

Original Article

The Prevalence of Impacted Maxillary Canine Amongst Libyan Population in Western Region: A Retrospective Study

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ABSTRACT

Aims. This study aims to determine the prevalence of impacted maxillary canines and its distribution difference between gender, location, and side of impaction in western Libyan population using panoramic radiographs. **Methods.** A sample of 1300 panoramic radiographs were retrospectively examined for the presence of impacted maxillary canines. The radiographs were obtained from the records of various private clinics in the capital city of Tripoli. **Results.** 1100 out of 1300 radiographs were selected of the study; of which 56 had evidence of maxillary canine impaction with a prevalence of 5.1%. Canine impaction distribution among the genders, the percentage of impacted canines in males was 37% and in females was 63%. A higher percentage of impactions were seen in female and more often unilaterally 82.1% than bilaterally 17.9%. No differences were noted between the right and left side of impactions. **Conclusion.** The prevalence of maxillary impacted canines in the western Libyan population was found to be (5.1%) lies within the range reported in other populations. The maxillary canine impactions occurred more in females, unilaterally than bilaterally.

Keywords: Impacted Teeth, Permanent Maxillary Canines, Prevalence of Teeth Impaction, Panoramic Radiographs.

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INTRODUCTION

The permanent canine is the most important tooth in the maxillary arch which plays a vital role in both the dentofacial aesthetic and functional occlusion [1,2]. The canine teeth, in general, following their eruption at adult age are essential for the arch development and guidance of teeth movement and, however, their position and projection eminence contribute to alar base support and upper lip curling which in turn enhance facial and dental aesthetic profile [2,3].

The permanent maxillary canines reported to be the second most frequently impacted tooth following the wisdom teeth in the permanent series [1]. This has been attributed to two main reasons; firstly, these teeth are considered last which develop in the series and, secondly, its long path of development and eruption which subjected to several impediments that increase chances of displacement of their normal eruption path and occlusion and subsequently lead to tooth impaction [3,4]. Impaction of permanent maxillary canines is a problem commonly in

encountered by general dentist and their management is challenging that require multidisciplinary dental approach. Based on the clinical and radiographic assessment, permanent maxillary canines that are impacted are either not expected to erupt completely within 6 months of their root completion, or their eruption delayed, or the tooth is absent in the arch during the physiological phase of eruption which compromise aesthetic and functions [5].

Several factors are reported to contribute to the impaction of maxillary canine teeth and these been classified into generalised and localised factors [1,2,3]. The generalised factors have been associated with endocrine diseases, abnormal muscle pressure, vitamin D deficiency and exposure to radiation, whereas the local factors may be attributed to the following; discrepancies of tooth size-arch length, abnormal tooth bud position, early loss or prolonged retention of the deciduous canines, association with trauma, alveolar cleft, ankylosis or other localised pathology such as cystic or neoplastic lesion, missing lateral incisors or idiopathic condition.

Unerupted or impacted permanent maxillary canines are usually asymptomatic but can cause several problems that compromise normal functioning occlusion and aesthetic outcome [2,3]. Complete impaction of maxillary canine can cause displacement and/or external resorption of the roots of the adjacent teeth or a pathology such as cystic lesion. However, partial erupted maxillary canine cause dental arch discrepancies or trigger dental caries and infection if left untreated [1,5].

Clinical and radiological examination at age of 10 years old is essential to locate the position of permanent maxillary canines [1,5]. Panoramic radiographs are widely used either as single modalities or in combination with other standard images such as periapical or occlusal radiographs. In addition, panoramic radiographs are essential dental imaging for recording and planning treatment in patient with missing or unerupted teeth.

A numerous studies estimated prevalence of impaction of permanent maxillary canines among various populations and considerable differences in their

findings have reported the pattern of the impaction [7,8,9,10]. Permanent maxillary canine impaction might occur palatally, labially, unilaterally or bilaterally, and considered to occur more frequently in females than males.

This work aimed to analyse the frequency of permanent maxillary canine impaction to estimate its prevalence among western Libyan population and subsequent difference of distribution in terms of the gender predominance and variation of the side and location of impaction within the maxilla of the studied population.

METHODS

A study of digital panoramic radiographs retrospectively conducted from the capital city, Tripoli, which is the largest population state in the Western region of Libya. The radiographs obtained from stored and archived records of patients from four private dental clinics from the period of 24 months from January 2021 to January 2023. The inclusion criteria of digital radiograph examined for evidence of impaction of permanent maxillary canines, were radiographs of patient at or above age of 15 years at the time of clinical examination. Exclusion of panoramic radiographs considered in the following: a patient under 15 years old, history of orthodontic treatment, history of trauma or permanent maxillary canine extraction, multiple impacted teeth, hereditary dental and medical conditions or syndromes and radiographs of poor diagnostic quality.

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and medical conditions or syndromes and radiographs of poor diagnostic quality.

Sample sizes estimated for this work performed using Biomath online statistic package provided by division of Biomathematics/Biostatistics at Columbia University Medical Centre [11]. Outcome measures considered in this study were based on results from previous study [12]. Sample size calculations undertaken for different outcome measures using a power of 80 % and significance level (α) of 0.05 (two-tailed) and these measures described below. Detectable difference with reasonable effect size would be achievable with sample size of 655 subjects, however, the p vale of 0.05 considered statically significant. Precision value of 1% was set to account for any discrepancies and the final sample size adjusted to 1000 subjects.

The panoramic radiographs examined by two experienced dentists for evidence impaction of permanent maxillary canine teeth. Data processed and analysed using IBM SPSS Statistics V. 22 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.). The chi square test used to reveal any differences in the distribution of pattern of impaction of permanent maxillary canines among gender, and further stratified by being either unilateral or bilateral along with impaction location in the maxilla (left or right), and. A p-value of <0.05 considered statistically significant.

RESULTS

Out of the examined 1300 digital panoramic radiographs, 1100 were selected for the study analysis. Of the selected 1100 patients, 630 were females and 470 were males (table 1); their mean age was 32.46 years and ranging from 15 to 80 years.

Table 1. Gender distribution of the studied sample.

Gender	Number	Percentages%
Male	470	42.7
Female	630	57.3
Total	1100	100

A total of fifty-six patients with evidence of at least an impaction of permanent canines, either unilateral or bilateral in the maxilla. Of these, 21 (37%) were males and 35 (63%) were females. The overall prevalence of impaction of permanent maxillary canines was 5.1%. The prevalence of impaction of permanent canines among genders were more in females as compared to males, 63 % and 37% respectively ($p<0.05$) (table 2).

Table 2. Distribution of maxillary canine impaction amongst gender.

Gender	No impaction	impaction	Total	P-value
	N(%)	N(%)	N(%)	
Male	449 (43)	21 (37)	470 (42.7)	0.002
Female	595 (57)	35 (63)	630 (57.3)	
Total	1044 (100)	56 (100)	1100 (100)	

Overall, 4.67% of males and 5.88% females with evidence of permanent maxillary canines' impaction was further analysed for any differences in impaction of canine when stratified by gender, location (either unilateral or bilateral and side distribution in the maxilla (left or right side). Among those with evidence of impaction, their mean age was 26.11 years and ranging from 15 to 56 years.

The side of maxillary canine's impaction occurred with equal probability ($p=1.000$). Of 56 cases, 46 (82.1%) were unilateral and 10 (17.9%) cases were bilateral impactions ($p<0.05$) (table 3). Out of 46 unilateral cases, 23 were right side impaction and 23 were left side impaction.

Table 3. Distribution of the location of maxillary canine impaction.

Location	Number (%)	p-value
Unilateral	46 (82.1)	0.000
Bilateral	10 (17.9)	
Total	56 (100)	

DISSCUSION

In literature, the prevalence of impacted maxillary permanent canines varies among the different studied populations. This variation might be attributed to the

racial differences, and the methodology of the studies and outcome findings. This study assessed the prevalence of impacted maxillary permanent canines without considering the impactions of other teeth.

Impaction of maxillary permanent canines are reported to be the second most in the series after third molars [1,2,3,4]. In our assessed data, the prevalence of maxillary canine impaction was 5.1% which was within range reported by other studies (1.2-6.29%).

A study of Bangladeshi population's, Alif et al. examined sample of 580 Panoramic images, with only evidence of impaction in 7 radiographs (1.2%) [7]. In Middle East, Mustafa et al assessed 3800 panoramic x-rays and their work showed that 55 patients had at least one impacted maxillary canine which accounted for 1.36% of prevalence of maxillary canine impactions of the studied population in Saudi Arabia [8]. In study of West India population, Patil et al assessed evidence of the impaction of maxillary canines in 4133 radiographs and reported a prevalence of 2.78% to have at least one impacted maxillary canine [9]. In another work, Kifayatuallah et al, examined 500 panoramic radiographs of Pakistani patients and reported only 20 (4%) patients had maxillary canine impaction [10]. Furthermore, Samih et al investigated records of 7730 patients from Alexandria, Egypt treated at several private dental clinics and their result revealed that 229 radiographs had at least one maxillary canine impaction with a prevalence of 2.96% [12]. A study done in Iraqi population involved assessment of 1050 Panoramic x-rays for maxillary canine impaction revealed that the prevalence was 6.29% [13].

Prevalence of impacted maxillary canines among genders was comparable to other studies reported in literature [4,5,10,12]. In females was 3.1%, whereas in males 0.9% with significant association between gender and canine impaction ($P < 0.05$), indicating that females have higher prevalence of permanent maxillary canine impaction than males. It has been postulated that the higher female percentages for due to females are seeking more dental treatment than male along with difference in growth pattern and the

smaller arch width might attributed to this outcome [14,15,16].

In contrast, other reported that males with maxillary canine impaction was three times higher than females [8,17]. Other studies reported that there was no gender difference regarding the maxillary canine impaction [7,18,19,24]. The present study demonstrates that patients with unilateral impacted maxillary canines (82.1%) were higher than those with bilateral impaction (17.9%). These findings are consistent with majority reported by other studies [12,13,15,18]. However, no significant difference in the prevalence of right or left canine impaction in the analysed data. These findings were consistent with other researchers [14,22].

Yet, different results from other studies reporting different distribution of unilaterally impacted maxillary canines between the left and right sides [9,20]. Many authors reported that maxillary canine impaction was more on the left side than right side [9,10,15,16]. In study by Samih et al, the side distribution in the unilateral canine impactions group only (82.1%, n=188) showed, 57 radiographs (24.89%) were with right-side impactions and 131 radiographs (57.2%) were with left-side impactions [12]. This agrees with studies of maxillary canine impaction in the Iraqi population revealed a high percent of impaction on the left side 57.1% than the right side 37.2% [13]. Similarly, Patil et al reported a higher prevalence on the left side 73% as compared to only 20% on the right side [9]. However, other found that the most affected side was the right side in both males and females [19,21].

In general, the results of this study agree with most studies that investigated the impaction of maxillary canines regarding females, unilateral impaction, and non-dominance of the side of maxillary canine impaction [14,21,23]. Although, there is some variation in the percentages when comparing the results of this study to those reported by other studies. The different results may arise from difference of racial origin and methodology of the studied population including sample selection, definition of impacted tooth and the age of the individual.

The present study supports general dentist and dentist with specialists' interest in orthodontics to appreciate the prevalence of permanent maxillary canine impaction and to understand the necessity for early diagnosis and referral to prevent undesirable consequence and complicated management which affect aesthetic and functional occlusion of the dentofacial complex.

CONCLUSION

The prevalence of impaction of permanent maxillary canine impaction was 5.1% and occurred more commonly seen in females. The impaction found more unilaterally than in both sides and equally on both sides in relation to the maxilla. Although, the aetiology of maxillary permanent canine impaction has never been explored in the Libyan population, further studies are essential to evaluate and understand the aetiology, accordingly, impacted maxillary canines can be erupted and guided to an appropriate location in the dental arch.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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