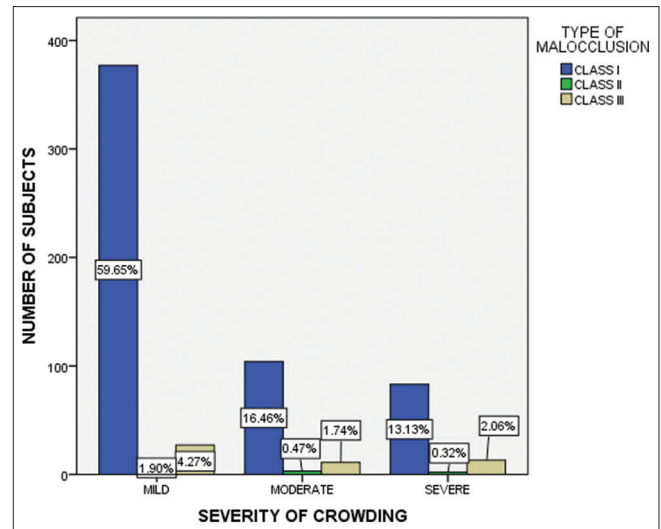
Figure 2: Bar graph for the association of crowding severity with gender. No significant association between gender and crowding severity was noted. Chi-square test - $P = 0.121$ (statistically not significant)

Figure 3: Bar graph for the association of crowding severity and type of malocclusion. No significant association between malocclusion type and crowding severity was noted ($P = 0.253$ - statistically nonsignificant)

with moderate type of crowding, Class 1 malocclusion was found to be more prevalent (16.46%) followed by Class 3 (1.74%) and Class 2 0.47%) (SD = 0.74). Similarly in subjects with severe crowding, the most commonly involved malocclusion was Class 1 (13.13%) followed by Class 3 (2.06%) and Class 2 (0.32%).

Mandibular arch crowding is one of the most prevalent malocclusions noted in a clinical setup. Psychological well-being, social acceptance, and the self-esteem of an individual are the primary reasons for subjects to take up orthodontic treatment and other than these reasons like esthetic and pleasing facial appearance are also reported. In the present study, the overall prevalence of lower anterior crowding was 46%. Children showed a higher prevalence of mandibular arch crowding followed by adults. Both males and females had an equal prevalence of crowding and no significant gender association was noted.

The findings of the current study are not in consensus with the studies by Al-Sehaibany and Aljubour and Yu *et al*.[29] They had reported no significant association of mandibular arch crowding with gender.[30] The study by Martha P Rojas-Sánchez e*t* a*l*. showed more female prevalence for lower arch crowding.[4] Even though the available literature reported more prevalence of crowding in female subjects the present study reported no gender predilection. This can be explained by the fewer number of subjects included in the present study and cultural and demographic differences.[31] Mild crowding of the mandibular arch was shown to be more common than moderate and severe crowding in the current study. Investigations by Smagliuk and Dmytrenko. backed up the conclusions of this study.[32] The result of that study mentioned that mild crowding of lower incisors was more common in the 9–13 year-old children. The

reason could be due to mismatch in arch length tooth size relationship.

Findings of the study published by Awni contradicted those of the current study.[33] In this study, a significant positive correlation was found between crowding dentoskeletal parameters such as ANB, PP-MP, Occ-SN and negative with SNA, SNB, ACL, L1MP, and L1NB. Hence, any of the dentoskeletal characteristics, whether alone or in combination with other factors can be associated with the development of mandibular incisor crowding. The results obtained from their study showed that the most typical sort of crowding was severe. The space deficit of arches, growth pattern, and arch length are all probable causes for the severe form of crowding.

Malocclusion can be an altered inter-arch relationship when the arches approximate each other as the jaws close and is also considered an unacceptable deviation from the ideal occlusion.[34] Malocclusion is considered third among all oral diseases second to tooth decay and periodontal diseases.[35] The result obtained from the study showed that Class 1 type of malocclusion showed a higher prevalence. Similar to the current study, the study by Mageet Ao has concluded that the prevalence of crowding is most common in Class I malocclusion than in Class II and Class III but the prevalence percentage found in the present study varied from previous studies but the pattern was similar.[36-38]

The major limitation of the current study was the small sample size when compared to that of other previously published studies. To better understand the incidence of mandibular incisor crowding, the patient's oral habits and family history should be noted. Future well-designed

studies with a larger sample size and thorough orthodontic diagnosis are needed.

CONCLUSION

In the present study, we conclude that mandibular anterior teeth most commonly presented with mild imbrications which were followed by moderate and severe crowding Types and Class I malocclusion subjects had more prevalence. Children are more commonly presented with imbrications than adults.

Conflicts of interest
There are no conflicts of interest.

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