



## Original Article

### To compare the efficiency of single file rotary and reciprocating systems in reducing bacterial load from contaminated root canals

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#### Abstract

**Background:** Endodontic therapy does treat the tooth from inside and its achievement is based on comprehensive canal debridement, effective disinfection, and complete obturation of the canal space. The present study was conducting to compare the efficiency of single file rotary & reciprocating systems in reducing *E. faecalis* colony count after instrumenting. **Material and methods:** The present study was conducted to compare the efficiency of single file rotary & reciprocating systems in reducing *E. faecalis* colony count after instrumenting. For study forty two freshly intact human mandibular premolar teeth (length 20-21 mm), straight, with radiographically confirmed single root canal and fully formed apices, were obtained. The teeth were stored in 10% formalin until use. Before the commencement of study ethical approval was taken from the Ethical Committee. The coronal access was performed 42 specimens were divided into 3 groups(n=14) based on the instrumentation technique used. Irrigation protocol was to use 2ml of 3% sodium hypochlorite and 5ml of distilled water, except group 3. Group 1 One Shape files with 6% taper, Group 2 WaveOne files with the same amount of taper associated, Group 3 canals were uninstrumented (Negative control group). Samples from each root canal were tested to verify the presence or absence of the microbial growth both before and after final disinfection procedures. Statistical analysis was done using Statistical Package for the Social Sciences, version 21 (SPSS, Chicago, IL). **Results:** In present study total sample size was 42, which were divided into three groups. Our study shows that group II shows greater efficiency in reducing bacterial load than group I and group III. **Conclusion:** Our study concluded that WaveOne files were better than One shape files in reducing bacterial load.

**Keywords:** One Shape files, WaveOne primary files, reciprocating

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**How to Cite:** Sandhu T. To compare the efficiency of single file rotary and reciprocating systems in reducing bacterial load from contaminated root canals. IDA Lud J –le Dent 2019;3(1):1-5.

## INTRODUCTION

One of the most important goals of endodontic treatment is to significantly eliminate or reduce the microbial load present inside an infected root canal system.<sup>1</sup> However, the total elimination of microorganisms in the root canal remains a difficult task. Pathogens like *Enterococcus faecalis*, *Pseudomonas aeruginosa*, *Staph aureus* and *Candida albicans* are frequently observed when endodontic treatment has failed.<sup>2</sup> Success of the root canal treatment depends on many factors such as method and the quality of instrumentation, irrigation, disinfection, and three-dimensional obturation of the root canal.<sup>3</sup> Several methods, including the use of a variety of instrumentation techniques<sup>4</sup>, irrigation schemes with antimicrobial solutions<sup>5</sup> and intracanal medications<sup>6</sup>, have been described aiming at a more effective intracanal disinfection. Sodium hypochlorite (NaOCl) is the most common irrigating solution used during chemomechanical preparation due to its broad spectrum of antimicrobial activity and its ability to dissolve organic material. The efficiency of disinfection by NaOCl is related to its contact time with the microorganisms and its concentration, which can range from 0.5% to 5.25%.<sup>7</sup> Single files which worked in continuous rotation motion include One Shape (Micro-Mega, France), KOMET F 360 (Komet, USA) and NeoNiTi files (Neolix SAS, France). Single reciprocating file systems include WaveOne (Dentsply Maileffer, Switzerland), Reciproc (VDW, Munich, Germany) and Unicone files (Medin, Czech Republic).<sup>8</sup> The present study

was conducting to compare the efficiency of single file rotary & reciprocating systems in reducing *E. faecalis* colony count after instrumenting.

## MATERIAL AND METHODS

The present study was conducted to compare the efficiency of single file rotary & reciprocating systems in reducing *E. faecalis* colony count after instrumenting. For study forty two freshly intact human mandibular premolar teeth (length 20-21 mm), straight, with radiographically confirmed single root canal and fully formed apices, were obtained. The teeth were stored in 10% formalin until use. Before the commencement of study, ethical approval was taken from the Ethical Committee. The coronal access was performed. To determine the working length, a #10 K-file was inserted into the root canal until it was visible at the apical foramen. The working length was calculated to be 1 mm less than the length obtained with this initial file. The specimens were put in storage in glass test tubes and were sterilized on an individual basis in an autoclave at 121 °C for thirty mins. Glass vials with rubber stoppers were adjusted for use in the present experiment. The experimental systems were sterilized in an autoclave at 121 °C for 30 min. Then the experimental systems were kept in an incubator at 37 ± 1°C for 96 h and no turbidity of the medium was observed. The microorganism strains used in this experiment was *Enterococcus faecalis*. 42 specimens were divided into 3 groups(n=14) based on the instrumentation technique used. Irrigation protocol was to use 2ml of 3%

sodium hypochlorite and 5ml of distilled water in 30 - gauge side vented needle in all the groups with the change of each file, except group 5.

In Group 1 One Shape files with 6% taper (tip diameter of 0.25mm) was used for instrumentation of canal in rotating motion in endomotors at 400rpm and 2.5Ncm torque. Instrumentation of canals was completed in three consecutive steps using in and out pecking motion up to WL.

In Group 2 WaveOne primary files with 6% taper (tip diameter of 0.25mm) was used for instrumentation canals in reciprocating motion in endomotor at 300rpm and 5Ncm torque. Instrumentation was completed in three consecutive steps.

In Group 3 canals were uninstrumented. (Negative control group)

Samples from each root canal were tested to verify the presence or absence of the microbial growth both before and after final disinfection procedures. To assess the antimicrobial action of the instrumentation protocols, sterile paper points size 15 were consecutively placed in the root canal. Each paper point was left in the root canal for 1 min, as follows: X1 (before biomechanical preparation) and X2 (after final disinfection). The paper points were transferred to Petri dishes containing the following media: Bile Aesueclin Azide Agar, Cetrimide Agar, Mannitol Salt Phenol-red Agar, and Saboraud Dextrose Agar. The plates were then incubated at 37 ± 1 °C for 48 h. After incubation, microbial growth was assessed with light microscopy at 400×. Statistical analysis was done using Statistical Package for the Social Sciences, version 21 (SPSS, Chicago, IL).

## RESULTS

In present study total sample size was 42, which were divided into three groups. Our study shows that group II shows greater

efficiency in reducing bacterial load than group I and group II (Table 1). Also the statistical analysis revealed a statistically significant difference among the group results (p<0.05).

**Table 1: Efficiency of single file rotary and reciprocating systems in reducing bacterial load from contaminated root canals**

Group	Reduction percentage post instrumentation	p-value
Group I	75.45%	0.024*
Group II	82.56%	
Group III	0%	

\*p – value less than 0.05 indicates significant difference.

## DISCUSSION

*E. faecalis*, *P. aeruginosa*, *S. aureus* e *C. albicans* were selected as the microbiological markers because they are considered the most resistant species in infected root canals, and are often associated with endodontic treatment failures.<sup>2</sup> Among the irrigating solutions currently used, NaOCl is the most common and accepted worldwide due to its properties that contribute to an effective chemomechanical preparation. The studies of Gulsahi et al.<sup>9</sup>, Almeida et al.<sup>10</sup> shows that NaOCl has a broad spectrum of antimicrobial activity, has the capacity to dissolve organic material, and acts as a lubricant during root canal system instrumentation. The antimicrobial action of NaOCl increases with its concentration, ranging from 0.5% to 5.25%, but this is also accompanied by an increase in its toxicity.<sup>11</sup> Our study shows that WaveOne files were better than One shape files in reducing bacterial load. Nabeshima *et al.*<sup>12</sup> had reported 96.5%

bacterial reduction for OneShape. However, Matos *et al*<sup>13</sup>., reported 75.61% bacterial reduction and used single rooted human canines. Machado *et al*<sup>14</sup>., reported 81.94% bacterial reduction and used distobuccal canals of upper molars for ProTaper rotary system. They irrigated canals with distilled water during instrumentation.

## CONCLUSION

Our study concluded that WaveOne files were better than One shape files in reducing bacterial load.

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**Conflict of Interest: None**

**Source of Support: NiL**



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