



Research Paper

## Comparative Evaluation of Antimicrobial Efficacy of Two Different Pediatric Rotary Files After Biomechanical Preparation: An In Vivo Study.

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**ABSTRACT:** The primary significance of rotary endodontics in pediatric dentistry lies in its ability to diminish the bacterial load and the byproducts they produce, which are responsible for causing pain, infections, abscesses, and extraoral swelling. The effectiveness of pulpectomy relies on thoroughly removing microorganisms from the root canals. To address the specific requirements of pediatric endodontics, specialized pediatric rotary files have been developed to tackle challenges and enhance treatment outcome. The present study aims to evaluate and compare the antimicrobial efficacy of two different pediatric rotary files in eliminating the root canal microflora of primary molars. This study was performed on 20 primary molar teeth which were selected for pulpectomy procedures. The patients for the study were selected from the children attending the outpatient clinic of Pediatric and Preventive Dentistry, Lenora institute of Dental Sciences. The selected teeth were classified into two groups. Group A: 10 molars were received pulpectomy with Kedo S Square and Group B: 10 molars were received pulpectomy with Neoendo Pedoflex files. Microbiological Assessment of the canal preparation was done after collection of initial and post instrumentation samples. In both the groups there was a statistical significant reduction of micro flora following instrumentation but Kedo S Square had a better potential of reducing the microflora in the canals when compared to Neoendo Pedoflex rotary files. Kedo S Square and Neoendo Pedoflex rotary files were equally effective in removing root canal microbes. Biomechanical preparation with a Kedo S Square rotary file resulted in greater microbial efficacy compared with Neoendo Pedoflex.

**KEYWORDS:** Rotary files, Biomechanical preparation, Pediatric rotary, Microbial count.

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### I. Introduction:

The dental pulp is essential for maintaining tooth health and vitality. As dental decay advances, the pulp becomes exposed to various irritants, triggering an inflammatory reaction. This leads to increased pressure within the pulp chamber, ultimately causing tissue damage and necrosis<sup>1</sup>. Although several irritants can lead to inflammation and necrosis of the pulp tissue, bacteria and/or their toxins are the primary cause of pulp inflammation and necrosis<sup>2</sup>. The primary significance of rotary endodontics in pediatric dentistry lies in its

ability to diminish the bacterial load and the byproducts they produce, which are responsible for causing pain, infections, abscesses, and extraoral swellings<sup>3</sup>. Pulpectomy could be the favored treatment for irreversible pulp inflammation or necrosis resulting from caries or trauma<sup>4</sup>. The effectiveness of pulpectomy relies on thoroughly removing microorganisms from the root canals. However, performing endodontic treatment in primary teeth is challenging due to factors such as physiological root resorption, root canal morphology, reduced thickness of radicular dentin, and limited cooperation time from children<sup>5</sup>. To address the specific requirements of pediatric endodontics, specialized pediatric rotary files have been developed to tackle challenges and enhance treatment outcomes<sup>6</sup>. The effectiveness of pulpectomy hinges on the absence of clinical and radiographic indications of problems. Critical factors include the initial access opening, thorough biomechanical preparation, and comprehensive three-dimensional root canal obturation<sup>7</sup>. In numerous instances, procedural errors may not significantly affect the outcome of endodontic therapy unless there is a concurrent infection. Residual infection persists as a significant contributor to pulpectomy failure. Therefore, thorough eradication of infection is crucial for the successful outcome of pulp therapy. Various studies has been present till date to evaluate the microbial efficacy of different types of hand and rotary files but none was there to evaluate the microbial efficacy in comparing the two different pediatric rotary files. Thus, the study aimed to evaluate the efficacy of two different pediatric rotary files after biomechanical preparation.

## II. Materials And Methods:

This clinical study was conducted to evaluate the efficacy of two different pediatric rotary file systems- Kedo S square and Nedoendo Pedoflex files in reducing the microbial count in primary canals after biomechanical preparation. The Institutional Review Board approved the study protocol and gave ethical clearance for the same. Informed consent was obtained from the guardians of the participants prior to the treatment and after providing complete information of the study protocol. A comprehensive history of all participants was documented, and oralexaminations were conducted by the investigator. Selected cases were devoid of systemic diseases that contraindicate pulp therapy and had not received antibiotic therapy for at least one week prior to the study.

A sample size of 20 was taken into the study and divided into two groups. Group A (n=10) and Group B (n=10). After selection through proper inclusion and exclusion criteria the procedure was started. On administering the local anaesthesia access opening was done and the canals patency was obtained using the k-file of 15 size. The distal canal of the mandibular molar and the palatal canal of the maxillary molar was selected for this study. Paper point of size 15 was taken and placed inside the canal and left for 1 minute and stored in sterile tube containing 1 mL of thioglycolate broth. After this procedure the bmp was carried out using the respective rotary files. Ethylene Diamine Tetra Acetic Acid (EDTA) was used as a lubricant. 5ml of saline is used as an irrigating agent as a standard volume and no other antimicrobial irrigants were used in this study to prevent the bias created from the solutions. The post instrumentation sample was obtained using sterile absorbent paper point and stored in the manner as illustrated prior. The collected samples were sent to the laboratory for microbial count. The samples were diluted with saline to obtain 10–4 dilution. 1 mL from each was inoculated onto blood agar plates and incubated aerobically at 37°C for 3 days. Thioglycolate agar plates are incubated in an anaerobic jar with a gas pack at 37°C for 7 days. The total bacterial count expressed as CFU/mL and obtained results were tabulated and sent to statistical analysis.

### Statistical Analysis

The data were collected, tabulated, and statistically analyzed by Statistical Package for social sciences software (SPSS), version 24. The level of statistical significance was predetermined at a P value of 0.05 or less.

## III. Results:

Results suggested that there is no statistical difference between group A and Group B. But there is a difference in microbial reduction of both the groups (P<0.005).

Groups	Microflora	Sample	Mean	Standard deviation	Mean difference	Microbial reduction	p- Value
Group A	Aerobic	Pre Instrumentation	0.722 × 10 <sup>5</sup>	0.227 × 10 <sup>5</sup>	0.697 × 10 <sup>5</sup>	596%	0.001*
		Post Instrumentation	5	5			
	Anaerobic	Pre Instrumentation	0.024 × 10 <sup>5</sup>	0.020 × 10 <sup>5</sup>	1.789 × 10 <sup>5</sup>	593%	
		Post Instrumentation	1.923 × 10 <sup>5</sup>	1.154 × 10 <sup>5</sup>			

			0.125 × 10	0.083 × 10				
Group B	Aerobic	Pre Instrumentation	1.167 × 10	0.664 × 10	5	5	94%	0.001*
		Post Instrumentation			5	5	92%	
	Anaerobic	Pre Instrumentation	0.094 × 10	0.073 × 10	5	5	1.858 × 10	
		Post Instrumentation	2.142 × 10	1.148 × 10	5	5		
			0.283 × 10	0.266 × 10				

**Table 1.** Tabular column showing microbial count in CFU/ml count.  $p < 0.05$  statistically significant

#### IV. Discussion:

The intricate root canal structure of primary teeth, along with potential drawbacks of traditional NiTi rotary files such as file breakage and discomfort for children during mouth opening due to their length (21-25 mm), as well as the absence of a defined protocol for rotary instrumentation in primary teeth, necessitated the development of dedicated pediatric rotary file systems along with specific guidelines. Implementing protocols designed for permanent teeth in primary teeth may result in lateral perforation of the primary root canal. Introduction of an exclusive pediatric rotary file system Kedo-S is a revolution that spearheaded in the arena of pediatric endodontics. The present study was undertaken to assess the efficacy of Kedo-S square and Neoendo pedoflex pediatric rotary files in primary teeth. Irrigation in pulpectomy procedure is not only essential to flush away the debris created during instrumentation, but also to act as a lubricant for instruments and to eliminate the smear layer that forms on dentine surfaces following instrumentation. No other antimicrobial irrigants were used in this study to avoid any bias<sup>9</sup>. The collected samples also defies the microbial count in which the culture has done and the media used as the anaerobic microbes when exposed to oxygen may become toxic to oxygen. The current study utilized thioglycolate agar and blood agar media for the cultivation of anaerobic and aerobic microbes, respectively, and they were expressed as CFU. Microbial reduction was significantly reduced in post-instrumentation samples but none of these samples were rendered to be free from microbes. Group A group rendered from 93-96% microbial reduction whereas Group B shown 92- 94% reduction. Estimation of mean microbial count instead of identifying specific microorganisms responsible for reinfection and comparison with only two type of rotary instrumentation can be considered as limitations of the current study. Further studies investigating different irrigation protocols, instrumentation techniques, and identifying specific microbes in primary root canals can be carried out.

#### V. Conclusion:

Within the parameters of this study, it can be concluded that both rotary files has shown significant reduction in root canal flora. Complete removal of the microflora can be enhanced using the irrigating solutions as a additive factor for the removal of the microbes. However kedo s square shown a better reduction than Neoendo pedoflex files and also the single file system in Kedo S Square shows better adaptation to children reducing the chair side time.

#### References

- [1]. Morotomi T, Washio A, Kitamura C. Current and future options for dental pulp therapy. Japanese Dental Science Review. 2019 Nov 1;55(1):5-11.
- [2]. Elmancy TA, Tawfik AM, Barakat IF, Fathi AA, Nasr GA. Antimicrobial efficacy of manual versus rotary instrumentation on Enterococcus faecalis in nonvital primary molars. Tanta Dental Journal. 2021 Jan 1;18(1):27-31.
- [3]. Figdor D, Sundqvist G. A big role for the very small—understanding the endodontic microbial flora. Australian dental journal. 2007 Mar;52:S38-51.
- [4]. AAPD pulp therapy for primary and immature permanent teeth. The reference manual of pediatric dentistry AAPD ; 2020 384 – 392
- [5]. Pinheiro SL, Araujo G, Bincelli I, Cunha R, Bueno C. Evaluation of cleaning capacity and instrumentation time of manual, hybrid and rotary instrumentation techniques in primary molars. International Endodontic Journal. 2012 Apr;45(4):379-85.
- [6]. Oz E, Timur BG, Cetin ES, Bilir G. Effectiveness of pediatric rotary, rotary and reciprocating instrumentations on bacterial load reduction in primary molars: an ex vivo comparative study. Journal of Clinical Pediatric Dentistry. 2023 Mar 1;47(2).
- [7]. Figini L, Lodi G, Gorni F, Gagliani M. Single versus multiple visits for endodontic treatment of permanent teeth: a Cochrane systematic review. Journal of Endodontics. 2008 Sep 1;34(9):1041-7.
- [8]. Punathil S, Bhat SS, Bhat SV, Hegde SK. Microbiological analysis of root canal flora of failed pulpectomy in primary teeth. Int. J. Curr. Microbiol. App. Sci. 2014;3(9):241-6.