

*Type of study : Original study*

# Most Commonly Associated Primary Tooth in Mandibular Arch with Space Infection or Abscess - A Retrospective Study

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## Abstract

Oral cavity is considered to be an ideal niche for the growth of microorganisms. Despite the advances in paediatric dentistry infections in the oral cavity remains to be a major problem in children. Infections in the jaws of a child have the ability to spread rapidly due wide marrow space. In children, unlike adults, the location of anatomic infection is a helpful guide for diagnosis and management which is essential to prevent progression. The objective of this study is to determine the most frequently associated primary mandibular tooth with space infection or abscess. The present study was a retrospective observational study conducted in a university hospital located in South India. The sample included Patients below 13 years who underwent extraction or pulpectomy of mandibular primary teeth. Patient records between June 2019-March 2020 were reviewed. This was followed by Excel tabulation of data. Data analysis was done using SPSS software. Descriptive statistics such as frequencies and percentages were elicited and chi square test was done to check association between different variables. The most common infection was found to be abscess 6.7%. The most frequently associated primary tooth in the mandibular arch with space infection or abscess was found to be the primary right mandibular second molar 22%. Within the limits of the study, the most frequently associated tooth with infection in the mandibular arch is the right second primary molar and shows correlation with the age group 7-10 years. Based on study results, posterior teeth were more susceptible to infection than anterior teeth. Space Infection and abscess had a male predilection.

**Keywords:** Space infection, Abscess, Odontogenic origin, Pediatric patients, Primary mandibular teeth.

## Introduction

Oral cavity is considered to be an ideal niche for the growth of microorganisms. Despite the great advances in paediatric dentistry infections in the oral cavity remains to be a major problem in children<sup>1</sup>. Majority of the

orofacial infections are odontogenic in origin, whereas the others are self-limiting in nature. An odontogenic infection may arise from a tooth or its supporting structures are secondary to dental caries, periodontal disease, or pericoronitis. They can range from localised abscesses to deep space head and neck infection<sup>2</sup>.

Orofacial space infections of odontogenic origin which are quite common in children originate from partially erupted teeth, traumatized teeth or necrotic pulp<sup>3,4</sup>. However, Seow has stated that developmental abnormalities like dentin dysplasia, dentinogenesis imperfecta and dens evaginatus, may also lead to space infections<sup>5</sup>. The study by Sawle RF et al 1988 reveals that acquired conditions like pre eruptive intracoronal resorption of dentin can result in space infection<sup>6</sup>. Based on previous studies it is found that most of the orofacial

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infections arise as result of neglected dental caries<sup>7,8</sup>. Neglected dental caries in turn lead to exposure of the pulp causing severe pain especially in children<sup>9,10</sup>. Controlling pain and prevention of further caries can be managed by the use of rotary instruments<sup>11,12,13</sup>. Therefore controlling further spread of dental caries is indeed an important measure to prevent the occurrence of oro facial infection<sup>14,15</sup>.

Infections in the jaws of a child have the ability to spread rapidly due wide marrow space and also because of the less density of the bones in children<sup>16</sup>. Rapid progression of Infection produces significant systemic symptoms. Moreover, abscess formation and cellulitis are quite exaggerated in children and failure to render correct treatment may result in severe complications like blindness, cavernous sinus thrombosis, septicemia, brain abscess and airway obstruction<sup>17</sup>.

Previous studies reveal that oro facial infection is most commonly associated with primary posterior teeth<sup>18,19</sup>. Further it also states that submandibular space is frequently susceptible to orofacial infection. However, the majority of studies on space infection and abscess was conducted in relation to maxillary teeth and only a few studies were conducted in relation to the mandibular arch. In children, unlike adults, the location of anatomic infection is a helpful guide for diagnosis and management which is essential to prevent progression<sup>20</sup>. It also helps to provide the necessary preventive care before any complication. The aim of this study is to determine the most frequently associated primary mandibular tooth with space infection or abscess in children of Chennai.

## Materials and Methods

### Study setting:

This study is a university hospital based retrospective cross sectional study conducted among patients who visited the hospital. Large sample size contributes as a major advantage for this study. Data collected was reliable and with photographic and radiographic evidence. The present study was approved by the Institutional Ethical Review Board [SDC/SIHEC/2020/DIASDATA/0619-0320].

### Sampling:

The study population included 5516 patients below

13 years who had visited the university hospital from June 2019- March 2020. Among these patients around 2527 patients had undergone extraction and pulpectomy procedures. By simple random sampling a sample size of 1000 was selected, which included patients below 13 years in which 734 patients had undergone extraction and the remaining 266 had undergone pulpectomy treatment in the mandibular arch. Cases were cross verified with the help of clinical photographs. Incomplete records were excluded from the study.

## Data Analysis

This was followed by Excel tabulation of parameters. and then the data was exported to SPSS version 20.0. Descriptive statistics and relation between variables were determined using chi square test with significance level set at  $p < 0.05$ .

## Results and Discussion

The present study was conducted on patients below 13 years. 49.4% cases lie in the age group between 7-10 years, which is the most common age group. 36.6% cases were recorded in children between 4-6 years. 10.6% cases were recorded in children between 11-13 years (Figure 1). The results are in consensus with study of Manal Al Malik et al. He has stated that the 6-10 age group is the most susceptible age group for oro facial infection<sup>21</sup>. The reason stated for this finding is due to the mixed dentition and partially erupted teeth. Space infection and abscess were predominantly seen in boys (54.6%). (Figure 2) The results are in consensus with the study of Faban Carl et al. According to him, orofacial infection distribution had a male predilection<sup>22</sup> (62.4%). Ozsurekci Y et al also highlighted that a male predominance is associated with orofacial infection with a male female ratio of 1:1.4<sup>23</sup>. The reason behind this finding may be due to the hyper active nature of boys and also diet of male children can result in increased DMFT score. Frequent susceptibility to trauma due to their aggressive nature also supports this finding.

Abscess was the most commonly encountered infection 6.7% followed by space infection. However, infection was not associated with 91.9% of the cases (Figure 3). This finding goes in hand with the previous study done by Nagaveni et al. Her study stated that abscess was the most common infection (12%)<sup>24</sup>.

Ozsurekci Y et al also reveals that abscess was the most common infection 20% followed by space infection 12%. This is mainly because abscesses are frequently associated with systemic disease. Frequent trauma and Vitamin D deficiency also contribute towards formation of abscess. Vitamin D deficiency may lead to bacterial infection which in turn leads to abscess formation.

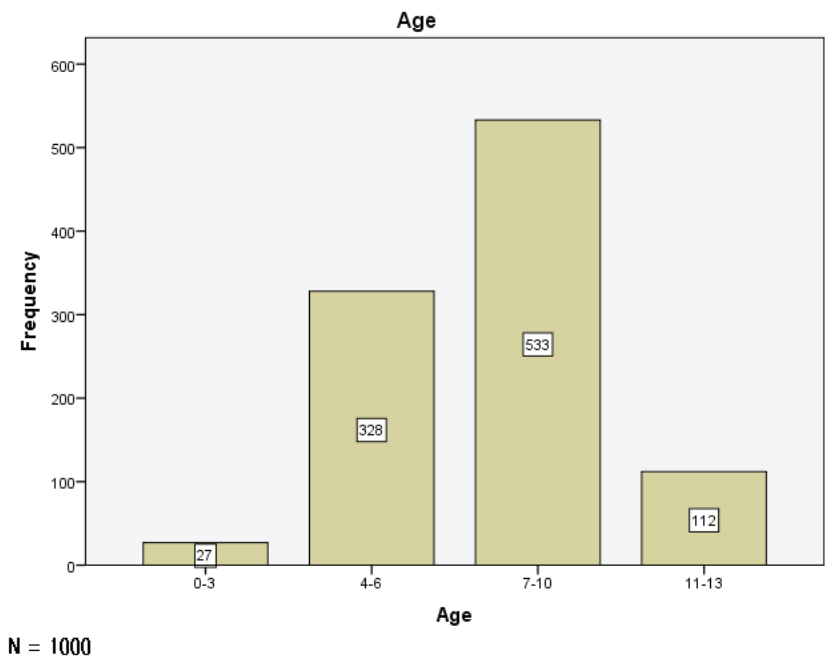


Figure 1 : Bar graph represents the frequency of age distribution among patients. X axis denotes different age groups of patients . Y axis denotes the number of patients. Majority of the cases lie in the age group between 7-10 years (533); followed by 4-6 years (328); followed by 11-13 years (112); and 0-3 years (27)

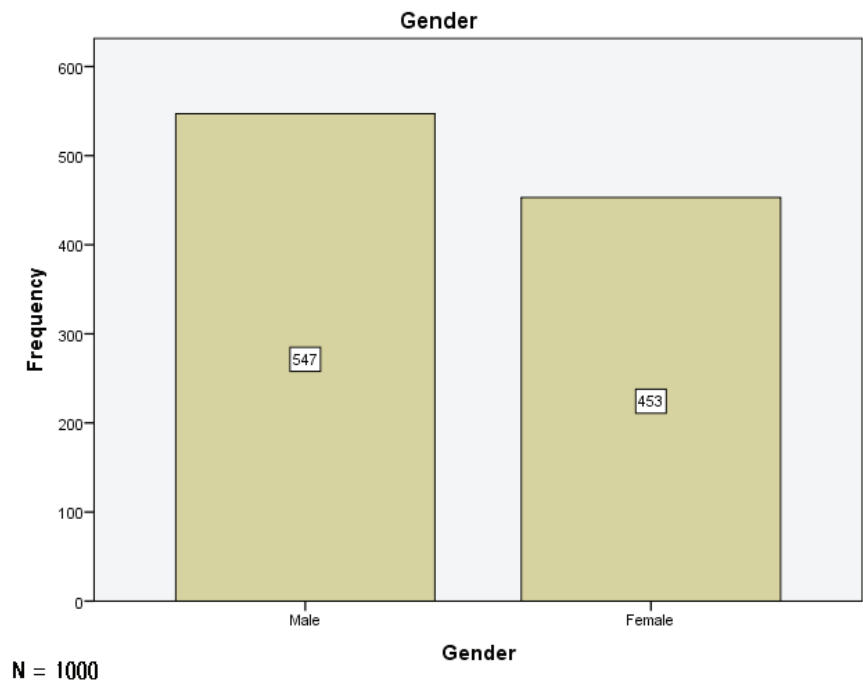
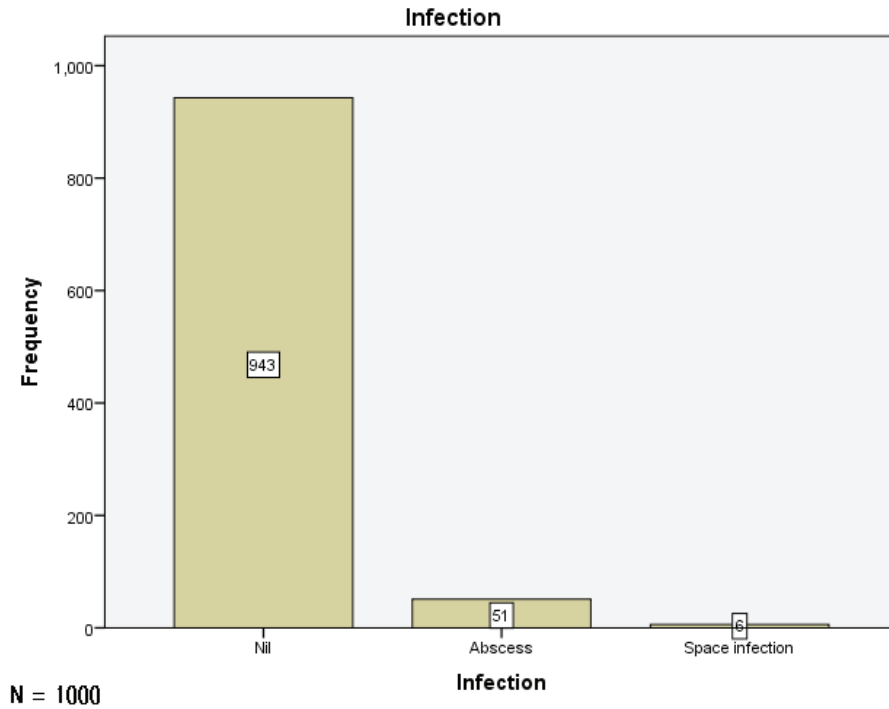
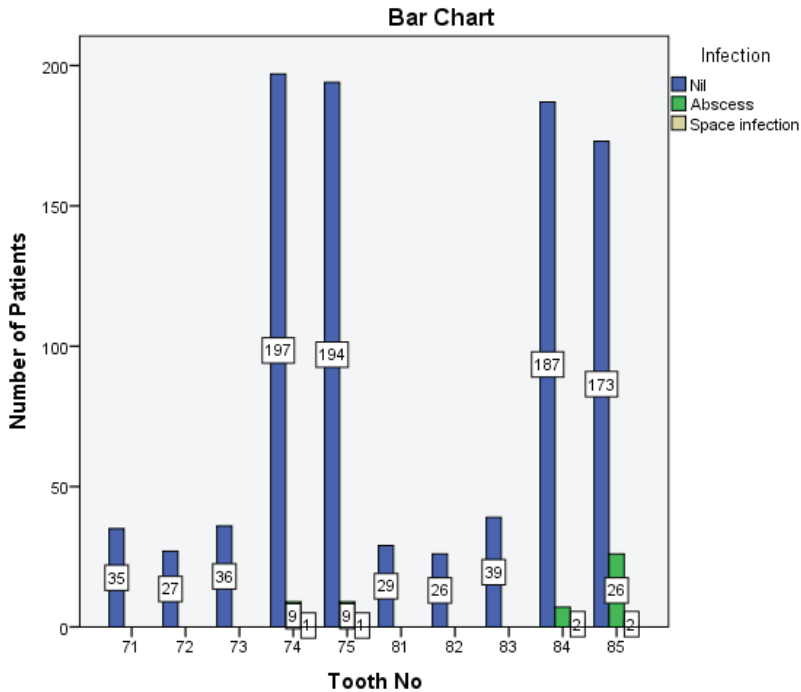


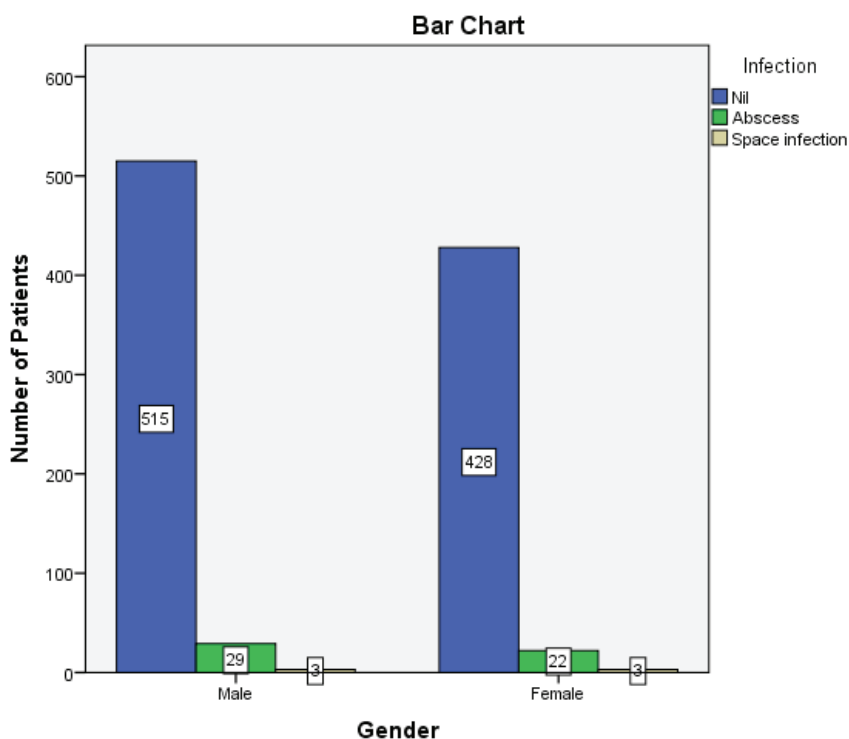
Figure 2: Bar graph represents the frequency of gender distribution among patients. X axis denotes gender of patients. Y axis denotes number of patients. Majority of the the patients were male children (547)



**Figure 3** This bar chart represents the prevalence of Infection among study samples .X axis denotes the type of infection. Y axis denotes the number of Children.(O represents no infection). Abscess was the most common infection (51); followed by space infection (6).



**Figure 4** represents the association between individual teeth in mandibular arch and type of infection. X axis represents Tooth number in the FDI system of nomenclature and x cluster denotes tooth with or without infection. Y axis represents the number of teeth. Blue colour denotes no infection, green denotes abscess and beige denotes space infection. Chi square test was done and the association was found to be not significant. (p value= .164 ;p value>0.05 Statistically not significant)



**Figure 5:** Bar graph represents the association of gender with infection. X axis denotes the gender of children and x cluster represents the children with or without infection. and Y axis denotes the number of children. Blue colour denotes no infection, green denotes abscess and beige denotes space infection. There was no difference in occurrence of infection between boys and girls. Chi square test was done and the association was found to be not significant. (p value = 0.321 >0.05 statistically not significant).

The primary mandibular right second molar is the most frequent tooth associated with space infection or abscess 22% followed by primary mandibular left first molar which is 21% and primary mandibular right first molar 9.9% ( Figure 4).This results are in consensus with the study of Manal Al Maliket al. He stated that primary posterior teeth are more susceptible to orofacial infection. This is mainly due to the accumulation of plaque and calculus in the posterior region due to the improper brushing.Children tend to pay more attention to the anterior region. However, Bruno et al stated 84 as the most frequent tooth associated with orofacial infection<sup>25</sup>. This may be due to the different geographic location and larger sample size. There was no statistically significant difference in occurrence of infection between boys and girls based on chi square test; (p value= .321 (p value>0.05 not significant) ( Figure. 5).

Patient management may vary with the severity of odontogenic infection,restorability of the tooth

concerned, ability to achieve sufficient anaesthesia. Febrile patients with acute signs of spreading infection such as odynophagia and stridor are managed by carrying out extraction . Extraction not only allows complete drainage of infection but it also reduces the likelihood of a recurrent episode in which more morbidities and life-threatening complications could entail. Pulpectomy is another common method of management. Young uncooperative patients who are not willing for pulpectomy can be managed by pulp opening<sup>26 27</sup> .Following pulpal opening, the tooth was always dressed with an intracanal medicament and access cavity closed

Infections in the jaws of a child have the ability to spread rapidly due wide marrow space and also because of the less density of the bones in children .It may result in complete destruction of the permanent tooth germs and if undiagnosed it can reach the critical growth centers of jaws like the condyle. The condylar region

of the mandible is the most sensitive area which can be grossly disfigured in case of growth disturbances . This study focuses on the most frequently associated mandibular tooth with infection which is nothing but the location of anatomic infection which acts as a helpful guide in understanding the prevalence of various teeth affected and which inturn will help in initiating various preventive measures.

The limitation of this study was that it cannot be generalised to another population since our study was a unicentered study conducted in the South Indian population. In future this study can be done on a larger population with a multicentered approach .

### Conclusion

Within the limitations of the study it can be concluded that primary posterior teeth were more susceptible to space infection or abscess rather than anterior teeth in the mandibular arch. The most frequently associated tooth in the mandibular arch was the right second primary molar mainly in the age group of 7-10 years.

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**Conflict of Interest:** Nil

**Ethical Clearance:** It is taken from “Saveetha Institute Human Ethical Committee” (Ethical Approval Number- SDC/SIHEC/2020/DIASDATA/0619-0320)

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