

Prevalence of Mandibular Anterior Teeth Crowding in Mixed Dentition Subjects Reporting to a University Hospital in Chennai City

Research Article

Fathima Bareera Rezvi¹, Ravindra Kumar Jain^{2*}, Manjari Chaudhary³

¹ Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.

² Associate Professor, Department of Orthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.

³ Senior Lecturer, Department of Oral Medicine and Radiology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.

Abstract

Crowding or deficiency in tooth size arch length is one of the most common reasons that people seek orthodontic treatment for themselves or their children. Diagnosis of this helps us determine the necessity for early interceptive orthodontic treatment. The aim of this study was to evaluate the prevalence of mandibular anterior teeth crowding in mixed dentition subjects among the South Indian population in patients visiting a private dental hospital from June 2019 to April 2020. The study population included orthodontic patients with crowding in mandibular anterior teeth, selected by non-probability purposive sampling. Data was collected and then subjected to statistical analysis. Out of 3652 patients aged between 6-12 years, 9.4% of the patients reported mandibular anterior teeth crowding. The results of the study were subjected to Chi-square tests. There was no significant association between mandibular anterior teeth crowding and gender (p value >0.05). There was significant association between mandibular anterior teeth crowding with age (p value <0.05). Mandibular anterior teeth crowding was commonly seen in subjects with Class I malocclusion. Within the limits of the study prevalence of mandibular anterior crowding was 9.4%. Mandibular anterior teeth crowding was significantly associated with age, but no association was found with gender.

Keywords: Mandibular Anterior Teeth; Crowding; Prevalence; Mixed Dentition.

Introduction

Recognizing mandibular anterior teeth crowding at an early stage, is important for interceptive orthodontic treatment planning [1]. There is an increase in the number of parents who are concerned about the possibilities of dental crowding in their children's future, aesthetic reasons being one of the major concerns [2], along with a psychosocial benefit that is provided by straight teeth [3]. Dental crowding is defined as a disparity in the relationship between tooth size and jaw size, leading to imbrications and rotations of the teeth [4]. Mandibular anterior teeth crowding is one of the most frequent malocclusion in children [5, 6].

Longitudinal studies evaluating mandibular anterior teeth crowding were performed in primary, mixed and permanent dentitions [4, 5], [7-10]. In this study [2] it was mentioned that indicators

of crowding in the primary dentition may lead to future anterior crowding during mixed dentition. The mesiodistal size of the primary canines, maxillary and mandibular dental arch length are factors for possible crowding in mixed dentition.

Size of the dental arch is an important factor in determining crowding in the dentition. Smaller dental arch along with larger teeth are associated with crowding [6-11]. When the eruption of permanent lateral incisors take place, an average of 1.6mm of additional space is required for the perfect alignment of the four permanent incisors [12, 13]. This type of slight crowding has been reported to be solved by a slight increase in the intercanine width and labial positioning of the permanent incisors relative to primary incisors [14, 15].

The space available in the anterior region is minimum when the permanent lateral incisors have erupted [12], but subsequently

*Corresponding Author:

Ravindra Kumar Jain,
Associate Professor, Department of Orthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.
E-mail: ravindrakumar@saveetha.com

Received: September 25, 2019

Accepted: November 20, 2019

Published: November 21, 2019

Citation: Fathima Bareera Rezvi, Ravindra Kumar Jain, Manjari Chaudhary. Prevalence of Mandibular Anterior Teeth Crowding in Mixed Dentition Subjects Reporting to a University Hospital in Chennai City. *Int J Dentistry Oral Sci.* 2019;S3:02:002:6-11. doi: <http://dx.doi.org/10.19070/2377-8075-S102-03002>

Copyright: Ravindra Kumar Jain ©2019. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

the difference in size of deciduous and permanent teeth along with leeway space, manage anterior teeth crowding temporarily. In pediatric dentistry and orthodontics, there is a necessity to distinguish between young children who have a tendency to develop future problems of space for the mandibular incisors and children who have temporary problem [16-18].

Direction of mandibular growth, early loss of primary molars, arch dimensions, oral musculature, incisor and molar inclination are factors that affect the severity of crowding. The determination of factors that lead to anterior mandibular teeth crowding in the mixed dentition is of utmost importance for treatment planning. Previously our team had conducted numerous clinical studies [19-29] and case reports [30-33] over the past 5 years. Now we are focussing on retrospective studies.

This study aims to evaluate the prevalence of mandibular anterior teeth crowding in mixed dentition subjects reporting to a university hospital in Chennai city.

Materials and Methods

Study Design and Study Setting

This retrospective cross-sectional study was conducted in a university hospital in Chennai city to evaluate the prevalence of mandibular anterior teeth crowding in mixed dentition subjects. The study included a total of 3652 subjects who reported to the Orthodontics department at Saveetha Dental College during June 2019 - March 2020. Digital records were used to retrieve the data. Ethical approval was obtained from the Institutional Ethical Committee - SDC/SIHEC/2020/DIASDATA/0618-0319.

Study population and sampling

Inclusion criteria for the study was subjects within 6-12 years of age with mandibular anterior teeth crowding in mixed dentition who reported to our institution. The exclusion criteria was subjects not within the above age group and those with mandibular

posterior teeth crowding data. After assessment of the university patient data registry, case records of 3652 patients were included in the study.

Data Collection

Data of 3652 subjects were reviewed and noted for mandibular anterior teeth crowding in mixed dentition. The collected data included the following parameters: Patients details: Name, Age, Gender, Patient identification number, presence of mandibular anterior teeth crowding in mixed dentition and dental malocclusion were recorded. Relevant Data was entered in Microsoft Excel Sheet. Repeated and incomplete data was excluded. Data verification was done by an external reviewer.

Statistical Analysis

The collected data was validated, tabulated and analysed with Statistical Package for Social Sciences for Windows, version 20.0 (SPSS Inc., Chicago, IL, USA) and results were obtained. Categorical variables were expressed in frequency and percentage. Chi-square test was used to test associations between categorical variables. P value <0.05 was considered statistically significant.

Results and Discussion

The following results were obtained from our study. Out of 3652 subjects, 370 of them (9.4 %) had mandibular anterior teeth crowding (Figure 1). Prevalence was almost similar in both genders. No significant association was found between gender and mandibular anterior teeth crowding, ($p>0.05$) (Figure 2). With increasing age, the prevalence of crowding also increased. There was significant association between age and mandibular anterior teeth crowding ($p=0.000$) (Figure 3). Class I malocclusion had a higher prevalence of crowding (8.6%) when compared to others. There was significant association between Class I dental malocclusion and mandibular anterior teeth crowding ($p=0.000$) (Figure 4).

Figure 1. bar chart represents the prevalence of mandibular anterior teeth crowding. X axis represents Yes (Blue) and No (Green) and Y axis represents the percentage of patients. The prevalence of mandibular anterior teeth crowding was present in 9.4% of the patients.

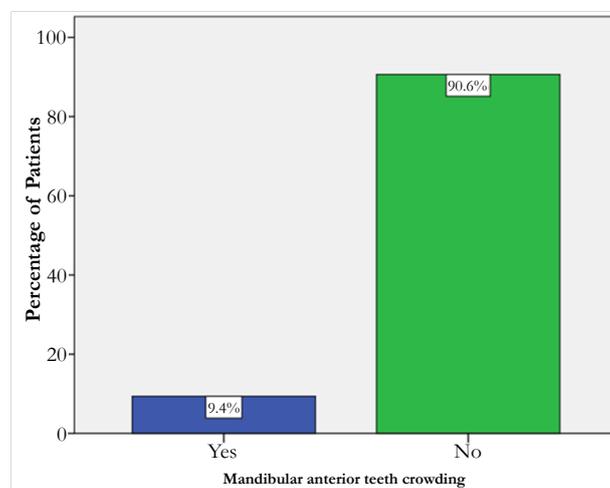


Figure 2. bar chart represents the association between gender and mandibular anterior teeth crowding. X axis represents the gender and Y axis represents the number of patients. Prevalence of mandibular anterior teeth crowding was almost similar in both genders. Chi square test was done [Pearson Chi square = 0.019^a, df = 1, p = 0.891 (p>0.05)] which showed no significant association was found between gender and mandibular anterior teeth crowding.

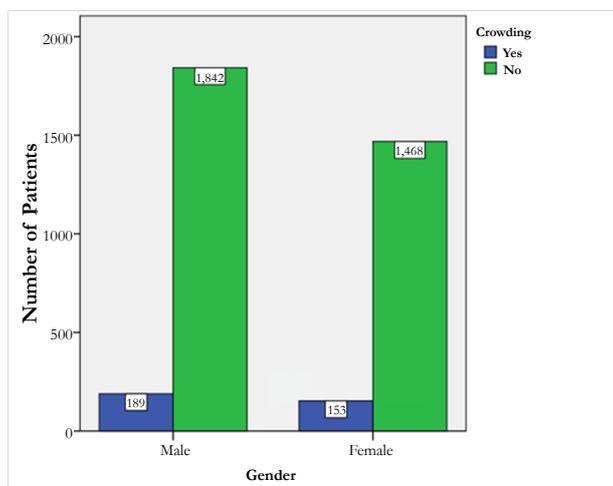


Figure 3. bar chart represents the association between age and mandibular anterior teeth crowding. X axis represents Age (6-12 years) and Y axis represents the number of patients. With increasing age, the prevalence of crowding also increases. Chi square test was done [Pearson Chi square 116.373^a, df = 6, p = 0.000 (p<0.05)] which shows that there is significant association between age and mandibular anterior teeth crowding.

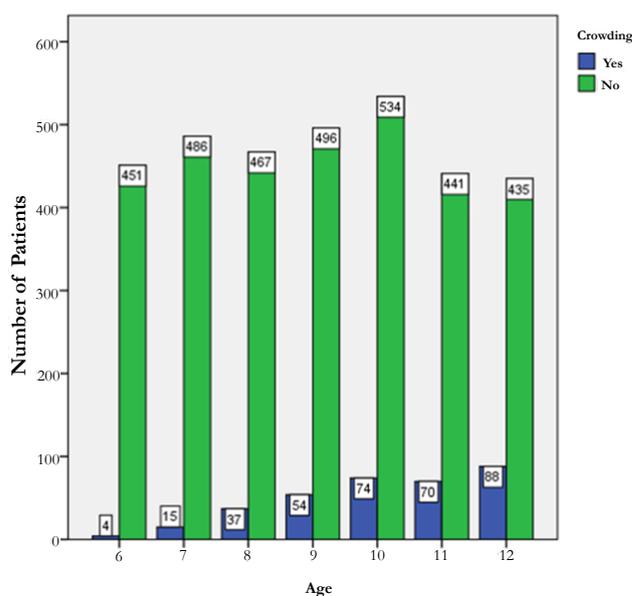
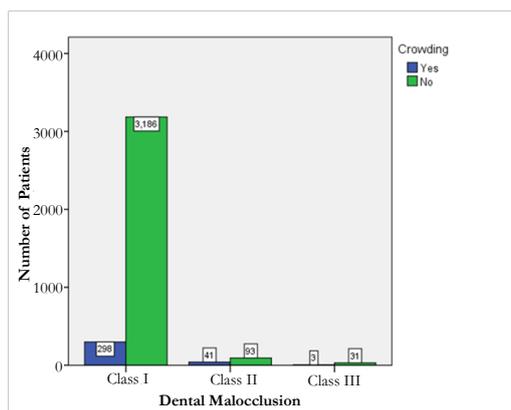


Figure 4. bar chart represents the association between dental malocclusion based on molar relation and mandibular anterior teeth crowding. X axis represents dental malocclusion based on molar relation and Y axis represents the number of patients. Chi square test was done [Pearson Chi square = 73.885^a, df = 2, p = 0.000 (p<0.05)] which shows that there is significant association between dental malocclusion based on molar relation and mandibular anterior teeth crowding.



According to our study, the prevalence of mandibular anterior teeth crowding was found to be around 9.4%. This is similar to the studies conducted by Reddy et al., [34] and Kumar et al., [35], where they had a prevalence of lower anterior teeth crowding of 11.8% and 12% respectively. But according to Brito et al., [36] and Silva et al., [37] the prevalence was found to be 26.8% and 29% respectively, higher than our study findings.

Our study has no significant association between gender and mandibular anterior teeth crowding. Reddy et al., [34] and Tschill et al., [38] also stated similar findings as our study, in which the former stated that there was no association between males and females and mandibular anterior teeth crowding, with a p value of 0.153 and the latter stated no significant association between gender and crowding, with $p > 0.05$. Contradicting our study results, Yu et al., [39] stated that crowding had a significant association with gender, in which $p = 0.001$

There was significant association between mandibular anterior teeth crowding and age, with $p = 0.000$. With increasing age the prevalence of crowding also increased in our study. Studies by Yu et al., [39] and Mugonzibwa et al., [40] state a similar finding to our study. The former had a p value of 0.006 and the latter had a p value of 0.001, showing statistically significant association, supporting our study results. But in contrast, Al-Sehaibany et al., [41] stated that there was no association between age and mandibular anterior teeth crowding.

We also observed a significant association between crowding and dental malocclusion. Prevalence of crowding was more in Class I dental malocclusion subjects, when compared to others. These findings are similar to those of Khan et al., [42] and Sayin et al., [43], where the p value was found to be 0.001 and 0.017 respectively. Sayin et al., had a Class I - 21.4%, Class II - 4.4% and Class III - 1.4%, which is similar to our study of Class I - 8.6%, Class II - 1.4% and Class III - 0.1%.

An orthodontist will have to weigh the risks and benefits as to when to initiate treatment. Certain malocclusions may become more complex later on, with increasing age, while some malocclusions benefit from an early phase of treatment. In other cases, the desire to initiate treatment early must be weighed against the tendency to over-treat patients, committing them to prolonged orthodontic treatment plans, which may lead to patient burnout, higher risks of decalcification and gingivitis and the additional burden of cost. It is essential for the orthodontist to monitor growth and development to determine the appropriate time to initiate treatment.

Our study has its own limitations. Further studies should be conducted considering the oral habits, history of orthodontic treatment for better outcomes.

Conclusion

Within the limits of the study, it was concluded that the prevalence of mandibular anterior crowding was 9.4% among mixed dentition subjects. With increasing age, the prevalence of crowding also increased and gender had no influence on crowding. Class I malocclusion based on molar relation was commonly associated with mandibular anterior teeth crowding.

Acknowledgment

We would like to thank Saveetha Dental College for providing us with the opportunity to review the case sheets.

Author's Contribution

First author (Fathima Bareera Rezvi) performed the analysis, and interpretation and wrote the manuscript. Second author (Dr. Ravindra Kumar Jain) contributed to conception, data design analysis, interpretation and critically revised the manuscript. Third author (Dr. Manjary Chaudhary) participated in the study and revised the manuscript. All the authors have discussed the results and contributed to the final manuscript.

References

- [1]. Sanin C, Savara BS. Factors that affect the alignment of the mandibular incisors: a longitudinal study. *Am J Orthod.* 1973 Sep;64(3):248-57. Pubmed PMID: 4516457.
- [2]. Luciana Melo DDS, Ono PY, Takagi PY. Indicators of mandibular dental crowding in the mixed dentition. *Pediatr Dent.* 2001;23(2). Available from: <https://pdfs.semanticscholar.org/006f/69aabb5d25e19e249c877506c8033573688b.pdf>
- [3]. Al-Bitar ZB, Al-Omari IK, Sonbol HN, Al-Ahmad HT, Cunningham SJ. Bullying among Jordanian schoolchildren, its effects on school performance, and the contribution of general physical and dentofacial features. *Am J Orthod Dentofacial Orthop.* 2013 Dec;144(6):872-8. Pubmed PMID: 24286910.
- [4]. Howe RP, McNamara JA Jr, O'Connor KA. An examination of dental crowding and its relationship to tooth size and arch dimension. *Am J Orthod.* 1983 May;83(5):363-73. Pubmed PMID: 6573844.
- [5]. Hunter WS, Smith BR. Development of mandibular spacing-crowding from nine to 16 years of age. *J Can Dent Assoc (Tor).* 1972 May;38(5):178-85. Pubmed PMID: 4503190.
- [6]. Doris JM, Bernard BW, Kuftinec MM, Stom D. A biometric study of tooth size and dental crowding. *Am J Orthod.* 1981 Mar;79(3):326-36. Pubmed PMID: 6938140.
- [7]. Leighton BC, Hunter WS. Relationship between lower arch spacing/crowding and facial height and depth. *Am J Orthod.* 1982 Nov;82(5):418-25. Pubmed PMID: 6961812.
- [8]. Sampson WJ, Richards LC. Prediction of mandibular incisor and canine crowding changes in the mixed dentition. *Am J Orthod.* 1985 Jul;88(1):47-63. Pubmed PMID: 3860012.
- [9]. Berg R. Crowding of the dental arches: a longitudinal study of the age period between 6 and 12 years. *Eur J Orthod.* 1986 Feb;8(1):43-9. Pubmed PMID: 3456900.
- [10]. Bishara SE, Jakobsen JR, Treder J, Nowak A. Arch length changes from 6 weeks to 45 years. *Angle Orthod.* 1998 Feb;68(1):69-74. Pubmed PMID: 9503137.
- [11]. Adams CP. A comparison of 15 year old children with excellent occlusion and with crowding of the teeth, Angle Class I malocclusion, in respect of face size and shape and tooth size. *Swed Dent J Suppl.* 1982;15:11-26. Pubmed PMID: 6963765.
- [12]. Moorrees CF, Chadha JM. Availablespacefortheincisorsduringdentaldevelopment--Agrowthstudybasedonphysiologicage. *Angle Orthod.*;1965 Jan;35:12-22. Pubmed PMID: 14258828.
- [13]. Moorrees CF, Gron AM, Le Bret LM, Yen PK, Fröhlich FJ. Growth studies of the dentition: a review. *Am J Orthod.* 1969 Jun;55(6):600-16. Pubmed PMID: 4890736.
- [14]. Mills LF. Arch width, arch length, and tooth size in young adult males. *The Angle Orthodontist.* 1964 Apr;34(2):124-9.
- [15]. McKeown M. The diagnosis of mixed arch crowding in children. *N Z Dent J.* 1981 Jul;77(349):93-6. Pubmed PMID: 6944631.
- [16]. Saatçi P, Yukay F. The effect of premolar extractions on tooth-size discrepancy. *American journal of orthodontics and dentofacial orthopedics.* 1997 Apr 1;111(4):428-34.
- [17]. Moyers RE. *Handbook of orthodontics.* Yearbook Medical Publishers. Inc. Chicago. 1988.
- [18]. Warren JJ, Bishara SE. Comparison of dental arch measurements in the primary dentition between contemporary and historic samples. *American Jour-*

- nal of Orthodontics and Dentofacial Orthopedics. 2001 Mar 1;119(3):211-5.
- [19]. Sivamurthy G, Sundari S. Stress distribution patterns at mini-implant site during retraction and intrusion-a three-dimensional finite element study. Progress in orthodontics. 2016 Dec 1;17(1):4.
- [20]. Samantha C, Sundari S, Chandrasekhar S, Sivamurthy G, Dinesh S. Comparative Evaluation of Two Bis-GMA Based Orthodontic Bonding Adhesives - A Randomized Clinical Trial. J Clin Diagn Res. 2017 Apr;11(4):ZC40-ZC44. Pubmed PMID: 28571259.
- [21]. Kamisetty SK, Verma JK, Arun, Sundari S, Chandrasekhar S, Kumar A. SBS vs Inhouse Recycling Methods-An Invitro Evaluation. J Clin Diagn Res. 2015 Sep;9(9):ZC04-8. Pubmed PMID: 26501002.
- [22]. Felicita AS. Quantification of intrusive/retraction force and moment generated during en-masse retraction of maxillary anterior teeth using mini-implants: A conceptual approach. Dental Press J Orthod. 2017 Sep-Oct;22(5):47-55. Pubmed PMID: 29160344.
- [23]. Rubika J, Felicita AS, Sivambiga V. Gonial angle as an indicator for the prediction of growth pattern. World J Dent. 2015;6(3):161-3.
- [24]. Jain RK, Kumar SP, Manjula WS. Comparison of intrusion effects on maxillary incisors among mini implant anchorage, j-hook headgear and utility arch. Journal of clinical and diagnostic research: JCDR. 2014 Jul;8(7):ZC21.
- [25]. Kumar KR, Sundari KS, Venkatesan A, Chandrasekar S. Depth of resin penetration into enamel with 3 types of enamel conditioning methods: a confocal microscopic study. American journal of orthodontics and dentofacial orthopedics. 2011 Oct 1;140(4):479-85.
- [26]. Felicita AS. Orthodontic management of a dilacerated central incisor and partially impacted canine with unilateral extraction - A case report. Saudi Dent J. 2017 Oct;29(4):185-193. Pubmed PMID: 29033530.
- [27]. Felicita AS, Chandrasekar S, Shanthasundari KK. Determination of craniofacial relation among the subethnic Indian population: a modified approach - (Sagittal relation). Indian J Dent Res. 2012 May-Jun;23(3):305-12. Pubmed PMID: 23059564.
- [28]. Dinesh SP, Arun AV, Sundari KK, Samantha C, Ambika K. An indigenously designed apparatus for measuring orthodontic force. J Clin Diagn Res. 2013 Nov;7(11):2623-6. Pubmed PMID: 24392423.
- [29]. Felicita AS. Orthodontic extrusion of Ellis Class VIII fracture of maxillary lateral incisor - The sling shot method. Saudi Dent J. 2018 Jul;30(3):265-269. Pubmed PMID: 29942113.
- [30]. Krishnan S, Pandian S, Kumar SA. Effect of bisphosphonates on orthodontic tooth movement-an update. J Clin Diagn Res. 2015 Apr;9(4):ZE01-5. Pubmed PMID: 26023659.
- [31]. Vikram NR, Prabhakar R, Kumar SA, Karthikeyan MK, Saravanan R. (2015) Ball Headed Mini Implant. J Clin Diagn Res;11(1):ZL02-3.
- [32]. Viswanath A, Ramamurthy J, Dinesh SP, Srinivas A. Obstructive sleep apnea: awakening the hidden truth. Niger J Clin Pract. 2015 Jan-Feb;18(1):1-7. Pubmed PMID: 25511335.
- [33]. Pandian KS, Krishnan S, Kumar SA. Angular photogrammetric analysis of the soft-tissue facial profile of Indian adults. Indian J Dent Res. 2018 Mar-Apr;29(2):137-143. Pubmed PMID: 29652003.
- [34]. Reddy ER, Manjula M, Sreelakshmi N, Rani ST, Aduri R, Patil BD. Prevalence of Malocclusion among 6 to 10 Year old Nalgonda School Children. J Int Oral Health. 2013 Dec;5(6):49-54. Pubmed PMID: 24453444.
- [35]. Kumar DA, Varghese RK, Chaturvedi SS, Agrawal A, Fating C, Makkad RS. Prevalence of malocclusion among children and adolescents residing in orphanages of Bilaspur, Chattishgarh, India. Journal of Advanced Oral Research. 2012 Sep;3(3):18-23.
- [36]. Brito DI, Dias PE, Gleiser R. Prevalence of malocclusion in children aged 9 to 12 years old in the city of nova friburgo, rio de Janeiro State, Brazil. Revista Dental Press de Ortodontia e Ortopedia Facial. 2009;14(6):118-24.
- [37]. da Silva LP, Gleiser R. Occlusal development between primary and mixed dentitions: a 5-year longitudinal study. J Dent Child (Chic). 2008 Sep-Dec;75(3):287-94. Pubmed PMID: 19040816.
- [38]. Tschill P, Bacon W, Sonko A. Malocclusion in the deciduous dentition of Caucasian children. Eur J Orthod. 1997 Aug;19(4):361-7. Pubmed PMID: 9308256.
- [39]. Yu X, Zhang H, Sun L, Pan J, Liu Y, Chen L. Prevalence of malocclusion and occlusal traits in the early mixed dentition in Shanghai, China. PeerJ. 2019 Apr 2;7:e6630. Pubmed PMID: 30972246.
- [40]. Mugonzibwa EA, Eskeli R, Laine-Alava MT, Kuijpers-Jagtman AM, Katsaros C. Spacing and crowding among African and Caucasian children. Orthod Craniofac Res. 2008 May;11(2):82-9. Pubmed PMID: 18416749.
- [41]. Al-Sehaibany F. Assessment of incisor crowding in mixed dentition among Saudi schoolchildren attending College of Dentistry clinics at King Saud University. Pakistan Oral & Dental Journal. 2011 Jun 1;31(1).
- [42]. Khan SQ, Ashraf B, Khan AQ, Mehdi H. PREVALENCE OF MALOCCLUSION AND ITS RELATION WITH CROWDING AND SPACING. Pakistan Oral & Dental Journal. 2014 Sep 30;34(3).
- [43]. Sayin MO, Türkkehraman H. Malocclusion and crowding in an orthodontically referred Turkish population. Angle Orthod. 2004 Oct;74(5):635-9. Pubmed PMID: 15529498.

Special Issue on

"Dental Abnormalities and Oral Health"

Theme Edited by:

Faiez-N. Hattab,

Jordan University of Science and Technology, Jordan.

E-mail: f_hattab@hotmail.com