

ORIGINAL RESEARCH

Comparative Evaluation of Hand K-flex Files, Pediatric Rotary Files, and Reciprocating Files on Instrumentation Time in children

¹Apurva Vaidya, ²Aditi Chauhan, ³Hisey Lhamu Sherpa, ⁴Ankur Sharma, ⁵Ridhima

¹MDS, Pediatric and Preventive Dentistry, Director at Chamba Smile Dental Clinic, H.P., India

²MDS, Pediatric and Preventive Dentistry, Director at SMITAM The Dental Studio, Yamunanagar, Haryana, India

³MDS, Pediatric and Preventive Dentistry, India

⁴Senior Resident, Department of Dentistry, Pt. J.L.N.G.M.C & H Chamba, H.P., India

⁵MDS, Pediatric and Preventive Dentistry, India

Corresponding author

Ankur Sharma

Senior Resident, Department of Dentistry, Pt. J.L.N.G.M.C & H Chamba, H.P., India

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ABSTRACT

Background: This study was conducted for Comparative Evaluation of Hand K-flex Files, Paediatric Rotary Files, and Reciprocating Files on Instrumentation Time in children. **Material and methods:** After ensuring they fulfilled the inclusion requirements, a total of 75 primary molar teeth were then randomly divided amongst the three groups. A stopwatch was used throughout the procedure to keep track of the amount of time spent on each step of the instrumentation. An evaluator observed the child both before and after the operation to make a judgment on the child's conduct. A questionnaire was used to evaluate the postoperative pain for up to a week after the procedure. **Results:** There was no statistically significant difference in the mean time for access opening based on instrumentation time. Nevertheless, it was discovered that the average amount of time spent on biomechanical preparation varied considerably amongst the three groups ($p < 0.001^{**}$). When compared to groups II and III, group I's mean time, which was calculated to be 45.6 minutes, was noticeably longer. The average amount of time spent instrumenting an obturation was longer for group III, which was another factor that was discovered to be statistically significant ($p < 0.05^*$). **Conclusion:** Although paediatric and reciprocating files performed better in clinical settings, the choice of file system did not significantly affect patient behaviour.

Keywords: hand files, k-flex, rotary files, reciprocating files, instrumentation time, children.

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INTRODUCTION

The premature loss of primary dentition is a common problem that can hinder aesthetics, impair the natural eruption of succeeding teeth, and lead to abnormal tongue habits. It can also prevent the normal eruption of succeeding teeth.¹ When it comes to treating pulpally implicated necrotic teeth, pulpectomy is considered to be the gold standard therapeutic modality.² Hand files are the tools of choice for the chemo-mechanical preparation that is traditionally performed during the pulpectomy surgery. Although they have been used traditionally, hand files can be difficult to use because the canals in primary teeth are often tiny and curved, and they are also subject to continuing physiological resorption. The use of hand files can increase the amount of time it takes to treat a

patient and make it more difficult to place fillings correctly.³ There is a possibility that the child's behaviour will be adversely affected as a result of the protracted duration of the treatment.⁴

Barr et al. were the first to introduce the rotary method for treating primary teeth in order to address these difficulties.⁵ Reduced instrumentation time and improved filling quality are two benefits associated with the use of the rotary approach.⁶ However, the rotating devices used for permanent teeth might not be able to successfully clean the isthmus in primary teeth.⁷ These instruments might also have the additional drawbacks of being more expensive and more prone to breakage.

Hence, this study was conducted for Comparative Evaluation of Hand K-flex Files, Paediatric Rotary

Files, and Reciprocating Files on Instrumentation Time in children.

MATERIAL AND METHODS

An alpha value of 0.05, a power of 0.80, and an effect size of 0.48 were used in the power analysis for a one-way ANOVA (Fixed Effects, Omnibus, One way) with three groups that was performed in G*Power16. The purpose of this study was to establish the appropriate sample size. The total sample size was 90 with 30 participants in each group. For the purpose of the study, we selected all of the patients who fell within the age range of four to eight years old and had primary molar teeth that required pulpectomy. Teeth that still had at least two thirds of their roots intact and displayed one or more of the following characteristics were considered for inclusion in the study: (a) necrotic pulp; (b) symptoms of irreversible pulpitis; and (c) radiolucencies in the periapical or furcation zone. Teeth that showed signs of edema, excessive mobility, cellulitis, perforated pulpal floor, or fistula were not included in the study. These signs were used to determine whether or not a tooth should be eliminated from the study. Children who lacked the ability to cooperate, those who suffered from a

systemic ailment, or those who need further medical attention were not included in the study.

The individuals were randomly split into three distinct groups. A statistician came up with the randomized process, and opaque envelopes were employed to keep the allocation a secret. The patients, as well as their parents, were kept in the dark regarding the treatment regimen, and the evaluator who was recording the instrumentation time and behavior was likewise kept in the dark. It was not possible to blind the chief operator who was performing the therapy while the operator was in the process of administering the treatment. Both the informed agreement of each parent or legal guardian and the ethical clearance of the Departmental Review board were acquired before the study was carried out.

The pulpectomy was completed in a single appointment by the same dentist who conducted the operation. In order to modify the child's behavior and win the child's cooperation, non-pharmacological methods of behavior management were utilized. After isolating the teeth with the rubber dam, a local anesthetic infiltration (2% lignocaine and 1:200,000 adrenaline) was performed.

RESULTS

Table 1: gender-wise distribution of subjects

Gender	Number of subjects	Percentage
Males	60	66.66%
Females	30	33.33%
Total	90	100%

The mean age of children taken for the study was 5.12 ± 1.5 years with 60 males and 30 females. There was no statistically significant difference in the mean time for access opening based on instrumentation time. Nevertheless, it was discovered that the average amount of time spent on biomechanical preparation varied considerably amongst the three groups (p

< 0.001**). When compared to groups II and III, group I's mean time, which was calculated to be 45.6 minutes, was noticeably longer. The average amount of time spent instrumenting an obturation was longer for group III, which was another factor that was discovered to be statistically significant (p < 0.05*).

Table 2: instrumentation times of 3 different files

Procedure	Mean instrumentation time (in minutes)
ACCESS OPENING	
Group I	5.70
Group II	5.00
Group III	5.04
BIOMECHANICAL PREPARATION	
Group I	45.60
Group II	32.55
Group III	29.63
OBTURATION	
Group I	8.63
Group II	5.22
Group III	4.02

There was no significant difference in the mean preoperative pain among the three groups

DISCUSSION

Despite advances in caries prevention measures and the reduction of its incidence rates worldwide, deep caries lesions that compromise pulp vitality remain a

common occurrence in clinical practice.⁸In these cases, pulp treatment (for example, pulpectomy) is essential to maintain the integrity of oral tissues, preserving deciduous teeth until their physiological

exfoliation.⁹ However, the success of the pulpectomy procedure depends on an effective biomechanical preparation of the root canal system.¹⁰

This biomechanical preparation can be performed with rotary or manual files, and automated systems have been shown to significantly reduce instrumentation time, and more effectively clean and shape the root canal.¹¹⁻¹³ However, other aspects contribute to the success of treatment. Some factors associated with clinical failure, such as the quality of root canal filling and coronal restoration, still need to be investigated.¹⁴

Hence, this study was conducted for Comparative Evaluation of Hand K-flex Files, Paediatric Rotary Files, and Reciprocating Files on Instrumentation Time in children.

In this study, the mean age of children taken for the study was 5.12 ± 1.5 years with 60 males and 30 females. There was no statistically significant difference in the mean time for access opening based on instrumentation time. Nevertheless, it was discovered that the average amount of time spent on biomechanical preparation varied considerably amongst the three groups ($p < 0.001^{**}$). When compared to groups II and III, group I's mean time, which was calculated to be 45.6 minutes, was noticeably longer. The average amount of time spent instrumenting an obturation was longer for group III, which was another factor that was discovered to be statistically significant ($p < 0.05^*$).

A study by Morankar et al.¹⁵ compared instrumentation time between hand files (SS K-files) and Hyflex rotary files and found a significant reduction in instrumentation time using rotary files in primary molar teeth.

Other studies which support the above-mentioned findings include Crespo et al.⁶ Govindaraju et al.¹⁶ and Makarem et al.¹⁷ Rotary systems are efficient for cleaning and shaping with better debris and tissue removal and less chairside time.¹⁸

On the contrary, Katge et al.¹⁹ reveal more instrumentation time using rotary Mtwo files vs hand H-files in an in vitro study on primary molars. Similar findings by Madan et al. attributed the increased time to the experience of the operator.²⁰

CONCLUSION

Although paediatric and reciprocating files performed better in clinical settings, the choice of file system did not significantly affect patient behaviour.

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