



Pediatric dentists' preference on usage of hand files or rotary files for pulpectomy of primary molars - A retrospective study

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ABSTRACT

Dental caries is the most prevalent chronic condition of the oral cavity. Excessive tooth decay can inflame pulp requiring pulpal intervention. One such endodontic procedure done to treat pulpitis is pulpectomy which is defined as complete removal of coronal and Radicular pulp. It can be done through hand or rotary filing techniques. A rotary filing system is better over hand filing that it gives more conical canal, reduces preparation time and thus enhances child cooperation. To analyse the preference of pediatric dentists in a private dental institution in using rotary and hand filing techniques during pulpectomy procedures in primary molars. All the cases reported between the month of June 2019 to March 2020 for pulpectomy in primary molars in paediatric patients were chosen for this study. Data of pediatric patients who underwent pulpectomy were shortlisted and the instrumentation techniques used were analyzed, tabulated and was subjected to statistical analysis. From the statistical analysis, it can be analysed that paediatric dentists had a higher preference towards rotary filing technique (85.7%), predominantly in male patients (57.2%) between the age group of 2 to 5 years (67%), primarily in mandibular molars (67.1%). Within the limitation of this study, the commonly preferred instrumentation technique by paediatric dentists for pulpectomy of primary molars is rotary over hand filing.



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resulting in space loss. Clinical success occurs when the tooth is painless, firm, non-mobile, and with no signs of inflammation or infection. Radiographically, lesions should be resolved within six months, and no pathologic root resorption should be observed (Thomas, 2010). The preliminary concept of biomechanical preparation of the root canal system is removing soft and hard tissue, providing space for irrigants, intracanal medicaments and subsequent obturation (Thomas, 2010). Thus, the success of pulpectomy depends on the elimination of irritants by means of cleaning and shaping the root canal (Yang et al., 1996).

INTRODUCTION

One of the foremost important concerns in pediatric dentistry is a loss of necrotic primary molars

Root canal preparation is performed with burs, files, reamers, sonic instruments or mechanical apparatus, and with nickel-titanium rotary file systems.

Since most hand preparation techniques are time-consuming and might cause iatrogenic errors (i.e. lodging, zipping, canal transportation and apical blockage), much attention has been directed toward preparation techniques with Ni-Ti rotary instruments (Walton and Torabinejad, 2002). Rotary instrumentation in curved molar root canals of permanent teeth had been shown to be time-efficient, with increased patient comfort and lower risk of a flare-up (Zarrabi et al., 2006; Bhagwat and Mehta, 2013). Nickel-Titanium files don't need precurvature because of their elastic memory; they're motor-activated and should prepare the root canal with high speed (Kosa et al., 1999; Coleman et al., 1995). Despite the advantages of rotary instrumentation and studies performed on primary molars, there aren't any clear guidelines or instructions for the suitable preparation technique of these teeth. Barr et al. used Nickel-Titanium Profile® 0.04 taper rotary instruments for primary root canal preparation and concluded that the use of Nickel-titanium rotary files for root canal preparation in primary teeth was cost-effective and rapid, resulting in a consistent uniform and predictable obturation. Panchal et al., in 2019, stated that the Pediatric rotary files Kedo-S had better obturation quality in minimum instrumentation time (Panchal et al., 2019). Also, Nair et al. assessed the postoperative pain after pulpectomy with different files systems and concluded that the least post-operative pain was found in Mtwo group followed by Kedo-S group and K-file group (Nair et al., 2018).

However, most of the primary molar root canals are ribbon-shaped. Little is known about the preference of the dentists on the usage of rotary and hand files among pediatric patients (Mohammed et al., 2017). Thus the aim of the current study is to qualitatively and quantitatively analyse the preference of pediatric dentists at Saveetha dental college in using rotary and hand filing techniques during pulpectomy procedures in primary molars.

MATERIALS AND METHODS

This was a retrospective study conducted under a university setting. Ethical approval for the current study was obtained from the institutional ethical board (Ethical approval number: SDC/SIHEC/2020/DIASDATA/0619-0320). This study had advantages of easy access to the software, large data availability yet also had disadvantages of smaller sample size and geographic limitation. In the current study, the data of patients who visited the Department of Pediatric and Preventive Dentistry from June 2019 to April 2020 were retrieved

from the dental records. Sample size n = 1733. All the case sheets included in the study were approved and verified by an external reviewer to avoid errors while recording. Also, Cross- verification of data was done with photographs and direct communication with dentists. Pediatric patients of all age groups (from 2 to 12 years) genders (both male and females) with pulpectomy procedures done in primary molars were included in the current study while other pediatric patients without pulpectomy procedures and pulpectomy procedures are done in other primary teeth were excluded from the study. This study has internal validity and no external validity. Data for the study was retrieved. Collected data were tabulated in the excel sheet. This data was then imported to SPSS by IBM after coding. Parametric and non-parametric correlations were done. Following which graphs were made. Non-parametric tests were done by clicking onto legacy dialogue, the chi-square test was run and P-value was determined to verify the significance of each of the variables considered and the results were interpreted and analysed statistically.

RESULTS AND DISCUSSION

From the statistical analysis done using SPSS by IBM, it can be well documented that the preference of pediatric dentists was higher in using rotary instrumentation technique for pulpectomy of primary molars (85.7%) than handfiling. P-value is 0.00 (less than 0.05) and is statistically significant (Figure 1). The commonest age group for which the rotary instrumentation technique was preferred the most was between 2 to 5 years (67%). P-value is 0.00 (less than 0.05) and shows statistical significance (Figure 2). Rotary instrumentation technique was preferred the most among male pediatric patients (57.2%) than female patients (42.9) with P-value greater than 0.05 showing statistical insignificance. This insignificance can be attributed to smaller sample size and unbiased data considered (Figure 3). Also, Rotary instrumentation technique was preferred the most while performing pulpectomy in mandibular molars(67.1%) followed primary maxillary molars (32.2%), with P value less than 0.05 showing statistical significance (Figure 4).

With regard to the type of instrumentation technique, higher preference was towards rotary instrumentation systems for pulpectomy of primary molars (85.7%). P-value is less than 0.05 and shows statistical significance. It is thus suggestive of better properties of rotary files over hand filing systems. This study is in concordance with the study conducted by Govindaraju et al., in 2017,

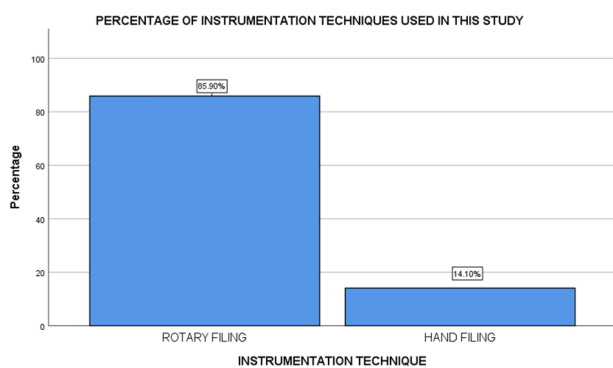


Figure 1: Bar graph showing the percentage of different types of instrumentation techniques used in pulpectomy of primary teeth.

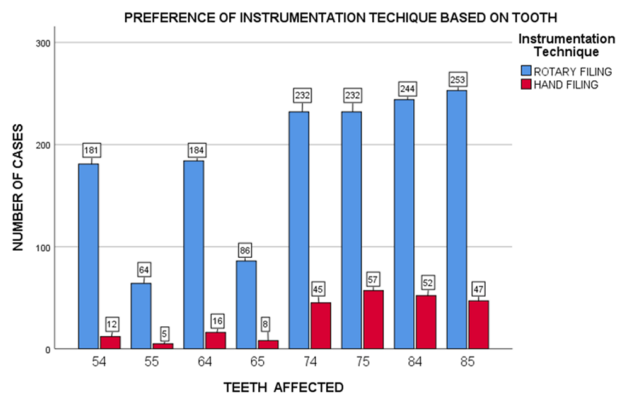


Figure 4: Bar graph showing the association between primary molar that under went pulpectomy and the instrumentation techniques employed.

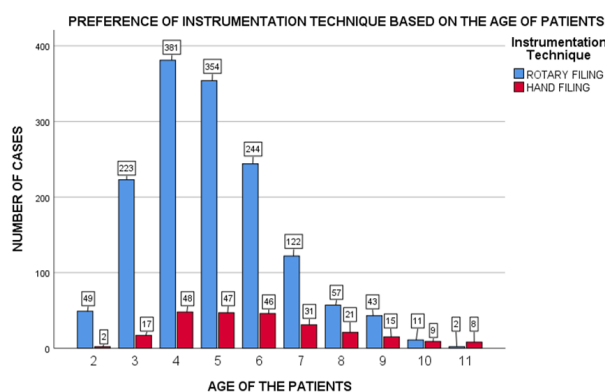


Figure 2: Bar graph showing the association between the age of the patient and the instrumentation techniques employed for pulpectomy of primary teeth.

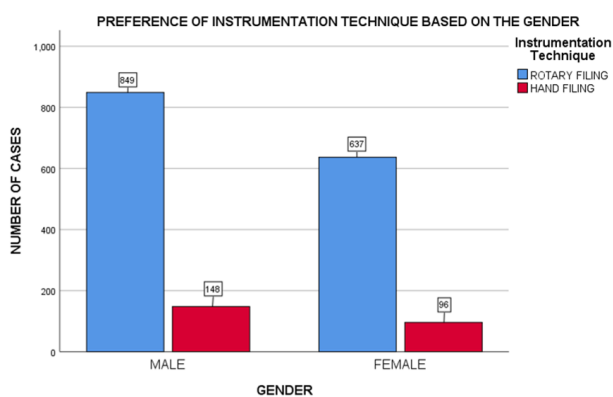


Figure 3: Bar graph showing the association between the gender of the patients and instrumentation techniques employed for pulpectomy of primary teeth

who stated that 50% of practitioners used Rotary instrumentation technique for a root canal in primary teeth (Govindaraju *et al.*, 2017c). Similar results were shown by sageena George *et al.*, in 2016 (George *et al.*, 2016) and Negar mokhtari *et al.* in 2017 (Mokhtari *et al.*, 2017). The highest Preference towards rotary filing systems can be attributed to its better properties over hand filing. Nickel-titanium files for root canal preparations are cost-effective, faster, gives consistently uniform and predictable fillings (George *et al.*, 2016; Packiri, 2017).

In pediatric dentistry, the duration of the treatment is essential in decreasing the anxiety among children. Shorter duration increases trust, decreases anxiety, thus rendering optimal treatment protocol. One of the previous studies has reported decreased chairside time with rotary instrumentation than with hand Instruments (Sharma *et al.*, 2019). Lavanya Govindaraju *et al.* in 2017 stated that the use of rotary instrumentation in primary teeth results in a marked reduction in the instrumentation time and improves the quality of obturation (Govindaraju *et al.*, 2017b). Similar findings have also been reported by other studies both In vivo and In vitro. Rotary Instrumentation reduces dexterity, thereby increasing the efficiency of the operator (George *et al.*, 2016). This will be the possible reason for reduced instrumentation time. This Rotary system uses a progressively increasing taper. The previous study has reported restricted apical preparation and higher cervical enlargement with progressive taper than a constantly fixed taper (Bergmans *et al.*, 2003). This will be the rationale for better obturation quality with the progressive taper rotary files as compared to fixed taper hand files (Jeevanandan and Govindaraju, 2018). One more reason for better

obturation quality with rotary files as compared with mechanical hand files are often because of the employment of Nickel-titanium material, which increases the pliability of files (Govindaraju *et al.*, 2017a). This aids in a better adaptation of files to root canal curvature, instead of increased transportation and zipping as in Hand filing (Tan and Messer, 2002). Another factor which may provide better preparation with rotary files is that the wider enlargement and more conical preparation (Govindaraju, 2017).

Preference of Rotary based on age was higher among pediatric patients of age 2-5 years (67%) followed by 6- 12 years (32 %). This was in accordance with the study conducted by B.O. Poopala et al. in 2018 (Popoola *et al.*, 2018). The reason could be attributed to features of the Rotary Instrumentation technique. Rotary is less time consuming thus enhances better cooperation and diminished tiredness in pediatric patients (Jeevanandan, 2017). In the primary dentition, dental caries was found to be the commonest reason for endodontic treatment with a peak age range of 6-9 years (Subramanyam, 2018). This finding is similar to those reported in previous studies where at the time of presentation of the carious lesion, it would require advanced endodontic interventions (Ukeje *et al.*, 2000). The study Deepa Gurunadhan et al., in 2016 proved the presence of elevated dental neglect score among the parents who resided in the suburban environment, whose educational qualification was minimum and who have not availed any dental service for >3 years. A higher DMFT and debris index scores were seen in the higher dental neglect group (Gurunathan and Shanmugaavel, 2016).

Rotary instrumentation techniques were highly preferred among male pediatric patients (57.2%) than female patients (42.9%). This study result was similar with the study conducted by B.O. Poopala et al., in 2018. He concluded that among those who had endodontic treatment, 51% were males while 49% of them were female patients (Popoola *et al.*, 2018). More male patients had endodontic treatment on account of trauma (Ravikumar *et al.*, 2017) while female patients had endodontic treatment on account of caries. This disparity may be due to the fact that Male children are more physically active hence are highly susceptible to fall and other forms of injuries while female children are more prone to dental caries due to excessive snacking on a cariogenic diet, genetic predisposition associated with AMELX gene (Kaiser and East, 1940). Fluoride ions replace hydroxyl groups in the formation of the apatite crystal lattice resulting in a stronger, fluoridated tooth mineral (fluorapatite) which is more

resistant to demineralisation hence helps in controlling caries (Somasundaram *et al.*, 2015; Ramakrishnan and Bhukri, 2018).

Rotary Instrumentation technique was highly preferred during pulpectomy procedures of mandibular molars (67.1%) than primary maxillary molars (32.2%). This result was in accordance with a study conducted by Ahmetoglu et al., in 2015 (Ahmetoglu *et al.*, 2015) which suggested that rotary was highly used in primary molars (93%). Rotary filing is significantly used in primary molars due to unpredictable canals and canal morphology, curved roots and ribbon-shaped root morphology (Christabel, 2015). Rahman. S. S in 2012, stated that more mandibular primary teeth had endodontic treatment relative to the maxillary teeth. This is often in agreement with other studies. This susceptibility of the mandibular teeth to caries could also be related to the relative ease of food lodgement and plaque accumulation in the mandibular posterior region (Rahman *et al.*, 2010). Thus, as a dental clinical practitioner, it is vital to bring awareness among pediatric patients and parents about the importance of proper brushing techniques and maintenance of good oral hygiene.

With the current study as a platform, better instrumentation technique can be identified and will enable dentists to gain a thorough knowledge on the pros and cons of different instrumentation techniques for pulpectomy of primary molars. Limitations of this study include Geographic limitation as predominantly South Indian population were only considered and was a Unicentric study with few Incomplete and unclear data. The Future scope of this study will yield a better and more accurate result when different ethnic populations are considered.

CONCLUSION

Within the limitation of the present study, Pulpectomy was highly done in Male pediatric patients primarily among the age group of 2-5 years. With regard to the preference of instrumentation technique for pulpectomy of primary molars, Rotary files were highly preferred by pedodontists, predominantly in male patients among the age group of 2 to 5 years primarily in mandibular molars. Thus, as a clinician, it is important to determine a better instrumentation technique for pulpectomy procedures in primary molars, taking into consideration all the influencing factors.

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Conflict of Interest

The authors declare that there are no conflicts of interest for this study.

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