

## Prevalence and Associated Factors for Dental Arch Crowding In Mixed Dentition Cases Reporting To Private Dental College

Research Article

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### Abstract

The mixed dentition is an important developmental state, to the undisturbed occlusal relationship. The eruption of the first permanent molar plays a critical role in maintaining the inter arch space and sagittal occlusal relationship. Dental crowding occurs when there is discrepancy between required space and space present between arch, & most commonly see. In the anterior teeth. Crowding represents one of the most frequent complaints of patients seeking orthodontists. The aim of the study is to assess the prevalence of crowding in mixed dentition cases reporting to private dental college. It is a university setting study, conducted in a private dental college. 1082 children in their mixed dentition stage of tooth development were randomly selected. Data regarding crowding was obtained after reviewing case sheets of patients in the age group 6-12 years. The data was entered in excel and imported to SPSS and variables were defined. The data included presence of crowding, dental malocclusion present and the arch involved. Descriptive statistics was used to describe the age and gender distribution of the study population. Chi square test was used to associate crowding with age, gender, dental malocclusion. Out of 1082 children in the age group between 6-12 years, crowding was present in 70 children (6.47%). Most common arch involved in crowding was the mandibular arch(56%). Positive correlation was found between age and crowding, 10-12 years old children had maximum crowding (3.14%) ( $p < 0.001$ ). Positive correlation was found between gender and crowding ( $p < 0.05$ ). Males had maximum crowding (4.62%) when compared to females (1.85%). No association was found between dental malocclusion and crowding. Within the limits of the study, crowding was prevalent in 6.47% of the children in the mixed dentition stage. 10-12 years old children had maximum crowding which was statistically significant. Also, males had maximum crowding than females which was statistically significant.

**Keywords:** Age; Crowding; Gender; Malocclusion; Mandible; Maxilla; Mixed Dentition.

### Introduction

Growing demands of the global population has unleashed the new era of a better standard living which is rising exponentially. The people of the world are concerned about the oro-facial region mostly because it draws the most attention from the other people in interpersonal interactions and it dictates the vocal, physical and emotional communication [1]. Within that, the tooth component which is also concerned with appearance plays an important role in overall ethical value, psychological impact, and social consequences [2].

Malocclusion can be defined as an occlusion in which there is a mal-relationship between the arches in any of the planes or in which there are anomalies in tooth position, number, form and developmental position of teeth beyond normal limits [3]. Clinically, it can be manifested in a broad range of variations from a signified rotation of a tooth, a small diastema to more severe forms of crowding, spacing, superior protrusion and in a combination of several traits [4]. Malocclusion is one of the most common oral disorders among children, and it affects not only the oral masticatory function but also the craniofacial development and facial appearance [5]. Children with certain malocclusion traits appear to have more problems related to psychology and social

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interactions and even their quality of life suffers when they reach adulthood [6]. For this reason, malocclusion is regarded as an emerging health issue.

Malocclusion can occur due to a variety of causes. Broadly speaking malocclusion is caused by either genetic or environmental factors [7]. Hereditary has for long been attributed for genetically as one of the causes of malocclusion. Another region attributed for genetically determined malocclusion is the racial, ethnic and regional inter-mixture, which might have led to the uncoordinated inheritance of teeth and jaws [8]. Environmental factors like prenatal influences from maternal diet, metabolism, drug induced, possible injury or trauma, infections and birth injuries also play an important role in determining the fate of tooth alignment [9]. Predisposing factors like dietary problems, abnormal habits, posture, accidents and trauma also led to an abnormality in teeth arrangement or malocclusion [10].

The mixed dentition is an important developmental state, to the undisturbed occlusal relationship. The eruption of the first permanent molar plays a critical role in maintaining the inter arch space and sagittal occlusal relationship [11]. Several longitudinal observations have revealed that a substantial number of malocclusions occurred during this period and the accumulated evidence has indicated that early intervention starting from the mixed dentition would benefit the youngsters with crowding [12].

Dental crowding, also referred as swarming, can be characterised as an inconsistency between tooth size and arch dimension which results in malocclusion [13]. Crowding can be classified as primary, secondary, or tertiary, when it affects the mixed dentition in the first transitional period, second transitional period & permanent dentition respectively [14]. Dental crowding occurs when there is discrepancy between required space and space present between arch, & most commonly seen in the anterior teeth. When there is shortage of space for the arrangement of teeth in the dental arch, teeth experience the ill effects of rotation, dislocated eruption etc [15]. The factors that may contribute to teeth crowding are broad teeth, bony bases and also the developmental pattern towards a decreased facial skeletal size without a relating diminish in tooth size. Crowded teeth are very difficult to clean properly and thoroughly, which results in poor mouth cleanliness and further dental and medical problems. Crowding represents one of the most frequent complaints of patients seeking orthodontists.

Previously our team had conducted numerous clinical trials [16-24] and *in vitro* studies [25, 26], and systematic reviews [27-30] over the past 5 years. Now we are focussing on epidemiological surveys. The idea for this survey stemmed from the current interest in the community.

So this study was designed to assess the prevalence of dental arch crowding in mixed dentition subjects. Early intervention minimises occlusal adverse effects resulting in better prognosis.

## Materials and Methods

### Study setting

It is a university setting study, conducted from the available case records of subjects reporting to Saveetha Dental College and

Hospitals. The pros of the study is easy retrieval of data. The cons of the study are that it is limited to a certain population, researcher's personal bias. Study population included children in the age group between 6-12 years with mixed dentition selected randomly from those who reported to Saveetha Dental College. The study was initiated after approval from the institutional review board and it was covered by the following ethical approval number; SDC/SIHEC/2020/DIASDATA/0619-0320.

### Sampling

It is a retrospective study. Data was collected from July 1, 2019 to March 31st 2020. Cross verification of data for errors was done by photographic evaluation.

### Data collection

Out of 86000 subjects who reported from July, 2019 to March 2020, 1082 case records of 6-12 year old subjects were included in the study. Patients details -name, age, gender, presence of crowding, arch involved, dental malocclusion were retrieved after analysing these case records. Data was entered in a methodical manner and imported to SPSS and variables were defined. Incomplete or censored data was excluded from the study.

### Analytics

The collected data was validated, tabulated and analysed with Statistical Package for Social Sciences for Windows, version 23.0 (SPSS Inc., Chicago, IL, USA) and results were obtained. Independent variables included age, gender. Dependent variables included crowding, dental malocclusion. Descriptive analysis was used to describe age and gender distribution of the study population. Chi square test was used to associate crowding with age, gender and dental malocclusion.

## Results and Discussion

Malocclusion has been shown to affect oral health, increased prevalence of dental caries and can cause Temporomandibular joint disorders. The prevalence of malocclusion varies from country to country and among different age and sex group.

In relation to prevalence of crowding, it is seen that out of 1082 children, crowding was present in 70 children (6.47%) and absent in 1012 children (93.53%) [Figure 1]. In relation to association between age and crowding it was seen that positive correlation was found between age and crowding. Crowding was more prevalent as age increases. 10 to 12 years age group had maximum crowding (3.14%). These results were statistically significant (Pearson Chi square= 23.127, p=0.000) [Figure 2]. In relation to the association between gender and crowding, it was seen that positive correlation was found between gender and crowding. Crowding was more prevalent in males (4.62%) when compared to females (1.85%). These results were statistically significant (Pearson Chi square= 3.957, p=0.047) [Figure 3]. In relation to association between dental malocclusion and crowding, it was seen that crowding was more prevalent in class I occlusion (5.91%). But these were not statistically significant (Pearson Chi square= 0.369, p=0.544) So there is no association between dental malocclusion and crowding [Figure 4].

Figure 1. Simple bar chart shows prevalence of crowding in the study population. X axis denotes prevalence of crowding and Y axis denotes the percentage of participants in each group. Out of 1082 children, crowding was present in 70 children (6.47%) and was absent in 1012 children (93.53%).

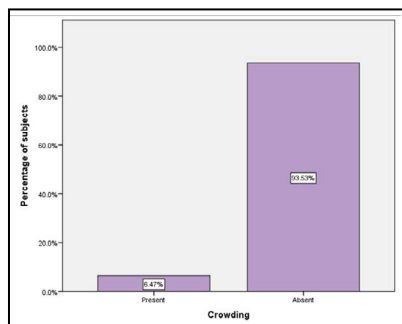


Figure 2. Bar chart shows association between age and crowding. X axis denotes the different age groups and Y axis denotes the percentage of crowding in each age group. Crowding was more prevalent as age increases. Chi square association was done and found to be significant (Pearson Chi square= 23.127, p=0.000 (<0.05)) proving crowding (blue) was more common in the 10-12 years age group.

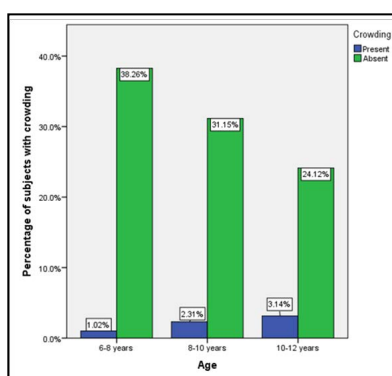


Figure 3. Bar chart shows association between gender and crowding. X axis denotes the different gender and Y axis denotes the percentage of crowding in each gender. Chi square association was done and found to be significant (Pearson Chi square= 3.957, p=0.047 (<0.05)), proving crowding (Blue) was more prevalent in males when compared to females.

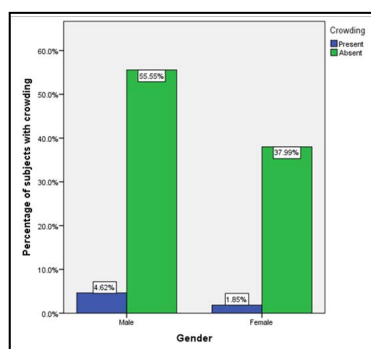
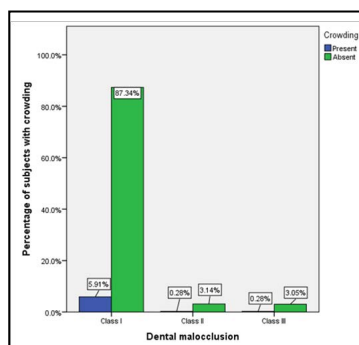


Figure 4. Bar chart shows association between dental malocclusion and crowding. X axis denotes the different types of malocclusion and Y axis denotes the percentage of crowding in each type of dental malocclusion. Chi-square test was done and was found to be statistically not significant (Pearson Chi square= 0.369, p=0.544 (>0.05)). Crowding (blue) was more prevalent in class I occlusion.



In relation to the prevalence of crowding, it was found that it was prevalent in 6.5% of the study population. Literature by Massler et al [31] stated that crowding was present in 21.5% of the children in the mixed dentition stage. The probable reasons would be differing sample size and geographic location.

In relation to the association between age and crowding, crowding was more prevalent in 10-12 years, as age increases crowding increases, which was similar to the study by Shivakumar et al [32]. The reason for crowding as age increases, it becomes prevalent is due to the eruption of permanent teeth. However, literature by Gelgor et al [6] stated that crowding was maximum in the 7 to 8 years age group which was contradictory to the present study. The reasons could be differing sampling size, geographic location & examiner's subjectivity.

In relation to the association between gender and crowding, contradictory findings were found in literature by Xin Yu et al [33], where crowding was more prevalent in females when compared to males. The possible reasons for these variations may be due to differing sample size and geographic location.

In relation to the association between dental malocclusion and crowding, contradictory findings were found in literature by Ansai et al [34] and Hassan et al [35], where crowding was maximum in class I occlusion which was statistically significant. However, present study didn't show any correlation between dental malocclusion and crowding. The probable reason for this variation could be sample size was large when compared to the present study.

The limitations of the study includes sample size, single centered study and examiner's subjectivity.

The future scope of this study is to do extensive research with a large sample size to know about prevalence of crowding & its associated risk factor factors which might help in early intervention resulting in better prognosis.

## Conclusion

Within the limits of the study, the prevalence of crowding among subjects in mixed dentition stage was 6.5%. Crowding was more common in 10-12 yr old male children than in females of the same age group. Crowding was not associated with any particular type of malocclusion.

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## Author's Contribution

First author Vaishali.S performed data collection, analysis and interpretation and wrote the manuscript.

Second author Ravindra Kumar Jain contributed to conception, study design, analysis, interpretation and critically revised the manuscript.

Third author Revathi Duraisamy contributed to review the manuscript.

All the authors have discussed the results and contributed to the final manuscript.

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