



RESEARCH ARTICLE

PREVALENCE AND LOCALIZATION OF IMPACTED CANINE TEETH USING PANORAMIC RADIOGRAPH IN A SAMPLE OF YEMENI ADULTS IN SANA'A, YEMEN

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Abstract

Background and aims: A tooth that fails to erupt into the dental arch during the anticipated growth window is said to be impacted. Clinical issues with impacted maxillary and mandibular canines are common. Most doctors concur that permanent teeth are significant from both an aesthetic and functional standpoint and should be kept as much as feasible. The legitimacy of justifying the work of this research can be proven by the fact that previous researches in Yemen were on a small sample of population. There was also inconsistency in the results in terms of prevalence rate as well as pattern of canine impaction. Therefore, providing a detailed outline of the context or situation again will lead to solving the puzzle or determining the correct position. The aim of this study was to determine the crude prevalence and pattern of impacted canines for 5 years in a sample of the Yemeni population in the city of Sana'a.

Methods: This cross-sectional study consisted of Yemeni patients who do panoramic x-ray at dental radiographic centers in Sana'a city, Yemen. The panoramic radiographs and dental records of the patients were retrospectively examined.

Results: The total prevalence of impacted canine for the 5 following years was 5.23%. The prevalence of an impacted canine was higher in the maxillary arch (93.9%) than in the lower arch (6.1%), higher in females (53.2%) than in men (46.8%), and 52.4% more common in the right canine than in the left (47.6%).

Conclusion: There was a slight increase in the prevalence of impacted canines in Yemeni patients. Females showed higher impacted teeth than males. Early diagnosis of impacted teeth can aid in maintaining healthy teeth and preventing malocclusions. Information about the prevalence of canine impaction in the Yemeni community is provided by the current study.

Keywords: Canine impaction, panoramic radiograph, prevalence, Sana'a city, Yemen.

INTRODUCTION

Impaction is the inability of a tooth to fully erupt into a position that is normally functional within the regular time frame due to a shortage of room in the dental arch, which is brought on by another tooth being in the way or by development in an aberrant posture¹. It is a common occurrence that has received extensive coverage in the literature²⁻⁵. However, there are differences in the occurrence of impacted teeth and their placement in the upper and lower jaws around the globe⁶⁻⁸. The permanent canines serve as the

cornerstone and support of an aesthetically pleasing grin and a useful occlusion. It supports the alar base and upper lip by standing at the dental arch's corner and generating the canine eminence. Functionally, it aids in the dentition's disarticulation during lateral motions in some people. Due to the length and volume of its root, it is one of the most outstanding abutments for the prosthetic replacement of other maxillary teeth. Impacted teeth, particularly canines, cause orthodontic problems. They may cause tooth mobility, appearance, and functional results⁹.

According to Moyers¹⁰, the maxillary cuspid has the most difficult and complicated eruption course of any tooth. When a child is three years old, it is high in the maxilla, with its crown pointed primarily mesially. It advances in the direction of the occlusal plane and progressively rights itself until it appears to hit the distal end of the lateral incisor's root. It appears to be redirected to a more vertical posture after that. But, it often does so with a pronounced mesial inclination into the oral cavity. Accordingly, third molars, maxillary canines, maxillary central incisors, and maxillary premolars are the most often impacted teeth, accordingly¹¹⁻¹³.

About 23% of people get canine impaction, and females are affected twice as frequently as males. Canine impaction occurs more frequently in the maxilla than the mandible¹⁴. Numerous systemic, local, genetic, and etiologic variables¹⁵ may contribute to canine impaction. Understanding the part that various teeth's impactions play in the etiology of different malocclusions is crucial since these conditions can have an impact on how teeth move, how their occlusion functions, and how they appear when they smile¹⁶⁻¹⁸. For instance, the impaction of the maxillary canine increases the chance of gingival infections, cystic follicular diseases, and root resorption of the adjacent lateral incisors¹⁹. One of the most common dental malformations is canine impaction, as is well recognized^{6,8,18}. The most frequent impacted teeth are maxillary permanent canines and third molars²⁰. Mandibular canine impaction is 20 times more common than maxillary canine impaction²¹.

Dental caries, oral and facial abscesses of odontogenic origin, localized aggressive gingivitis (LAP), periodontitis, bacterial and fungal oral infections, oromandibular dystonia, deep bite malocclusion, and histological and radiographic studies of pathologic change in fully impacted third molar dental follicles are just a few of the subjects that have been the subject of previous research in Yemen²²⁻²⁸. Only a few articles on tooth impaction have been published, and two of them dealt with canine impaction in Sana'a city^{29,30}. However, there has been no information previously discovered about canine impaction in the population of Ibb city. Therefore, in a sample of the Yemeni population in Sana'a, this study sought to ascertain the prevalence and pattern of impacted canines in the upper and lower jaws.

SUBJECTS AND METHODS

Study design: From January 2012 to December 2016, 1403 panoramic radiographs were collected for this cross-sectional study in the Yemeni city of Sana'a. This data was submitted too late for publication as we are still collecting for the remaining years to 2023 and it will be provided soon.

Sample size: The sample size was calculated by random sampling and the epi info software, version 7, in accordance with a population survey study. Taking into account the subsequent standards Sana'a has a population of 4,000,000³¹. As previously reported in Yemen, the expected frequency of canine impaction is

equivalent to 3.55% and the worst acceptable of precision is equal to 0.385% at a 95% confidence level³². The sample size needed to produce meaningful results was 8738 panoramic radiographs, however after adding 32 cases, the total was 7837.

Inclusion criteria: The inclusion criteria were: any patient of Yemeni origin, over 15 years old and not suffering from diseases affecting the skull and jaw.

Exclusion criteria: Patients less than 15 years of age, those with a history of maxillofacial trauma, those with Down syndrome or cleidocranial dysostosis, those with insufficient data or poor OPG quality, and those with incomplete root formation were removed from the study.

Data variables: Each patient had a unique panoramic radiograph taken, which was used to record their gender, impaction type, side (left/right), and jaw (maxilla, mandible).

Data analysis: The gathered information was checked, coded, and subjected to descriptive statistics analysis before being entered into a spreadsheet of Epi-Info version 7 (CDC, US) and subjected to this version's analysis. Results of the relationships between the variables were evaluated and presented as frequency and percentage.

Ethical approval: On September 1, 2022, the Sana'a University Faculty of Dentistry's Medical Ethics Committee issued its official approval under the reference number 202429. The confidentiality of all information, including clinical details and patient identification, was maintained.

RESULTS

The prevalence of impacted canine for the following five years was 5.23%, and ranged from 4.44% in 2015 to 6.06% for 2014. The number of patients tested in 2012 was 2045, 106 of whom were affected by impacted canine (5.18%). The number of patients tested in 2013 was 4422, 235 (5.29%) of whom were suffering from impacted canine. In 2014, the number tested was 431 patients with 26 (6.03%) impacted canine. In 2015 and 2016, the number of patients tested was 697 and 242 patients with 31 (4.44%) and 13 (5.37%) suffering from impacted canine, respectively (Table 1).

Table 1: Distribution of impacted canines by years among Population Referred to panoramic x-ray at dental radiographic centers.

Years	Number tested	Canine impaction N (%)
2012	2045	106 (5.18)
2013	4422	234 (5.29)
2014	431	26 (6.03)
2015	697	31 (4.44)
2016	242	13 (5.37)
Total	7837	410 (5.23)

The prevalence of impacted canine for female was 53.4%, slightly higher than that of male (46.6%). The prevalence of impacted canine was higher in the

maxillary arch (93.9%) than in the lower arch (6.1%); right canine maxillary impaction was 52.4% more than left impaction (47.6%), and the prevalence of impacted left side canine was higher in males (64.1%) than in

females (35.9%), while the prevalence of impacted right side canine was higher in females (69.3%) than in males (30.7%) (Table 2).

Table 2: The Prevalence of the Impacted Canines in Both Yemeni based on sex in a population referred to panoramic x-ray at dental radiographic centers.

Impacted Canines	N (%)	Maxilla N (%)	Mandible N (%)	Left side N (%)	Right side N (%)
Male	191 (46.6)	180 (46.8)	11 (44)	125 (64.1)	66 (30.7)
Female	219 (53.4)	205 (53.2)	14 (56)	70 (35.9)	149 (69.3)
Total	410 (5.23)	385 (93.9)	25 (6.1)	195 (47.6)	215 (52.4)

DISCUSSION

The permanent maxillary canine is next in line for most impacted teeth after the third molar, followed by the mandibular canines. Canines play a crucial role in dental arch uniformity, occlusion, and aesthetics. The maxillary canines also feature the longest and most intricate impulse patterns of any tooth. Dental effusion can result in a number of consequences, including auditory and cosmetic issues as well as functional abnormalities. Canine impaction therefore requires special consideration. Treatment for impacted canines is likely to be lengthy and challenging, and may include fixed prosthodontics or removable prosthodontics¹⁻³ as well as orthodontic forced eruption following surgical exposure. The prevalence of canine impaction among these Yemeni populations in the cities of Sana'a was found to be 5.23%, slightly higher than the prevalence reported by Al-Mutreb *et al.*, study, among the population of Sana'a City, Yemen where canine impaction was 3.55%³². However the rate of this study, lower than that reported by Shumar in 2021, among the population in Sana'a City, Yemen where the prevalence of canine's impaction was 9.2%³³. Higher prevalence of canine impaction have been found in India (9.7%)³⁴, Iran (9.8%)³⁵, and central Saudi Arabia (7.5%)³⁶. Also, a lower prevalence of canine impaction as in our study just above the studies of Hong Kong (2.05%)³⁷, west of Saudi Arabia (1.44%)³⁸, Sudan (2%)³⁹ and slightly similar to West India (5.9%)⁴⁰ and Najran in Saudi Arabia (5.35%)⁴¹.

When the association of impacted canines with sex was considered, there was a higher rate among female patients with the rate being 53.4% versus 46.6% in males. The slightly higher of females in the current study disagrees with the findings of studies previously conducted in Yemen where 66.5%³³ and 65.4%³² of the impacted canines were observed in females. At the international level, studies also show a predilection for females such as that achieved in Hong Kong (61.4%)³⁷, in Sudan where the ratio of males to females was approximately 1:4³⁹, among the Jordanian population (68.6%) were females⁴². However, our results agree with some studies that showed no significant difference between males and females (42.6% vs. 57.4%)^{35,43}. Even so, a few studies, such as the one done at King Khalid University in Saudi Arabia where the male to female ratio was 43:12 (3.58:1)⁴⁰ and in the United Arab Emirates where the male rate was 77%, showed a

stronger inclination for men among the cases of canine impaction⁴⁴.

In the current study, impaction of maxillary canines (93.9%) was more prevalent than mandibular canine impaction (6.1%) (Table 2). Similar results were reported previously in Yemen in which the impaction of maxillary canines was more prevalent than mandibular canine impaction^{32,33}. Internationally among different races, similar results were reported in Western India in which the canine impaction in the maxillary arch was 89.3%⁴⁰, in Sudan 69%³⁹, in Saudi Arabia (94.54%)³⁸ and in Iran, where maxilla to mandible canine impaction ratio was 5:1³⁵.

In line with a prior study among the Sana'a community, which found that the right side was the most hosting side of canine impaction (51.8 % ?)³³, the current study found that the right side was the most hosting side of canine impaction (52.4%) (Table 2). Additionally, a study conducted in a Portuguese community⁴⁵ and in a Jordanian population⁴² found that the right side was dominant in the hosting side of canine impaction. However, no significant differences between left and right side effects were reported between Mexican populations⁴³ and Palestinian populations⁴⁶. On the other hand, some other studies indicated that there is a tendency to the left side, in contrast to previous studies; among these studies, what was done in Belgium⁴⁷, the United Arab Emirates⁴⁴, western India⁴⁰ and Najran in the Kingdom of Saudi Arabia⁴¹.

Limitation of the study

More research is needed to determine whether this relationship results from genetic differences in the sexes or if it results from a malformed sample. An increase in symptomatic findings for impacted canines should be encouraged. As well as at the community level, awareness must be raised and the population should be educated about the clinical effects and the importance of implementing preventive and interceptive measures to prevent the bad effects and complications of canine impaction.

CONCLUSIONS

The following findings can be rejected given the limitations of the current study: Impacted canines were more common in female patients, in the right side's particular maxillary arch. There is a need for more research to assess the pattern of canine impaction and its related dental diseases and anomalies in different

Yemeni locations, including a wider age range. Cone beam computed tomography (CBCT) is a more suitable radiographic technique that should be utilized to locate impacted canines and estimate the prevalence of canine impaction as a whole. In addition, additional research is needed to assess the epidemiological data gathered about postoperative squeals and problems related to the surgical removal of impacted canines in the Yemeni population.

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AUTHOR'S CONTRIBUTION

Alhadi YAA: writing, analyzed data. **Alrahabi LM:** data analysis, report drafting. **Shaalan MA:** editing, review. **Al-Shamahy HA:** data analysis and interpretations. All the authors approved the finished version of the manuscript.

DATA AVAILABILITY

The data supporting the findings of this study are not currently available in a public repository but can be made available upon request to the corresponding author.

CONFLICT OF INTEREST

There is no conflict of interest around this work.

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