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Prevalence Of Impacted Canines Among Dental Patients - A Retrospective Study

Research Article

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Abstract

Impacted canines are those teeth which fail to erupt to their normal position in the arch and do not display any radiographic or clinical evidence of spontaneous eruption beyond chronological age. Maxillary canines are the third most common teeth to be impacted in the permanent dentition. The aim of this study was to determine the prevalence of impacted canines among dental patients. The retrospective study involved analysis of case records of patients with impacted canines and assessment was based on the following parameters: Age, gender, and quadrant of impaction. Using SPSS Version 20.0, categorical variables were expressed as frequency and percentage, continuous variables as mean and SD; and Chi-square test was used to determine the association between categorical variables. A p-value <0.05 was considered statistically significant. The sample size of the study was 54. Highest prevalence of canine impactions was observed in males (51.9%). According to the age group, impacted canines were most prevalent in the age group of 21-30 years (31.48%) and in the 2nd quadrant (38.9%). The association between gender and quadrant of impaction was statistically significant with p-value 0.03. According to our study it can be concluded that in the South Indian population, the maxillary canine impactions were more prevalent than mandibular canine impactions. Males reportedly had higher prevalence of canine impactions than females and in the age group of 21-30 years. A significant association between gender and quadrant of canine impaction has been observed with higher prevalence of impactions of canine in the 2nd quadrant in case of females and in the 1st quadrant in case of males.

Keywords: Age; Canines; Gender; Impacted Teeth; Prevalence.

Introduction

An impacted tooth is one whose eruption has been delayed considerably and there is sufficient evidence both radiographically and clinically to confirm that the tooth will not erupt to a functional occlusion in the near future. Impaction of permanent teeth is a common phenomenon with mandibular and maxillary third molar being the most frequently impacted of all.

Maxillary canines are one of the common teeth to be impacted next to third molars. The etiology of such impacted canines is governed by a number of factors, that can be either local or genetic, posing a hereditary influence [1, 2]. The local governing factors include crowding, dilaceration, abnormal position of tooth bud, cystic formation, early loss or prolonged retention of deciduous canines or iatrogenic position of adjacent teeth into the canine's pathway. Another commonly discussed etiology is the path of canine eruption, which is quite long and tortuous, starting from its site of formation lateral to piriform fossa to its final position in the arch [3, 4]. The position of such impacted canines can be buccal or palatal or in arch. Mandibular canines are less frequently impacted than maxillary canines.

The incidence and prevalence of canine impactions have been studied in different populations by different authors and significant differences have been observed [3-5]. A difference in the position of impacted canines has also been observed. In a study by C Mason et al., [6], out of 100 patients with impacted canines that they observed, 33% were bilateral and 33% were palatally placed. As a continuum of this, Shellhart et al., [7] has given a case report of bilaterally impacted maxillary canines leading to significant amounts of root resorption of maxillary lateral incisors. Observing the population based study of canine impactions, U Aydin et al., [7, 8] have done a study in which 4500 panoramic

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radiographs were analysed and the incidence of canine impactions was found to be 3.58% with a male to female ratio of 1:1.51 in a Turkish population. Similarly, in a Saudi population, canine impaction was twice as common in females as in males; but the orthodontic treatment difficulty index was more in males than in females [9, 10].

However, there is very little literature evidence on the prevalence and incidence of canine impactions in the Indian population when compared to other global populations. Moreover there is also lack of data about the gender based differences in impacted canines in the Indian population. Previously our team has a rich experience in working on various research projects across multiple disciplines [11-25]. Now the growing trend in this area motivated us to pursue this project.

The aim of this study was to determine the prevalence of impacted canines among dental patients and its association with gender.

Materials and Methods

Study Design and Study Setting:

This retrospective cross-sectional study was conducted in the department of oral and maxillofacial surgery, Saveetha dental college and hospital, Saveetha University, Chennai, to analyse the prevalence of impacted canines among dental patients visiting our institution from June 2019 to March 2020. The study was initiated after approval from the institutional review board [SDC/SIHEC/2020/DIASDATA/0619-0320].

Study Population and Sampling:

After assessment in the patient database of Saveetha Dental College, all case records of patients who had impacted canine teeth were included in the study with a total of 54 patients. All missing or incomplete data and patients with congenital anomalies and syndromes were excluded from the study. Cross verification of data for errors was done with the help of an external examiner.

Data Collection and Tabulation:

Data collection was done using the patient database with the timeframe work of 1st June 2019 to 30th April 2020 by a single calibrated examiner. Case records of around 41,438 patients were reviewed. The collected data was tabulated based on the following parameters: Patient details, name, age, gender and impacted canine teeth.

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; and continuous variables in mean and standard deviation. Chi-square test was used to test associations between categorical variables. P value < 0.05 was considered statistically significant.

Results & Discussion

The age wise distribution of impacted canines in dental patients has been shown in Figure 1, with an age range of 8-50 years and a mean age of 26.5±10.5 years. The prevalence of canine impactions was highest in the age group of 21-30 years [31.48%, (n=17)], followed by 11-20 years [29.62%, (n=16)]. Equal prevalence was observed in the age groups of 31-40 years and 41-50 years, each with 12.96% (n=7). The least prevalence was in 1-10 years age group, with prevalence proportion being only 1.85% (n=1). [Figure 1].

The gender wise distribution of impacted canines has been shown in [Figure 2] with highest prevalence seen in males with 51.9%

Figure 1: Bar chart depicting age wise distribution of patients having impacted canines. X- axis - age groups (in years); Y-axis - total number of patients with impacted canines; Higher prevalence of impacted canines was in the age group of 21-30 years.

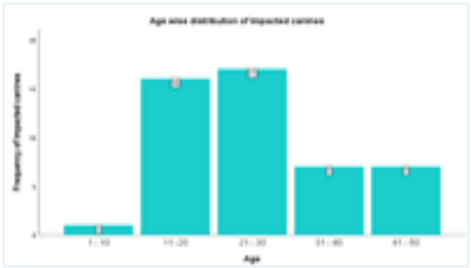


Figure 2: Bar chart depicting gender wise distribution of impacted canines. X-axis - gender of patients with impacted canines; Y-axis - total number of patients with impacted canines, slightly higher prevalence of impacted canines was observed among males.

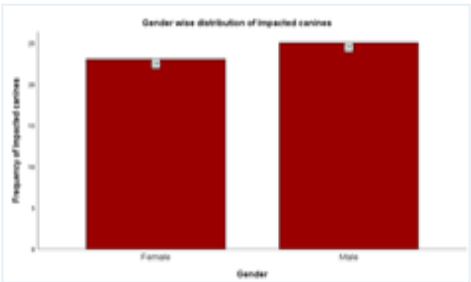


Figure 3: Bar chart depicting quadrant wise distribution of impacted canines. X- axis - quadrants of impacted canines; Y-axis - total number of impacted canines; higher prevalence of impacted canines was observed in the second quadrant.

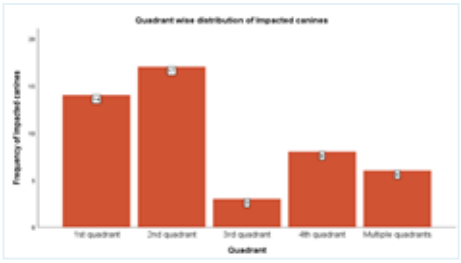


Figure 4: Bar chart showing association between age groups (in years) and quadrant of impacted canines. X-axis - age groups of patients with impacted canines (in years) ; Y-axis -frequency of impacted canines in different quadrants. Higher prevalence of impacted canine was in relation to 13 in 11-20 years and 23 in 21-30 years. Chi-square test, p-value 0.647 (>0.05). However the results were statistically not significant.

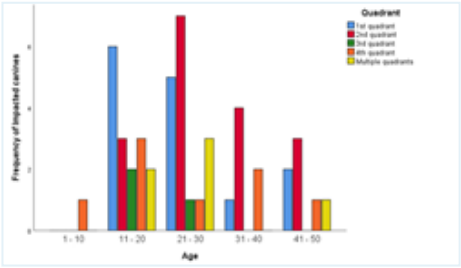
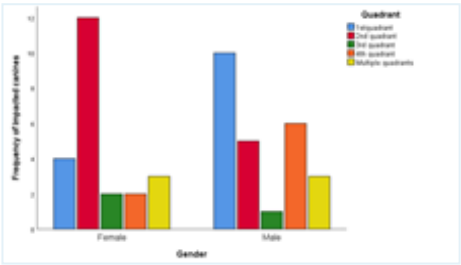


Figure 5: Bar chart showing association between gender and quadrant of impacted canines with X-axis - gender of patients with impacted canines; Y-axis - frequency of impacted canines in different quadrants. Higher prevalence of impacted canine was in relation to 13 among males and 23 among females. Chi-square test, p-value 0.031 (<0.05). The results were statistically significant.



(n=28). The prevalence in females was 48.1% (n=26).

Quadrant wise distribution of impacted canine is shown in Figure 3. Highest prevalence was in the 2nd quadrant (tooth number 23), 38.9% (n=21), followed by the 1st quadrant (tooth number 13), 33.3% (n=18). 3rd quadrant (tooth number 33) had the least prevalence with only 9.3% of cases (n=15). The prevalence in 4th (tooth number 43), was 18.5% (n=10) [Figure 3].

In the age group of 1-10 years, impacted canines were seen only in the 4th quadrant (43), whereas in 11-20 years, the highest prevalence was in the 1st quadrant (13). Equal prevalence of 2nd quadrant (23), was seen in age groups 21-30 years, 31-40 years and 41-50 years, and the results were not statistically significant.[Chi-square test, p-value 0.647].[Figure 4].

In females, highest prevalence was observed in the 2nd quadrant (23), with a percentage of 27.78% (n=15) and least prevalence in 3rd and 4th quadrants (33 and 43), with 3.70% (n=2) each. In males, the prevalence was highest in the 1st quadrant (13), 20.37% (n=11) and least in 3rd quadrant (33), 5.5% (n=3). The association between quadrant of impacted canine and gender was found to be statistically significant. [Chi-square test, p-value 0.031]. [Figure 5].

The pattern of canine impactions shows a population based variation. This study was conducted with the aim of observing the pattern, gender based and age based variation in impacted canines among the south Indian population. It has been observed that about 51.9% of impacted canines were reported in males and based on age group 31.48% of impacted canines were seen in the age group of 21-30 years. The canines in the 2nd quadrant (23) were most frequently impacted with a prevalence proportion of 38.9%. The association between gender and quadrant of canine impaction revealed that in females higher prevalence was observed in the 2nd quadrant and in males it was in the 1st quadrant. This association was statistically significant.

Impaction is a failure of tooth eruption at its appropriate site in the dental arch within its normal period of growth [26]. The commonly stated impacted teeth in the decreasing order of their frequency of occurrence is - Mandibular 3rd molar, maxillary 3rd molar, maxillary canine, mandibular premolar, maxillary premolar, mandibular canine, maxillary central incisor and maxillary lateral incisors [27, 28]. Similarly, in the current study also maxillary canines were more frequently impacted than mandibular canines. The prevalence of maxillary canine impactions was about 2.5 times more than mandibular impactions. In the Pakistani population, the maxillary impactions were 7 times more frequent than mandibular impaction, as reported by Hameedullah Jan et al., [29].

In general, the incidence of maxillary canine impactions has been reported by various studies to be around 0.8-2.8% [(30)]. Gisakis et al., [30] observes a higher prevalence of impacted anterior teeth in maxilla than in mandibles. A number of etiological factors have been pointed out by Becker et al., [31] for maxillary canine impactions which includes local obstruction, local pathologies like cysts, odontomes, lack of normal development and guidance theory of canine impactions [32].

Kifayatullah et al., [33] reports a statistical significance in the distribution of impacted maxillary canines when stratified by gender and quadrant in a Pakistani population. However, the study does not reveal about the existence of such significance in mandibular canine impactions too. In the same study, the female to male ratio was 1.85:1, but in our study a reversal of this ratio was observed i.e. male to female ratio is 1.07:1. Oliver et al., [34] in the study of prevalence of canine impactions and lateral incisor hypodontia, have reported only 4.71% as the prevalence proportion of canine impactions, with all impactions placed in maxilla. The authors have reported absence of specific sex difference in the prevalence of impactions [35, 36].

The aim of current study was not just to study the prevalence, but also determine the gender based differences in canine impactions. Accordingly, the results had also revealed a statistically significant association between gender and quadrant of canine impaction in the South Indian population. Comparing the results of the current study with previous studies, in other populations, significant differences have been observed [37, 38]. In a study conducted in Pakistani population, no statistically significant association was observed between gender and quadrant of impaction [39]. This is totally contradictory to the results of our study, and also to the study by Kifayatullah et al., in the similar Pakistani population.

Similarly, no association between gender and quadrant was observed in the Turkish population as reported by Thomas et al., [40]. Kamiloglu et al., [41]studied the prevalence of Impacted and transmigrated canine in a Cyprotic orthodontic population in North Cyprus. The reports claim that maxillary canine impaction occurred significantly more frequently than mandibular impactions but gender based associations remain statistically insignificant in case of mandibular canine impactions [42-43]. The statement of Kamiloglu is contradicted by the findings of a study in Iranian population, where the prevalence of Canine impactions was 2.8% with no significant difference between the genders [44].

While many studies have focussed on maxillary canine impactions, Yavuz et al., [45] did an exclusive study in mandibular canine impactions and the incidence was found to be 1.29% in the Turkish subpopulation which is quite higher than the incidence reported by Hakan et al., [27] . The Arab Israelian population based study has reported that the prevalence of canine impactions was higher in Orthodontic patients (3.7%) and was usually unilateral and not associated with gender [46].

The above literature evidences contradict each other in terms of association between gender and prevalence of canine impactions, but point out one common finding that maxillary impactions being more prevalent than mandibular impactions. Batool Ali et al., [47] have reported a significantly higher incidence of Sella bridging in patients with canine impactions, opening up a new possible etiological factor behind canine impactions. The statement has been substantiated with the fact that the anterior part of Sella turcica and dental epithelial progenitor cells share a common embryologic origin and hence alterations in Sella turcica at developmental level can lead to impacted canines.

Atoche et al., [48] has reported significant association between maxillary canine impactions and other dental anomalies like microdontia and transposition in maxillary lateral incisors, in a Mexican population. In an interesting study by Shapira et al., [49] in individuals with Down's syndrome, a higher prevalence of maxillary canine impactions (15%), which can be attributed to genetic variations [Trisomy 21].

In a study of CBCT analysis of 30 maxillary impactions, Kalyani et al., [50] have observed that an angulation exceeding 31 degrees of impacted canine decreased the probability of eruption and also the vertical height of canine was a significant determining factor as assessed by Power and Short's vertical position. The current study and available literature evidence reveal that the prevalence of maxillary canine impactions is always higher irrespective of the population studied. The gender based differences and associations however are inconsistent and vary according to the population.

The current study possesses few limitations, in the sample size being small and inability to generalize results to a larger population. The existing literature evidence on the canine impactions in the south Indian population is very less and the current study will serve as an eye-opener. Future scope of the study allows CBCT analysis of position of maxillary and mandibular impacted canines. Our institution is passionate about high quality evidence based research and has excelled in various fields [51-61]. We hope this study adds to this rich legacy.

Conclusion

Within the limitations of the study it was observed that the maxillary canine impactions were more prevalent than mandibular canine impactions. The prevalence of impacted canines was nearly equal in males and females. A significant association between gender and quadrant of canine impaction has been observed with higher prevalence of impactions of canine in the 2nd quadrant in case of females and in the 1st quadrant in case of males.

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