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ORIGINAL ARTICLE

PREVALENCE AND PERCENTAGE OF IMPACTED MAXILLARY CANINE AND AGENESIS OF MAXILLARY CANINE IN NORTH KERALA POPULATION – A RADIOGRAPHIC RETROSPECTIVE PILOT STUDY

Dr.Jenish Harry, Dr.Jithesh Kumar, Dr. Panchami Marish

Department of Orthodontics and Dentofacial orthopedics, Mahe Institute of dental sciences and hospital, Mahe, Puducherry, 673310, India

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Address for Correspondence
Dr. Jenish Harry,
Mahe Institute of dental sciences and hospital,
Mahe, 673310
Puducherry,
India
Email: jenishharry@gmail.com

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ABSTRACT

The purpose of this study was to evaluate the percentage of impacted maxillary canine and agenesis of maxillary canine from 12 to 26 years of age in the north Kerala population. Random 250 patients' orthopantomograms have been taken from the year 2015 - 2021 from the north Kerala population. The age selection was from 12 to 26 years. Statistical analysis revealed that the frequency distributive percentage of impacted maxillary canine is more when compared to agenesis of maxillary canine. Maxillary canine impaction is more prevalent than the agenesis of maxillary canine with female dominance.

KEYWORDS: Canine agenesis, Canine impaction, North Kerala population, Frequency distribution

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INTRODUCTION

Impaction is defined because of the failure of tooth eruption at its appropriate site within the dental arch, within its normal period of growth. There are various terminology in literature to define impaction including delayed eruption, primary retention, submerged teeth, impacted teeth, etc. After the third molar, the maxillary permanent canine is the most ordinarily impacted tooth. Mandibular canines, premolars, and incisors follow in order of decreasing frequency. Canines play an important role in facial appearance, dental aesthetics, arch development, and functional occlusion. apart from maxillary 3rd molar, maxillary canine impaction is more common. other than their importance in a perfect mutually protected occlusal scheme, the maxillary canine also plays a key role in the aesthetics and continuity of the dental arch. Several complications may result from the impaction of teeth, including aesthetic and phonetic compromises, loss in arch length, and hurting [1]. The ectopic eruption and impaction of maxillary permanent canines could be a frequently encountered clinical problem. Although there are wide variations in impacted teeth among individuals, third molars remain the foremost prevalent impaction [2]. Multiple factors are considered to blame for the upper impaction prevalence of canines; for example, maxillary canines have a relatively long-rooted path of eruption, develop deep into the jaw and erupt following neighboring teeth. Mandibular canine impactions, on the other hand, are much less common than maxillary canine impaction [3]. Additionally, genetic factors play a big role in the development of maxillary canine impactions (MCIs) [4]. The potential of the maxillary canine for impactions and eruption guidance facilitated by lateral incisors are controlled by genetics. Therefore, the developmental stage of a tooth encompasses a key role in the guidance. The occurrence of bilateral canine impaction is more common than a unilateral ectopic canine eruption [5,6]. Maxillary canines are the foremost frequently impacted teeth after the third molar, with an incidence starting from 0.9% to 2.2%. Several authors reported that the palatal to buccal maxillary impaction ratio is 3:1, with an incidence twice as high in females compared with males [7]. The prevalence of impacted mandibular canines varies from 0.05% to 0.4%, which is a smaller amount frequent than impaction of maxillary canines, starting from 0.9% to 2.2%.

It's often tough to predict whether a missing canine is affected, delayed in eruption, or congenitally absent, especially in young individuals, when it concerns timely diagnosis. Hence, the detailed assessment of the disorder for its location, angulation, and orientation is vital for treatment planning.

Tooth agenesis or hypodontia is one amongst the foremost common anomalies of human dentition, characterized by the developmental absence of one or more teeth. Several studies have reported that the ubiquity of congenital absence of permanent teeth varies from 3% to 11% among European and Asian populations. A meta-analysis done by Polder [8] in 2004, showed that dental agenesis is sometimes 1.37 times more frequent in females than in males. The foremost affected teeth were found to be the maxillary canines, mandibular second premolars, the maxillary lateral incisors, and the maxillary second premolars.

Hence, the present study is aimed to appreciate the prevalence and distribution of the percentage of impacted maxillary canines and agenesis of maxillary canines in the north Kerala cohort.

AIM

The purpose of this study was to appreciate the percentage of impacted maxillary canine and agenesis of maxillary canine in age from 13 to 26 years in the north Kerala population.

OBJECTIVES

1. To study the prevalence of impacted maxillary canines
2. To study the prevalence of congenitally missing maxillary canines
3. To evaluate and compare the percentage of impacted maxillary canine and agenesis of maxillary canine in the north Kerala cohort.

METHODS

The design of the study was a retrospective radiographic study in which orthopantomograms (OPG) of random 250 patients have been taken from the year 2015 - 2021 from the

north Kerala population. The age selection was from 12 to 26 years. The panoramic radiographs were assessed and the observations were recorded by one investigator. The radiographs were taken with a Planmeca digital X-ray machine exposed to 72kvp, 10Ma, and 0.8s, from a fixed distance of 60 inches.

RESULTS

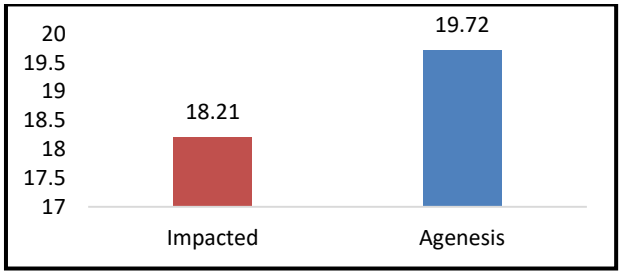
Data were analyzed using descriptive and inferential statistics. The mean comparison was carried out using ANOVA among three groups, the frequency distribution of gender among groups studied was carried out using chi-square. A p-value of <0.05 was considered significant. Statistical analysis was performed electronically by using Window SPSS (ver.24, IBM, Chicago, USA). Statistical significance was accepted at 5% ($p < 0.05$).

A comparison of mean age between the impacted and agenesis groups showed that there was no statistically significant difference found in the mean age p>0.05 (Table.1, Graph.1).

Table 1 Comparison of mean age between impacted and agenesis group

Group	N	Mean	SD	ANOVA	P-value
Impacted	84	18.21	4.03	7.142	0.096NS
Agenesis	22	19.72	2.45		

Graph 1 Mean Age of two groups

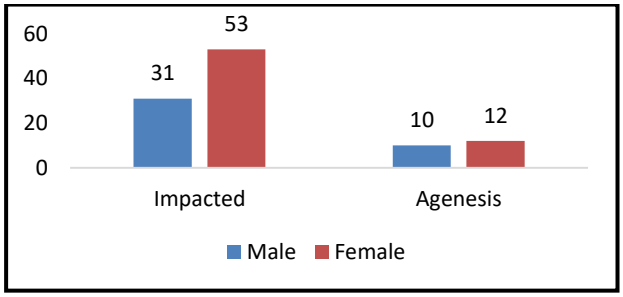


The distribution of gender between impacted and agenesis groups showed that there was no statistically significant difference in the distribution of gender. However, female dominance was noted in the impacted canine group. (P>0.464) (Table.2, Graph.2).

Table 2 Distribution of gender between impacted and agenesis groups

Group	Male	Female	Chi-square	P-value
Impacted	31	53	0.537	0.464NS
Agenesis	10	12		

Graph 2. Mean age of two groups

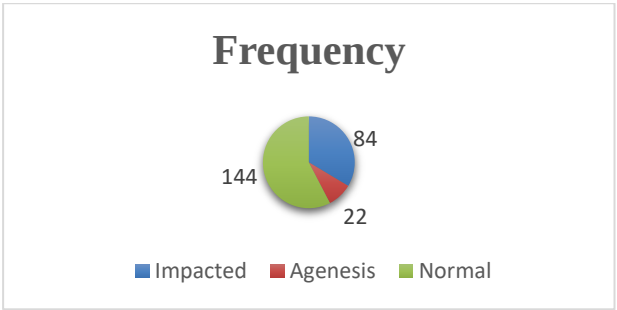


Frequency distribution among participants showed that 30.6% were having impacted canine, 8.8 % had agenesis and 57.6% were normal (Table.3, Chart.1).

Table 3. Frequency distribution among participants

Group	Frequency	Percentage
Impacted	84	30.6
Agenesis	22	8.8
Normal	144	57.6

Chart 1. Frequency distribution chart among two groups



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DISCUSSION

The goal of this retrospective radiography investigation was to access if there were any associations between tooth agenesis and MCI in a North Kerala population, using orthodontic patients without agenesis and impaction as a control group. Overall, after analyzing for gender, it was noticed that the prevalence of MCI was greater in females compared to males across agenesis and no agenesis; and it was noted that there was no association between MCI and agenesis of maxillary canine once gender was taken into account.

There has yet to be a study in North Kerala that looks into maxillary canine agenesis and MCI, as a result, any theories concerning these events would be based purely on study samples from various ethnicities. According to the methodology used, studies on maxillary canine agenesis and MCI can be divided into two categories: (1) those examining patients who had been diagnosed with impaction and then looking for consequent agenesis among those patients, and (2) those examining subjects who were identified with tooth agenesis and then looking for concomitant impaction among those patients. Mercuri et al. [9] examined palatally displaced canines and labially displaced canines individually and identified no agenesis in both impaction types.

In studies that started with an agenesis sample, MCI prevalence ranged from 5.2 percent to 12.6% when at least one upper lateral incisor agenesis was present [10] and 8.1% in the presence of at least one-second premolar agenesis. The potential confounding effect of gender is not taken into account in any of the aforementioned investigations. The current study, on the other hand, looked at gender individually and found no correlation between gender and agenesis condition. Agenesis status was defined as a four-way vector of features in our study for statistical analysis. A bigger sample would be better for detecting a substantial difference when one exists, but it would be worse for finding specific trends in certain forms of agenesis.

Despite the fact that women outnumber men in this study with a sample size of 250, there is evidence that gender is a weak predictor of MCI. After accounting for agenesis status, females had a 5 percent chance of developing MCI compared to males. This conclusion, when taken with the findings of previous research that show a higher female prevalence, refutes the idea that impaction has a strong sex inheritance pattern.

The criteria for diagnosing MCI and agenesis were the same in both groups. Establishing that the exposure before the disease is a challenge when doing a retrospective radiography analysis; however, this was not a difficulty in this investigation because maxillary canine agenesis is frequently seen before MCI. The maxillary canine eruption course cannot be assessed radiographically until the age of ten years, beyond which there is still a possibility of self-correction [11,12]. With the purpose of eliminating data bias, the key age of 12 years was chosen as an appropriate cut-off age for diagnosing both MCI and maxillary canine agenesis. Furthermore, because of the patients' age, the risk of remembrance bias (patients or parents recalling past extractions/traumas) is lower. However, the effects of endocrine state and gender on tooth eruption timing were not taken into account.

In the current study, the frequency distribution among participants showed that 30.6% were having impacted maxillary canine, 8.8 % had maxillary canine agenesis and 57.6% were normal. These data suggest that, while MCI differ in their etiologic basis, some commonalities can be expected in the scenario of contemporaneous agenesis. The present study, however, did not look at the distorting effect of crowding.

CONCLUSION

From this present study, by accessing the orthopantomograms (OPG) of random 250 patients from 13 to 26 years of age, it has been concluded that,

1. Frequency distribution among participants showed that 30.6% were having maxillary impacted canine, 8.8 % had maxillary canine agenesis and 57.6% were without MCI and agenesis.

2. Female dominance was noted in the MCI group with a percentage of 5%

ETHICAL APPROVAL:

The research protocol was approved by the Human Research Ethics Committee: HREC project: MINDS/PG-ETHICAL/006/2019-20.

INFORMED CONSENT:

For this type of study, formal consent is not required.

FUNDING:

No funding

DISCLOSURE OF INTEREST:

The authors declare that they have no competing interests.

DATA AVAILABILITY STATEMENT:

The data that supports the findings of this study are available within the article [and its supplementary material].

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