Type of Study: Original Research

A Retrospective Analysis of the Most Frequently Infected Maxillary Primary Tooth in Pediatric Patients Visiting A University Hospital in Chennai

Santhanam Panneer Selvam[1],Geo Mani[2], Raghu Sandhya[3]

[1]Research Associate, [2]Reader, Reader, Department of Pedodontics and Preventive Dentistry, [3]Reader, Department of Conservative Dentistry and Endodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai

Abstract

An abscess is defined as a collection of pus that has built up within the tissue of the body. Space infection can be defined as a rapidly spreading, bilateral, indurated cellulitis which usually occur in the suprahyoid soft tissues, the floor of the mouth, and both sublingual and submaxillary spaces without abscess formation.This research comprehensively studies and assesses the most commonly associated primary tooth in the maxillary arch of a patient which gets commonly infected by an abscess or space infection.Since abscess and space infection can affect the daily routine of an individual especially in the Paediatric population which shows more effects. Understanding, identification and early diagnosis helps in preventive care for patients before complications.This is a retrospective descriptive study in Chennai population. Our study is an institution based retrospective descriptive study carried out in between the month of June2019-March2020. Data of patients aged below 13 years who came with chief complaints of pain,infection and who had undergone Pulpectomy and extraction procedures were included in the study sample. SPSS software is used for statistical analysis. Based on statistical analysis results were tabulated. Most prevalent Primary tooth in Upper Arch to be infected with Abscess or Space infection is found to be 54. Around 347 out of 1100. Primary maxillary right first molar is the most prevalent tooth to be affected with abscess/space infection. Within the limitations of the study , the most frequently associated primary tooth in maxillary arch with space infection or abscess is maxillary right first primary molar [54] which shows direct correlation with the age group of 7-10 years.

Keywords: *Primary Tooth, Abscess, Space infection, Children, Extraction, Pulpectomy*

Introduction

An abscess is defined as a collection of pus that has built up within the tissue of the body[1]. Space infection is defined as rapidly spreading, bilateral, indurated cellulitis which usually occur in the suprahyoid soft tissues, the floor of the mouth, and both sublingual and submaxillary spaces without abscess formation. Although not a true abscess, it resembles one clinically and is treated similarly. Abscess and space infection were usually caused by a bacterial infection. Orofacial infections are one of the most common health care concerns in children and are a frequent cause for dental consultation worldwide [2,3]. Microorganism related to oral cavity are the most important causative agents in osteomyelitis, aspiration pneumonia, bacterial endocarditis, halitosis, periodontal disease, abscesses, pulpitis, dental caries, space infection in children, cerebral infarction, coronary heart disease, and preterm low birth weight [4–6]. Fluoride application reduces occurrence of dental caries and caries related infections [7,8]. In order to prevent

Corresponding author
Geo Mani,
Reader, Department of Pedodontics and Preventive Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, 162 Poonamallee High Road, Chennai -600 077, Tamil Nadu, India.
Email Id: geomani.sdc@saveetha.com
Telephone number: +91-7358433246

systemic involvement Early diagnosis, management and recognition of orofacial infections in children play an important role. [9,10]

Most orofacial infections are found to be odontogenic in origin, but others are self-limiting in nature [11,12]. Odontogenic infections have polymicrobial sources with mixed aerobic bacteria and anaerobic bacteria [13]. Paediatric orofacial infections, disease has more ability to progress in a rapid manner, by producing significant systemic symptoms including fever, dehydration, and airway compromise[14]. Because of the possibility of progression to systemic disease, early management and recognition of orofacial infections in children is necessary [15,16]

In children, unlike adults, the location of various anatomic infections is thought to be helpful to guide for proper diagnosis and management and treatment [17,18,19]. In case of early diagnosis of abscess and space infection can be treated with endodontic procedure-pulpectomy. Success of pulpectomy procedure depends on instrumentation[20] and behaviour management. Usage of rotary instruments in pulpectomy procedure consumes less time [21,22,23,24,25]. In severe cases tooth has to be surgically extracted [26,27]. Since abscess and space infection can affect the daily routine of an individual especially in the paediatric population which shows more effects. Understanding, identification and early diagnosis helps in preventive care for patients before complications.This retrospective descriptive study limited to the Chennai population. This research comprehensively assesses the most commonly associated primary tooth in the maxillary arch of children which gets commonly infected resulting in an abscess or space infection.

Materials and Methods

Our study is a retrospective descriptive study. For this study we got approval from the Institutional Ethical Review Board (SDC//SIHEC/2020/DIASDATA/0619-0320) and our study was carried in a university hospital setting in a major city of Tamil Nadu, South India. After getting approval Case sheets of 5516 paediatric dental OP patients aged below 13 years who visited the University Hospital in between the month of June 2019 and March 2020 were considered. In that 5516 around 2527 case sheets of patients with chief complaints of pain, irritation in the oral cavity underwent pulpectomy and extraction procedure were taken into study. 1100 case sheets were obtained by filtering those patients who aged below 13 years who visited the University Hospital with chief complaints of pain, irritation in oral cavity underwent pulpectomy and extraction procedure especially in maxillary arch were analysed. The collected data were filtered and a case sheet of patients below the age of 13years was considered.

These 1100 data were analysed , even photographs, radiographs in the image gallery of the patient online case sheet records were verified. In order to reduce, minimise and avoid the occurrence errors, verified case sheets were once again cross verified by another examiner. Verified case sheet details were tabulated in excel under columns of age, gender, patient with abscess/ space infection , maxillary arch tooth number in FDI notation ,treatment done by dentist to patient. Excel tabulated data is transferred to SPSS software for statistical analysis. Descriptive statistics and chi square tests were conducted to evaluate differences between groups with significance level at 95% confidence interval ($P<0.05$).

Result and Discussion

Based on analysis results were obtained and tabulated. The frequency distribution of age of patient where around 315 patients fall between the age group of 7-10 years , 296 patients between 11-13 years, 255 patients between 0-3 years and 234 patients between 4-6 years (Figure 1). Considering the percentage of Age distribution of patients in our study 28.6%(315nos) lie between 7-10 years and 26.9%(296nos) lie between 11-13 years. Which goes in relation with study done by Ingle NA, et al, where 6 to 10 years - 9.46%[28] there are several reasons like dental caries, infection,trauma for high prevalence in this age group.

The frequency distribution of gender of patient where around 589 patients were male and 511 patients were female (Figure 2). On seeing the percentage of gender distribution in our study around 53.5%(589nos) were males and the remaining 46.5%were females=46.5% who had infection. This is in relation with a previous study done by Manal Al-Malik et al where 64.8% males and 35.2% females had infections[5]. The reason stated was boys are hyperactive, prone to infection, etc.

The frequency distribution of individual tooth considered in our study (Figure 3) where 357 nos -54, 247 nos -51, 207 nos- 52,84 nos-62 , 63 nos- 62, 52 nos -53, 48nos- 55, 31 nos – 64 , 11nos- 65 and 6 nos -63 is involved. The frequency distribution of type of infection associated with tooth in the study (Figure 4) where around 994 teeth are not associated with any infection, 136 teeth had abscess and 20 teeth had space infection. On seeing the percentage of Infection distribution around 85.8% cases had no infection, 12.4% had Abscess and 1.8% had Space infection. This is in relation with previous studies where the authors say orofacial infections constitute approximately 20% of total maxillofacial and oral surgery admissions [5,29].

The frequency distribution of the type of treatment done by dentists to patients in the study (Figure 5)where 628 patient teeth were extracted, 466 patients were treated with pulpectomy and 6 patients didn't go for any treatment. The gender wise categorisation of frequency distribution of type of infection (Figure 6) where 516 male had no infection, 63 male had abscess and 10 had space infection, 428 female had no infection, 73 female had abscess and 10 had space infection. The Age wise categorisation of frequency distribution of type of infection (Figure 7) where about 119 patients were present with abscess and 14 patients present with space infection between the age group of 7-10years.

The individual tooth wise categorisation of frequency distribution of infection in patients (Figure 8) where infection is more prevalent in 54. Most prevalent primary tooth in the upper arch to be infected with abscess or space infection is found to be 54 (Figure 8).

Primary maxillary right first molar is the most prevalent tooth to be affected with abscess/space infection. On seeing percentage of most frequently associated primary tooth in maxillary arch with space infection or abscess is maxillary right primary molar =32.5%, maxillary right primary central incisor=22.5% maxillary right primary lateral incisor= 18.3% This is in relation with previous study where the author says in almost 84% cases primary posterior teeth were considered to be a major source of infection.

The most commonly affected teeth were the primary first molars[5]. This can be due to mastication where molars play an important role, habits like bruxism, difference in chronological age like 1st primary molar erupt before 2nd primary molar so higher plaque accumulation and lack of prophylactic method and improper brushing in posterior region can be taken as several cause for space infection. Chi square tests were carried for frequency distribution of individual teeth which got infected, age by individual tooth in the study, age by infection, gender by individual tooth association, gender by individual tooth in the Study shows p value statistically significant.

Abscess and space infection in children aged below 13 years can significantly affect the quality of life of children. It also leads to missing school hours and overall well being of the child. Considering the impact caused by abscess and space infection in children early diagnosis and treatment planning plays an important role. Understanding the most commonly affected tooth with infection can help in implementing better preventive strategies, evidence from the present study can be utilized for these purposes. Our study had few limitations such as its a single centered study, subjects were not available for direct examination and we relied on photographs and case sheets of patients.

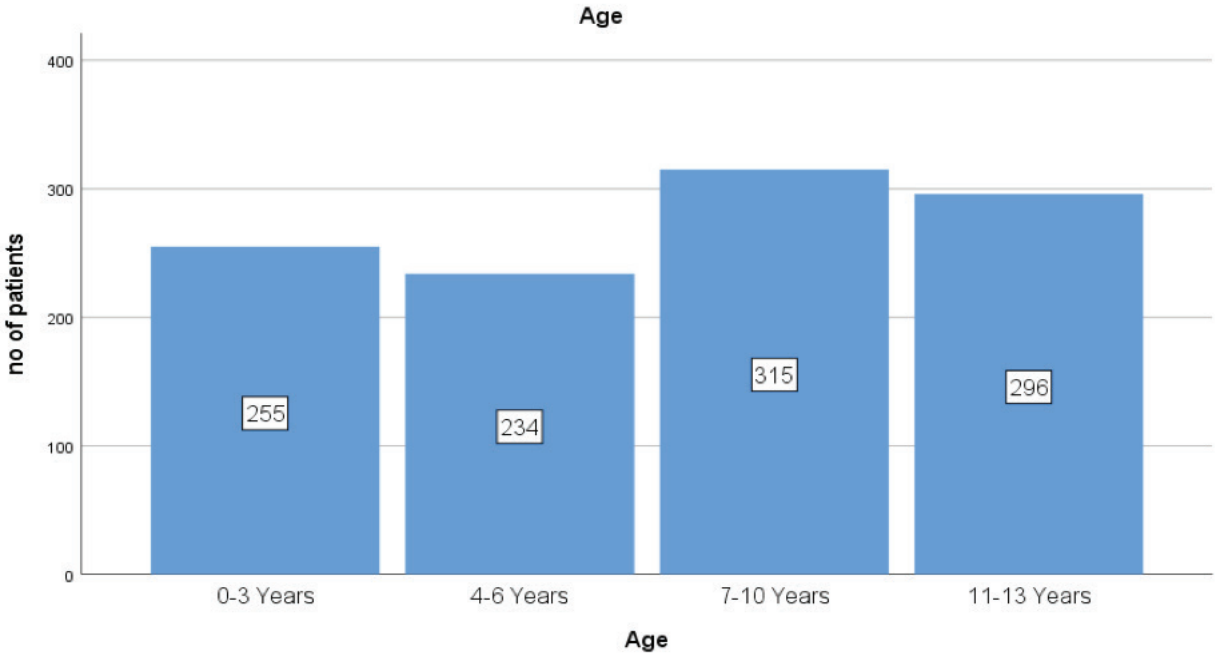

Figure 1: Bar graph representing frequency distribution of age group of children in the sample population. X-axis represents age groups and Y-axis represents the number of children in each age group. Most of the patients who underwent extraction/ pulpectomy procedures were between the age group of 7-10 years (315).

Figure 2: Bar graph representing frequency distribution of gender of children in the study population. X-axis represents gender and Y-axis represents the number of children. Most of the children who underwent extraction/ pulpectomy procedure were males (589) compared to females (511).

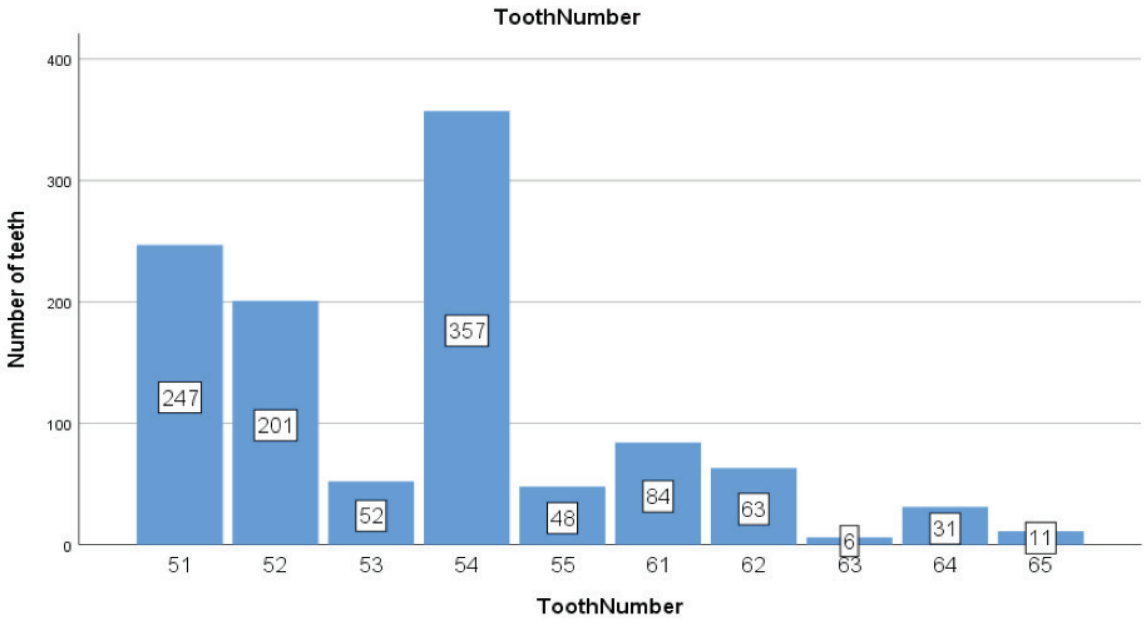

Figure 3: Bar graph representing frequency distribution of individual tooth in FDI notation. X-axis represents tooth number in FDI notation and Y-axis represents the number of times the tooth was involved. Graph shows that most of the children's individual tooth which underwent extraction/ pulpectomy procedures was Maxillary right first primary molar (357).

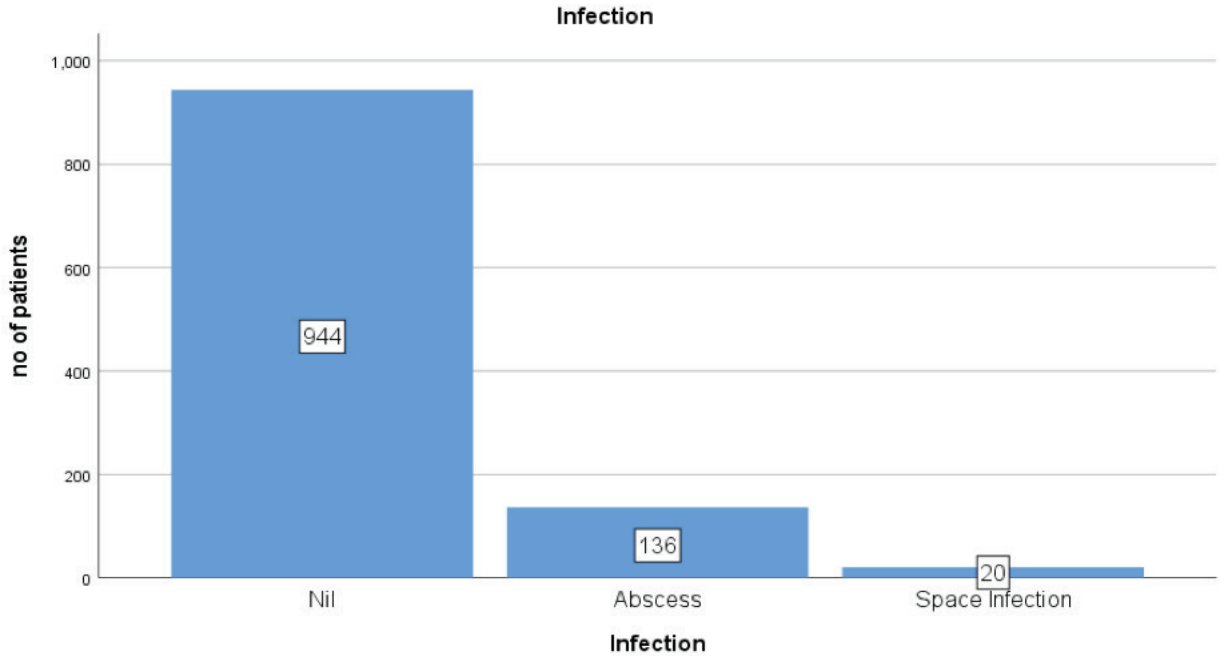

Figure 4 : Bar graph representing frequency distribution of type of infection. X-axis represents the type of infection and Y-axis represents the number of patients. Most of the patients had no infection (944), abscess was seen in 136 children and space infection in 20 children.

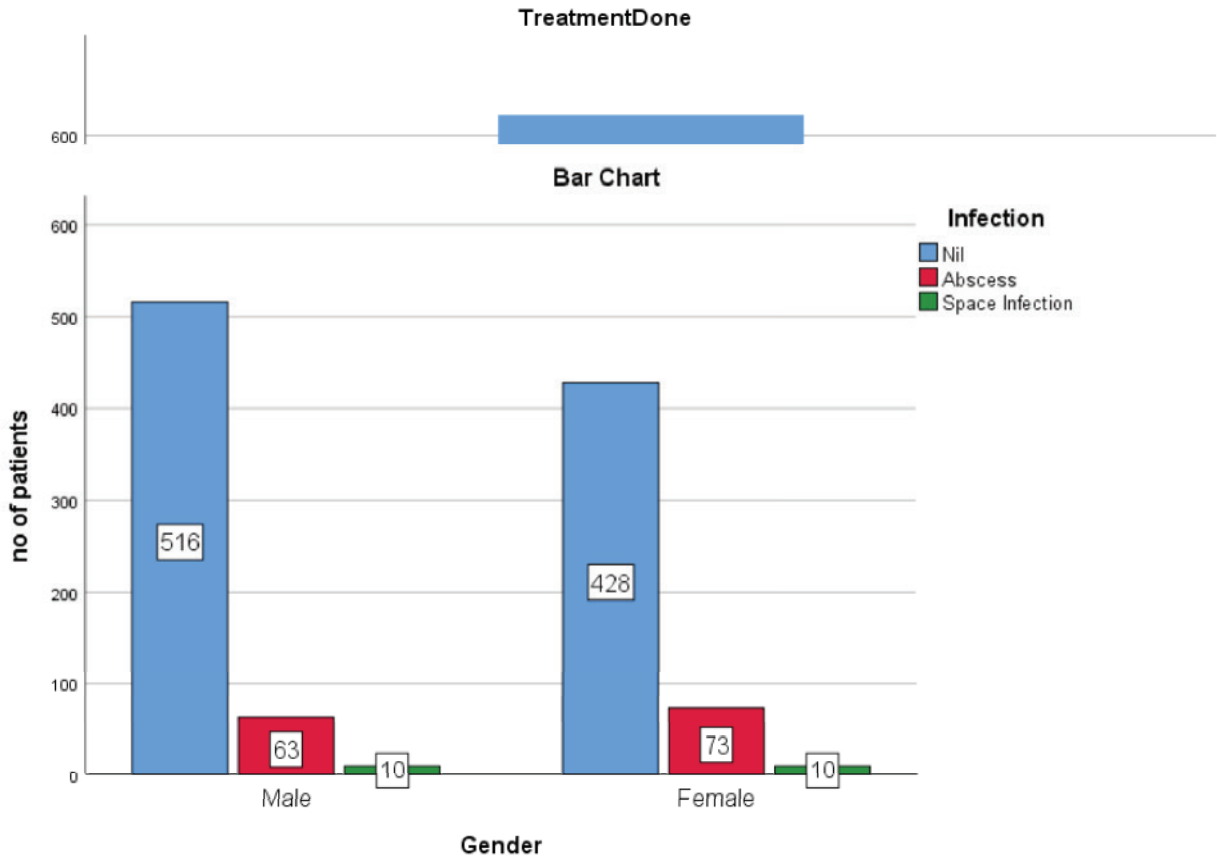

Figure 6: Bar graph representing association between gender and frequency distribution of type of infection . X-axis: gender wise categorisation of frequency distribution of type of infection (blue colour= no infection

; red colour= abscess; green space infection). Y-axis: No.of Patients.There was no difference between boys and girls in type of infection.Chi square test was done and the association was found to be not significant.(p value was =0.180 p>0.05 statistically not significant).

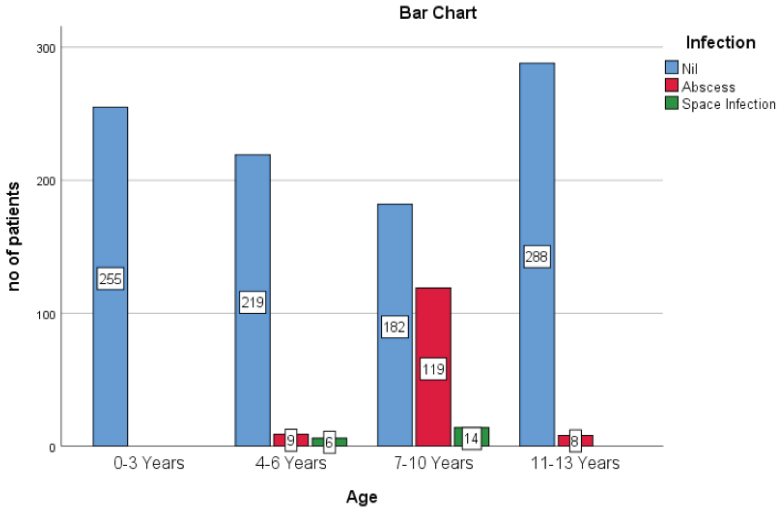

Figure 7: Bar graph representing association between age and type of infection . X-axis represents age groups and x clusters represent types of infection (blue colour= no infection ; red colour= abscess; green space infection). Y-axis: Number of children with different types of infection.There was a difference in occurrence of infection between age groups with higher occurrence among the age group of 7 to 10 years. Chi square test was done and the association was found to be significant.(p value was =0.000 p<0.05 statistically significant).

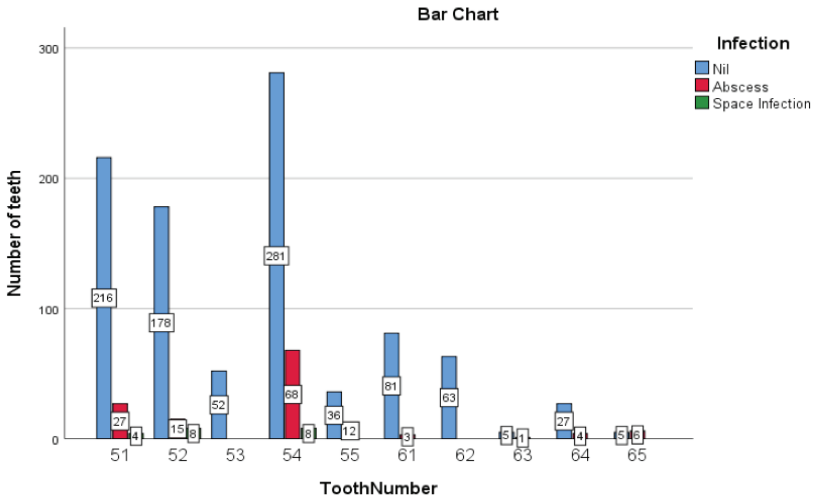

Figure 8: Bar graph representing association between individual tooth and type of infection . X-axis represents tooth number in the FDI system of notation and x cluster shows types of infection(blue colour= no infection ; red colour= abscess; green= space infection). Y-axis represents the number of teeth. Higher occurrence of infection was noticed in maxillary right first primary molar compared to other teeth. Chi square test was done and the association was found to be significant. (p value = 0.000 <0.05 statistically significant).

Conclusion

Within the limitation of the study , Most frequently associated primary tooth in maxillary arch with space infection or abscess: is Maxillary Right First Primary Molar [54] which shows direct correlation with the age group of

7-10 years. 11.5 % of children who underwent extraction or pulpectomy presented with abscess or space infection.

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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)

References

1. Singer AJ, Talan DA. Management of Skin Abscesses in the Era of Methicillin-Resistant Staphylococcus aureus [Internet]. Vol. 370, New England Journal of Medicine. 2014. p. 1039–47. Available from: http://dx.doi.org/10.1056/nejmra1212788
2. Nair RG, Salajegheh A, Itthagarun A, Pakneshan S, Brennan MT, Samaranayake LP. Orofacial viral infections – an update for clinicians [Internet]. Vol. 41, Dental Update. 2014. p. 518–24. Available from: http://dx.doi.org/10.12968/denu.2014.41.6.518
3. Gendron R, Grenier D, Maheu-Robert L-F. The oral cavity as a reservoir of bacterial pathogens for focal infections [Internet]. Vol. 2, Microbes and Infection. 2000. p. 897–906. Available from: http://dx.doi.org/10.1016/s1286-4579(00)00391-9
4. Li X, Kolltveit KM, Tronstad L, Olsen I. Systemic Diseases Caused by Oral Infection [Internet]. Vol. 13, Clinical Microbiology Reviews. 2000. p. 547–58. Available from: http://dx.doi.org/10.1128/cmr.13.4.547
5. Al-Malik M, Al-Sarheed M. Pattern of management of oro-facial infection in children: A retrospective [Internet]. Vol. 24, Saudi Journal of Biological Sciences. 2017. p. 1375–9. Available from: http://dx.doi.org/10.1016/j.sjbs.2016.03.004
6. Subramanyam D, Gurunathan D, Gaayathri R, Vishnu Priya V. Comparative evaluation of salivary malondialdehyde levels as a marker of lipid peroxidation in early childhood caries. Eur J Dent. 2018 Jan;12(1):67–70.
7. Somasundaram S, Ravi K, Rajapandian K, Gurunathan D. Fluoride Content of Bottled Drinking Water in Chennai, Tamilnadu. J Clin Diagn Res. 2015 Oct;9(10):ZC32–4.
8. Fluoride, Fluoridated Toothpaste Efficacy And Its Safety In Children - Review [Internet]. Vol. 10, International Journal of Pharmaceutical Research. 2018. Available from: http://dx.doi.org/10.31838/ijpr/2018.10.04.017
9. Cachovan G, Phark J-H, Schön G, Pohlenz P, Platzer U. Odontogenic infections: An 8-year epidemiologic analysis in a dental emergency outpatient care unit [Internet]. Vol. 71, Acta Odontologica Scandinavica. 2013. p. 518–24. Available from: http://dx.doi.org/10.3109/00016357.2012.696694
10. Packiri S, Gurunathan D, Selvarasu K. Management of Paediatric Oral Ranula: A Systematic Review. J Clin Diagn Res. 2017 Sep;11(9):ZE06–9.
11. Heimdahl A, von Konow L, Satoh T, Nord CE. Clinical appearance of orofacial infections of odontogenic origin in relation to microbiological findings [Internet]. Vol. 22, Journal of Clinical Microbiology. 1985. p. 299–302. Available from: http://dx.doi.org/10.1128/jcm.22.2.299-302.1985
12. Porras AL, Lozano Porras A, Gonzalez Navarro B, Arranz Obispo C, Mari Roig A, Jane Salas E, et al. Infective endocarditis and antibiotic prophylaxis in dentistry [Internet]. Medicina Oral Patología Oral y Cirugia Bucal. 2015. p. S36–36. Available from: http://dx.doi.org/10.4317/medoral.17643979
13. Brook I. Microbiology and Management of Deep Facial Infections and Lemierre Syndrome [Internet]. Vol. 65, ORL. 2003. p. 117–20. Available from: http://dx.doi.org/10.1159/000070776
14. Dodson TB, Kaban LB. SPECIAL CONSIDERATIONS FOR THE PEDIATRIC EMERGENCY PATIENT [Internet]. Vol. 18, Emergency Medicine Clinics of North America. 2000. p. 539–48. Available from: http://dx.doi.org/10.1016/s0733-8627(05)70142-5
15. Dodson TB, Perrott DH, Kaban LB. Pediatric maxillofacial infections: A retrospective study of 113 patients [Internet]. Vol. 47, Journal of Oral and Maxillofacial Surgery. 1989. p. 327–30. Available from: http://dx.doi.org/10.1016/0278-2391(89)90331-5

16. Hegazi M. CHARACTERISTICS OF DENGUE INFECTION IN SAUDI CHILDREN: SINGLE CENTER RETROSPECTIVE STUDY IN A TERTIARY HOSPITAL IN JEDDAH, WESTERN SAUDI ARABIA [Internet]. Available from: http://dx.doi.org/10.26226/morressier.58fa1764d462b80290b509b2
17. Flynn TR, Halpern LR. Antibiotic selection in head and neck infections [Internet]. Vol. 15, Oral and Maxillofacial Surgery Clinics of North America. 2003. p. 17–38. Available from: http://dx.doi.org/10.1016/s1042-3699(02)00082-1
18. Gurunathan D, Shanmugaavel A. Dental neglect among children in Chennai [Internet]. Vol. 34, Journal of Indian Society of Pedodontics and Preventive Dentistry. 2016. p. 364. Available from: http://dx.doi.org/10.4103/0970-4388.191420
19. Govindaraju L, Gurunathan D. Effectiveness of Chewable Tooth Brush in Children-A Prospective Clinical Study. J Clin Diagn Res. 2017 Mar;11(3):ZC31–4.
20. Nair M, Jeevanandan G, Vignesh R, Subramanian EMG. Comparative evaluation of post-operative pain after pulpectomy with k-files, kedo-s files and mtwo files in deciduous molars -a randomized clinical trial [Internet]. Vol. 21, Brazilian Dental Science. 2018. p. 411. Available from: http://dx.doi.org/10.14295/bds.2018.v21i4.1617
21. Jeevanandan G. Kedo-S Paediatric Rotary Files for Root Canal Preparation in Primary Teeth - Case Report. J Clin Diagn Res. 2017 Mar;11(3):ZR03–5.
22. Govindaraju L, Jeevanandan G, Subramanian EMG. Comparison of quality of obturation and instrumentation time using hand files and two rotary file systems in primary molars: A single-blinded randomized controlled trial. Eur J Dent. 2017 Jul;11(3):376–9.
23. Govindaraju L, Jeevanandan G, Subramanian EMG. Knowledge and practice of rotary instrumentation in primary teeth among indian dentists: A questionnaire survey [Internet]. Vol. 9, Journal of International Oral Health. 2017. p. 45. Available from: http://dx.doi.org/10.4103/jioh.jioh_4_17
24. Jeevanandan G, Govindaraju L. Clinical comparison of Kedo-S paediatric rotary files vs manual instrumentation for root canal preparation in primary molars: a double blinded randomised clinical trial [Internet]. Vol. 19, European Archives of Paediatric Dentistry. 2018. p. 273–8. Available from: http://dx.doi.org/10.1007/s40368-018-0356-6
25. Govindaraju L, Jeevanandan G, Subramanian E. Clinical Evaluation of Quality of Obturation and Instrumentation Time using Two Modified Rotary File Systems with Manual Instrumentation in Primary Teeth. J Clin Diagn Res. 2017 Sep;11(9):ZC55–8.
26. Ravikumar D, Jeevanandan G, Subramanian EMG. Evaluation of knowledge among general dentists in treatment of traumatic injuries in primary teeth: A cross-sectional questionnaire study. Eur J Dent. 2017 Apr;11(2):232–7.
27. Christabel SL, Linda Christabel S. Prevalence of Type of Frenal Attachment and Morphology of Frenum in Children, Chennai, Tamil Nadu [Internet]. Vol. 6, World Journal of Dentistry. 2015. p. 203–7. Available from: http://dx.doi.org/10.5005/jp-journals-10015-1343
28. Ingle NA, Hemapriya S, Chaly PE, Reddy VC. Prevalence of Malocclusion and Orthodontic Treatment Needs Among 12 and 15 Years Old Rural School Children in Kancheepuram District, Tamilnadu [Internet]. Vol. 7, Journal of Oral Health and Community Dentistry. 2013. p. 84–90. Available from: http://dx.doi.org/10.5005/johcd-7-2-84
29. Thikkurissy S, Rawlins JT, Kumar A, Evans E, Casamassimo PS. Rapid treatment reduces hospitalization for pediatric patients with odontogenic-based cellulitis [Internet]. Vol. 28, The American Journal of Emergency Medicine. 2010. p. 668–72. Available from: http://dx.doi.org/10.1016/j.ajem.2009.02.028
30. Norrby-Teglund A, Muller MP, McGeer A, Gan BS, Guru V, Bohnen J, et al. Successful management of severe group A streptococcal soft tissue infections using an aggressive medical regimen including intravenous polyspecific immunoglobulin together with a conservative surgical approach [Internet]. Vol. 37, Scandinavian Journal of Infectious Diseases. 2005. p. 166–72. Available from: http://dx.doi.org/10.1080/00365540410020866

31. Maki MH. Orofacial Infections in Iraq [Internet]. Vol. 21, Journal of Craniofacial Surgery. 2010. p. 1911–6. Available from: http://dx.doi.org/10.1097/scs.0b013e3181f4b1d0