

EVALUATION OF PRIMARY TEETH WITH CARIES REQUIRING PULPECTOMY AND EXTRACTION IN CHILDREN BETWEEN 5-7 YEARS OLD VISITING A UNIVERSITY DENTAL HOSPITAL

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ABSTRACT

Dental caries in the form of early childhood caries is more prevalent in children. Severe form of caries extending throughout the coronal structure in the root can result in tooth pain. These kinds of teeth with caries extending to the pulp may require pulpectomy or extraction. Pulpectomy is a restorative treatment done in primary teeth which is used to extirpate the coronal and radicular pulp and seal the entire root canal using an obturating material. The obturating material is of different types. The commonly used material is the Metapex, which helps in the natural resorption of the roots, exfoliation and does not irritate the periapical region. Extraction in children can be due to trauma or grossly decayed teeth in children due to caries extending subgingivally or presence root stumps. Children presenting with class 2 caries have been exposed to caries involving the pulp. Early childhood caries is one of the most infectious diseases of childhood having a chronic progression rate resulting in the destruction of tooth structure. They are of different types and patterns being rampant caries, nursing bottle caries. This is generally associated with unusual dietary patterns and improper feeding patterns in children with prolonged use of baby bottles for milk feeding. Caries in children are mainly caused by the bacteria *Streptococcus mutans*. The aim of this study is to evaluate the primary teeth with caries requiring pulpectomy and extraction in children between 5-7 years old. A retrospective study was carried out using digital records of 903 subjects. These data were collected from DIAS and coded in MS Excel sheets. The collected data was analysed by computer software SPSS version 21 using Chi square test and graphical illustration was done. From the above study, it was found that extraction and pulpectomy was common in males, with prevalence of extraction in the maxillary arch among children of 7 years and pulpectomy in children of 5 years, and seen in the mandibular posterior region.

KEYWORDS: Children, Dental caries, Extraction, Pulpectomy

INTRODUCTION

Dental caries are commonly seen worldwide. In children, it can present in the form of ECC or early childhood caries. This is a virulent form of dental caries. ECC can begin at an earlier age and progress rapidly. They are generally seen affecting the proximal and occlusal/ incisal regions. Therefore, ECC is defined as the presence of one or more decayed, filled and missed tooth surfaces in children of 72 months or younger (Weinstein *et al.*, 1994). ECC generally affects the maxillary anterior teeth, commonly due to improper feeding patterns (Dilley, Dilley and Machen, 1980). Severity of ECC is proportional to the poor oral hygiene and maintenance. The main objective of pulp therapy is to maintain the integrity and health of the teeth. It is done to maintain the vitality of pulp of the teeth affected by caries, traumatic injury or other causes (Fuks and Eidelman, 1991).

Pulp therapy is done in cases of necrotic pulp, irreversible pulpitis, trauma etc ('American Association of Endodontists', 1988). Pulpectomy is the root canal procedure carried out for primary teeth which is irreversibly inflamed or necrotic due to caries or trauma. They are generally done using rotary hand files (Lo *et al.*, 2007). Optimal bacterial decontamination of the coronal is important and done using sodium hypochlorite/ chlorhexidine (Ercan *et al.*, 2004; Zehnder, 2006). Most of the pulpectomy procedures are performed in the mandibular posterior region. The main aim of pulpectomy and the material used is that it should not interfere with the eruption of the permanent teeth and should permit resorption of primary tooth root (Ozalp, Saroğlu and Sönmez, 2005). During cleaning and shaping the root canals, the main objective is to remove the soft and hard bacteria-containing tissue. This will aid the irrigant to reach the apical third of the root resulting in a sterile root canal for obturation. Endodontic Procedures are performed using reamers, files, burs, sonic instruments, and Nickel-Titanium (Ni-Ti) rotary file systems. Rotary systems gained importance as they minimise the iatrogenic errors in endodontic treatment (Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017a; Jeevanandan, 2017; Panchal, Jeevanandan and Subramanian, 2019). The greatest advantage of using rotary NiTi files than the conventional method is decreased working time (Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017b; Jeevanandan and Govindaraju, 2018; Nair *et al.*, 2018). A study revealed that the hand files, S2 ProTaper Universal and K3 0.25 tip 4% taper files systems had similar properties with respect to the quality of obturation but differed in their instrumentation time in primary teeth (Govindaraju, Jeevanandan and E. Subramanian, 2017).

Trauma to primary dentition is seen around 2-4 years of age, and treatment to such injuries require precise diagnosis, complex measures and routine follow up examinations. A study reported that the most common traumatic injury encountered in primary teeth is avulsion seen due to the resilient alveolar bone, with a prevalence of 5.8% (Ravikumar, Jeevanandan and Subramanian, 2017). Teeth with crown-root fractures and root fractures present with a higher frequency of premature loss. One of the common types of luxation injuries seen are subluxations. Trauma can result in various complications, one of them rarely being seen on the floor of the mouth is the ranula (Packiri, Gurunathan and Selvarasu, 2017). Studies have reported that the component in saliva, malondialdehyde (MDA) is seen in increasing levels in ECC (Subramanyam *et al.*, 2018). Prolonged caries can lead to excessive pathologic root resorption with loss of crown structure or excessive decayed tooth, and in these cases extraction is indicated (Coll and Sadrian, 1996). The common cause for extraction is dental caries (Ashiwaju *et al.*, 2011). Early or premature tooth loss can result in space loss and malocclusion at an early age. These can be prevented by using space maintainers in children that preserve the space caused due to loss of primary teeth in guiding the permanent tooth in occlusion (Azodo, Orikpete and Chukwumah, 2014). Other reasons for extraction are the trauma, pain and sepsis and root stumps. Natural teeth is considered as the best space maintainers in primary dentition. Therefore preservation of tooth from caries and damage is important. Therefore, the aim of this study is to evaluate the caries in primary teeth requiring pulpectomy and extraction between 5-7 years old.

MATERIALS AND METHODS

Study Design

This is a cross sectional study conducted in a university setting, Chennai. The total sample size of this study is 411 subjects from a total of 903 records. The pros of this study is the available data and similar ethnicity, whereas the cons of this study are the geographic limitations. The ethical approval was by the ethics board of SIMATS. The time period of this study was from June 1, 2019 to April 1, 2020. Children between 5-7 years old were included in the study, irrespective of gender. Simple random technique of data collection and segregation was used to minimise the sampling bias. Internal validity is the caries in primary teeth and external validity is that the data is generalised.

Data collection and Analytics

Data collection was from a case sheet record with a software. Data collected was transferred to MS Excel Sheet and coding was done based on the data collected. These data collected were then imported to SPSS IBM Version 20.0. The independent variables are the gender and age. The dependent variables are the pulpectomy and extraction. Descriptive and Inferential statistics (chi-square test) were used. Data was transferred to the host computer and graphical illustration and tabular representation was done.

RESULTS AND DISCUSSION

In the present study, From Figure 1, with x-axis as age and y-axis as percentage treated, prevalence was more for 7 years (43.3%) with extraction followed by 6 years (33.6%) and 5 years (23.1%). From Figure 2, with x-axis as gender and y-axis as the percentage treated with extraction, prevalence was more for males (57.7%) than females (42.3%). From Figure 3, with x-axis as the tooth site and y-axis as the percentage treated with extraction, prevalence was more for maxilla (49.6%) than mandible (38%). From Figure 4, with x-axis as age and y-axis as the percentage treated with pulpectomy, prevalence was more for 5 years (44.9%) , followed by 6 years (35.7%) and 7 years (19.4%). From Figure 5, with x-axis as gender and y-axis as the percentage treated with pulpectomy, prevalence was more for males (57.1%) than females (42.9%). From Figure 6, with x-axis as the tooth site and y-axis as the total distribution of children with pulpectomy, prevalence is more for mandibles with 55.5% than maxilla with 26.7%. From Figure 7, on association between age and primary teeth with extraction based on independent sample t-test, it was more prevalent in maxilla and for children at 7 years of age (47.1) with p value of 0.2 (>0.05), statistically not significant. From Figure 8, on association between gender and primary teeth with extraction based on independent sample t-test, extraction was predominantly done in the mandible (59.0%), with a p value of 0.912 (>0.05), statistically not significant. From Figure 9, on association between age and primary teeth with pulpectomy based on independent sample t-test, it is more prevalent in both maxilla and mandibles for children at 5 years of age (62.9%) with p value of 0.01 (<0.05), statistically significant. From Figure 10, on association between gender and primary teeth with pulpectomy based on independent sample t-test, pulpectomy was predominantly done in both mandible and maxilla (67.4%), with a p value of 0.128 (>0.05), statistically not significant.

Dental neglect is seen as the foremost reasons for progression of caries in the primary dentition. Dental neglect scale (DNS) has been used to objectify dental neglect, that helps in identifying the reasons for poor oral health (Gurunathan and Shanmugaavel, 2016). Increasing levels of stress are seen among dentists performing endodontic treatment especially in uncooperative children or in children having strict parents, who neglect their dental visits (Aishwarya and Gurunathan, 2017). Primary teeth are important for chewing,

speaking, space maintenance and for esthetics (Setia, 2013). Early loss of primary teeth can lead to malocclusion and poor esthetics (Bani *et al.*, 2015), whereas different types of frenal attachment can also lead to midline diastema in children resulting in open proximal contacts that predispose to caries (Christabel and Linda Christabel, 2015). In addition to caries, loss of teeth in children is mainly due to trauma or in therapeutic orthodontic treatment (Ockell, Mansour Ockell and Bågesund, 2010). Pulpotomy is a conservative treatment approach (Maklin, Dummett and Weinberg, 1979). A study conducted in Japan showed Vitapex, a combination of calcium hydroxide and iodoform had good properties and was a successful root canal filling material (Nakornchai, Banditsing and Visetratana, 2010). Increase in the progression of caries can lead to rampant caries destroying the tooth structure. Therefore treatment of ECC is important to start at an early age, depending upon the severity and progression of the disease. Children at low risk may require preventive procedures, whereas children at high risk of caries requires intervention of proximal lesions, restorative therapy etc (Tinanoff and Douglass, 2001). One of the recent advances is the chewable toothbrush which reduces the debris and calculus index in children, and hence can be used as an effective alternative to manual brushing in children (Govindaraju and Gurunathan, 2017).

Tooth decay is not a self limiting disease. They can easily progress based on the individuals oral cavity pH, salivary rate, buffering capacity etc. Dietary patterns play a major role in ECC. A wide range of risk is seen from people who are underprivileged and with low socioeconomic status (Edelstein, 2009). Extraction of a tooth is done in cases where the teeth no longer can be saved or had undergone complete or partial root resorption of primary teeth. This results in premature loss of teeth. Caries prevention is necessary and hence can be achieved by using fluoridated toothpaste, fluoride varnish or topical fluoride application at dental visits (Somasundaram *et al.*, 2015; Mahesh R, 2018). Measures should be taken to educate the parents and school children about the management and prevention of dental cares at an early age. The above results of this study were obtained within the limitations of this study such as the geographic limitations and small sample size.

CONCLUSION

In this study, it can be concluded that extraction was more prevalent in males, in the maxillary arch and among children of 7 years of age, whereas pulpotomy was prevalent in males, in the mandibular posterior regions and among children of 5 years of age. Therefore oral disease prevention is important.

AUTHOR CONTRIBUTIONS

Author 1 (Anupama Deepak) carried out the retrospective study by collecting data and drafted the manuscript after performing the necessary statistical analysis. Author 2,3 and 4 (EMG Subramaniam, Ganesh Jeevanandan and M.Jeevitha) aided in the conception of the topic, participated in the study design, statistical analysis and supervised in preparation of the manuscript and helped in study design and coordinated in developing the manuscript. All the authors have equally contributed in developing the manuscript.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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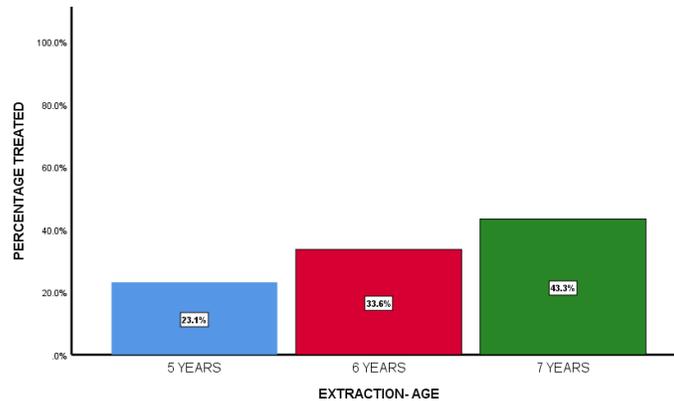


Figure 1: Bar chart representing the percentage of subjects treated with extraction based on age, with X-axis representing the age and Y-axis representing the percentage of patients treated. Majority of the subjects belonged to 7 years of age (43.3%) followed by those in the age group of 6 years (33.6%) and 5 years (23.1%).

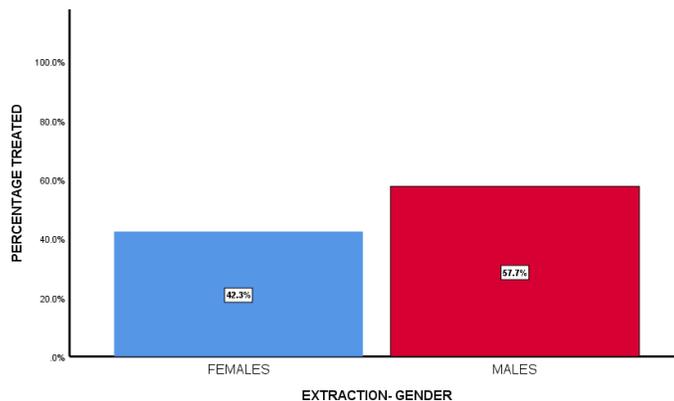


Figure 2: Bar chart representing the percentage of subjects treated with extraction based on gender, with X-axis representing the gender and Y-axis representing the percentage of patients treated. Majority of the subjects were males (57.7%) whereas 42.3% were females.

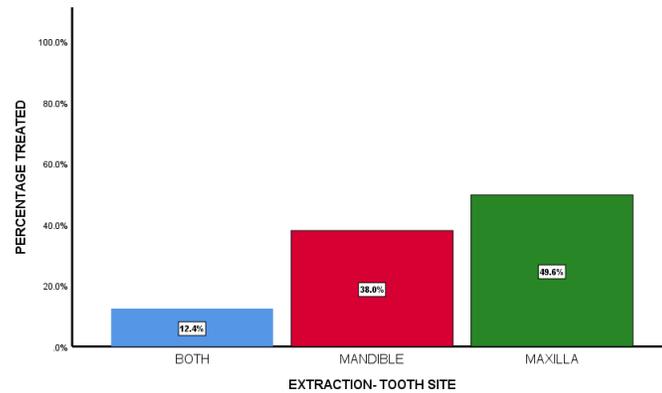


Figure 3: Bar chart representing the percentage of subjects treated with extraction based on tooth site, with X-axis representing the tooth site and Y-axis representing the percentage of patients treated. Majority of the subjects underwent extraction in the maxilla (49.6%). 38% underwent extraction in mandible and few subjects had got extraction done in both mandible and maxilla (12.4%).

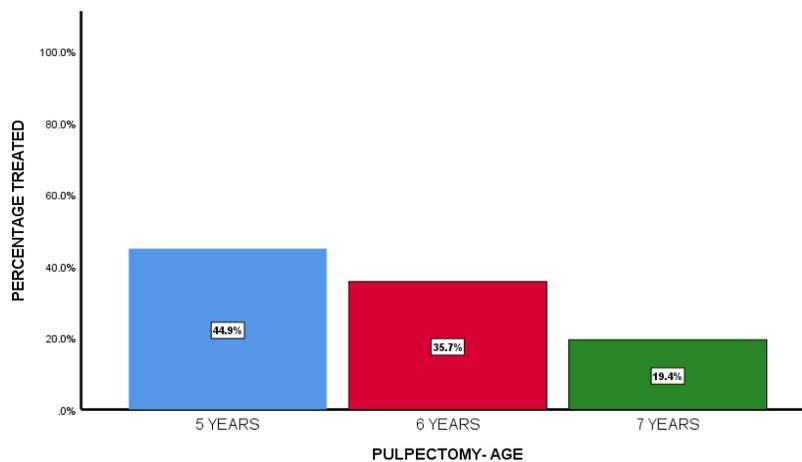


Figure 4: Bar chart representing the percentage of subjects treated with pulpectomy based on age, with X-axis representing the age and Y-axis representing the percentage of patients treated. Majority of the subjects belonged to 5 years of age (44.9%).

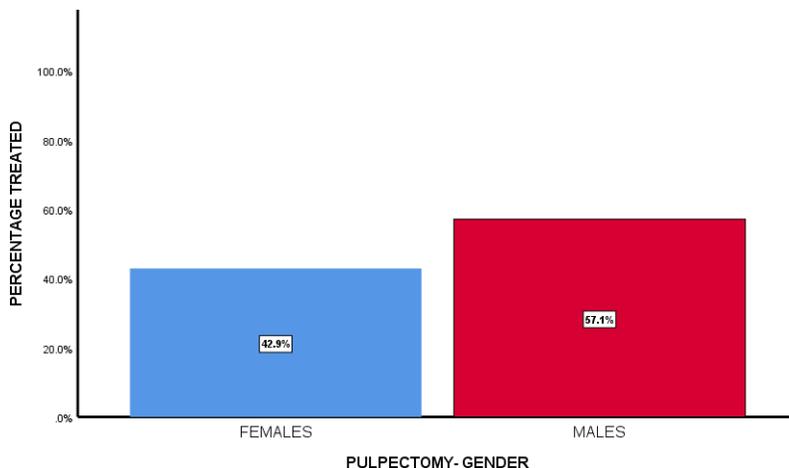


Figure 5: Bar chart representing the percentage of subjects treated with pulpectomy based on gender, with X-axis representing the gender and Y-axis representing the percentage of patients treated. Majority of the subjects belonged to males (57.1%) followed by females (42.9%).

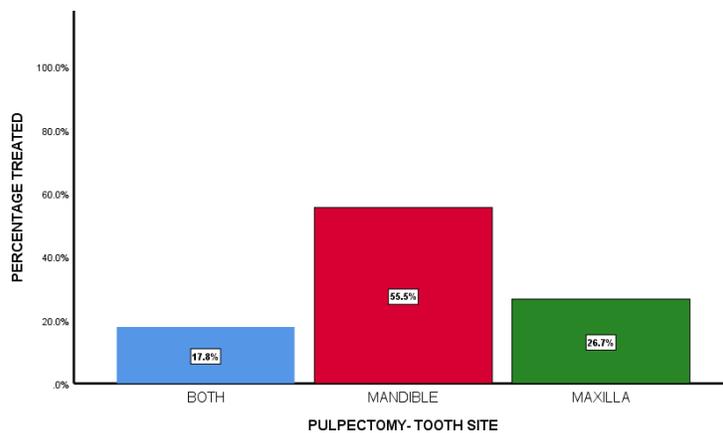


Figure 6: Bar chart representing the percentage of subjects treated with pulpectomy based on tooth site, with X-axis representing the tooth site and Y-axis representing the percentage of patients treated. Majority of the subjects underwent pulpectomy in the mandible (55.5%). 26.7% had pulpectomy done in maxilla and few subjects had pulpectomy done in both mandible and maxilla (17.8%).

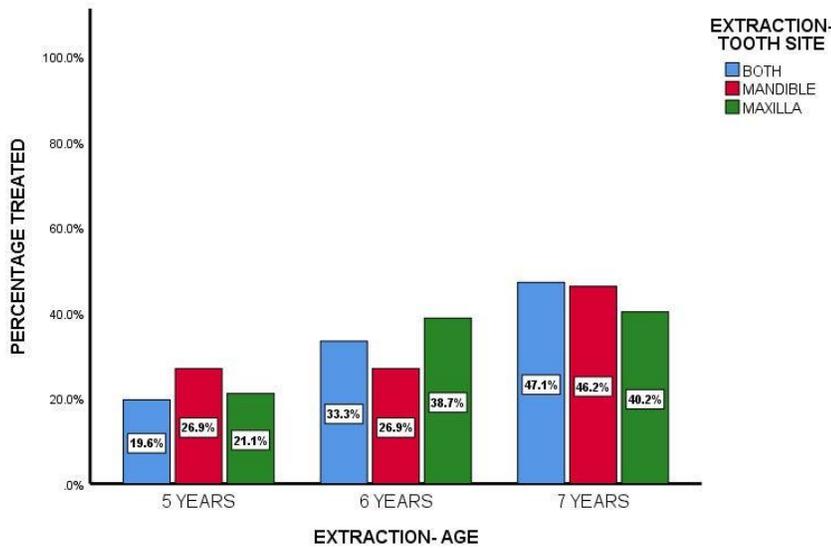


Figure 7: Bar chart representing the association between subjects treated with extraction based on tooth site and age with X-axis representing the age and Y-axis representing the percentage of patients treated. In subjects with 5 years of age, extraction was predominantly done in the mandible (red) (26.9%), in subjects with 6 years of age, extraction was predominantly done in the maxilla (green) (38.7%) and in subjects with 7 years of age, extraction was predominantly done in both mandible and maxilla (blue) (47.1%) giving a p value of 0.268 (>0.05) which is statistically not significant which means there is no significant association between age and the site of tooth extraction.

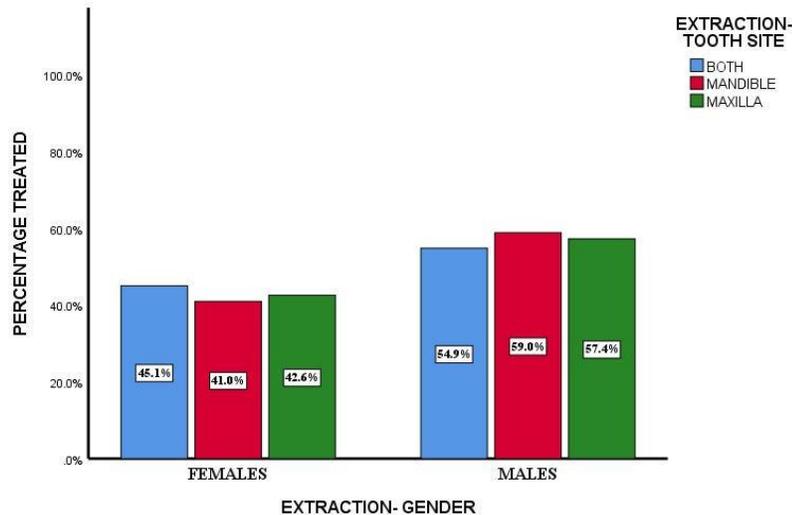


Figure 8: Bar chart representing the association between subjects treated with extraction based on tooth site and gender with X-axis representing the gender and Y-axis representing the percentage of patients treated. In females, extraction was predominantly done in both mandible and maxilla (blue)(45.1%), whereas in males, extraction was predominantly done in the mandible (red)(59.0%), giving a p value of 0.912 (>0.05) which is statistically not significant which means there is no significant association between gender and the site of tooth extraction.

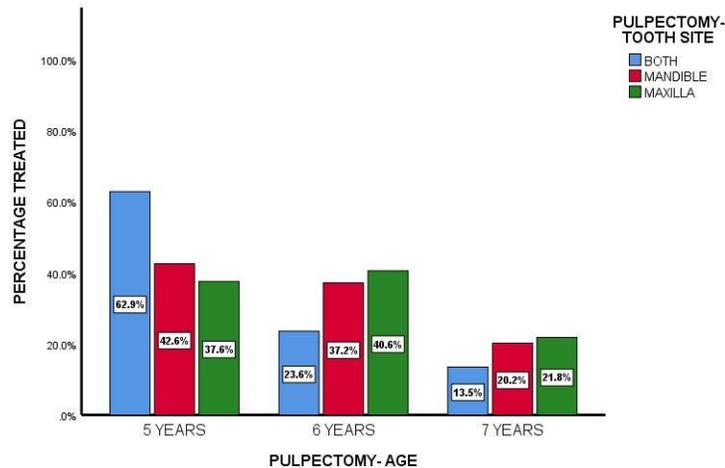


Figure 9: Bar chart representing the association between subjects treated with pulpectomy based on tooth site and age with X-axis representing the age and Y-axis representing the percentage of patients treated. In subjects with 5 years of age, pulpectomy was predominantly done in both mandible and maxilla (blue) (62.9%), in subjects with 6 years of age, pulpectomy was predominantly done in the maxilla (green) (40.6%) and in subjects with 7 years of age, pulpectomy was predominantly done in the maxilla (green) (21.8%) giving a p value of 0.001 (<0.05) which is a statistically significant association meaning there is significant association between age and site where most of the pulpectomies were done.

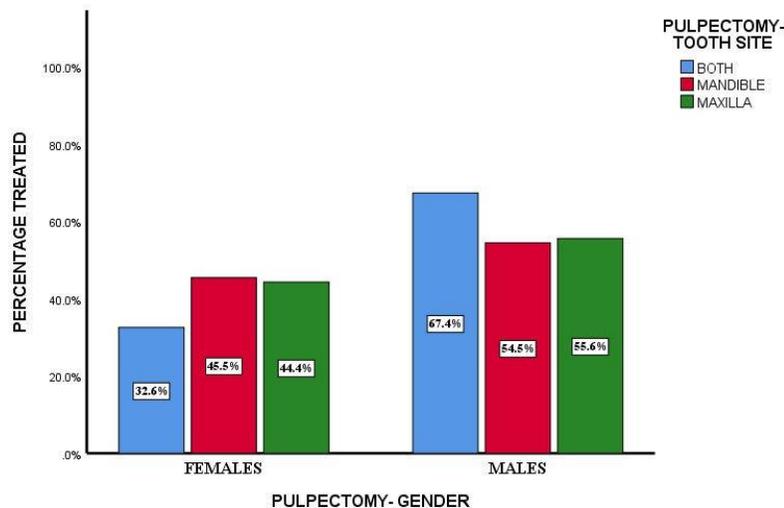


Figure 10: Bar chart representing the association between subjects treated with pulpectomy based on tooth site and gender with X-axis representing the gender and Y-axis representing the percentage of patients treated. In females, pulpectomy was predominantly done in the mandible (red)(45.5%), whereas in males, pulpectomy was predominantly done in both mandible and maxilla (blue) (67.4%), giving a p value of 0.128 (>0.05) which is statistically not significant which means there is no significant association between gender and site where most of the pulpectomies were done.