

# Association of vertical growth pattern with canine impactions in Dravidian subjects

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## ABSTRACT

Canine impaction, ectopic canines, canine transposition, canine transmigration, and agenesis are all caused by disturbances during development and eruption of the teeth. The position of the canines is of utmost importance, and they should be carefully inspected as they follow the longest path during eruption in the oral cavity and their shape and position play a major role in occlusal guidance. The prevalence of canine impaction may also be connected to the pattern of facial growth. The objective of this study was to analyze the association of vertical growth pattern and canine impaction in Dravidian population. The dental records were consulted for information. The patient information was gathered from the outpatient data records of patients who were treated with fixed orthodontic treatment at the private dental setup. Patients with canine impactions were shortlisted. Malocclusion, growth pattern, and type of impaction were recorded. The data obtained were tabulated and analyzed using statistical software. Out of 1385 subjects, 35 patients had impacted canines. Among 35 patients with impacted canines, 23 (65.71%) have a vertical growth pattern, 6 (17.14%) have an average growth pattern, and 6 (17.14%) have a horizontal growth pattern. According to the findings of this investigation, there was no gender-related difference in canine impaction. The canine impaction prevalence in Dravidian subjects was found to be 2.53%. Most of them with impacted canines had a vertical growth pattern.

**Key words:** Bilateral, canine, growth pattern, impaction, malocclusion, unilateral

## INTRODUCTION

Canine impaction refers to the abnormal Infraosseous position of the canine that fails to erupt even after the complete root development, whereas displacement refers to the abnormal infraosseous location of the canine prior to

eruption. Permanent canine tooth impaction manifests two times more in the maxillary jaw than in the mandible.<sup>[1]</sup> The majority of the canine impaction is usually due to the palatal displacement in the maxilla. A multidisciplinary approach is required for the successful treatment of impacted maxillary canines.<sup>[2]</sup> Early diagnosis along with timely intervention is required using combined surgical-orthodontic approach to redirect the impacted maxillary canines to erupt in an acceptable location in the dental arch.

Canine impaction has been linked to various reasons such as retained deciduous canine, peg-shaped laterals, lack of normal buccal canine bulge, delay in eruption due to systemic diseases, and migrated or distally tipped lateral

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incisor.<sup>[3]</sup> In terms of its appearance and function, the treatment of impacted canines is of utmost importance. Clinicians must provide patients' different therapy alternatives that are in the patient's best interests in terms of prognosis and interest. Clinicians can limit the incidence of maxillary canine impaction by thorough evaluation along with timely intervention and treatment.<sup>[4,5]</sup>

The most straightforward method of preventing permanent canine impaction is to extract certain deciduous and serial extraction at the appropriate times to provide room for the erupting permanent canine. This therapy usually allows the permanent canines to erupt properly into the dental arch if there is enough space.<sup>[6]</sup> A combined orthodontic-surgical technique can be used to bring out the impacted canines. However, good maintenance of these teeth involves the use of competent surgical technique as well as the orthodontist's ability to administer calibrated forces in a beneficial direction.<sup>[7,8]</sup> The use of the proper force in the proper direction allows for successful management of the impacted canine while also preventing harm to the surrounding teeth. The proper alignment of impacted canines necessitates the use of surgical and orthodontic techniques that are carefully chosen.<sup>[9]</sup> Our team has extensive research experience and expertise, which has resulted in high-quality publications.<sup>[10-29]</sup> The purpose of this retrospective study was to analyze the association of growth pattern and canine impaction in Dravidian population.

## MATERIALS AND METHODS

The research was done in a university setup among subjects who reported to the Outpatient Department which consisted of predominantly South Indian population. In this retrospective study, a total of data of 1385 patients visiting Saveetha Dental College and Hospitals for orthodontic correction were considered. The data were gathered from the patient's treatment records who underwent fixed orthodontic treatment at the Department of Orthodontics. The approval for this study was obtained from the Institutional Ethical Committee (IHEC/SDC/ORTHO/21/235).

Inclusion criteria were based on the patients with impacted maxillary canines in all age groups irrespective of the type of malocclusion and side of involvement. Patients who did not have maxillary impacted canine and patients with previous history of orthodontic treatment were excluded from this study. The data on the type of canine impactions, associated malocclusion, and growth patterns were obtained and were imported to SPSS (version 20.0; SPSS, Chicago, Ill). Descriptive statistics and Chi-square tests were done.

## RESULTS AND DISCUSSION

In this retrospective study, out of 1385 subjects with malocclusion and requiring orthodontic treatment, only 35

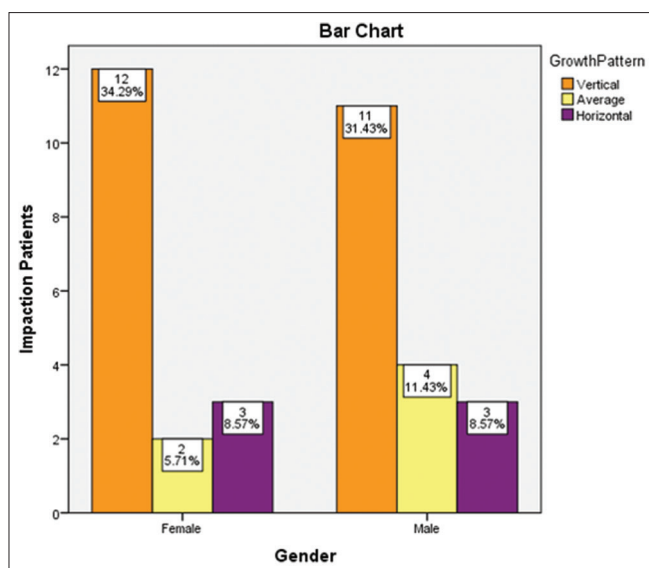
showed the incidence of impacted canine. The prevalence of canine impaction is 2.53%. Out of 35 canine 2 impaction patients, 18 were males and 17 were females [Figure 1]. In this study, out of 35 impaction patients, 23 had a vertical growth pattern, 6 had an average growth pattern, and the rest had horizontal growth pattern [Figure 2]. When evaluating the type of canine impaction, 26 of them had unilateral canine impaction and 9 of them had bilateral canine impaction [Table 1].

The prevalence of impacted canines in the Central Indian population was reported to be 1.38% in a previous study. The frequency of impacted maxillary canines was 0.94%, which was lower than the rate discovered by Al-Ramil *et al.* in their study.<sup>[30]</sup> The study reported a 2.1% frequency in Caucasian and Chinese populations. Another research by Aydin *et al.*<sup>[31]</sup> stated that incidence in the Turkish community was greater than the 0.44% seen in the current sample of 4500 individuals. However, canine impaction was shown to be present in 2.53% of them in our study.

The most typical finding, according to Takahama and Aiyama,<sup>[32]</sup> was unilateral canine impaction. According to a study by Sandhya Jain,<sup>[33]</sup> unilateral canine impaction was the most common impaction, which contradicted the findings of a study by Bass,<sup>[34]</sup> which stated that bilateral canine impaction was the most common impaction. However, only 9 of the 35 patients in our study exhibited bilateral canine impaction, whereas the remaining 26 had unilateral canine impaction. Majority of the studies suggest that the canine impaction prevalence was found to be more in females.<sup>[35]</sup> Some studies, however, have indicated equal frequency of impacted canines in both genders.<sup>[36]</sup> We also discovered that male and female individuals had about equal prevalence in the current investigation.

**Table 1: Frequency distribution of the included sample**

Factors	Frequency distribution	
	Number of patients, n (%)	
Gender		
Male	18	(51.43)
Female	17	(48.57)
Growth pattern		
Vertical	23	(65.71)
Average	6	(17.14)
Horizontal	6	(17.14)
Side of involvement		
Unilateral	26	(74.29)
Bilateral	9	(25.71)
Malocclusion		
Class I	29	(82.86)
Class II division 1	5	(14.29)
Class II division 2	1	(2.86)
Class III	0	



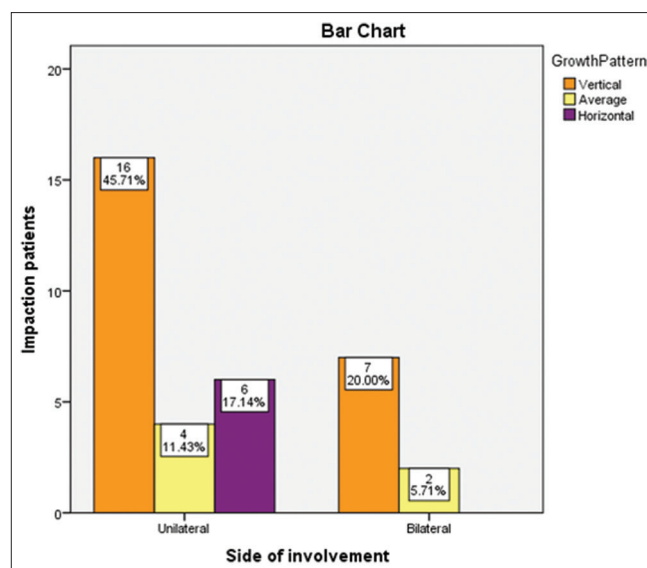
**Figure 1:** Bar graph depicts the Chi-square correlation between gender and growth pattern in subjects with canine impactions. Vertical growth pattern was most common among subjects with canine impactions. Gender and growth patterns did not have a statistically significant relationship.  $P$  value for Chi-square 0.7 ( $P \geq 0.05$ , statistically not significant)

Many researchers have tried to figure out which dental and skeletal characteristics are linked to a higher risk of canine impaction. Canine impaction was linked to Class II division 2 malocclusions in 33.5% of patients and 9% of Class III patients, according to Basdra *et al.*<sup>[37,38]</sup> However, in our study, impaction of canine was associated with Class I malocclusion in 82.86% of cases followed by Class II division 1 malocclusion in 14.29% of cases and Class II division 2 malocclusions in 2.86%.

Sacerdoti and Baccetti discovered that canine impaction was three times more common in hypodivergent individuals than in normal participants, demonstrating a link between vertical craniofacial characteristics and canine impaction.<sup>[39]</sup> Larsen *et al.* also found that those with impacted maxillary canines had a transversely larger maxilla but a sagittally and vertically smaller maxilla, emphasizing the need of a three-dimensional study of space in ectopic canine cases.<sup>[40]</sup>

Few researchers believe that the correlation between certain skeletal and dental malformations may be attributable to genetic rather than environmental reasons.<sup>[41]</sup> Overall, there is no clear evidence of a link between craniofacial characteristics and maxillary canine impaction in the extant research. As per previous study's findings, a skeletal pattern cannot be utilized to predict the probability of canine impaction developing. However, the majority of patients with canine impaction in our study had a vertical development pattern.

Canines are one of the most significant teeth in the jaw since they serve in smile esthetics, canine guidance, and other



**Figure 2:** Bar graph depicts the Chi-square correlation between side of involvement and growth pattern in subjects with canine impactions. Vertical growth pattern was most common among subjects with both unilateral and bilateral canine impactions. No significant association between side of involvement and growth pattern is noted. Chi-square  $P = 0.2$

functions. The orthodontist must be familiar with canine anomalies in order to recognize them at an early age and treat them effectively. Data from all population groups are essential because the prevalence of canine impaction differs by population. The study's primary flaw was its lack of external validity, and the sample size was too small. The current study's primary flaw was its lack of external validity and the small sample size. This was a one-sided, geographically limited study. The project's future scope was to be done as a multicentered study with a geographic extension.

## CONCLUSION

The prevalence of canine impaction among subjects reporting to a dental hospital was 2.53%. Most of the patients with canine impactions had vertical growth pattern, Class I malocclusion, and unilateral involvement.

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## Conflicts of interest

There are no conflicts of interest.

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