

INCIDENCE OF MESIODENS IN CHENNAI BASED DENTAL COLLEGE

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ABSTRACT:

Aim :

To assess the incidence of mesiodens in Chennai based dental college.

Introduction:

Mesiodens is the supernumerary teeth between the two central incisors in the premaxillary region which contributes to various dental issues such as dentofacial impairment, malocclusion and sometimes cyst development. In the current study, this condition is focused on its prevalence with regards to age, gender and also the frequency of treated and untreated patients were evaluated.

Materials and methods:

Case sheets of patients were obtained from Record management system software for analysis. Patients with mesiodens who visited Chennai based dental college from June 2019 to February 2021 were selected and the sample size was found to be n = 94 patients. The collected data was then tabulated for statistical analysis using SPSS.

Results:

From the results obtained in our study, incidence of mesiodens was more prevalent in males (79.79%) than females (20.21%) and also the majority of the male population (46.81%) got treatment for the same. It was also found that the majority of the patients belonging to 1 - 10 years of age have undergone treatment for mesiodens.

Conclusion:

Within the limitations of the study it can be concluded that an in depth analysis of mesiodens will be beneficial in developing effective clinical care for the affected individuals.

Keywords: Prevalence; mesiodens; dental disturbances; management.

INTRODUCTION:

Supernumerary teeth are developmental abnormalities that arise during odontogenesis and lead to the creation of teeth in surplus of the usual number. Excess teeth can appear in both the permanent and primary dentitions, although the primary dentition is five times less likely to have them. According to Alberti et al (1) mesiodens are the most prevalent form of supernumerary tooth and they can be solitary, numerous, unilateral, or bilateral in nature. Since the Lower Pleistocene era, the first verified record of supernumerary teeth has been identified in ancestral skeletal remnants (2) and the most primitive proof of the existence of mesiodens was discovered among the bones of an Australian aboriginal 13000 years ago (3). It has also been noted that an inverted mesiodens extruded into the nasal cavity was found in ancient remains discovered in Germany around the 7th century (4).

The etiology of mesiodens is unknown; nevertheless, the literature presents three theories explaining the cause of mesiodens, though this topic is still debated and was formerly thought that mesiodens were a phylogenetic vestige of extinct ancestors with three central incisors. A theory called the Phylogenetic reversion (atavism) is an idea that embryologists have largely abandoned. Secondly, the dichotomy theory proposes that the tooth bud splits to become two teeth, one of which is the mesiodens. Followers of this idea argue that dichotomy is a sign of entire germination, which is also common in the anterior maxilla (5). The third theory, which involves the dental lamina's hyperactivity, is largely acknowledged which proposed that dental lamina remnants or palatal offshoots of active dental lamina are stimulated to grow into an additional tooth bud, resulting in a supernumerary tooth. The fact that supernumeraries are more prevalent in family members shows that genetics may play a role, although it does not follow a straightforward Mendelian pattern. Environmental variables have been hypothesized to influence genetic susceptibility (6). The ability to transmit genes via an autosomally dominant characteristic was found with insufficient penetration, and an X-linked heritage was revealed that might explain sexual dominance in this anomaly. It has also been stated that environmental variables could play a significant role in the incidence of mesiodens along with splitting of the tooth bud or the dichotomy theory (7).

Clinical and radiographic exams are the most effective ways to detect the existence of mesiodens. To aid in the diagnosis of mesiodens, panoramic, maxillary occlusal, and periapical radiographs are recommended. A panoramic radiograph acts as a screening tool and offers extra details on the related supernumerary or congenitally missing teeth that are commonly observed with mesiodens, however this type of imaging usually produces minimal evidence of the mesiodens due to a lack of precision in the midline area (8). Obtaining two periapical or maxillary occlusal films, which are examined according to the parallax, is the most diagnostic radiographic approach for identifying and locating a mesiodens. This type of film analysis allows the determination of the eruption course (normal, inverted, or horizontal) and position (palatal or labial, superior or inferior) of the affected mesiodens relative to surrounding structures, as well as the creation of an effective treatment strategy (9). Cone-beam computed tomography (CBCT) scans, on the other hand, may provide the three dimensional connectivity of the mesiodens to the related teeth and nearby structures, which is important for treatment planning (10).

Mesiodens can have a variety of morphologies which are categorised based on whether they occur in the primary dentition (supplementary mesiodens) or the permanent dentition (rudimentary mesiodens) and there are three main forms based on their morphology; specifically, conical or peg shaped, tuberculate, and molariform mesiodens have been documented, with the conical form being the most prevalent (11). Mesiodens erupt regularly in some patients, however they frequently stay impacted or erupt inverted. It's also possible that these teeth will emerge in an unusual pattern or even in an ectopic area. Supplementary mesiodens are similar in size and shape to natural teeth, but rudimentary mesiodens have an irregular form and are considerably smaller. Conical mesiodens are frequently seen alone. They are often peg shaped and are normally situated palatally between the maxillary central incisors, likely to displace the emerging permanent central incisors. Conical mesiodens frequently have a fully developed root and can emerge into the mouth in which inverted conical mesiodens, with the crown pointing superiorly, are much less prone to emerge into the oral cavity; inverted conical mesiodens have infrequently emerged into the nasal cavity (12). Tuberculate mesiodens have incomplete or erratic root development and are barrel shaped with many cusps or tubercles. Tuberculate mesiodens, in contrast to conical mesiodens, seldom erupt but moreover postpone the emergence of the permanent incisors. They can appear unilaterally or bilaterally, and they are frequently linked with

additional supernumerary teeth. Tuberculate mesiodens arise later than conical mesiodens and are frequently more palatal. The molariform mesiodens has crown-like premolar and a fully developed root, making it a considerably uncommon variety (13).

Delayed eruption, crowding, spacing, impaction of permanent incisors, abnormal root formation, alteration in the path of eruption of permanent incisors, median diastema, cystic lesions, intraoral infection, rotation, root resorption of adjacent teeth, or even eruption of incisors in the nasal cavity can all happen as a consequence of the existence of mesiodens (14). The most prevalent consequences are latency in the emergence of permanent teeth and displacements of permanent maxillary incisors, whereas crowding, diastema, and dilaceration of permanent teeth are less prevalent. On rare occasions, a cyst may develop or a tooth may emerge into the nasal cavity. According to Seddon et al (15), the occurrence of supernumerary teeth may result in delayed eruption in 26-52 percent of instances and displaced or rotation of neighboring teeth in 28 to 63

% of the situations. Other difficulties he documented included resorption of nearby roots, crowding, the formation of dentigerous cysts, diastema, dilaceration, and ectopic emergence of permanent teeth into the nasal cavity. Any change in the eruption course of the central incisors, including asymmetric eruption, requires the doctor to consider the possibility of an extra tooth. Detecting dental defects in primary dentition is significantly easier during a normal dental examination. Furthermore, a substantial association has been documented between dental malformations in the primary and permanent dentition; the existence of a dental abnormality in the primary dentition significantly influences permanent dentition in 50% of instances (16). The treatment of supernumerary teeth is determined on the kind and position of the tooth and its effect on the adjacent teeth. Restriction or delay of eruption, displacement of the neighboring tooth, incompatibility with orthodontic equipment, presence of pathologic ailment, or spontaneous eruption of the supernumerary tooth are all reasons for immediate removal of mesiodens. According to Munns (17), the quicker the mesiodens are extracted, the greater the prognosis. Immediate extraction before root formation of the permanent incisors and delayed extraction after root development of the permanent incisors are the two procedures for extracting mesiodens. In order to enhance spontaneous eruption and alignment of the incisors, some writers propose extraction of mesiodens in the way earlier mixed dentition. There is debate in the literature on when unerupted mesiodens should be removed. The rapid removal vs delayed surgical intervention during central incisor and lateral incisor root growth around the age of eight to ten years has been addressed (18). It is suggested to extract mesiodens in the early mixed dentition to encourage eruption and appropriate alignment of neighbouring teeth, which may lessen the need for orthodontic treatment. After the mesiodens is removed, it may take six months to three years for an unerupted tooth to flare up. Henry and Post (19) proposed delaying extraction of the mesiodens until about the age of 10, when the apex of the central incisor is virtually formed. If intervention is delayed after this age, more complicated surgical and orthodontic therapy may be required. The type and site of the unerupted tooth, the amount of space left in the dental arch, and the stage of root development all have an impact on how long it might take for an impacted tooth to emerge after surgical removal of the mesiodens (20).

It is essential to diagnose and treat people with supernumerary teeth as soon as possible in order to avoid or limit consequences. To minimize further complications for patients, the dentists, anthropologists, geneticists, and other health professionals should be aware of the incidence of dental malformations in various communities. The main purpose of our study was to assess the prevalence of mesiodens with regards to age, gender and also to find the frequency of treated and untreated patients visiting Chennai based dental college.

MATERIALS AND METHODS:

With the approval of the Institutional ethical committee, this retrospective study was conducted in a private university setting. The main advantage of conducting the study in the university setting is that it aids as a single centre for multiple people from different localities at the same time. On the other hand, the disadvantage of the study is that it does not represent the general population. The diagnostic records of the patients from June 2019 to February 2021 inclusive of all the age groups and gender were taken into consideration, hence a total study sample size was found to be n=94 patients. A third examiner reviewed the case records of the collected data to confirm the validity of the data with pre operative photographs. The collected data was then tabulated for statistical analysis using SPSS. Descriptive statistics and chi square tests were performed with the level of significance at 5% ($p < 0.05$). The independent variable of the study was the geographical background and the dependent variables were the age, gender of the patient and the presence of mesiodens.

RESULTS:

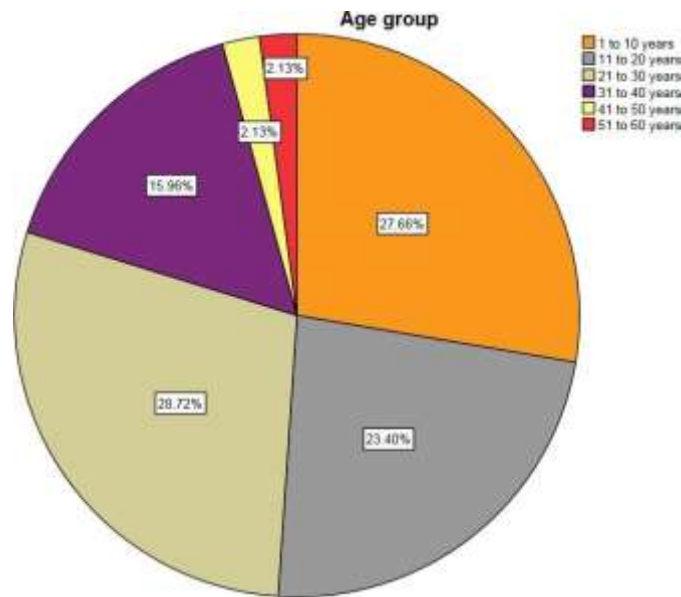


Figure 1: This pie chart represents the distribution of mesiodens with regards to age. Most of the people who are likely to have mesiodens were 21 to 30 years of age (28.72%), 27.66% were 1 to 10 years old, 23.40% were 11 to 20 years old, 15.96% were 31 to 40 years old and 41 to 50 years old patients as well as 51 to 60 years old patients who had mesiodens were only 2.13% of the total sample size.

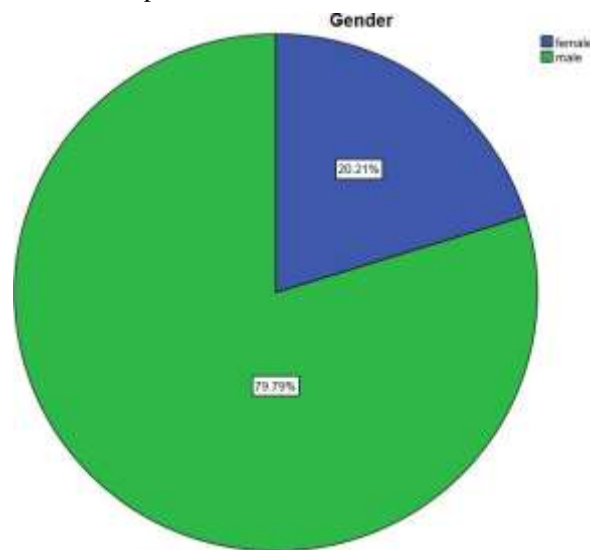


Figure 2: This pie chart represents the distribution of mesiodens with regards to gender. Dark blue colour in the chart represents female and green represents male. Nearly more than half of the study population with mesiodens (79.79%) were males and only 20.21% of the population were females.

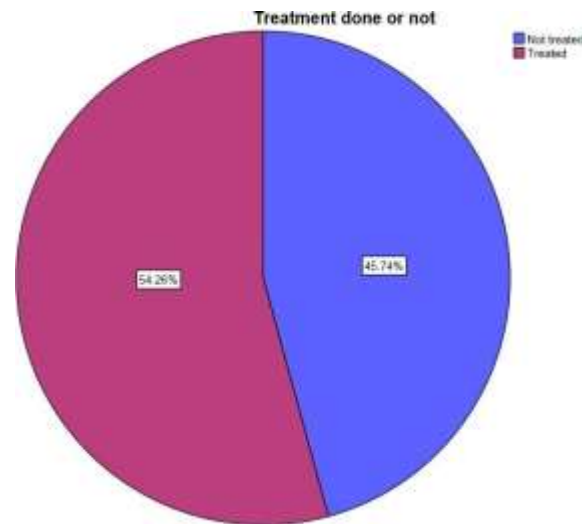


Figure 3: This pie chart represents whether the patient with mesiodens has undergone any treatment for the same or not. The pink colour in the chart represents the patient who has undergone any treatment for mesiodens and ink blue represents the patients who failed to get it treated. Nearly more than half of the study population with mesiodens (54.26%) were treated and 45.74% of the population were untreated.

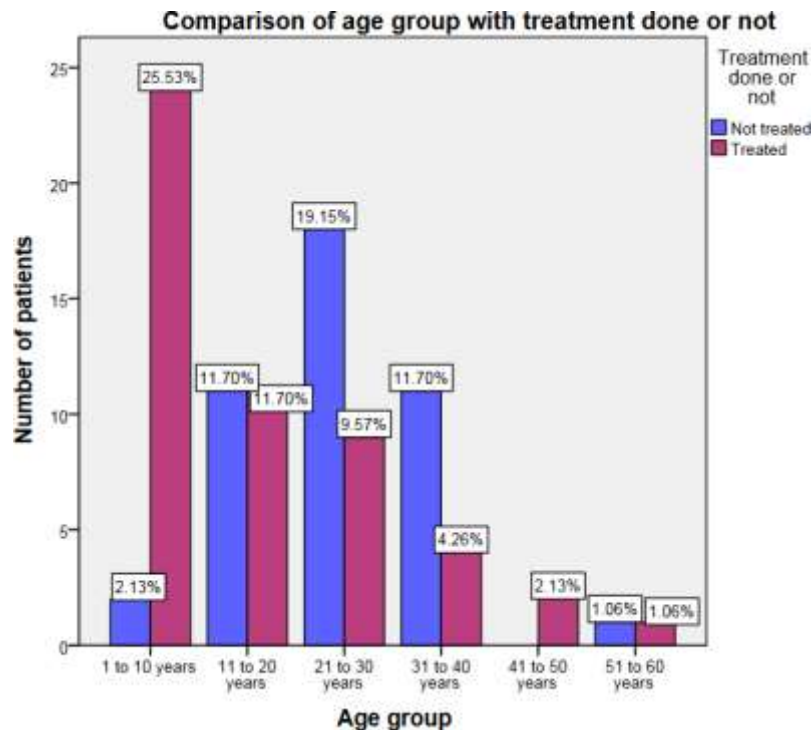


Figure 4: This bar chart represents the comparison of age group with the frequency of treated and untreated patients. The X-axis represents the different age groups of the patients and the Y-axis represents whether the patient with mesiodens has undergone any treatment for the same or not. The pink colour in the chart represents the patient who has undergone any treatment for mesiodens and ink blue represents the patients who failed to get it treated. 25.53% of the patients belonging to 1 to 10 year of age were majorly treated with mesiodens. Secondly, 19.15% of the patients in the age group 21 to 30 years didn't undergo any treatment for the same. But in the age group of patients belonging 11 to 20

years, 11.70% were treated and 11.70% were not treated. As well as 11.70% of the 31 to 40 year old patients were not treated for the mesiodens. 41 to 50 year old patients were all treated for mesiodens (2.13%) while 51 to 60 year old patients were 1.06% treated and 1.06% not treated. Chi square test shows Pearson Chi square value of 26.392a and p value of 0.000 ($P < 0.05$), hence statistically significant association was found. From the graph we can interpret that the majority of the patients belonging to 1 - 10 years of age have undergone treatment for mesiodens.

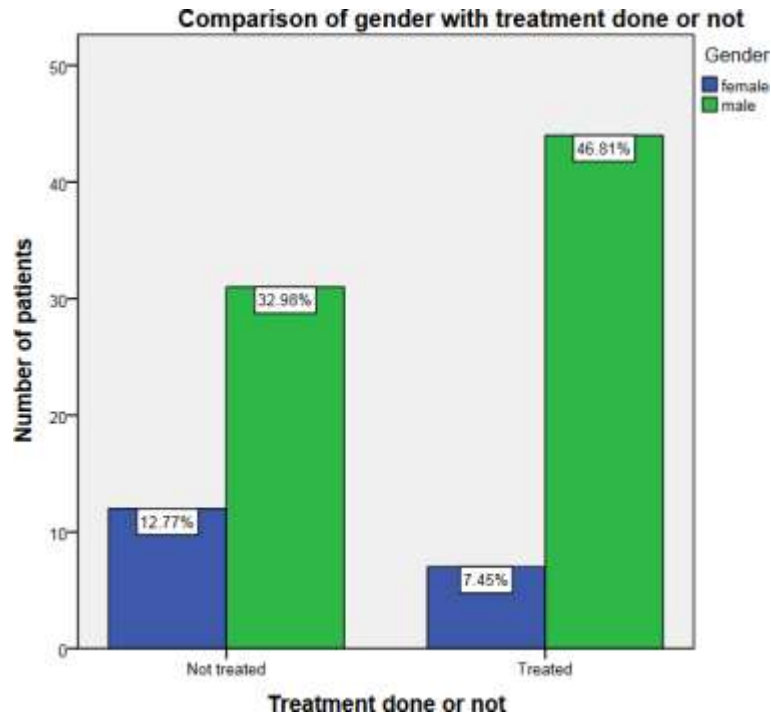


Figure 5: This bar chart represents the comparison of gender with the frequency of treated and untreated patients. The X-axis represents whether the patient with mesiodens has undergone any treatment for the same or not and the Y-axis represents the gender. The green colour in the chart represents male and the dark blue colour represents females. Among males, 46.81% of them got it treated while 32.98% of the male population have not undergone any treatment. Among females, only 7.45% were treated and the rest of 12.77% were not treated. Chi square test shows Pearson Chi square value of 2.909a and p value of 0.088 ($P < 0.05$), hence the association was found to be statistically insignificant. From the graph we can interpret that the male population who had the highest incidence of mesiodens got it treated while most of the females were untreated for the same.

DISCUSSION:

The current study is focused on the prevalence of mesiodens with regards to age, gender and also the frequency of treated and untreated patients were evaluated. From our study we found that the mesiodens was more prevalent in males (79.79%) when compared to females which was 20.21% (figure 2) which is also favoring the sex ratio of different studies in literature. In the sample population of Jordanian children, Rajab and Hamdan et al.,(21) found a sex ratio of 2.2:1. Davis observed a higher ratio of 6.5:1 for the prevalence of supernumerary teeth in Hong Kong children (22). In the permanent dentition, males have twice as many supernumerary teeth as females; however, no strong gender diversity has been documented in the primary dentition. Gender differences in favor of men have also been documented in the Caucasian population. Males outnumber females 5:1 in the Iranian population, according to Mighani (23). On the contrary, a similar type of study done on the general Chennai population revealed an equal prevalence of mesiodens in both gender with the sex ratio of 1:1 (24). The gender variance might be due to differences in sampling size and the racial group studied where it could be observed that the gender preponderance of men over females, Sedano and Gorlin proposed an autosomal dominant characteristic with lack of penetrance in certain generations, as well as an X-linked inheritance (25). According to a recent study of three siblings with cleidocranial dysplasia syndrome and supernumerary teeth, non genetic or epigenetic control mechanisms may be involved in the production of these extra teeth (26).

It was also found in our study that the prevalence of mesiodens was more frequent in the age group of 21 to 30 years of age (28.72%) and also the pediatric age group of 1 to 10 years old children had the second most prevalence (figure 1). Supporting these results, a recent study done on the pediatric group reported higher incidence in children between the age group of 7 and 9 years. This might be linked to the eruption of the maxillary central incisors, which happens around this age. Ray also observed a 4-year-old child with erupted primary supernumerary teeth. There have been no recent studies that have revealed the high frequency of mesiodens in patients aged 21 to 30. The erupted type appears to be more common in deciduous dentition (27). Mesiodens spontaneously emerge into the oral cavity in one-fourth of instances which impinge with the eruption of the other permanent teeth in situations where they have not yet erupted, resulting in malocclusion (28).

From figure 3 we can say that only half of the study population with mesiodens has undergone treatment (54.26%) while 45.74% of the population were untreated. No recent studies reveal the prevalence of treatment done for mesiodens. Usually patients visit a dentist only when they experience a severe pain for any condition or when they are in need of any aesthetic corrections to be done, maybe the group of patients who has undergone treatment can belong to this type of category. Even though half of the population has undergone treatment, the rest half aren't taking a further step even after diagnosing the condition; lack of awareness about the complications and dental anxiety may be some reasons for the ignorance to the treatment.

This study also compared the age group with the frequency of treated and untreated patients, revealing the majority of the patients belonging to 1 - 10 years of age have undergone treatment for mesiodens even though the occurrence rate was more in the age of 21 to 30 year old patients (figure 4). A similar study found that 62.8 % of cases with a mean age of 6.35 ± 1.85 years were majorly treated to avoid complications (29). This rate is significantly higher than the 53.1 % of mesiodens operated on patients with an average age of 11 years previously reported (6). These data show that surgical removal of mesiodens before the kid reaches the age of six or before the associated central incisor has formed 1/3 of its root is likely to provide patients with better alternatives. There was also some data that contradicted the preceding one, suggesting that early surgical excision of the mesiodens increases the risk of injury to the tooth germs of neighboring permanent teeth or causes tooth development to be delayed. They recommend delaying treatment until the neighboring permanent incisors have virtually completed root growth, which typically happens between the age of 8 and 10. Our present study results seem to support both the age groups mentioned in those studies even though the reason in between those two are advocated. Early surgical intervention may harm Hertwig's epithelial root sheath, causing disruption or halt of future growth of the afflicted roots. If the mesiodens is close to the surrounding permanent incisors, a delay in surgical removal is indicated (30).

On comparison between gender and the frequency of treated and untreated patients, it was shown that the male population who had the highest incidence of mesiodens got it treated while most of the females were untreated for the same (figure 5). This could be because of dental anxiety and negligence which was more exhibited by females could be a reason. Infrequent dental visits, long waits at the dental clinic, previous painful dental encounters, discomfort during dental surgery, the quantity of attention received, and the procedure's complexity may all contribute to women's high levels of dental anxiety (31). The use of equipment such as needles and handpieces, as well as the tilted-back position of the chair, were reported to be common causes of dental anxiety (Dental Anxiety Scale 1) (32).

The limitation of our study is minimum external validity and also the validity can be extended by encompassing subjects of a wider demographic range. Also this study is a retrospective analysis and does not record the same in other Chennai based dental colleges. From our study it can be concluded that the mesiodens were most prevalent in males at the age group of 21 to 30 years but mesiodens was majorly treated in the patients belonging to the age group of 1 to 10 years. And also we found that male population was treated more than the female population. Hence, required surgical management can be done even before the condition could further progress to avoid complications to the patients.

CONCLUSION:

Within the limitations of the study, it can be concluded that the incidence of mesiodens was more prevalent in younger age groups and in males while most of them got it treated but the females with less prevalence of mesiodens were not ready to undergo any treatment for the same. Hence by knowing the prevalence, an in depth analysis of mesiodens will be beneficial in developing effective clinical care for the affected individuals.

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CONFLICT OF INTEREST:

The author declares no conflict of interest.

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