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Prevalence and associated factors for mandibular Premolar impaction in various malocclusions

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ABSTRACT

Teeth which fail to erupt to the level of the occlusal plane even after $^{2}/_{3}$ rd root formation is completed are termed as impacted teeth. Prevalence of impacted teeth can vary from one person to another and also among populations. This study was aimed to evaluate the prevalence of mandibular premolar impaction in various skeletal malocclusion patients. This retrospective study included case records of 886 subjects who visited the orthodontic department of Saveetha Dental College from June 2019- March 2020. OPG and intraoral photographs of all the subjects were analysed to find the prevalence of mandibular premolar impaction. The present study reported the prevalence of impacted mandibular premolar at 0.5%. Out of the total 4 cases in which mandibular premolars were impacted, three patients had skeletal Class I malocclusion. The prevalence of premolar impaction was higher in females than males. No significant association between gender and premolar impaction was noted ($p > 0.05$). To conclude, though the prevalence of mandibular premolar impaction is low, it is important to diagnose early to avoid complications and plan treatment.

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INTRODUCTION

Teeth which fail to erupt to the level of the occlusal plane even after $^{2}/_{3}$ rd root formation is completed are termed as impacted teeth (Archer, 1961). An eruption of a tooth might be obstructed usually by adjacent teeth or dense bone or soft tissue and also may cause impaction. It is theoretically impossible for all the teeth to follow the correct eruptive path and can sometimes be impacted within the dentoalveolar process or other unusual anatomic sites such as nasal/sinus cavities (Alling and Catone, 1993). Also, the unerupted cyst might be associated with any offending pathology. This is why it is essential to perform a thorough clinical and radiographic examination when there is any deviation from the usual eruption schedule (Rubika *et al.*, 2015; Samantha *et al.*, 2017).

The order of frequency of impacted teeth includes permanent third molars, permanent maxillary canines followed by mandibular premolars (Ro and Tin-Oo, 2009; Yamaoka *et al.*, 1996). The etiology of tooth impaction is multifactorial. The etiology

of impaction of teeth other than the third molars are poorly defined (Tang and Sayaniwas, 2006). Impaction of teeth might be due to a mesial drift of teeth which is the result of premature loss of primary teeth. It can also be due to any ectopic positioning of developing tooth buds or any pathology such as inflammatory or dentigerous cyst (Kalia and Aneja, 2009). They can also be associated with syndromes like cleidocranial dysostosis (Suri *et al.*, 2004). Since the mandibular canines and mandibular first molars erupt before the mandibular premolars, an arch length tooth discrepancy in the premolar region can lead to impaction of the second premolars. The prevalence of premolar impaction varies greatly and may according to age and gender. According to the previous literature and studies of mandibular premolar impaction, a classification for mandibular premolar impaction is suggested by Mehta *et al.* (2017).

1. Type 1 - 0°
2. Type 2 - Distal inclination
3. Type 3 - Mesial inclination not crossing midline
4. Type 4 - Mesial inclination crossing the midline
5. Type 5 - 90°
6. Type 6 - Positioned in the condyle/ascending ramus
7. Type 7 - Inverted position

Treatment methods suggested for impacted teeth include interceptive orthodontics, surgical exposure and extraction depending on the position of impacted teeth, and also their relationship with adjacent teeth (Frank, 2000). Most of the cases of premolar impaction are reported accidentally on routine screening of patients or when the patients report to the clinic for some other dental problem. Impacted premolar are sometimes advised for removal by orthodontists before the start of treatment (Jain *et al.*, 2014; Kamisetty *et al.*, 2015). Disimpaction of impacted teeth and bringing them to occlusion is one of the most common challenging problems faced by an orthodontist clinical practice (Sivamurthy and Sundari, 2016). Detailed knowledge of the development, eruption paths and patterns of the teeth is needed for successful management of impacted teeth (Krishnan *et al.*, 2018; Kumar *et al.*, 2011).

Previously our team had conducted numerous clinical studies (Felicita, 2017a,b, 2018) and case reports (Felicita *et al.*, 2012; Dinesh *et al.*, 2013; Krishnan *et al.*, 2015) over the past 5 years. Now we are focussing on retrospective studies. The idea for this study stemmed from the current interest in our community. So this study aims at evaluating the premolar impaction among subjects visiting Saveetha Dental College.

MATERIALS AND METHODS

Study setting

This cross-sectional retrospective study was conducted among a total of 886 subjects who reported to the Orthodontic 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/0619-0320

Data Collection

OPG and intraoral photographs of 886 subjects were checked and noted for impacted mandibular premolars. Demographic data such as age, gender and Skeletal Malocclusion of the patient was recorded. Relevant Data was entered in Microsoft Excel Sheet. Repeated and incomplete data were excluded. Data verification was done by an external reviewer.

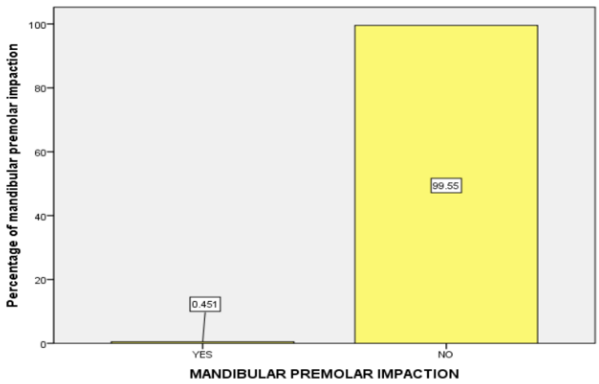

Figure 1: Bar graph depicts the percentage distribution of impacted mandibular premolars

Statistical Analysis

Data entered in excel sheet and later transferred to the SPSS Software (version 20.0) for statistical analysis. Variable definition process was done. Both descriptive and inferential statistics were employed. Level of significance was set at $p < 0.05$.

RESULTS AND DISCUSSION

The following results can be inferred from this study,

1. Out of 886 subjects, there were only four subjects who had mandibular premolar impaction,

Figure 2: Bar graph depicts the percentage distribution of skeletal malocclusion among impacted mandibular premolars

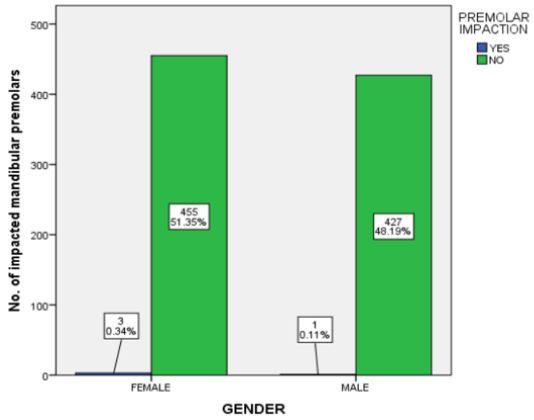

Figure 3: The above graph represents the association between gender and mandibular premolar impaction

and all the four impacted premolars were mandibular second premolars Prevalence of mandibular premolar impaction was 0.5% in this study. [Figure 1] The prevalence of impacted premolars was 0.5%.

2. Prevalent age of mandibular premolar impaction was 18 - 25 years, according to this study.

3. Both Angles Class I and class II malocclusions were associated with mandibular premolar impaction. Among these, Class I skeletal malocclusion had a higher prevalence [Figure 2]. It was noted that 75% of the subjects had Skeletal Class I malocclusion, whereas only 25% of the patients had Skeletal Class II malocclusion.

4. No statistical significance between gender and premolar impaction was noted. Females had a higher premolar impaction prevalence ($p > 0.05$). Statistically insignificant [Figure 3]. Pearson's Chi-square value 0.874, DF:1, p-value:0.62. Hence, no significant gender association was found for impacted mandibular premolars.

According to this study, it was noted that 0.34 % of the females had premolar impaction, whereas it was only about 0.11% among the males. Prevalent age of premolar impaction was 18 - 25 years, according to this study.

Premolar impaction, according to this study, was found to be 0.5% prevalent among 886 subjects. According to a study done by Collett (2000) reported the mandibular 2nd premolar impaction accounted for about 24% approximately of all the dental impactions. The overall prevalence of mandibular premolar impaction in adults has been reported to be 0.5% (Laskin *et al.*, 1997; Manjunatha *et al.*, 2014) (0.1% to 0.3% for maxillary premolars and 0.2% - 0.3% for mandibular premolars). Mcnamara and Mcnamara (2005) and Simsek-Kaya *et al.* (2011) have also reported that mandibular premolar impaction has less significance in comparison with other impacted teeth. The most common reason reported for mandibular premolar impaction is lack of availability of space, or it can be due to environmental and genetic influences. The finding of this current study was in agreement with the other studies.

Premolar impaction is most prevalent in the younger age group. According to this study, it was from 18 - 25 years of age. Mustafa (2015) in his study quoted that the 20 - 25years age group had a higher rate of prevalence of impacted premolars. Prevalansı (2013) in his study reported that the mean age was 23.2 $\pm$ 2.4 in the Anatolian population. This prevalence in the lower age group is because patients visit the dentist more frequently for orthodontic correction. This finding is in agreement with the findings of the previous studies.

Female predilection was reported for mandibular premolar impaction in this study. Mishra and Pandey (2017) and Oikarinen and Julku (1974), in their study also reported similar findings. Even though there is no statistical significance, there is not much literature evidence in support of this.

Jain and Kallury (2011) have reported that there is no statistical significance between skeletal malocclusion and premolar impaction. In this study, skeletal Class I malocclusion was reported with mandibular premolar impaction. Though most of the cases of mandibular premolar impaction are asymptomatic,

its management is important esthetically and functionally to the patient. In case the patient is indicated for the treatment of an impacted tooth, a thorough assessment and diagnosis of all findings is fundamental to decide a suitable treatment plan.

Early diagnosis and early treatment are the most important keys for correction of mandibular second premolar impaction. The following observations should be made 1)presence of any congenitally missing teeth 2)whether the condition is generalized or localized 3)whether the succedaneous tooth has a proper size and shape potential factors for eruption and whether there is any delay in eruption is due to over-retained primary teeth (such as ankylosis or incomplete root resorption). The presence of overlying soft tissue or bone might be an impeding factor for an eruption of any tooth. Space management of deciduous molars will frequently facilitate the uneventful eruption of premolars. Orthodontic guidance for an eruption of teeth is usually never indicated if problems are often detected at an early period and managed properly. Treatment of impacted teeth can be difficult and unpredictable if proper diagnosis and planning to assess whether it is favourable or not (Vikram *et al.*, 2017; Viswanath *et al.*, 2015). Various diagnostic aids can be used for assessment like IOPA, CBCT. Treatment of impacted teeth involves an interdisciplinary approach involving both the Orthodontist and the oral surgeon. Although there are many theories to support the evidence for impacted teeth, nothing has been proved. Most commonly accepted theory will be the discrepancies between jaw size and tooth size.

Further studies with much larger sample size, including the treatment options for impacted premolar teeth will be included in the study. Current limitations of the study will be eliminated.

CONCLUSION

Within the limits of the study, it was observed that mandibular premolar impaction was common among the younger age group with a female predilection. It was associated with Skeletal Class I malocclusion, but none of these findings was significant.

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Authors Contributions

The first author (Hemashree J) performed the analysis, and interpretation and wrote the manuscript. The second author (Dr. Ravindra Kumar Jain) contributed to the conception, data design, analysis, interpretation and critically revised the manuscript. The third author (Dr. Manjari Chaudhary) participated in the study and revised the manuscript. All three authors have discussed the results and contributed to the final manuscript.

Conflict of Interest

The authors declare that they have no conflict of interest.

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REFERENCES

Alling, C. C., Catone, G. A. 1993. Management of impacted teeth. *Journal of Oral and Maxillofacial Surgery*, 51(1):3–6.

Archer, W. H. 1961. Oral surgery; a step-by-step atlas of operative techniques. Philadelphia, Saunders. Third Edition. Pages 947. .

Collett, A. R. 2000. Conservative management of lower second premolar impaction. *Australian Dental Journal*, 45(4):279–281.

Dinesh, S. P. S., Arun, A. V., Sundari, K. K. S. 2013. An indigenously designed apparatus for measuring orthodontic force. *Journal of clinical and diagnostic research: JCDR*, 7(11):2623–2626.

Felicita, A., Shanthasundari, K. K., Chandrasekar, S. 2012. Determination of craniofacial relation among the subethnic Indian population: A modified approach - (Sagittal relation). *Indian Journal of Dental Research*, 23(3):305–312.

Felicita, A. S. 2017a. Orthodontic management of a dilacerated central incisor and partially impacted canine with unilateral extraction – A case report. *The Saudi Dental Journal*, 29(4):185–193.

Felicita, A. S. 2017b. Quantification of intrusive/retraction force and moment generated during en-masse retraction of maxillary anterior teeth using mini-implants: A conceptual approach. *Dental Press Journal of Orthodontics*, 22(5):47–55.

Felicita, A. S. 2018. Orthodontic extrusion of Ellis Class VIII fracture of maxillary lateral incisor – The sling shot method. *The Saudi Dental Journal*, 30(3):265–269.

Frank, C. A. 2000. Treatment Options For Impacted Teeth. *The Journal of the American Dental Association*, 131(5):623–632.

Jain, R. K., Kumar, S. P., Manjula, W. S. 2014. Comparison of intrusion effects on maxillary incisors

among mini implant anchorage, j-hook headgear and utility arch. *Journal of clini-cal and diagnostic research: JCDR*, 8(7):21–25.

Jain, U., Kallury, A. 2011. Conservative management of mandibular second premolar impaction. Peo-ple's. *Journal of Scientific Research*, 4(1):59–61.

Kalia, V., Aneja, M. 2009. Mandibular Premolar Impaction. *Scholarly Research Exchange*, 2009:1–3.

Kamisetty, S. K., Verma, J. K., Arun 2015. SBS vs Inhouse Recycling Methods-An Invitro Evaluation. *Journal of clinical and diagnostic research: JCDR*, 9(9):4–8.

Krishnan, S., Pandian, K., Kumar, S. 2018. Angular photogrammetric analysis of the soft-tissue facial profile of Indian adults. *Indian Journal of Dental Research*, 29(2):137–143.

Krishnan, S., Pandian, S., Kumar, S. A. 2015. Effect of bisphosphonates on orthodontic tooth movement-an update. *Journal of clinical and diagnostic research: JCDR*, 9(4):1–5.

Kumar, K. R. R., Sundari, K. K. S., Venkatesan, A., Chandrasekar, S. 2011. Depth of resin penetration into enamel with 3 types of enamel conditioning methods: A confocal microscopic study. *Amer-ican Journal of Orthodontics and Dentofacial Orthopedics*, 140(4):479–485.

Laskin, D. M., Petersen, J. K., Andreasen, J. O. 1997. Textbook And Color Atlas Of Tooth Impactions: Diagnosis, Treatment, Prevention. pages 1–544. Copenhagem: Munksgaard.

Manjunatha, B. S., Chikkaramaiah, S., Panja, P., Koratagere, N. 2014. Impacted maxillary sec-ond premolars: a report of four cases. *BMJ Case Reports*.

Mcnamara, C., Mcnamara, T. G. 2005. Mandibular premolar impaction: 2 case reports. *Journal of the Canadian Dental Association*, 71(11):859–863.

Mehta, S., Vineetha, R., Mehta, A., Lodha, S., Sreed-haran, H. 2017. Unusual impaction of mandibu-lar second premolar. *International Journal of Orthodontic Rehabilitation*, 8(4):147–149.

Mishra, A., Pandey, R. K. 2017. Sexual dimorphism, pattern of third molar and mandibular second pre-molar agenesis in Indian paediatric orthodontic patients. *The Saudi Dental Journal*, 29(2):78–82.

Mustafa, A. B. 2015. Prevalence of Impacted Pre-Molar Teeth in College of Dentistry. *Journal of international oral health*, 7(6):1–3.

Oikarinen, V. J., Julku, M. 1974. Impacted premo-lars. An analysis of 10 000 orthopantomo-grams. *Proceedings of the Finnish Dental Society. Suomen Hammaslaakariseuran toimituk-sia*, 70:95–98.

Prevalansı, A. 2013. The Prevalence of Impacted Pre-molars in the Anatolian Popula-tion. *Bezmialem Science*, 1(1):28–32.

Ro, J., Tin-Oo, M. M. 2009. Impacted mandibular third molars among patients at-tending Hospital Universiti Sains Malaysia. *Archives of Orofacial Sci-ences*, 4(1):7–12.

Rubika, J., Felicita, A. S., Sivambiga, V. 2015. Gonial Angle as an Indicator for the Prediction of Growth Pattern. *World Journal of Dentistry*, 6(3):161–163.

Samantha, C., Sundari, S., Chandrasekhar, S. 2017. Comparative Evaluation of Two Bis-GMA Based Orthodontic Bonding Adhesives - A Randomized Clinical Trial. *Journal of clinical and diagnostic research: JCDR*, 11(4):40–44.

Simsek-Kaya, G., Melih-Omezli, M., Yapici, G., Dayi, E., Ertas, U. 2011. Prevalence of impacted premo-lars in a Turkish population and considerations for surgical treatment. *Medicina Oral Patología Oral y Cirugia Bucal*, 16(6):e781–e786.

Sivamurthy, G., Sundari, S. 2016. Stress distribu-tion patterns at mini-implant site during retrac-tion and intrusion—a three-dimensional finite ele-ment study. *Progress in Orthodontics*, 17:1–11.

Suri, L., Gagari, E., Vastardis, H. 2004. Delayed tooth eruption: Pathogenesis, diagnosis, and treatment. A literature review. *American Journal of Orthodon-tics and Dentofacial Orthopedics*, 126(4):432–445.

Tang, A. T., Sayaniwas, M. 2006. Impactions in adult dentition. *Hong Kong Dent J*, 3(1):7–13.

Vikram, N. R., Prabhakar, R., Kumar, S. A. 2017. Ball Headed Mini Implant. *Journal of clinical and diag-nostic research: JCDR*, 11(1):2–3.

Viswanath, A., Ramamurthy, J., Dinesh, S. P. S. 2015. Obstructive sleep apnea: awaken-ing the hidden truth. *Nigerian journal of clinical practice*, 18(1):1–7.

Yamaoka, M., Furusawa, K., Fujimoto, K., Uematsu, T. 1996. Completely impacted teeth in dentate and edentulous jaws. *Australian Dental Journal*, 41(3):169–172.