

PREVALENCE AND ASSOCIATED FACTORS FOR UNFAVORABLE CANINE IMPACTION AMONG PATIENTS REPORTING TO AN INSTITUTION- AN OPG BASED RETROSPECTIVE STUDY

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Abstract:

The eruption of permanent canine is a complex series of events and has the tortuous path of eruption before the canine reaches the occlusal plane. The aim of the study was to assess the prevalence of unfavorable canine impaction and also to assess the various factors involved in canine impaction. All case records of patients reported from July 2019 to March 2020 with malocclusion to a dental hospital were screened. The case record of 25 patients with impacted canines were selected for the study and details were recorded. Variables such as age, gender and type of malocclusion were extracted from the case records. Data was tabulated and statistically analysed using IBM SPSS version 20.0 and the results were obtained. Descriptive and chi square analysis was done to find the association among age, gender, type of malocclusion and the impacted canines. In our study, out of 25 patients, the prevalence of impacted canines among males was 44.83% and females was 55.17%. Favorable impacted canines (62.1%) had more prevalence than unfavorable impacted canines (37.9%). On comparing the prevalence of impacted canines among different age groups, the higher prevalence was found among 21-30 years age groups (48.3%) in which unfavorable canines were 17.24%. On analysing the type of malocclusion among patients with impacted canines, type I malocclusion had higher prevalence among unfavorable impacted canines (37.93%), $p > 0.05$. On comparing the quadrant most involved in unfavorably impacted canines, quadrant II had the highest prevalence (37.93%), $p > 0.05$. Within the limitation of the study favorable canine impactions were more common than unfavorable ones. Unfavorable canine impactions were more commonly associated with younger age groups, female gender and class I malocclusion. Maxillary arch and quadrant II were most commonly involved but none of the associations were statistically significant.

Keywords: Impacted canine, malocclusion, prevalence, radiograph, panoramic.

I. INTRODUCTION:

Impaction is the deceleration of the normal eruption process of the tooth. Maxillary and mandibular canine impaction are frequent and are a clinical problem which has to be texted based on the type of impaction Maxillary canine has longer path of eruption and erupts after premolar, since the canines have the longer roots. Diagnosis is generally based on clinical and radiographic analysis. (Power and Short, 1993; Alqerban et al., 2015)

Maxillary canines are most commonly impacted next to 2nd and 3rd molar impaction. About 2% of the population reported maxillary canine impaction and had female predominance. About 8% of population had bilateral canine impaction. About 85% of palatally impacted canine had sufficient space to erupt while 17% of labially impacted upper canine had sufficient space to erupt. (Ericson and Kuroi, 1986; Bishara and Ortho, 1992)

The etiology of the canine impaction are the spaced arches, missing lateral incisors or any other adjacent teeth, any anomalies or abnormal shape and size of lateral incisor, late developing dentition and familial history of canine impaction. The sequelae of the canine impaction are root resorption, dentigerous cyst formation, infection and referred pain. (Nisha, Shashikumar and Chandra, 2017) Diagnosis comprises both clinical and radiographic examination. The clinical signs include prolonged retention of deciduous canines beyond 14 to 15 years of age. Absence of a normal labial canine bulge, presence of a palatal bulge and delayed eruption, or migration of the adjacent teeth. (Ericson and Kuroi, 1987)

In terms of early diagnosis, it is often difficult to determine whether the missing canine is impacted

or delayed eruption in young patients. For this purpose, a variety of radiographic techniques have been in usage. (Ericson and Kuroi, 1987) Although CBCT is more precise and has more applications in dentistry, high dose radiation dose is the major concern. In comparison, the panoramic radiograph uses lower radiation dose and gives information on various structures for initial assessment. (Bishara and Ortho, 1992)

There are localized, systemic, or genetic etiological factors that cause canine impaction. Early diagnosis by clinical and radiographic examinations is required for the prevention of impaction. The treatment approach is interdisciplinary and included no treatment, interceptive, extraction, autotransplantation, and surgical exposure followed by orthodontic alignment of the impacted canine. Each treatment has its own advantages and disadvantages, and the treatment planning should be focused on both esthetic and functional harmony. (Sukh, Singh and Tandon, 2014; Nisha, Shashikumar and Chandra, 2017; Oliveira, Figueiras and Castro, 2017)

Previously our institution has conducted various conceptual studies (Rubika and Felicita, no date; Ramesh Kumar et al., 2011; Felicita, Chandrasekar and Shanthasundari, 2012; Dinesh et al., 2013; Jain, Kumar and Manjula, 2014; Sivamurthy and Sundari, 2016; Felicita, 2017a, 2017b, 2018; Vikram et al., 2017; Pandian, Krishnan and Kumar, 2018), in vitro studies (Kamisetty et al., 2015), clinical trials (Samantha et al., 2017), reviews (Krishnan, Pandian and Kumar S, 2015; Viswanath et al., 2015). Now we are focussing on retrospective studies. Thus, the aim of the study was to assess the prevalence of unfavorable canine impactions and the associated factors like age, gender and the type of malocclusion.

II. MATERIALS AND METHOD:

Study design and study setting:

This retrospective study was done to evaluate the prevalence of unfavorably impacted canines among patients in a dental hospital from July 2019 to December 2019. Ethical approval was obtained from the Institutional Ethical Committee, Saveetha university, Chennai. Ethical approval number was SDC/SIHEC/2020/DIASDATA/0619-0320.

Sampling:

After thorough assessment in the university patient data records, case records of all 25 patients who reported with impacted canines were included in the study. Among 25 patients, 4 patients had bilateral canine impactions and hence there were 29 impacted canines in the study. The exclusion criteria was missing or incomplete data. Cross verification of data for errors were done with the help of an external examiner.

Data collection:

A single calibrated examiner evaluated the digital case records of the patients reported with impacted canines from July 2019 to December 2019. The digital records of patients includes clinical, radiographic examinations and treatment undergone by the patients. From the digital case records, the type of impaction and the malocclusion was analysed from the OPG and intraoral photographs and data was retrieved. Demographic details like age, gender were also recorded.

Statistical analysis:

The collected data was tabulated and analysed with a statistical package for windows, IBM SPSS version 20.0 and results were obtained. Categorical variables were expressed in frequency and percentage. Chi square analysis was used to test

associations between categorical variables. P value <0.05 was considered statistically significant.

III. RESULTS AND DISCUSSION:

In the present study, out of 25 patients, 18 patients (62.1%) had favorably impacted canines while 11 patients (37.9%) had unfavorably impacted canines. 8 patients (27.59%) under 13-20 years, 14 patients (48.28%) under 21-30 years, 5 patients (17.24%) under 31-40 years, 2 patients (6.90%) under 41-50 years presented with impacted canines.[Figure 1]

In the present study, out of 25 patients with impacted canines, 13 patients (44.83%) were males and 16 patients (55.17%) were females.[Figure 2]. Among the quadrants, 12 patients (41.38%) had canine impactions in quadrant I, 11 patients (37.93%) had canine impactions in quadrant II, 2 patients (6.90%) had canine impaction in quadrant III, 4 patients (13.79%) had canine impaction in quadrant IV. [Figure 3]

On statistical analysis, higher prevalence of favorable canine impactions were associated with quadrant I (31.03%) and unfavorable canine impactions were associated with quadrant II (24.14%). There was no significant association between the type of canine impaction and the quadrants involved (p value - 0.142). [Figure 4].

On analysing the association between the type of impaction and the dental malocclusion, both favorable (48.28%) and unfavorable canine impactions (37.93%) were commonly associated with class I malocclusion. There was no statistically significant association between the type of canine impaction and dental malocclusion (p value - 242).[Figure 5]

On analysing the association of type of canine impaction and gender. Females had a higher prevalence of favorable (34.48%) and unfavorable (20.69%) canine impactions. There was no

statistically significant association between the type of canine impactions and gender (p value- 0.275).[Figure6]

On analysing the association of type of canine impaction and age. Adults had a higher prevalence of favorable (37.93%) and unfavorable (24.14%) canine impactions. There was no statistically significant association between the type of canine impactions and age groups.(p value- 0.379). [Figure 7]

In the present study, impacted canines were in higher prevalence among females and more commonly found among 21-30 years. Irrespective of the type of impacted canine , they were associated with class I malocclusion. Impacted canines were more commonly seen in maxillary arch than mandible. Unfavorable impacted canines were most commonly seen in quadrant II.

In our study, on assessing the prevalence of canine impaction among gender , females had higher prevalence of favorable and unfavorable canine impactions than males. Previous studies have shown prevalence of impacted canines with female predilection.(Ericson and Kuro1, 1986; Shapira and Kuflinec, 1998). Our findings are in accordance with the previous study. Some studies have reported that there is no gender predilection and there is equal distribution of impacted canines among both males and females.(Alqerban et al., 2015; Littlewood and Mitchell, 2019). Our findings were contradictory to the previous study. The variation in study would be due to the ethnicity and the variation in the geographic location.

In our study, a higher prevalence of favorable and unfavorable canine impactions among adults than adolescents. In the study done by Arbion H, et.al, showed that the prevalence of impacted canines was higher among 25-30years.(Sharmila, 2016; Jain and Debbarma, 2019). Our findings are in accordance with the previous study. Previous

studies have shown higher prevalence of impacted canines among 11-18years.(Patil and Maheshwari, 2014). Our findings are contradictory to the previous study. The variation in the prevalence of impacted canines among different age groups would be the retention of deciduous canines and the malocclusion.

In our study, maxillary canines had a higher prevalence of impaction than mandibular canines. Unfavourably impacted canines were more common in maxilla and had a prevalence in quadrant II. Previous studies have shown a higher prevalence of maxillary impacted canines. (Richardson and Russell, 2000). Our findings are in accordance with the previous study.

In our study, the association of malocclusion and impacted canines were studied. It showed that class I malocclusion were more commonly involved in patients with both favorable and unfavorable canine impactions. Previous studies have shown that palatally impacted canines are associated with class II,III malocclusion.(Sinko et al., 2016; Arabion et al., 2017) In our study the impacted canines were associated with class I malocclusion.

The studies can be associated with dental anomalies or defects. Further studies can be conducted on the association with skeletal malocclusion and treatment approaches.

The limitation of the study is that it was a retrospective study and the data were collected from the digital case records. And so the intra oral photographs and the radiographs were verified by a single calibrated examiner to eliminate subjective variation. The sample size was smaller which could not define the entire generalized population. Thus multicentric study can be conducted with a larger sample size.

IV. CONCLUSION:

Within the limitation of the study the prevalence of unfavorable canine impactions was less common than favorable ones. Unfavorable canine impactions were more commonly associated with younger age groups, female gender and class I malocclusion. Maxillary arch and quadrant II were most commonly involved but none of the associations were statistically significant. Early diagnosis and intervention should be done to prevent complexity in the management of impacted canines.

AUTHORS CONTRIBUTION:

Prashaanthi.N contributed acquisition of data, analysis, literature collection and also in drafting the article and revising it critically for important intellectual content.

Ravindra Kumar Jain contributed in conception, the study design, interpretation of data, formatting, manuscript preparation, supervision and guidance.

Shantha Sundari.K.K contributed in editing, supervision and final approval of the submitted version of the manuscript.

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CONFLICT OF INTEREST:

The authors declare that there is no conflict of interest

V. REFERENCES:

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FIGURES:

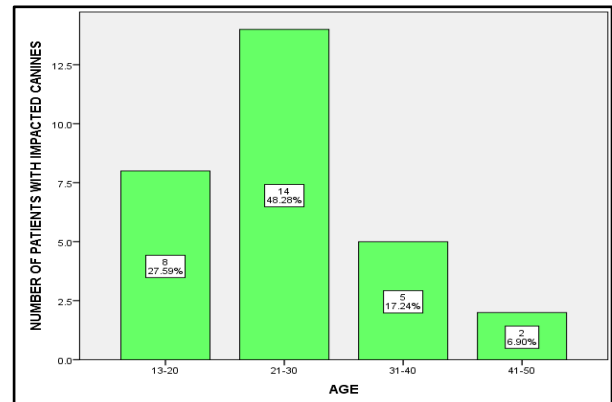


Figure 1: Bar graph depicting the age wise distribution of patients with impacted canines. X axis - age in the years ; Y axis - number of patients with impacted canines. Descriptive analysis showed a higher prevalence of impacted canines (48.28%) among 21-30 years and least prevalence among 41-50 years.(41-50%)

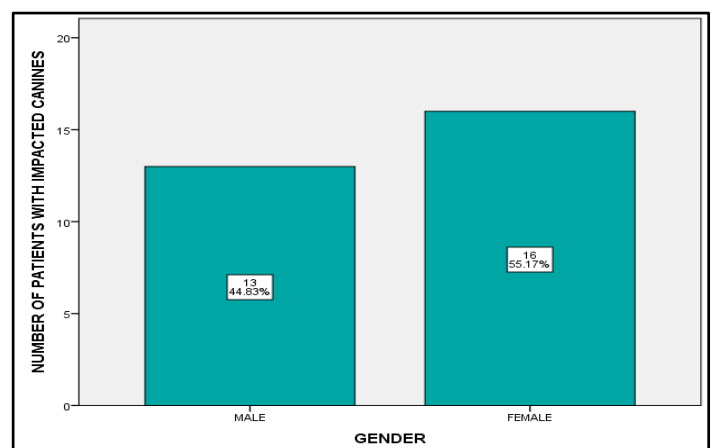


Figure 2: Bar graph depicting gender distribution of patients with impacted canines. X axis - gender (males/females) ; Y axis - number of patients with impacted canines. Descriptive analysis showed a higher prevalence of impacted canines among females (55.17%) than males (44.83%).

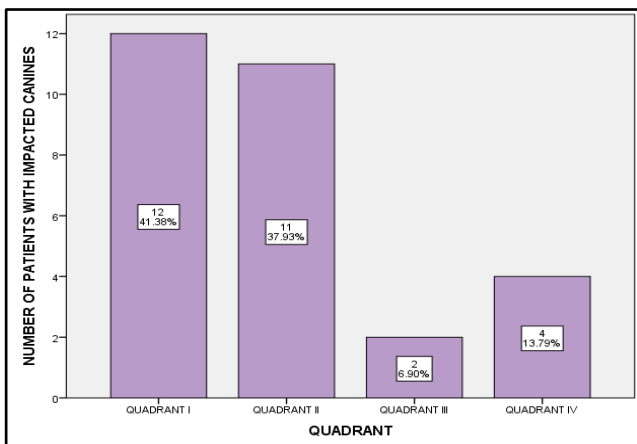


Figure 3: Bar graph depicting the quadrant wise distribution of patients with impacted canine. X axis - quadrant ; Y axis - number of patients with impacted canines. Descriptive analysis showed a higher prevalence of impacted canines in quadrant I (41.38%) followed by quadrant II (37.93%).

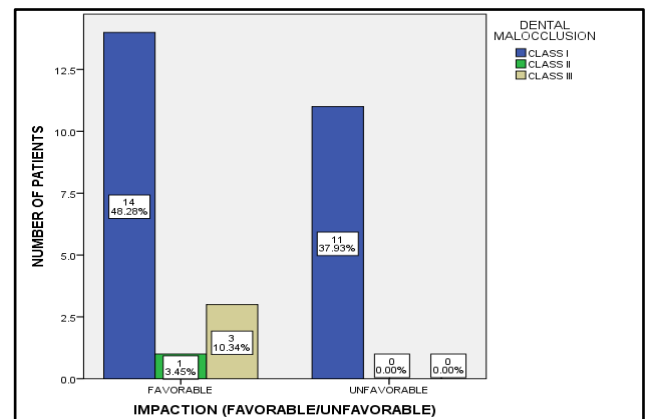


Figure 5: Bar graph depicting the association of type of impaction and dental malocclusion. X axis - impacted canines (favorable/unfavorable) ; Y axis - number of patients with impacted canines. Both favorable and unfavourable canine impactions were commonly associated with class I malocclusion (blue). There was no statistically significant association between the type of canine impaction and dental malocclusion. (Pearson chi square - 2.836^a ; p value- 0.242 (p>0.05))

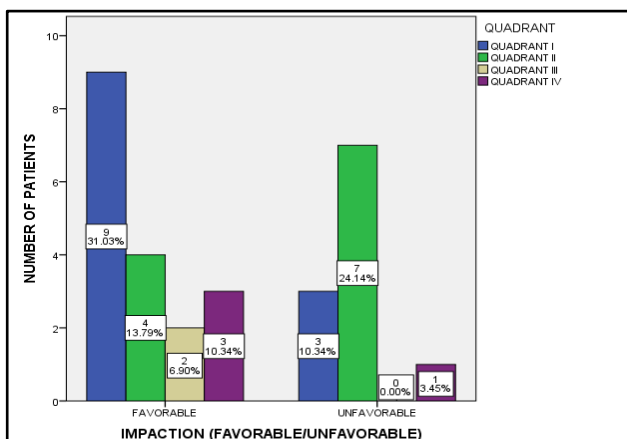


Figure 4: Bar graph depicting the association of type of canine impaction and the quadrants involved. X axis - impacted canines (favorable/unfavorable) ; Y axis - number of patients with impacted canines . Favourable canine impactions were associated with Quadrant I (blue). Unfavourable canine impactions were commonly associated with Quadrant II (green). There was no statistically significant association between the type of canine impactions and quadrants involved.(Pearson chi square - 5.446^a ; p value- 0.142 (p>0.05))

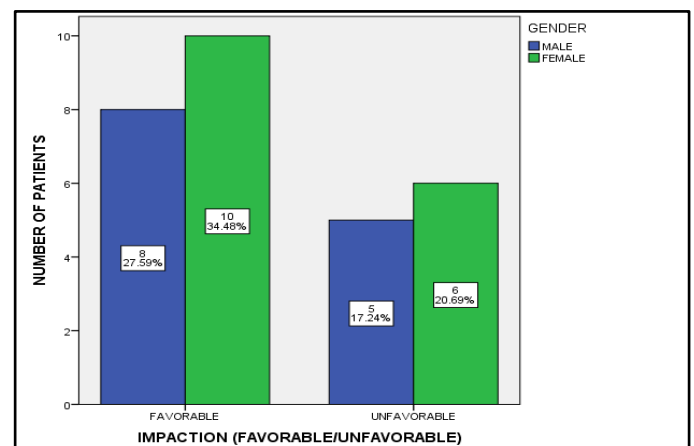


Figure 6: Bar graph depicting the association of type of canine impaction and gender. X axis - impacted canines (favorable/unfavorable) ; Y axis - number of patients with impacted canines Females (green) had a higher prevalence of favorable and unfavorable canine impactions. There was no statistically significant association between the type of canine impactions and gender.(Pearson chi square - 3.879^a ; p value- 0.275 (p>0.05)).

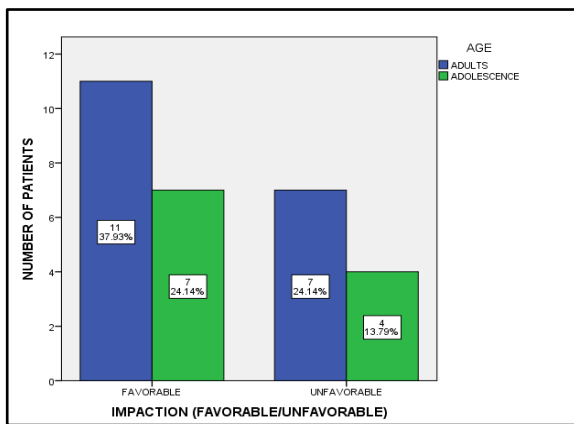


Figure 7: Bar graph depicting the association of type of canine impaction and age. X axis - impacted canines (favorable/unfavorable) ; Y axis - number of patients with impacted canines Adults (blue) had a higher prevalence of favorable and unfavorable canine impactions. There was no statistically significant association between the type of canine impactions and age groups.(Pearson chi square - 4.179^a ; p value- 0.379 (p>0.05)).