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REASONS FOR EXTRACTION OF PERMANENT FIRST MOLARS IN CHILDREN BETWEEN 6-17 YEARS OF AGE - A RETROSPECTIVE STUDY

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Abstract:

Introduction:

The permanent first molar teeth are the most caries prone teeth in mixed dentition. Reasons for permanent molar teeth loss include poor prognosis, caries,orthodontic and periodontal reasons. This study was done with the aim to assess the common reasons for extraction of first permanent molars in children between 6-17 years of age.

Materials and methods:

A total of 89000 case sheets were reviewed and cross verified from June 2019 to March 2020. Data related to permanent molar extractions were retrieved by searching with Patient ID, age, gender ,tooth number and treatment relevant to the study. Data was tabulated in the excel sheet. Statistical analysis was done using Statistical Package for the Social Sciences software(version 9.0.3). Results were statistically analysed using association analysis.

Results:

Higher number of males (64.47%) had first permanent molar extractions when compared to females (35.53%). In males, dental caries with pulpitis (22.37%) was the most common reason for extraction of permanent molars. In females, root stumps(13.16%) was the most common reason for extraction of permanent molars. In both 8-12 years age group and 13-17 years age group, dental caries with pulpitis (34.21%) was the most common reason for extraction of permanent molars.

Conclusion:

Within the limitations of the current study, first permanent molars were commonly extracted among males and dental caries with pulpitis was the most common reason for extraction of first permanent molars.

Keywords: *Children, Extraction , Permanent molar teeth, Prevalence, Reasons.*

INTRODUCTION:

Paediatric patient management is one of the most challenging aspects that patient cooperation as well as skilful management by the clinician are essential. Dentition is important for stimulation of development of dental arches, maintaining normal occlusal relationship and role in speech development (Chen *et al.*, 2017). Dentition should not be neglected mainly in children since it serves as a guideline for permanent dentition (Gurunathan and Shanmugaavel, 2016). Loss of natural teeth in a child may be harmful, which ultimately leads to drifting, tilting and malposition of adjacent and succedaneous teeth,

as a result causing psychological stress. This complication may further be a burden to the child and the parents (Abuelniel, Duggal and Kabel, 2020) .Many causes for extraction of teeth exist but the main reason found was periapical problems where a tooth is decayed to the extent and pulp therapy showed poor prognosis.

Tooth extractions are commonly considered only when suggestive treatment requires i.e. orthodontic treatment, in order to correct dental arch irregularities so on (Carrotte, 2005). Even tooth brushes can play an important role in oral hygiene of children (Govindaraju, 2017) . It may be preventive or interceptive which may be necessary to prevent irregularity from progressing into a more severe malocclusion (Sabashvili, 2018)(Bennett, 2006). Traumatic injuries can be considered as one of the common causes for tooth to be extracted since traumatic injuries usually occur among young children immediately after tooth eruption;thus tooth vitality is checked for root canal treatment (Ravikumar, Jeevanandan and Subramanian, 2017)(Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017a)(Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017b)(Fuks, 2002). Around 5 years of age , most boys would have suffered dental trauma, such injuries in the primary dentition may interfere with the normal development of the permanent dentition (Somasundaram *et al.*, 2015)(Govindaraju, Jeevanandan and E. Subramanian, 2017). Hence extraction is done. The retained primary teeth which do not shed at the normal time will cause dental malocclusion and abnormalities (Jeevanandan, Ganesh and Arthilakshmi, 2019)(Subramanyam *et al.*, 2018) . Variations in the primary teeth exfoliation are found in child patients (Ramakrshnan and Bhurki, 2018). Normal tooth mobility that causes child discomfort due to interference with dentition. Other then removal of primary teeth, treatment options like root canal treatment with rotary files (Nair *et al.*, 2018)(Panchal, Jeevanandan and Subramanian, 2019)(Jeevanandan and Govindaraju, 2018) .

This study aims to find out the most common reasons for permanent molar extractions in age group of 6-17 years in a private dental college.

MATERIALS AND METHODS:

The current case control study was set in a hospital based - university setting. Ethical approval was obtained from the Institutional Ethical committee of the University. Consent to use treatment records for research purposes were obtained from patients/guardians at the time of patient entry into the university for dental needs. The retrospective data were collected by obtaining and analysing the 89000 dental case records of the university from June 2019 to March 2020. The inclusion criteria for the current study were children between the age of 6-17 years age, children who require extraction of first permanent molars due to varied reasons, complete photographic and written records regarding the complete intra-oral examination of the patient. The exclusion criteria were incomplete and censored dental records and absence of photographic evidence of the case records. The selected sample group was examined by three people; one reviewer, one guide and one researcher. The patients' case sheets were reviewed thoroughly. Cross checking of data including digital entry and intra oral photographs, removal of data records of the same patient involved in multiple extractions

were done by an additional reviewer and as a measure to minimise sampling bias, samples for the group were picked by simple random sampling.

Data of the patients that were selected based on inclusion and exclusion criteria was tabulated in the excel sheet**.** Chi-square test was done using Statistical Package for the Social Sciences software(version 9.0.3).

RESULTS AND DISCUSSION:

First permanent molars were commonly extracted in males (64.47%) when compared to females (35.53%)[Figure 1]. Children in the complete permanent dentition period i.e. 13-17 years age group (78.95%) showed higher extraction of first permanent molar when compared to children in the mixed dentition period i.e. 8-12 years age group (21.05%) [Figure 2]. Dental caries with pulpitis (34.21%) was found to be the most common reason for permanent molar extractions, followed by root stumps (25%), dental caries with furcal involvement (19.74%), reinfected root canal treated teeth (9.21%), full mouth rehabilitation (6.58%) ,pulp polyp (2.63%) and non vital tooth with dental caries (2.63%) [Figure 3]. In males, dental caries with pulpitis (22.37%) was the most common reason for extraction of permanent molars. In females, root stumps(13.16%) was the most common reason for extraction of permanent molars. This difference was not statistically significant (p=0.555) [Figure 4].In both 8-12 years age group (7.89%) and 13-17 years age group (26.32%), dental caries with pulpitis was the most common reason for extraction of permanent molars. This difference was not statistically significant. (p=0.352) [Figure 5]

In our study , gender prevalence was found to be higher in males(66%) compared to females (34%) This was in accordance with Boley (Boley, 2002) who reported that males were frequently visiting dental clinic for extraction than females.

Mandibular left first permanent molars were the most extracted permanent molars(40.79%) followed by mandibular right permanent molars,maxillary left and right first permanent molars (27.63%) . This was supported by Saber (Saber *et al.,* 2018) where he reported that during 8 years of age, mandibular left and right first molars were the most commonly extracted. Permanent molar extractions were done less in special children. This was in accordance with Barclay's study (Barclay, 1974) where he stated special children were less prone to extraction of permanent molars.

Dental Caries with pulpitis (34.21%) was found to be the most common reason for permanent molar extractions, followed by root stumps (25%), Dental caries with furcal involvement (19.74%), Reinfected root canal treated teeth (9.21%), full mouth rehabilitation (6.58%) ,pulp polyp (2.63%) and non vital tooth with dental caries (2.63%) This was supported by Soukey's study (Soukeye, 2018) where he concluded that dental caries were the main reason for extraction.

Maintaining healthy teeth is essential to a child's overall oral and general development. Parents and family members are considered the primary source for knowledge about child rearing and health habits for children, which undoubtedly have a long-term

influence in determining a child's oral health status.They are considered the key persons in achieving the best oral health outcomes and assuring well-being for children. Frequently in pediatric dental practice we find parents ignorant about the primary tooth, its function and importance. They often question the necessity of treatment to save and maintain the milk tooth in function.There is no good reason for leaving primary teeth decayed and untreated in a child's mouth. No other branch of medicine would willingly leave disease untreated. The extractions of permanent molars may be due to the higher cariogenic diet. Improper oral hygiene measures and no frequent dental visits ultimately leads to grossly decayed teeth. Due to such circumstances, if it is not possible for a clinician to save the tooth, then extraction is done. Proper diagnosis and planning before treatment is necessary to avoid any mishaps (Packiri, Gurunathan and Selvarasu, 2017)(Christabel and Gurunathan, 2015) .

The strengths of the current study were the study was done under a university setting which provided us the required data pertaining to a particular community of people and all data were validated by a reviewer which improvised the data's internal validity. Limitation of the study was found to be smaller sample size with limited demographic population and minimal external validity of the study. Future scope of study could include larger sample size with various ethnicities for better results.

CONCLUSION:

Within the limitations of the study, extraction of first permanent molars were most commonly seen in children during the permanent dentition period and the most common reason was dental caries with pulpitis. Male children had higher extractions when compared to females.

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AUTHOR CONTRIBUTIONS

- Design - Karthikeson, Vignesh Ravindran
- Intellectual content - Vignesh Ravindran
- Data collection - Karthikeson
- Data analysis - Vignesh Ravindran, Kiran kumar
- Manuscript writing - Karthikeson
- Manuscript editing - Vignesh Ravindran, Kiran kumar

CONFLICTS OF INTEREST:

No conflicts of interest were declared by the authors of this manuscript.

REFERENCES:

[1] Abuelniel, G. M., Duggal, M. S. and Kabel, N. (2020) 'A comparison of MTA and Biodentine as medicaments for pulpotomy in traumatized anterior immature permanent teeth: A randomized clinical trial', *Dental traumatology: official publication of International Association for Dental Traumatology*. doi: 10.1111/edt.12553.

[2] Barclay, J. K. (1974) 'A survey of dental extractions in New Zealand. II. Reasons for tooth loss', *The New Zealand dental journal*, 70(319), pp. 25–38.

[3] Bennett, J. C. (2006) *Orthodontic Management of Uncrowded Class II Division 1 Malocclusion in Children*. Elsevier Health Sciences.

[4] Boley, J. C. (2002) 'Serial extraction revisited: 30 years in retrospect', *American journal of orthodontics and dentofacial orthopedics: official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics*, 121(6), pp. 575–577.

[5] Carrotte, P. (2005) 'Endodontic treatment for children', *British dental journal*, 198(1), pp. 9–15.

[6] Chen, K. J. *et al.* (2017) 'Dental caries status and its associated factors among 5-year-old Hong Kong children: a cross-sectional study', *BMC Oral Health*. doi: 10.1186/s12903-017-0413-2.

[7] Christabel, S. L. and Gurunathan, D. (2015) 'Prevalence of Type of Frenal Attachment and Morphology of Frenum in Children, Chennai, Tamil Nadu', *World Journal of Dentistry*, 6(4), pp. 203–207.

[8] Fuks, A. B. (2002) 'Current concepts in vital primary pulp therapy', *European journal of paediatric dentistry: official journal of European Academy of Paediatric Dentistry*, 3(3), pp. 115–120.

[9] Govindaraju, L. (2017) 'Effectiveness of Chewable Tooth Brush in Children-A Prospective Clinical Study', *JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH*. doi: 10.7860/jcdr/2017/24238.9528.

[10] Govindaraju, L., Jeevanandan, G. and Subramanian, E. (2017) 'Clinical Evaluation of Quality of Obturation and Instrumentation Time using Two Modified Rotary File Systems with Manual Instrumentation in Primary Teeth', *Journal of clinical and diagnostic research: JCDR*, 11(9), pp. ZC55–ZC58.

[11] Govindaraju, L., Jeevanandan, G. and Subramanian, E. M. G. (2017a) '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', *European journal of dentistry*, 11(3), pp. 376–379.

[12] Govindaraju, L., Jeevanandan, G. and Subramanian, E. M. G. (2017b) 'Knowledge and practice of rotary instrumentation in primary teeth among indian dentists: A questionnaire survey', *Journal of International Oral Health*, p. 45. doi: 10.4103/jioh.jioh_4_17.

[13] Gurunathan, D. and Shanmugaavel, A. K. (2016) 'Dental neglect among children in Chennai', *Journal of the Indian Society of Pedodontics and Preventive Dentistry*, 34(4), pp. 364–369.

[14] Jeevanandan, G., Ganesh, S. and Arthilakshmi (2019) 'Kedo file system for root canal preparation in primary teeth', *Indian journal of dental research: official publication of Indian Society for Dental Research*, 30(4), pp. 622–624.

[15] Jeevanandan, G. and Govindaraju, L. (2018) 'Clinical comparison of Kedo-S paediatric rotary files vs manual instrumentation for root canal preparation in primary molars: a double blinded randomised clinical trial', *European Archives of Paediatric Dentistry*, pp. 273–278. doi: 10.1007/s40368-018-0356-6.

[16] Nair, M. *et al.* (2018) 'Comparative evaluation of post-operative pain after pulpectomy with k-files, kedo-s files and mtwo files in deciduous molars -a randomized clinical trial', *Brazilian Dental Science*, p. 411. doi: 10.14295/bds.2018.v21i4.1617.

[17] Packiri, S., Gurunathan, D. and Selvarasu, K. (2017) 'Management of Paediatric Oral Ranula: A Systematic Review', *Journal of clinical and diagnostic research: JCDR*, 11(9), pp. ZE06–ZE09.

[18] Panchal, V., Jeevanandan, G. and Subramanian, E. (2019) 'Comparison of instrumentation time and obturation quality between hand K-file, H-files, and rotary Kedo-S in root canal treatment of primary teeth: A randomized controlled trial', *Journal of the Indian Society of Pedodontics and Preventive Dentistry*, 37(1), pp. 75–79.

[19] Ramakrshnan, M. and Bhurki, M. (2018) 'Fluoride, Fluoridated Toothpaste Efficacy And Its Safety In Children - Review', *International Journal of Pharmaceutical Research*, 10(04), pp. 109–114.

[20] Ravikumar, D., Jeevanandan, G. and Subramanian, E. M. G. (2017) 'Evaluation of knowledge among general dentists in treatment of traumatic injuries in primary teeth: A cross-sectional questionnaire study', *European journal of dentistry*, 11(2), pp. 232–237.

[21] Sabashvili, M. (2018) 'Prevalence of Malocclusion Among 6-15-Year-Old Children in Georgia: Case Report', *Biomedical Journal of Scientific & Technical Research*. doi: 10.26717/bjstr.2018.07.001553.

[22] Saber, A. M. *et al.* (2018) 'Consequences of early extraction of compromised first permanent molar: a systematic review', *BMC oral health*, 18(1), p. 59.

[23] Somasundaram, S. *et al.* (2015) 'Fluoride Content of Bottled Drinking Water in Chennai, Tamilnadu', *Journal of clinical and diagnostic research: JCDR*, 9(10), pp. ZC32–4.

[24] Soukeye, N. (2018) 'Analysis of Reasons for Extraction of Permanent Teeth in Children in Senegal: A Retrospective Study', *Interventions in Pediatric Dentistry Open Access Journal*. doi: 10.32474/ipdoaj.2018.02.000131.

[25] Subramanyam, D. *et al.* (2018) 'Comparative evaluation of salivary malondialdehyde levels as a marker of lipid peroxidation in early childhood caries', *European journal of dentistry*, 12(1), pp. 67–70.

LIST OF FIGURES:

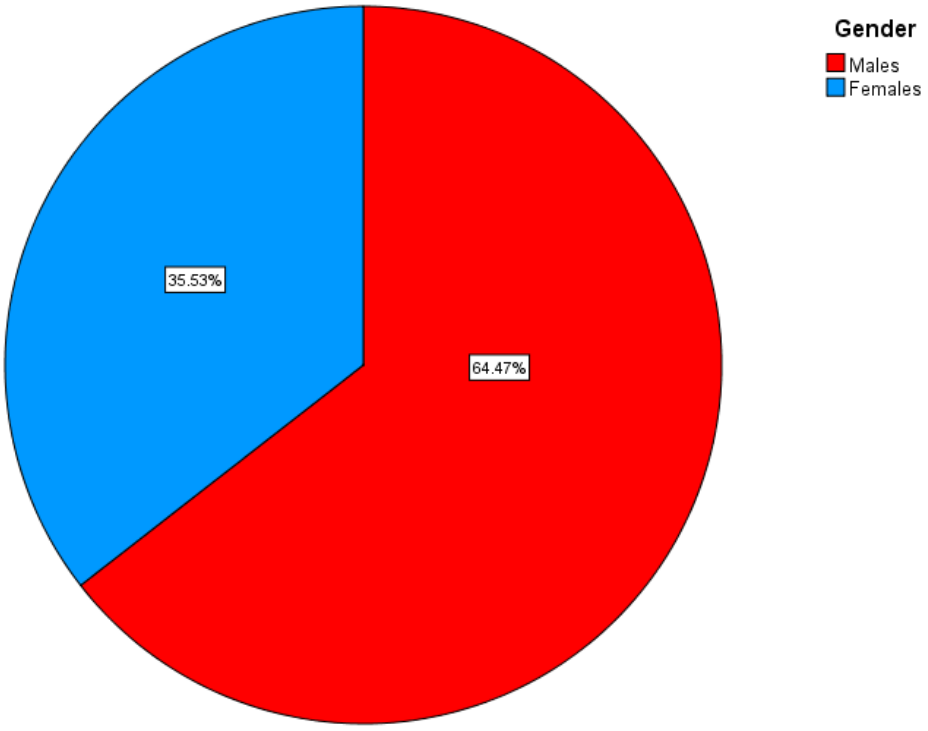

Figure 1:Pie chart represents distribution of children in the study based on gender . (Red colour denotes males and Blue colour denotes females) Higher number of males(64.47%) underwent extraction of first permanent molars when compared to females (35.53%)

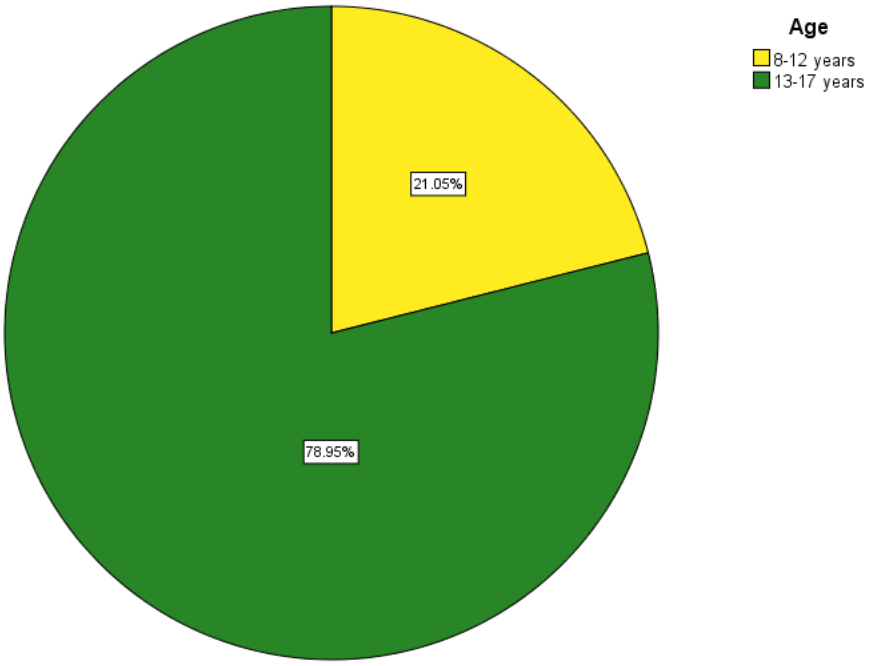

Figure 2:Pie chart represents distribution of children in the study based on age. Yellow colour denotes 8-12 years age group and green colour denotes 13-17 years age group. Higher number of children during complete permanent dentition stage (13-17 years age group) (78.95%) underwent extraction of first permanent molars when compared to children during the mixed dentition stage (8-12 years age group) (21.05%)

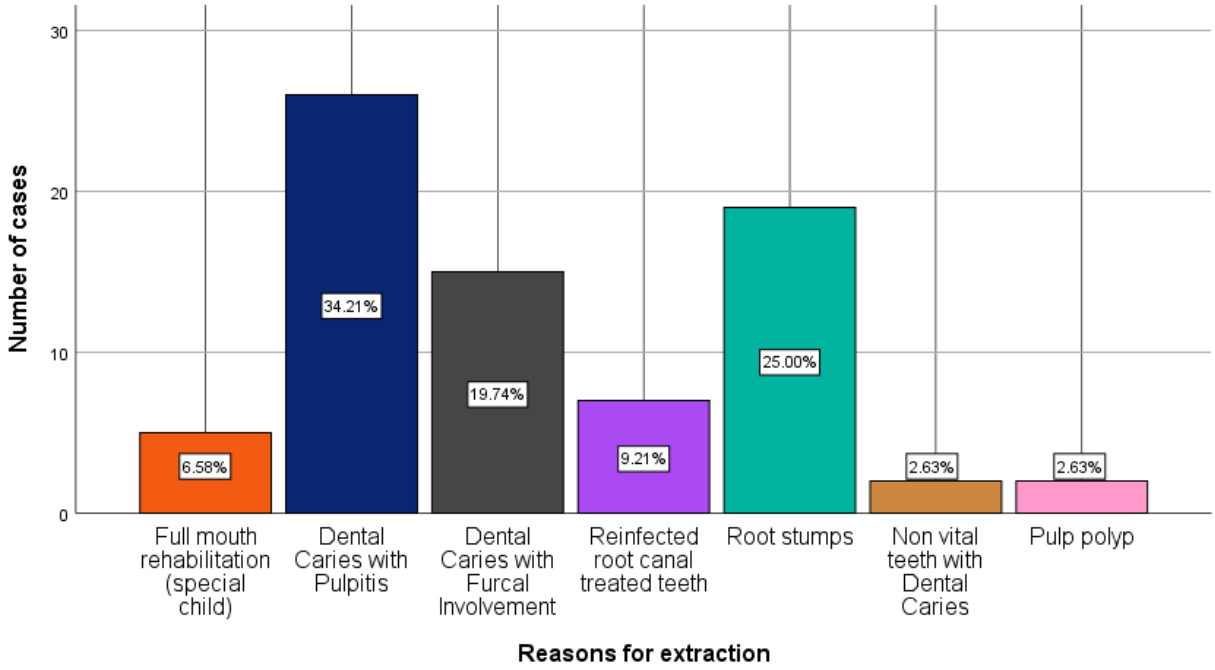

Figure 3:Bar Graph represents reasons for permanent molar extractions and number of cases. The X-axis represents different reasons for extraction and the Y-axis represents the number of cases.Dark blue denotes dental caries with pulpitis, grey colour denotes dental caries with furcal involvement, cyan colour denotes root stumps. Dental Caries with pulpitis (34.21%) was found to be the most common reason for extraction of first permanent molars, among the study participants.

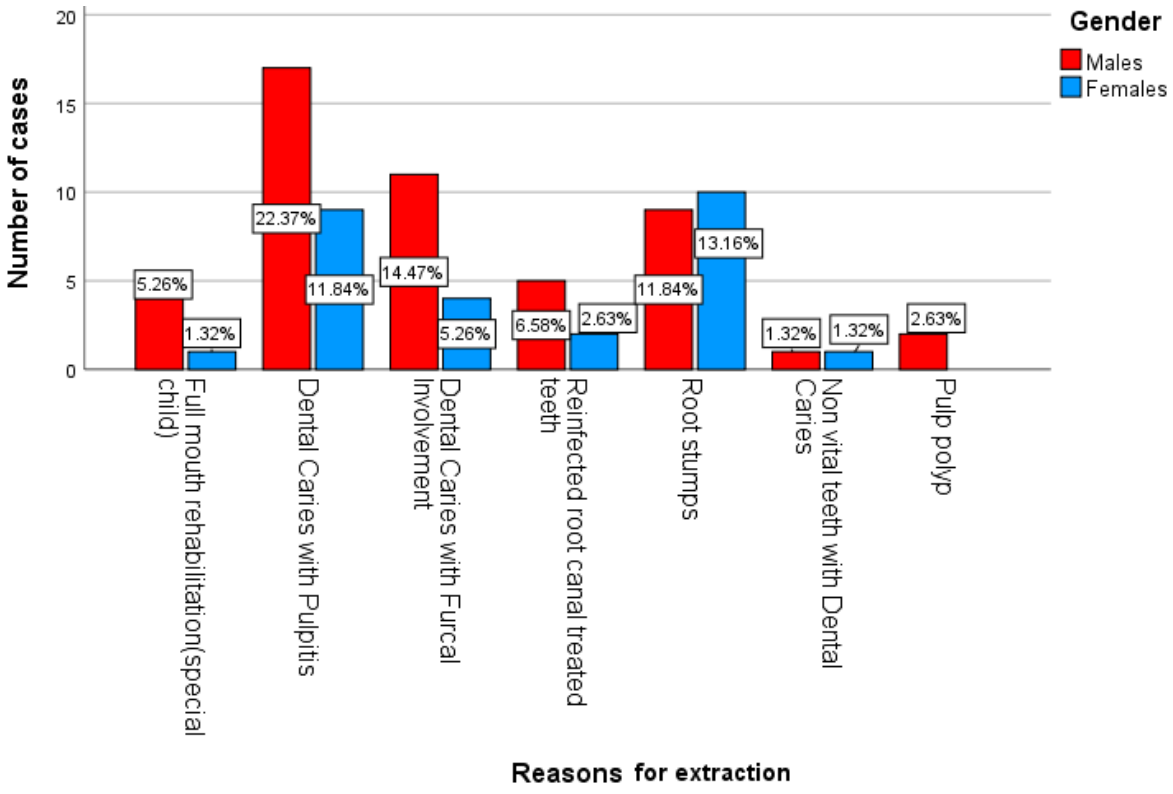

Figure 4:Bar Graph represents association of gender of the child with reasons for first permanent molar extractions. (The X-axis represents reasons for extraction of first permanent molar and the Y-axis represents the number of cases; Red colour denotes males and Blue colour denotes females) The common reason for extraction of first permanent molars in males was dental caries with pulpitis (22.37%) while in females was due to root stumps(13.16%) but this difference was not statistically significant. (Chi square test; p-value = 0.555 - not statistically significant).

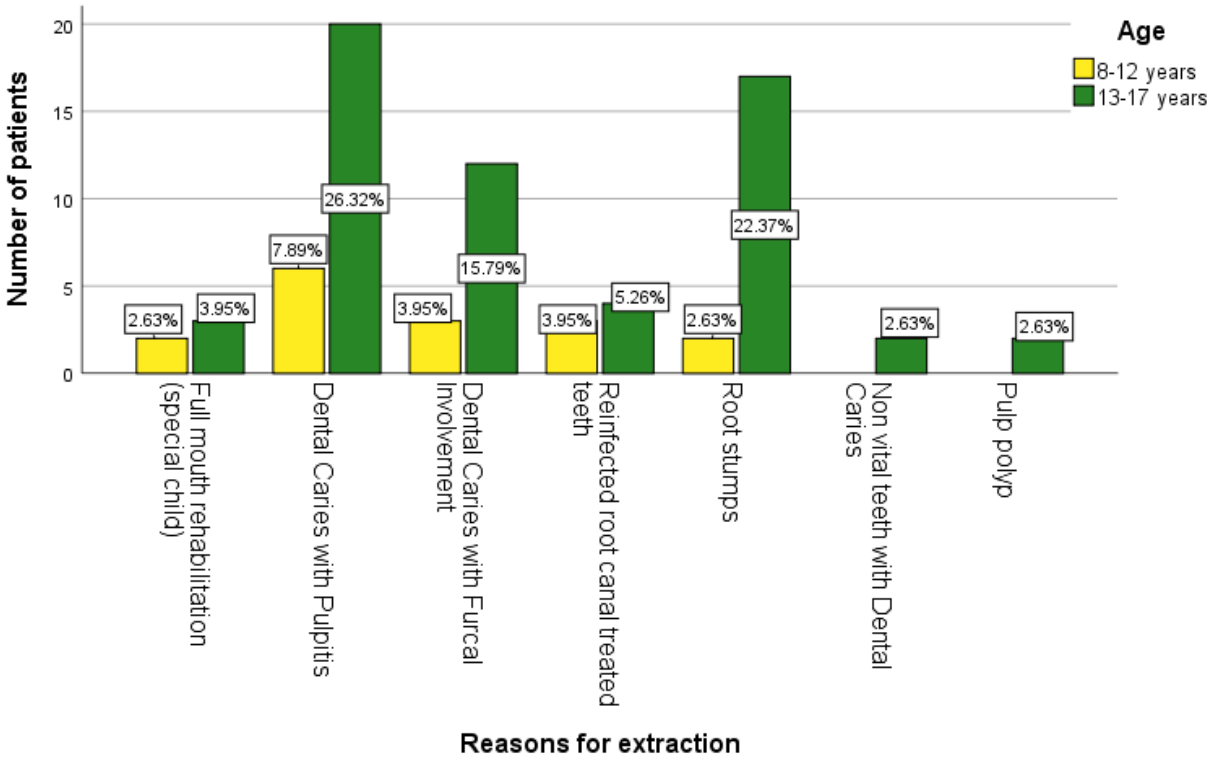

Figure 5:Bar Graph represents association of age with reasons for first permanent molar extractions. The X-axis represents reasons for extraction of the first permanent molar and the Y-axis represents the number of cases. There was no difference in the reason for extraction of first permanent molars among children in 8-12 years age group (7.89%) and 13-17 years age group (26.32%). (Chi-square test; p-value = 0.352 - not statistically significant.)