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Evaluation of carious primary teeth that causes swelling in children visiting a private dental institute - an observational study

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ABSTRACT

The worldwide incidence of ECC was found to be 1.76 billion. If left untreated, these carious lesions have high possibility to progress into oro-facial swellings. The purpose of this study was to evaluate the carious teeth in primary dentition, which causes oro-facial swelling. This observational study is carried out by observing the oro-facial infection in children and describing the associated carious teeth using GV Black's classification, ICDAS Criteria for carious teeth and also categorizing the caries index of the patient using dmft index. A total of 189 case sheets were reviewed, and cross-verification was done by photographs. Among the 189 case sheets, a total of 70 cases were selected after proper review. Out of 70 patients, 51 patients had Class 1 carious lesion, and 19 had Class 2 carious lesion all the teeth were categorized under ICDAS score 5 and 6, the mean dmft score was 8.64. Class 1 carious lesions with visible dentin were most commonly associated with Oro-facial Swelling in children. The carious teeth, which were ICDAS-6, were treated by extraction and which were ICDAS-5, were rendered pulp therapy.

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INTRODUCTION

Among Odontogenic pain, dental pain i.e, pain due to the inflammation of dental pulp is the most common, and it can present in several ways (Renton, 2011). Dental pain affects the quality of life of an adult hindering their social life and also disturbing their daily routine (Reisine *et al.*, 1989). Even though it has been found that neonates and infants have a high pain threshold naturally (Loizzo *et al.*, 2009), dental pain in a child definitely affects his or her quality of life (Sharna *et al.*, 2019). One of the most common causes of dental pain in children with primary dentition is Early Childhood Caries (ECC). The worldwide incidence of ECC is found to be 1.76 billion (Vos *et al.*, 2013). If left untreated, these carious lesions have high possibility to progress into oro-facial swellings (Al-Malik and Al-Sarheed, 2017) Oro-facial swellings result from various causes like trauma, dental abscess, cysts and tumours. Among this, the most commonly occurring oro-facial swelling in children is due to dento-alveolar abscess.

Long-standing periapical infections which are left without any intervention results in the formation of an abscess, which is followed by dentoalveolar swelling (Irani, 2017). In children, this oro-facial swelling has a rapid and faster onset than that of a

permanent tooth in an adult (Gonçalves *et al.*, 2013). These oro-facial infections can lead to complications such as sepsis, cysts formation, sinus tract openings and also cellulitis (Rallis *et al.*, 2006). Prevention of early childhood caries is the best intervention in the oral hygiene of a child as it causes many devastating complications as mentioned above. Early intervention in oro-facial swellings includes pus drainage through the carious canal and antibiotic therapy (Al-Malik and Al-Sarheed, 2017). In severe cases, incision and drainage are done, and also the extraction of the carious tooth is carried out (Al-Malik and Al-Sarheed, 2017). In this study, the objective is to examine the pediatric patients reporting to a dental college in chennai with oro-facial swellings and evaluate the clinical features of the associated carious tooth.

MATERIALS AND METHODS

The study was conducted retrospectively using the case sheets of the pediatric patients visiting the OP of Saveetha dental college during the period of June 2019 to March 2020. Ethical approval was given by the institutional review board. The study design is retrospective and observational.

The study tools used were, decayed missing filled teeth (dmft index), GV Blacks classification of carious lesions and International Caries Detection and Assessment System (ICDAS). The dmft index was used to determine the oral hygiene status and the caries index of the patient. GV black's classification is used to determine the location of carious lesions on the tooth, and ICDAS scoring is given to categorize the extent of the carious lesion.

The selection criteria were children with primary or mixed dentition reporting with oro-facial swelling. Children with extra-oral swelling as a result of traumatic injury, cyst or tumour were excluded. Also, children who had swelling because of dento-alveolaer abscess in a permanent tooth are excluded. Only children who reported with oro-facial swelling associated with a carious primary tooth were included in the study.

A total of 189 case sheets were reviewed, and cross-verification was done by photographs. Among the 189 case sheets, a total of 70 cases were selected after proper review. Sampling bias was minimized by keeping the eligibility criteria specific, which is oro-facial swelling associated with the carious primary tooth.

Statistical analysis was done using SPSS software version 23. Analysis was done with the association of the oro-facial swelling with the type and extent of carious lesion and caries index of the patients. Independent variables were age and gender of the patients. Dependent variables were the type of carious lesion, site of the swelling and extent of the lesion. Chi square test was done to determine the correlation of the ICDAS scores and Type of carious lesion with the orofacial swelling.

RESULTS AND DISCUSSION

The most common age group of children reported with oro-facial swelling in this study was 4 to 6 years of age (Graph 1). The X-axis represents the age of the patients, and Y-axis represents the percentage of occurrence; The most common age group encountered is 4 to 6 years of age.

Both the genders were equally distributed in the study (Graph 2). The X-axis represents the gender of the patients, Y-axis represents the percentage of occurrence;Both the genders are equally distributed.

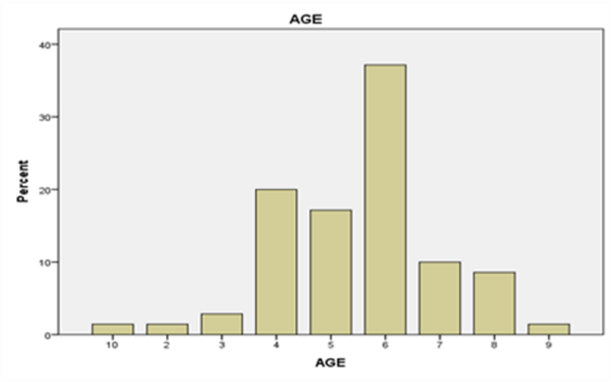
No statistical difference between the number of teeth involved in oro-facial swelling (Graph 3). Maxillary primary first molars and mandibular right primary molars showed a higher incidence of oro-facial swelling.

In this study, we observed that all the carious teeth that caused swelling in children were categorized using ICDAS criteria (Graph 4).

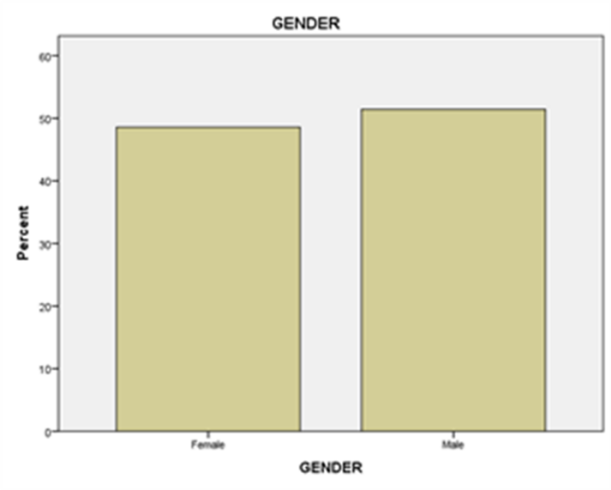
under the score of 5 or 6 (ICDAS 5 - distinct cavity with visible dentin and ICDAS 6 - extensive distinct cavity involving more than half of the surface with visible dentin). No statistically significant difference was obtained between the association of oro-facial swelling with teeth of ICDAS score five and score 6 (p-value > 0.005). Out of 70 samples included in this study, 45 cases in which the teeth were given the ICDAS score of 6, were treated by extracting the tooth associated with the oro-facial swelling. Pulp therapy was done in the remaining 25 cases, where the teeth associated with the swelling were given the ICDAS score of 5 (Graph 5). The teeth which were given ICDAS score six were extracted.

GV Black classification of caries for 51 teeth were Class 1 and of 19 teeth were Class 2 (Graph 6). Majority of the teeth had class 1 carious lesions.

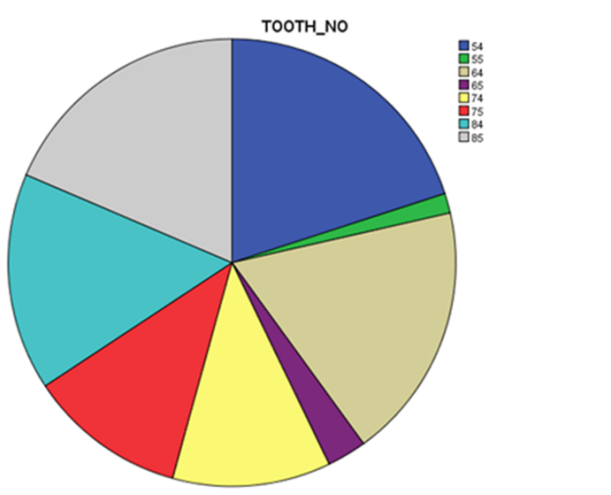
No statistically significant difference was obtained between the association of oro-facial swelling with teeth of GV Black class 1 carious lesion and Class 2 lesion (p-value > 0.005). The mean dmft score of all the patients reported with oro-facial swelling was 8.64 (Graph 7). No association was found between the dmft score and the tooth involving orofacialswelling.



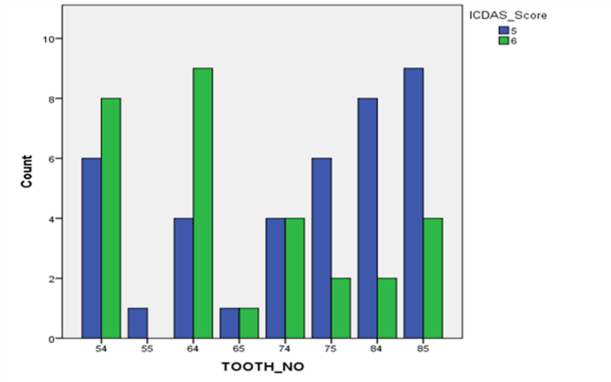
Graph 1: Bar Chart showing the distribution of various age groups in the study across a scale of 1 to 9



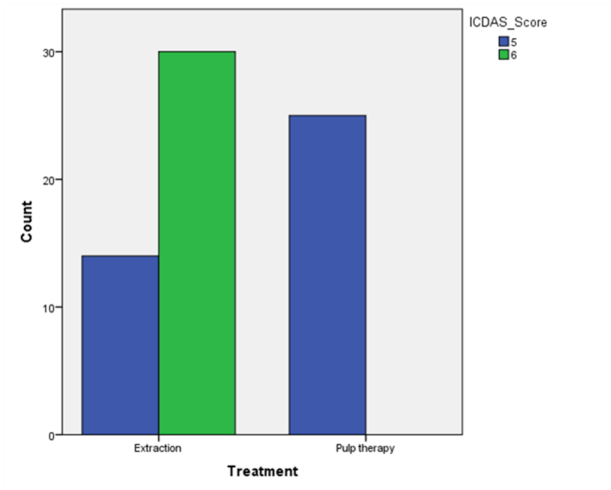
Graph 2: Bar Chart showing the distribution of gender in this study



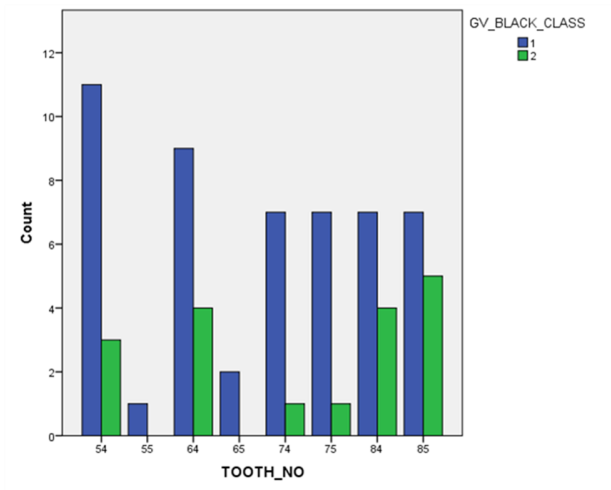
Graph 3: Pie Chart showing the distribution of the tooth numbers in relation to the Oro-facial swelling



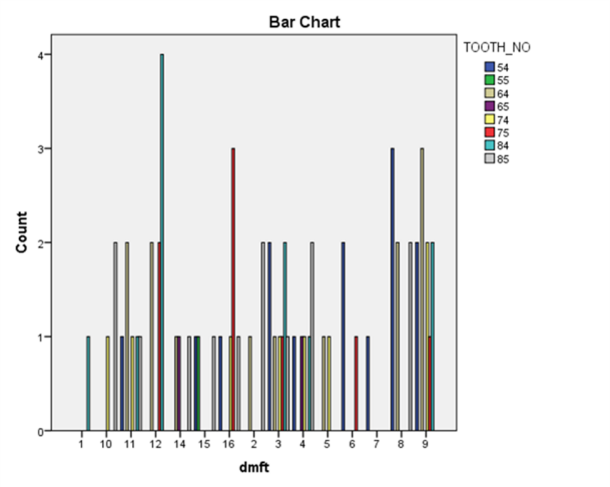
Graph 4: Bar Chart showing the ICDAS Scores of each tooth involved



Graph 5: Bar Chart showing Treatment provided in relation with the ICDAS Score of the tooth involved



Graph 6: Bar Chart showing GV Black Class of each tooth involved



Graph 7: Bar Chart showing dmft of the patients and relationship with the tooth involved

Early childhood caries in children is one of the major causes for dental abscess during primary dentition. There are various preventive strategies available in pediatric dentistry to spare a child from the hazardous outcomes of dental caries like even evaluating the fluoride content of bottled drinking water thereby providing more innovative fluoridation plans (Somasundaram *et al.*, 2015). One of the easiest and cheap modes in providing fluoride to children is through the toothpaste they are using (Ramakrishan and Shukri, 2018). An interesting study was carried out to evaluate the efficacy of using chewable toothbrush for oral hygiene maintenance in children (Govindaraju, 2017). A biochemical approach in early diagnosis of early childhood caries is the evaluation of salivary malondialde hyde levels as a marker of lipid peroxidation (Subramanyam *et al.*, 2018). However, prevention is always better than cure, treatment is also as important as prevention. There are various innovative strategies for the treatment of carious teeth in primary dentition. Restorations using cements or resins are carried out for superficial carious lesions. In deep carious lesions, pulp therapy is carried out. The invention of the exclusive rotary endodontic file for primary tooth extended the purview of pediatric endodontics (Jeevanandan, 2017). Various studies have been carried out proving the efficacy of the use of pediatric rotary endodontic file compared to the conventional methods (Jeevanandan and Govindaraju, 2018). As studied by various researchers (Panchal *et al.*, 2019) already dental procedures are stressful and especially when rendering dental treatment to a child, the operator undergoes tremendous stress. Compared to the experienced clinicians, dental students treating pediatric dental patients were proven to be undergoing increased stress (Aishwarya and Gurunathan, 2017). As the use of rotary files (Nair *et al.*, 2018). In pediatric endodontics not only reduces the instrumentation time but also improves the obturation quality in primary teeth, this reduces the stress for the operator (Govindaraju *et al.*, 2017b). This innovative breakthrough (Govindaraju *et al.*, 2017a) in the field of pedodontics has reached all over the globe, and the awareness about its usage across the country is very well established (Govindaraju *et al.*, 2017a).

Failing to intervene early childhood caries results in devastating conditions like dento-alveolar abscess causing oro-facial swelling. In this study, we observed that all the carious teeth that caused swelling in children were categorized using ICDAS criteria under the score of 5 or 6 (ICDAS 5 - distinct cavity with visible dentin and ICDAS 6 - extensive distinct cavity involving more than half of the surface with visible dentin). In the study done by Guglielmo Campus et al., only 10% of the carious lesions were characterized as dentinal lesions, whereas 67.94 % were enamel lesions (Campus *et al.*, 2019). Out of 70 samples included in this study, 45 cases in which the teeth were given the ICDAS score of 6, were treated by extracting the tooth associated with the oro-facial swelling. Pulp therapy was done in the remaining 25 cases, where the teeth associated with the swelling was given the ICDAS score of 5. According to AAPD guidelines, treatment option for necrotic pulp in primary and immature permanent teeth was pulp therapy (Fuks, 2014). GV Black classification of caries for 51 teeth were Class 1 and of 19 teeth were Class 2. Zafer Azizi in 2014 found out in his study, that class 1 dental caries are more prevalent than class 2 in primary dentition which is supporting our present finding (Azizi, 2014). The mean dmft score of all the patients reported with oro-facial swelling was 8.64. The mean dmft in the study conducted by ZaferAzizi was 2.46 (Azizi, 2014). This shows that patients with poor oral hygiene are more prone to form dental caries which eventually results in periapical infections and dentoalveolar abscess. The teeth that have enough remaining dentin and which may sustain in the oral cavity after pulp therapy are rendered pulp therapy. Following pulp therapy, after the complete healing of the periapical infection, a suitable full coverage restoration which is most commonly a stainless steel crown is rendered to protect the pulp therapy done and to regain the masticatory function of the tooth. Those teeth whose remaining dentin is less than half and are given ICDAS score as six were extracted. After extractions,

a suitable space maintainer was delivered to prevent the space loss, which might occur due to migration of the adjacent teeth, thereby preventing further orthodontic treatments. However, interdental spacings in permanent dentition due to developmental malformations like high frenum attachment has to be corrected through surgical intervention (Christabel, 2015). In a few cases, even the teeth which were categorized under ICDAS 5 were extracted as the periapical infection caused external root resorption thereby making pulp therapy insignificant. All the teeth which were associated with orofacial swelling and were rendered pulp therapy in multiple visits. In the first visit, the access opening and pus drainage along with cleaning the canals were done. In a few cases where there is also an intraoral swelling, incision and drainage of the abscess was done. Dental abscess also causes fever in children. As the inflammatory response is high, and as the child becomes dehydrated without proper liquids and nutrition during an extraoral swelling, the body temperature rises and the child feels fatigued and nauseous. In many cases where the extraoral swelling is associated with the mandibular primary molars, the child had restricted mouth opening. This is because the abscess was constricting the lateral pterygoid muscle. In such cases, as there is restricted mouth opening, no dental procedures could be carried out but just reducing the inflammation by antibiotic therapy.

As mentioned earlier, dental pain is devastating and very tough to tolerate for even adult patients. Pediatric dental patients with dento-alveolar abscess experience severe pain, and hence prevention of it must be a primary goal in the treatment planning for a patient with early childhood caries. Any newly erupted tooth with deep pits and fissures must be given suitable fissure sealants. Any early carious lesions must be excavated and filled. The teeth which require pulpal therapy should be rendered pulp therapy followed by a suitable full coverage restoration like stainless steel crown.

Not only dental abscess causes oro-facial swellings, but also dental traumatic injuries have a great chance in causing oro-facial swelling. General dentists outside the field of pediatric dentistry are also equipped with knowledge and practice in managing traumatic dental injuries in primary teeth (Ravikumar *et al.*, 2017). Other causes for swelling such as tumours and cysts or pseudocysts were also studied by various authors. One of the common oral swellings in children is ranula, and the management of the same is well established (Packiri, 2017).

The limitation of this study is that it includes a low sample size that involved only the patients who reported with one year of time frame. Studying more about the characteristic feature of the carious lesion that progresses to oro-facial abscess will help us to prevent the poor prognosis by early diagnosis and intervention because dental neglect will result in the poor oral health of the children (Gurunathan and Shanmugaavel, 2016)

CONCLUSION

Within the limits of this study, we can conclude that all of the carious lesions, which caused oro-facial swellings in children visiting Saveetha dental college in the past year were categorized under ICDAS 5 and 6. The carious teeth which were ICDAS-6 were treated by extraction and which were ICDAS-5 were rendered pulp therapy. Majority of the carious lesions encountered were class 1 cavities. More studies have to be carried out to study the characteristic features of carious lesions progressing to dento-alvolar abscess.

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Conflict of interest

The authors declare that they have no conflict of interest for this study.

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