PREVALENCE AND ANALYSIS OF FACTORS ASSOCIATED WITH CANINE IMPACTION IN CLASS III MALOCCLUSION. - A RETROSPECTIVE CASE STUDY

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Abstract

Impacted teeth are those with a delayed eruption time or that are not expected to erupt completely based on clinical and radiographic assessment.After the third molars, the maxillary canine is the second most frequently impacted tooth in the dental arch. The prevalence of impacted maxillary canine is 0.9 to 2.2%. Knowledge of occlusion of each patient can contribute significantly to complete care and instruction.The aim of the study was to analyse the association of canine impaction to age , gender and types in class III malocclusions. This was a single retrospective study set in a university dental hospital with predominantly south Indian population. The data was collected from the electronic database of the university.A total of 50 patients were included in the study .Data tabulation was done in EXCEL then it was imported and assessed using Statistical Package for Social Science 20(SPSS,IBM corporation). A test for frequency of incidence of impacted canine among patients diagnosed with class III malocclusions was conducted. Chi-square test was conducted for association of age , gender , type of class III malocclusion.The results were descriptively presented in the form of graphs and tables . Only patients with true class III malocclusion in the age range of 13-30 yrs were included in the study.Among the study population 78% of the patients were diagnosed with a skeletal class III and 22% of the patients were diagnosed with a dental class III. Out of the whole study population only four patients had impacted canines that is 8% of the total study population.Of the total study population , 6% of the patients with impacted canines were male and 2% of the patients were female.Canine impaction has statistically significant association to both adult and child age groups, p=0.028. Also males patients with class III malocclusions showed a higher association to canine impaction , p=0.004. Among the study population , canine impaction showed more association with dental class III patients ,(p = 0.038).

I. Introduction

Impacted teeth are those with a delayed eruption time or that are not expected to erupt completely based on clinical and radiographic assessment.[1] Failure of tooth eruption may be the consequence of local factors. These factors may include mechanical obstruction; insufficient space in the dental arch due to skeletal discrepancy(micrognathia); or to the premature loss of deciduous teeth or to tooth arch size discrepancy. Systemic factors such as genetic disorders, endocrine deficiencies, previous irradiation of the jaw may also be associated with the failure of tooth eruption . In a majority of systemic conditions multiple teeth are usually impacted. In most cases however the specific cause of failure of eruption remains unknown.[2]

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Third molars, maxillary canine, maxillary and mandibular premolar, and maxillary central incisor are the teeth most frequently involved.After the third molars, the maxillary canine is the second most frequently impacted tooth in the dental arch. The prevalence of impacted maxillary canine is 0.9 to 2.2% but mandibular canine impact impaction occurs less frequently.[3,4] A large number of completely impacted teeth may be retained when asymptomatic. However, Bishara et al, suggested a few sequelae of canine impaction,such as labial or lingual malpositioning of the impacted tooth, migration of the neighbouring teeth and loss of arch length, external root resorption of the impacted tooth as well as the neighbouring tooth, infection particularly with partial eruption resulting in pain and trismus and referred pain. [5]

Occlusion is the relationship between the maxillary and mandibular teeth when they approach each other, either during chewing or at rest.[6] It is examined and recorded as part of the oral examination. Knowledge of occlusion of each patient can contribute significantly to complete care and instruction. Recognition of malocclusion assists in the reference of patients to the orthodontist, gives many valuable points of reference for patient instruction, and determines necessary adaptations in technique.[7] Occlusion has been defined as the interdigitation of maxillary and mandibular teeth [8].This description is misleading in that it implies that occlusion is a static contact relationship or arrangement of teeth. The practical concept of occlusion is to recognise the interplay between the teeth, temporomandibular joint and neuromuscular system.[9] The World health Organisation (1962) define malocclusion as a dentofacial anomaly.

Currently , even though malocclusions occurs in a majority of the population , it's a variation to normal occlusion and is an eccentric condition that required treatment .[8]According to the angle classification class III malocclusion is defined as the mesially placed lower molar in relation to the upper molar with no specifics in regard to the line of occlusion[10,11] . Nevertheless as with all Angles classification,class III malocclusion comprises several skeletal and dental components that may differ from the concept of normality. Previous studies regarding force implementation , resin penetration , soft tissue profiles , mini implants for anchorage[12–22] , clinical reports, clinical trials regarding different approaches[23–26] kindled our interest in epidemiological studies related to malocclusion and impactions . Multiple studies have documented the prevalence of class III malocclusion. Although the incidence of canine impaction and its relation to class III malocclusion has not been investigated in the south Indian population.The aim was to analyse the association of canine impaction to age , gender and types in class III malocclusions .

II. Materials and methods :

This was a retrospective study conducted in a university dental hospital with predominantly south Indian population. The data was collected from the electronic database of the university. The ease of access and the availability of a standardised data collection format, complete availability of photographic data of both pre and post orthodontic therapy was an advantage. The approval for the research was given by the ethical review board of Saveetha Institute of Medical and Technical Sciences (SDC/SIHEC/2020/DIASDATA/0619-032020).

The study population selected were outpatients who were diagnosed with a Class III malocclusion at the department of orthodontics at Saveetha Dental College from the duration of June 2019 to march 2020. Patients with trauma to teeth , systemic diseases, previous orthodontic treatment, periodontal pathology were excluded from the study. All incomplete data was excluded on the basis of possible bias. As the data was collected from the university database, and as it was verified both by department and the patient and cross-checked with the photographic record, the study was said to be internally valid. The results of this study can be applied to the south Indian population for epidemiological inferences.
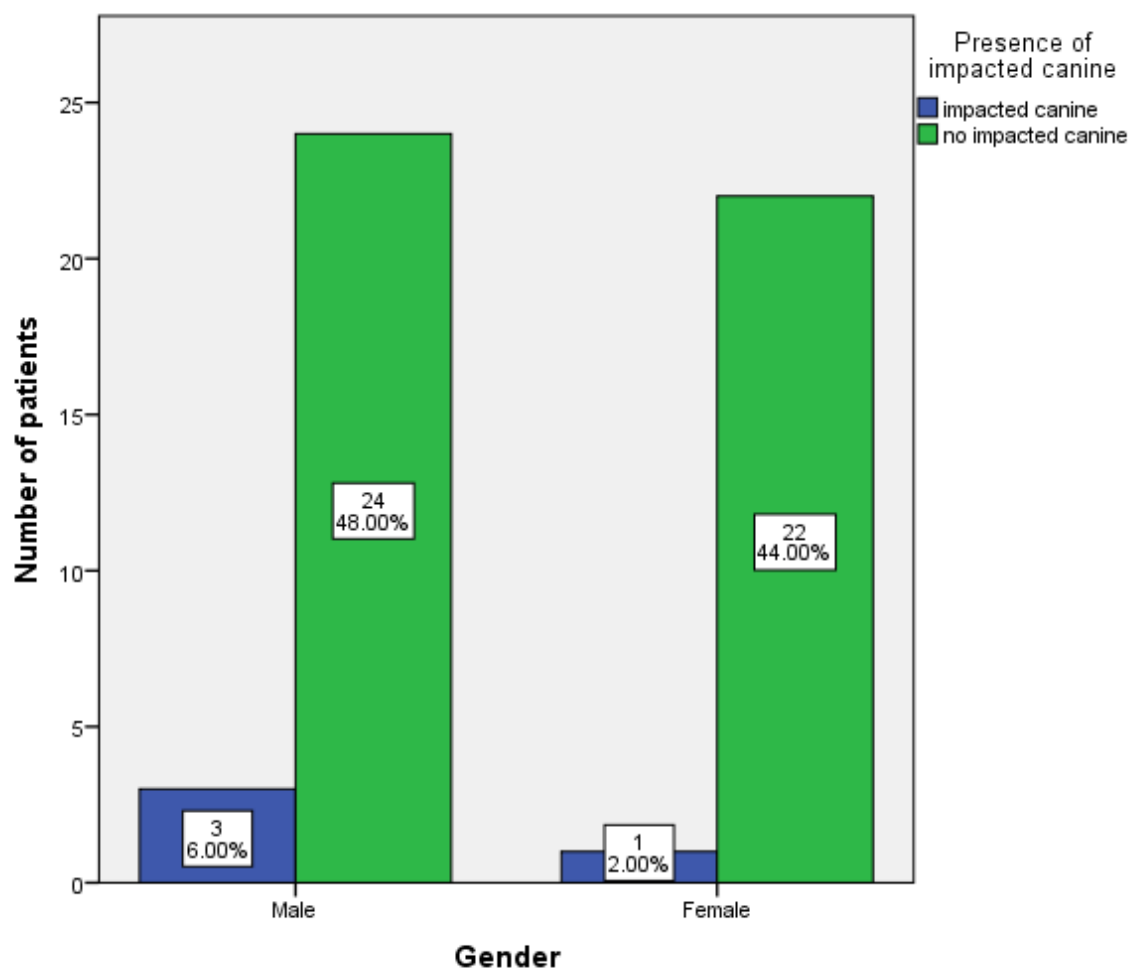
A total of 50 patients were included in the study. The data tabulated from the university database was PID (patient identification), duration of treatment ,age, gender,pret-op digital records etc.Data tabulation was done in EXCEL.The data was imported and transcribed in Statistical Package for Social Science 20(SPSS,IBM corporation). A test for frequency of incidence of impacted canine was conducted. Chi-square test was conducted for association of age , gender , type of class III malocclusion . Finally, the results were descriptively presented.
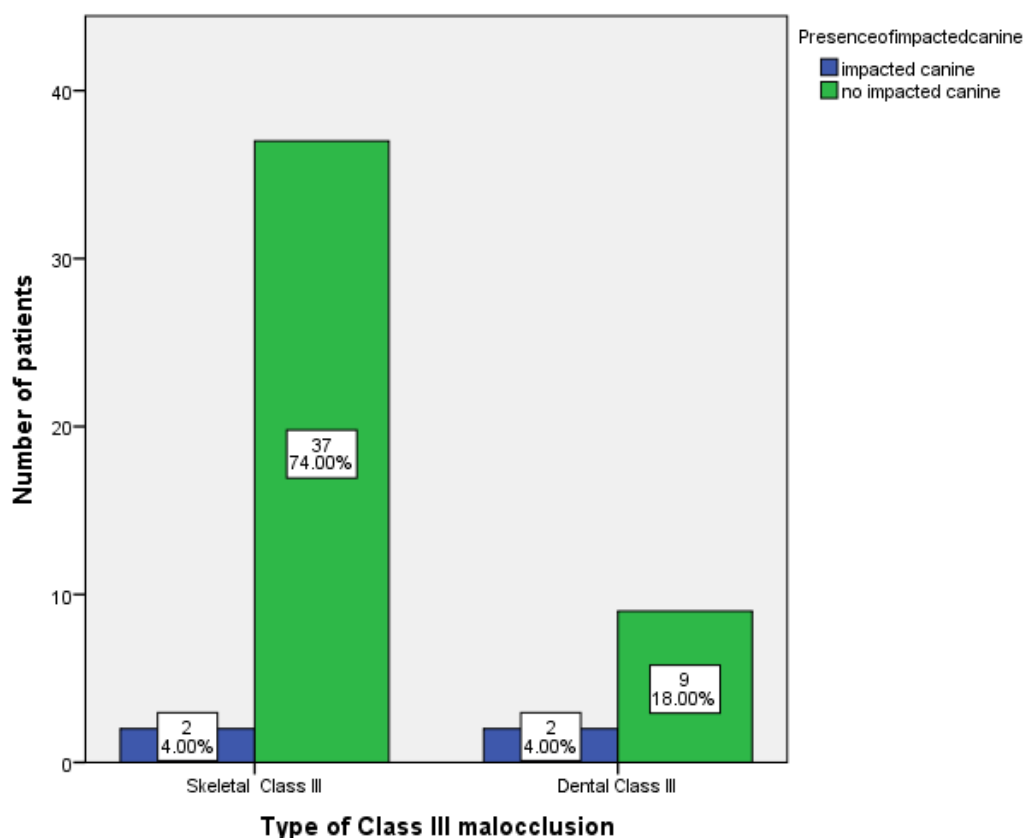
III. Results :

A total number of 50 patients were included in the study who were diagnosed with class III malocclusion during the duration of the study.The patients included aged from a range of 12 years to 31 years . Only patients with true class III malocclusion were included in the study. Of the whole study population , 78% of the patients were diagnosed with a skeletal class III and 22% of the patients were diagnosed with a class III subdivision. Out of the whole study population only four patients had impacted canines that is 8% of the total study population. 6% of the patients with impacted canine were male and 2% of the patients were female.Canine impaction has statistically significant association among both adult and child age groups, p=0.028(graph 3) Also males patients with class III malocclusions showed a higher association to canine impaction , p=0.004(graph 1) . Among the study population , canine impaction showed more association with dental class III patients , p = 0.038 .(graph 2)

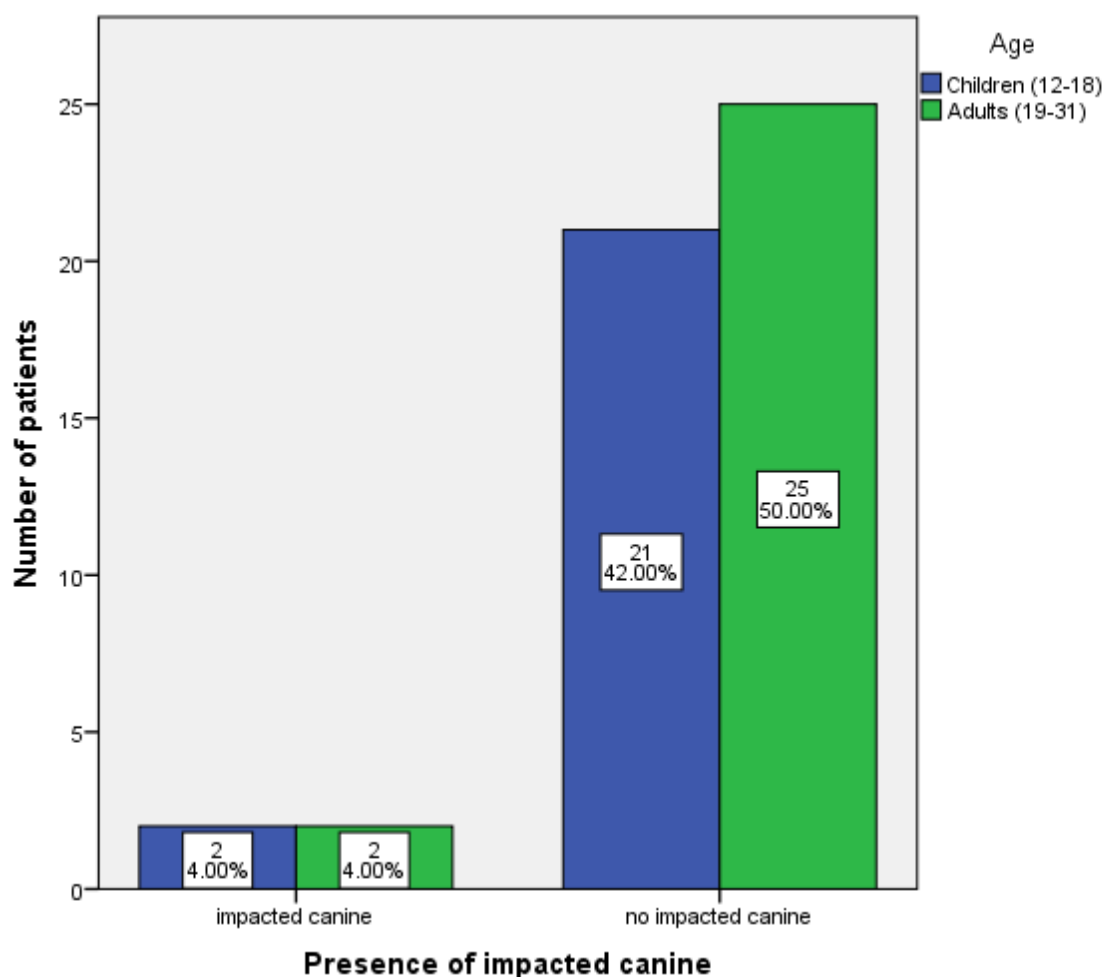| | | | Presence of impacted canine | |
| | | | impacted canine | no impacted canine |
			Number of patients (%)	Number of patients (%)
Type of malocclusion	Skeletal Class III	Male	2(4%)	20(40%)
		Female	0(0%)	17(34%)
	Dental Class III	Male	1(2%)	4(8%)
		Female	1(2%)	5(10%)

Table 1: Table discribes the study popuplation based on gender anf type of class III maloccusion . Canine impaction is seen in 4% of the male population with skeletal class III malocclusion and 2% of the dental class III malocclusions .Also , among the female study population canine malocclusion is seen in only 2% of the dental class III malocclusions and none in skeletal class III malocclusion .

Graph 1 : Graph depicts the association between presence of impacted canine patients diagnosed with class III malocclusion and gender. The X axis denotes the gender of the patients and the Y axis denotes the number of patients with or without impacted canine. Among the study population , male patients were found to have 6% of impacted canine(blue) . The female study patients were found to have 2% of impacted canine(blue). Chi square test. p=0.004 ,(<0.05) hence statistically significant .

Graph 2: Graph depicts an association between the type of malocclusion and presence of impacted canine .The X axis represents the type of class III malocclusion and the Y axis represents the number of patients with or without canine impactions .Among the patients with skeletal class III , 2% of the patients have impacted canines (blue). Also among patients with dental class III, 2% of the patients have impacted canines (blue) .Impacted canines have more association with dental class III patients ,chi-square test done , Chi square test done.P = 0.038(<0.05) which is statistically significant.

Graph 3: Graph shows the association between incidence of impacted canine and age. The X-axis represents incidence of impacted canine and Y-axis represents the number of patients . About 4% of the study population with impacted canines belong to the adult age group (green) and 4% of the study population with impacted canines belong to the age agroung of children (blue)Chi square test done.p=0.028(<0.05) , hence statistically significant .

IV. Discussion :

In our retrospective study , 50 patients who had been diagnosed with class III malocclusions had been radiographically evaluated for presence of impacted canines . Among the 50 patients diagnosed with class III malocclusion , only 4 patients , that is 8% of the population had impacted canines . Out of which male patients showed a higher prevalence 6% and 2% of the female patients had impacted canines(graph 1) .Canine impaction has statistically significant association among both adult and child age groups, p=0.028(graph 3) Also males patients with class III malocclusions showed a higher association to canine impaction , p=0.004(graph 1) . Among the study population , canine impaction showed more association with dental class III patients , p = 0.038 .(graph 2). The large variation in Angle class III malocclusion prevalence rates can be seen globally suggesting a high level of variability across geographic regions and races. Chinese and Malaysian groups showed a much higher mean prevalence rate than other racial groups: 15.69% and 16.59%, respectively. This is also consistent with previous reports of higher rates of Angle class III malocclusion among Asian populations .[27] Literature also states that previously reported Angle class III prevalence data appears to be haphazard at best among different populations. Furthermore, major discrepancies appear to exist among populations within

individual countries.In the limits of our study among patients who reported to the orthodontic department for treatment, 36.2% of the study population were diagnosed with Class III malocclusions. Only patients with true class III malocclusion were included in the study. 78% of the patients were diagnosed with a skeletal class III and 22% of the patients were diagnosed with a class III subdivision.(table 1). The results of these and our study are not comparable because our study accomplished only on the orthodontic patient population.

There are many reasons why canines fail to erupt.[28] Most surgeons agree the reasons may include a suspected pathological condition, infection, interference with prosthetic devices, disturbance of the existing dentition, pain, and ectopic eruption. Many authors have also speculated about the cause of impacted canines and their relation to malocclusion[6] . These causes include inadequate space, supernumerary teeth, premature loss of the deciduous dentition, retention of the deciduous canine, excessive crown length, hereditary factors, functional disturbances of the endocrine glands, tumors, cysts, and trauma. [29]Mitchell[30] reported trauma also has an effect on the impaction of a tooth as an etiologic factor.

In this study,(graph 1) the incidence of canine impaction in men was more than women (6% in men, 2 % in women), being statistically significant(p<0.05). Nagahara et al observed that the frequency of tooth impaction is not different between men and women[31] .In contrast, Dachi and Howell et al stated that girls most likely have canine impaction twice more than boys[32] .The prevalence of impacted maxillary canines is 0.9–2.2% in a population with normal occlusion.[4] In the limits of our study , the incidence of impacted canine among patients with class III malocclusions was found was 8% of the study population has impacted canines.Among the study population , canine impaction showed more association with dental class III patients . A chi-square analysis done among patients with class III malocclusions and of canine impaction , gives a P value of 0.038 , so this association between dental class III malocclusion and canine impaction was significant (p> 0.05).In another study, a researcher observed that the prevalence of canine impaction was not different significantly between patients with class III malocclusion [33] .Also, Leifert et al reported that Angle C [34] .A study population with a much bigger and unbiased study population may help shed a light on the association between malocclusions and impacted canine .

V. Conclusion :

Within the limited sample size, canine impaction was found in 8% of class III malocclusion patients. Canine impaction has statistically significant association among both adult and child age groups, p=0.028 . Also males patients with class III malocclusions showed a higher association to canine impaction , p=0.004 . Among the study population , canine impaction showed more association with dental class III patients , p = 0.038 .

Authors Contribution

Author 1 (Amina Mehrin Bano) carried out the retrospective study by collecting data and drafting the manuscript after performing the necessary statistical analysis . Author 2(Dr.Srirengalakshimi) aided in conception of the topic , has participated in the study design , statistical analysis and has supervised in preparation of the manuscript . All authors discussed the results and contributed to the final manuscript.

Conflict Of Interest

The researcher claims no conflict of interest

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