



Pediatric Dentists Preference on Using Hand or Rotary Instruments in Single Visit Permanent Molars

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ABSTRACT

The main purpose of instrumentations in primary procedures of primary teeth is the removal of the organic debris. The success of the root canal therapy is based on the quality of instrumentations. The aim of this study was to evaluate the preference of hand or rotary instrumentation in single visit permanent molars. The study was conducted in a university setting. A total of 80 samples were collected and the data was tabulated in excel, which was later exported to SPSS software for the statistical analysis. The output was represented in the form of graphs and pie charts. A total of 80 cases were collected. The mean age calculated was 13.8 years. Gender distribution in the patients were 51.2% females and 48.78% males. The age group commonly seen was 14 years (p-value = 0.219). Most common tooth number was found to be the upper left first molar. Rotary instrumentations were the most preferred technique for root canal treatment in permanent molars. The preference was more towards female patients and mandibular molars with age between 14-15 years.



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INTRODUCTION

The main purpose of instrumentation in pulpectomy procedures of primary teeth is the removal of organic debris. (Azar *et al.*, 2012; Casamassimo *et al.*, 2012). The success of the root canal treatment depends on the method and the quality of instrumentation, irrigation, disinfection and three-dimensional obturation of the root canal (Güler

et al., 2013).

Conventional endodontic treatment technique for primary teeth remains hand instrumentation. This is time-consuming and often causes fatigue to the operator and child (Silva *et al.*, 2004; Lin *et al.*, 2006). The introduction of nickel titanium rotary instrumentation has made Endodontics in permanent teeth easier and faster than manual instrumentation, resulting in consistent and predictable root canal shaping (Glickman and Koch, 2000). Similar principles of canal debridement and dentin shaping using nickel-titanium can be applied to primary teeth. Rotary instruments were introduced to Pediatric Endodontics by Barr *et al.*, in 2000 (Barr *et al.*, 2000). Use of the rotary instrumentation technique transforms the root canal to a more conical shape and thus enhances the quality of obturation. The design and flexibility of nickel-titanium alloy instruments allow the files to preserve the original anatomy of curved canals, especially in primary teeth and reduce procedural errors. Disadvantages

of NiTi rotary lenses are the high cost of nickel-titanium rotary systems and the need for training to learn the technique (Kummer *et al.*, 2008).

There are many previous studies done on a similar topic, and many have suggested the use of rotary instrumentation over hand instrumentations (Moghaddam *et al.*, 2009; Musale, 2013; Ramezanali *et al.*, 2015; Katge *et al.*, 2014; Azar *et al.*, 2012). Study done by Jeevanandan and Govindaraju (2018) concluded that clinical use of paediatric rotary files Kedo-S was effective during root canal preparation of primary teeth with a reduction in instrumentation time and better quality of obturation (Lakshmanan *et al.*, 2020).

The challenges faced in this study is that not many studies have been done on this topic and some studies have shown that they found no significant difference in cleaning efficacy at middle and apical thirds, but the cervical third was more effectively cleaned with hand K files. The purpose of this research is to collect more data on the preference of pediatric dentists on hand or rotary instruments which gives us better and efficient root canal therapy resulting in patient satisfaction.

The aim of this study was to evaluate the preference of instrumentation between hand and rotary files in primary molar among pediatric dentists.

MATERIALS AND METHODS

This retrospective study was done in a university setting i.e. patients visiting the Out Patient department. The pros being the data availability and similar ethnicity and the cons being the geographic limitation. The ethical approval was obtained from the institutional review board. (SDC/ SIHEC/ 2020/ DIASDATA/ 0619-0320). There are three people involved in the research, namely the researcher, the reviewer and the guide. The data was collected from a particular time period which was June 2019 to March 2020. The number of cases reviewed were 3826. Inclusion criteria were children below the age group of 18 years and complete database in the software. The exclusion criteria were patients above the age group of 18 years and incomplete databases in the software. To minimize sampling bias, simple random sampling was done. So the final sample size that was used for the study was 80. Cross verification of the data was done by an additional reviewer. Internal validity was maximum. External validity was minimum.

Data collection and tabulation- data collection was done by Dental Information Archiving Software and tabulated in excel which was then exported to SPSS

for statistical analysis. Censored and incomplete data were excluded from the study. The statistical analysis used was chi-square test and the statistical software used was SPSS by IBM (Govindaraju *et al.*, 2017a). The results were then represented in the form of graphs and pie charts.

RESULTS AND DISCUSSION

A total of 80 cases were collected and tabulated, in which 90.2% preferred the rotary type of instrument and 9.8 % preferred the hand type of instrumentation. The highest preference leaned towards rotary instruments compared to hand instruments in which 90.2% preferred the rotary type of instrument and 9.8 % preferred the hand type of instrumentation (Figure 1). The preference of instruments based on gender showed that rotary instruments were more commonly preferred in female subjects and hand type of instrument was preferred in both genders. X-axis denoted the category and y-axis denotes the count of cases. The higher preference of rotary file systems was found to be for treating female subjects and hand type of instrument was preferred in both genders (Figure 2). The preference of hand or rotary instrument based on the patient's age revealed that rotary instrumentation was more preferred and commonly used in 14 years of age. X-axis denoted the category and y-axis denotes the count of cases higher rotary preference in patients among the age group of 14 years (Figure 3). The preference of rotary type of instrument based on different permanent teeth showed that the rotary and hand instrument were more preferred in the lower right first molar. X-axis denoted the category and y-axis denotes the count of cases. The highest preference was seen in 46 followed by 36 (Figure 4).

Early childhood caries is defined as "the presence of one or more decayed, missing teeth, or filled tooth surfaces in any primary tooth in a child 72 of months age or younger. In children younger than three years of age, any sign of smooth-surface caries is indicative of severe early childhood caries (S-ECC). From ages 3 through 5, one or more cavitated, missing teeth (due to caries), or filled smooth surfaces in primary maxillary anterior teeth, or decayed, missing, or filled score of ≥ 4 (age 3), ≥ 5 (age 4), or ≥ 6 (age 5) surfaces constitutes (Suzuki *et al.*, 2008). Host factors such as saliva play an important role in maintaining the oral health of the individual (Subramanyam *et al.*, 2018). Oral hygiene measures such as fluoride application can be done for the reduction of early childhood caries (Somasundaram *et al.*, 2015). Fluoride replaces the minerals lost due to

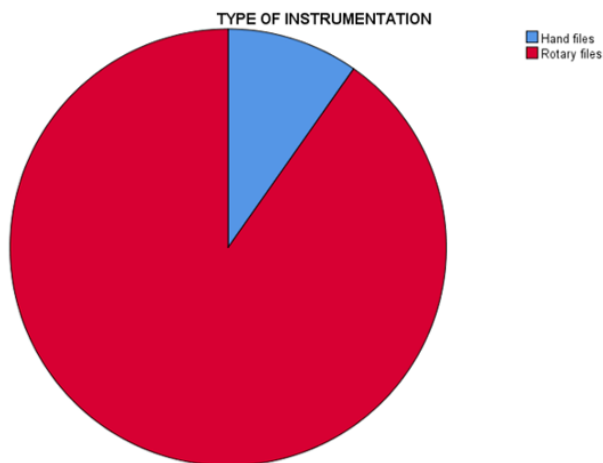


Figure 1: Pie chart shows the reference of rotary or hand type of instrumentation among pediatric dentists.

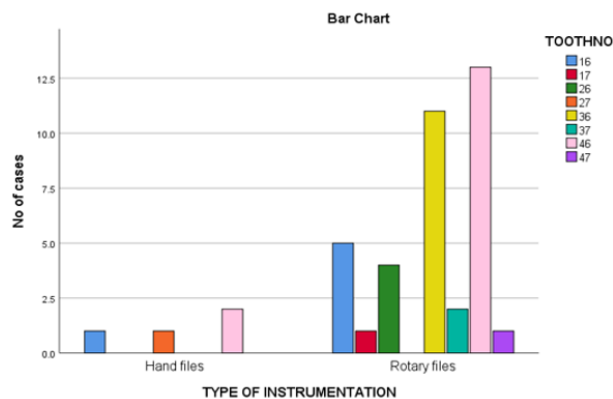


Figure 4: Bar graph shows the preference of rotary or hand type of instrumentation based on different permanent teeth.

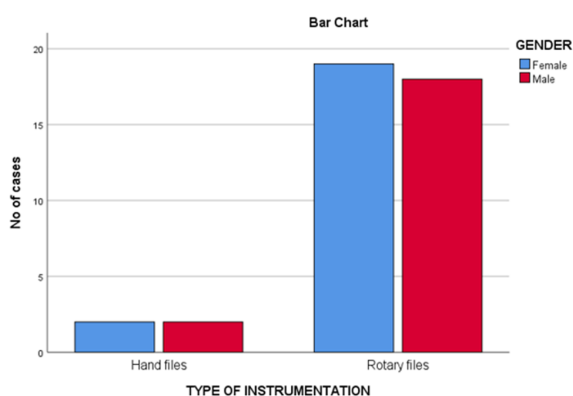


Figure 2: Bar graph shows the preference of rotary or hand type of instrumentation based on the patient's gender.

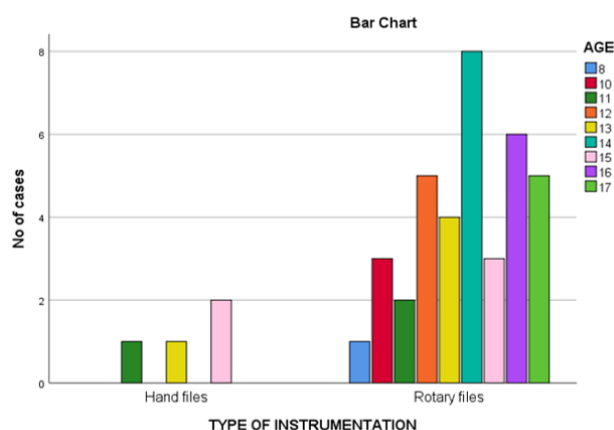


Figure 3: Bar graph shows the preference of rotary or hand type of instrumentation based on different patients' age groups.

the acid production by reducing the demineralisation process (Ramakrishnan and Shukri, 2018).

The diagnosis of early childhood caries include correlation of the morphological variations during clinical examination to avoid any misdiagnosis and wrong treatment by the dentists (Christabel, 2015). Imaging techniques can also be advised to know the extent of the lesion (Packiri, 2017). The etiology of early childhood caries is multifactorial and has been established well. Early childhood caries is commonly associated with plaque (Govindaraju, 2017). The other reasons for caries can be due to poor oral hygiene and malnutrition which can be due to dental neglect (Gurunathan and Shanmugaavel, 2016).

Teeth play an important role in the self-esteem of a child and speech development (Ravikumar et al., 2017). In paediatric dentistry, the most important concern is the loss of primary molars leading to inadequate space. A pulpectomy is considered the first treatment of choice for primary teeth with pulp involvement. Bacteria play an important role in the initiation and formation of pulpal and periapical disease. During cleaning and shaping the root canal system, the main objective is to remove soft and hard bacteria-containing tissue. Proper cleaning and shaping aid the irrigant to reach the apical third of the root during the irrigation process resulting in a sterile root canal for obturation (Jeevanandan, 2017).

Advancing technology has brought the rotary system to reduce manual dexterity and improve the quality of treatment for pulpectomy (Panchal et al., 2019; Jeevanandan and Govindaraju, 2018). The advantages of rotary instrumentation over hand instrumentation were the reduction of chair time, less fatigue to the dentist as well as the child undergoing the treatment. In a study done by Abbas Makarem in 2014 and Tania Ochoa-Romero in 2011,

a statistically significant difference was noted in the quality of obturation as well (Makarem *et al.*, 2014; Govindaraju *et al.*, 2017c). Similarly, hand files are used for cleaning and shaping but are time-consuming. The length of the appointment is dependent on the child's behaviour (Rosa *et al.*, 2014).

The mean age calculated was 13.8 years. The gender distribution in the patients that were studied were 51.12% females and 48.78% males. The most common preferred instrumentation was rotary instrumentation. The most common age group found among rotary instruments was 14 years (p value= 0.219- non-significant). The rotary instrument preferred based on gender were females. (p value= 0.02- significant). Rotary instruments preferred based on tooth number was 46 (p value= 0.003- significant).

The most common instrument was rotary instruments. This study results are supported by Silva *et al.* 2004, who preferred rotary instruments (Silva *et al.*, 2004). The results were contradicting a study done by AR Prahakar 2016 which preferred hand files (Prabhakar *et al.*, 2016). The reason being less time consumption with easier preparation of the canal. The most common age group in the study was found to be 14 years of age. The reason being aesthetics and masticatory functions- easily understandable during the Formal Operational stage. The gender predilection was found to lean towards females. This study was supported by a study done by Lavanya *et al.* 2017 (Govindaraju *et al.*, 2017b). The reason that could explain the female predilection is that girls can easily understand and aesthetics and functions also play a role (Preethy *et al.*, 2019). The most common tooth preferred was mandibular molars- 46. The study supporting these results was a study done by Govind *et al.* in 2017. However, these results were contradicted by Prasad K *et al.* 2013. The reason for the results were poor oral hygiene which resulted in a higher incidence of dental caries (Musale, 2013).

The benefit of this study includes data validity and easy data collection. The limitations of the study were reduced sample size, unequal of cases and limited geographic area. The future scope of this study is to carry this study on with larger sample size and with different ethnicity which can provide better results.

CONCLUSION

Within the limitations of the current study, rotary instruments were the most preferred technique for root canal treatment in permanent molars. The preference was more towards female patients

and mandibular molars with an age between 14-15 years.

Conflict of interest

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

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