

Original Research

Comparative evaluation of efficacy of two different irrigation system

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ABSTRACT:

Background: To comparison evaluation of efficacy of two different irrigation system. **Materials & methods:** A total of 60 freshly extracted mandibular first premolars were collected and included in the study. The incubated specimens are randomly divided into two groups and one control group with 20 specimens in each group as follows: Group A: 2.5% NaOCl and Conventional Needle Irrigation, Group B: 2.5% NaOCl + EndoVac irrigation system, and Group C: Control group, normal saline irrigation. Placement of paper points was done inside the root canal space and was then kept on to petri plates containing brain heart infusion broth, which were incubated for 37 degree C. Colonies were counted, and the number of colony-forming units per milliliter (CFU/mL-1) was calculated. All the results were evaluated and compared. **Results:** Mean microbial load after irrigation among group A, group B and group C specimens was 1.56 CFU/mL-1, 0.41 CFU/mL-1 and 3.13×10^5 CFU/mL-1 respectively. Significant results were obtained while comparing the efficacy of different root canal irrigating solutions. **Conclusion:** EndoVac irrigation system is better in comparison to conventional NaOCl irrigation systems.

Key words: Irrigating solution, Root canal therapy

Received: 20 January, 2023

Accepted: 25 February, 2023

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This article may be cited as: Gupta A, Soni N, Doranala S, Patil OA, Patel R, Gendar S. Comparative evaluation of efficacy of two different irrigation system. J Adv Med Dent Sci Res 2023;11(3):28-30.

INTRODUCTION

The ultimate goal of endodontic therapy should be to return the involved teeth to a state of health and function. Instrumentation of the root canal system is recognized as being one of the most important stages in root canal treatment. The debris created during root canal instrumentation should be removed from the dentine surface of the canal wall and the dentine tubules.¹⁻³

Irrigants can augment mechanical debridement by flushing out debris, dissolving tissue, and disinfecting the root canal system. An effective irrigation delivery system is required for the irrigants to reach the working length. Such a delivery system should have

adequate flow and volume of irrigant to the working length to be effective in debriding the complete canal system.^{4,5} Published literature showed that regardless of instrumentation and irrigation techniques, effectiveness of irrigating solution remains limited in prepared root canals. Therefore, improvement of irrigating protocols is essential during root canal treatment in order to achieve better cleaning efficiency in very complex area.^{6,7} Hence; the present study was conducted for evaluating and comparing the efficacy of two different irrigation system.

MATERIALS & METHODS

The present study was conducted for evaluating and comparing the efficacy of two different irrigation systems. A total of 60 freshly extracted mandibular first premolars were collected and included in the study. Access cavity preparation was done in all the specimens followed by biochemical preparation for cleaning and shaping following step back technique initial apical binding file increasing the size up to #50. Cyanoacrylate was used for blocking the root tips of each specimen. This was followed by mounting of specimens in plaster blocks. A pure culture of *E. faecalis* in brain heart infusion broth was used to obtain a suspension. A 10 µL of the suspension was placed in each root canal, and sterile cotton was placed inside the canal entrance. The blocks were then placed inside stainless steel boxes and incubated at 37°C for 24 h. The incubated specimens are randomly divided into two groups and one control group with 20 specimens in each group as follows:

Group A: 2.5% NaOCl and Conventional Needle Irrigation

Group B: 2.5% NaOCl + EndoVac irrigation system.

Group C: Control group, normal saline irrigation.

Placement of paper points was done inside the root canal space and was then kept on to petri plates containing brain heart infusion broth, which were incubated for 37 degree C. Colonies were counted, and the number of colony-forming units per milliliter (CFU/mL-1) was calculated. All the results were evaluated and compared.

RESULTS

A total of 60 tooth specimens were obtained and were divided into three study groups as follows: Group A: 2.5% NaOCl and Conventional Needle Irrigation, Group B: 2.5% NaOCl + EndoVac irrigation system and Group C: Control group, normal saline irrigation. Mean microbial load after irrigation among group A, group B and group C specimens was 1.56 CFU/mL-1, 0.41 CFU/mL-1 and 3.13 x 10⁵ CFU/mL-1 respectively. Significant results were obtained while comparing the efficacy of different root canal irrigating solutions.

Table 1: Comparison of microbial load

Group	Mean microbial load (x10 ⁵ CFU/mL-1)	SD	p-value
Group A	1.56	0.84	0.000 (Significant)
Group B	0.41	0.12	
Group C	3.13	1.34	

DISCUSSION

The principal goal for a successful endodontic treatment is to remove vital and necrotic remnants of pulp tissues, microorganisms, and microbial toxins from the root canal system. As there are abundant studies of evidence ascertained that complete debridement of root canal through chemomechanical preparation, cleaning, and shaping is nearly impossible due to its intricate nature. Therefore, the placement of calcium hydroxide (CH) as intracanal medication has been implemented to facilitate complete disinfection from the complex structures of the root canal. Researchers have shown that remnants of CH on dentinal walls affect the penetration of sealers, increase apical leakage, and react chemically with obturating materials, thus interfering with their properties which cause compromising the quality of the seal provided by endodontic root filling materials. Therefore, the complete removal of CH from the root canal before obturation is recommended.⁷⁻⁹ Hence; the present study was conducted for evaluating and comparing the efficacy of two different irrigation systems.

A total of 60 tooth specimens were obtained and were divided into three study groups as follows: Group A: 2.5% NaOCl and Conventional Needle Irrigation, Group B: 2.5% NaOCl + EndoVac irrigation system and Group C: Control group, normal saline irrigation. Mean microbial load after irrigation among group A, group B and group C specimens was 1.56 CFU/mL-1, 0.41 CFU/mL-1 and 3.13 x 10⁵ CFU/mL-1 respectively. Paul ML et al compared the efficacy of

different irrigants including ethylene diaminetetraacetic acid (EDTA), EDTA along with ultrasonication, citric acid, and mixture of tetracycline isomer, an acid, and a detergent (MTAD) as final irrigants where sodium hypochlorite (NaOCl) was used in each experimental group during root canal preparation with special emphasis on the apical third. Forty-five human upper anterior teeth were selected and divided into one control group (group 1) and four experimental groups (group 2 to group 5), each containing nine teeth. All the four experimental groups were irrigated with 5.25% NaOCl solution during preparation, whereas test irrigants (5 mL) as the final solution used in each experimental group were 17% EDTA, 17% EDTA along with ultrasonication, 25% citric acid, and MTAD, respectively. The samples were prepared and observed under a scanning electron microscope (SEM). The photomicrographs were recorded and evaluated with a scoring system. None of the combined irrigants was found completely effective.¹⁰

Significant results were obtained while comparing the efficacy of different root canal irrigating solutions. Srivastava I et al evaluated the cleaning efficacy of single-beveled needle, side-vented needle, endovac, and endo-irrigator plus in the removal of debris from apical third of root canal by Scanning Electron Microscope. Forty single-rooted freshly extracted human permanent mandibular premolars were collected. Root canals were cleaned and instrumented till X2 (25/06) with rotary Protaper Next at working length 1 mm short of the apex. Teeth were randomly

divided into four equal groups: Group 1 (n = 10): Endovac, Group 2 (n = 10): Endo irrigator plus, Group 3 (n = 10): Side-vented needle, and Group 4 (n = 10): Single-beveled needle. Irrigation was done with 5.25% NaOCl, followed by 17% ethylenediaminetetraacetic acid. Samples were sectioned and examined under SEM at apical levels. The level of debris removal efficacy is as follows: Endovac > Endo-irrigator plus > Side-vented needle ~ Single-beveled needle. Endovac showed the maximum number of debris removal and has better cleaning efficacy in the apical areas of the root canal, followed by Endo irrigator plus, Side-vented needle and Single-beveled needle.¹¹

CONCLUSION

EndoVac irrigation system is better in comparison to conventional NaOCl irrigation systems.

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