

ORIGINAL RESEARCH

Pre-sterilization cleaning of endodontic instruments before placement in glass bead sterilizer- An invitro study

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ABSTRACT:)

Background: Root canal instrumentation results in accumulation of debris on the instruments. The present study was conducted to assess effectiveness of pre-sterilization cleaning of endodontic instruments before placement in glass bead sterilizer. **Materials & Methods:** The present study was conducted on 60 K files used in patients and were divided into 3 groups of 20 each. Group I had contaminated files were without any cleaning protocol, group II had files which underwent manual brushing + 3% H₂O₂ and group III files underwent manual brushing + ultrasonic bath for 5 min. later on all the instruments were immersed in Van- Gieson's stain for 3 minutes. The instruments were examined for debris based on Linsuwanont et al criteria at 3 levels apical, middle & coronal using a stereomicroscope. Debris was scored as 0, 1, 2, 3 and 4. **Results:** Score 4 was seen in 4 in group I, and 2 in group II, score 3 was used in 8 in group I and 6 in group II, score 2 was seen in 6 in group I, 8 in group II and 8 in group III, score 1 was seen in 2 in group I, 4 in group II and 12 in group III. The difference was significant (P< 0.05). **Conclusion:** Manual brushing + ultrasonic bath is better than underwent manual brushing + 3% H₂O₂ in cleaning of endodontic instruments.

Key words: Endodontic instruments, Manual brushing, Ultrasonic bath

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INTRODUCTION

In endodontic practice, microorganisms are the main causative agents for endodontic diseases; hence prevention for transmission of infectious diseases among patients, dentists & its auxiliary staff through proper disinfection & sterilization is of utmost importance.¹

Root canal instrumentation results in accumulation of debris on the flutes of the file, these instruments have to be cleaned, disinfected and sterilized effectively.² This is especially important in endodontics because during root canal instrumentation all types of debris such as necrotic and vital tissue, bacteria, dentin chips, blood by products and other by potential irritants are encountered. The exchange of this debris via instruments from one patient to another is undesirable as they may act as antigens, infecting agents or non specific irritants.³

Endodontic instruments are often contaminated with necrotic & vital tissue, bacteria, dentin chips, blood by-products & other potential irritants which may act as antigens & precipitate spread of infection from one patient to another. This bio burden by forming a protective layer may insulate underlying microorganisms & thus interferes with sterilization.⁴

There are various cleaning procedures such as mechanical (different types of brushes and sponges), chemical (Embedded in various disinfectants, detergents or enzymatic cleaners), ultrasound and a final rinse before sterilization have been used in endodontics.⁵ The present study was conducted to assess effectiveness of pre-sterilization cleaning of endodontic instruments before placement in glass bead sterilizer.

MATERIALS & METHODS

The present study was conducted in the department of Endodontics. The study protocol was approved from institutional ethical committee. It comprised of 60 K files used in patients and were divided into 3 groups of 20 each. Group I had contaminated files were without any cleaning protocol, group II had files which underwent manual brushing + 3% H₂O₂ and group III files underwent manual brushing + ultrasonic bath for 5 min. later on all the instruments were immersed in Van- Gieson's stain for 3 minutes.

The instruments were examined for debris based on Linsuwanont et al criteria at 3 levels apical, middle & coronal using a stereomicroscope. Debris was scored as 0, 1, 2, 3 and 4 where 0

was clean surface without any debris, 1 was organic film, 2 was slight staining in the form of single particles of debris scattered on the instrument surface, 3 was moderate staining, organic particles covering the surface of the instrument as a continuous layer, 4 was a high level of staining, with the cutting flutes completely covered with debris. Score from all surfaces were taken and mean was calculated. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I shows that group I had contaminated files were without any cleaning protocol, group II had files which underwent manual brushing + 3% H₂O₂ and group III files underwent manual brushing + ultrasonic bath for 5 min. Table II, graph I shows that score 4 was seen in 4 in group I, and 2 in group II, score 3 was used in 8 in group I and 6 in group II, score 2 was seen in 6 in group I, 8 in group II and 8 in group III, score 1 was seen in 2 in group I, 4 in group II and 12 in group III. The difference was significant (P<0.05).

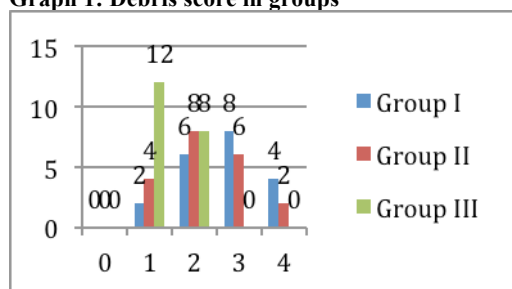
Table 1: Distribution of instruments

Groups	Group I	Group II	Group III
Technique	No cleaning	Manual brushing + 3% H ₂ O ₂	Manual brushing + ultrasonic bath
Number	20	20	20

Table 2: Assessment of debris score in groups

Score	Group I	Group II	Group III	P value
0	0	0	0	-
1	2	4	12	0.04
2	6	8	8	0.05
3	8	6	0	0.02
4	4	2	0	0.01

Graph 1: Debris score in groups



DISCUSSION

It is seen that for effective sterilization it is important to remove residual organic debris, which may prevents direct contact of disinfectant or sterilant or may bind and inactivate its action. Therefore for destruction of viable microorganisms, pre-cleaning of instruments is required prior to their sterilization.⁶ Various methods have been advocated for cleaning endodontic files which includes mechanical cleaning using different kinds of brushes and sponges, chemical cleaning by immersion in different concentration of sodium hypochlorite, hydrogen peroxide, detergents, enzymatic cleaners, a combination of mechanical and chemical cleaning, or the use of ultrasonics. In spite of several methods available for cleaning there is little consistent information on the optimum method of cleaning.⁷

Hydrogen Peroxide produces transient yet energetic effervescence that displaces debris. The bubbling action of the solution when in contact with tissues physically foams debris out of the instruments.⁸ The present study was conducted to assess effectiveness of pre-sterilization cleaning of endodontic instruments before placement in glass bead sterilizer.

In this study, group I had contaminated files were without any cleaning protocol, group II had files which underwent manual brushing + 3% H₂O₂ and group III files underwent manual brushing + ultrasonic bath for 5 min.

In study by Shenoi⁹, 50 K files were contaminated by preparing canals of extracted human mandibular teeth. Instruments were divided in five groups of 10 instruments each and different cleaning protocols were applied to each group. The selected endodontic instruments were then immersed in Van-Gieson's stain and debris was evaluated under stereomicroscope for scoring. It was found that 81% of the selected samples showed residual debris. Combination of mechanical and chemical (2% glutaraldehyde) cleaning procedure followed by ultrasonic bath was found to be an effective method of removing debris from endodontic instruments. There was a statistically significant difference in the mean values with respect to the various cleaning protocol applied.

We observed that score 4 was seen in 4 in group I, and 2 in group II, score 3 was used in 8 in group I and 6 in group II, score 2 was seen in 6 in group I, 8 in group II and 8 in group III, score 1 was seen in 2 in group I, 4 in group II and 12 in group III. The difference was significant (P<0.05).

Craig et al¹⁰ in their study sixty used and fifteen unused hand instruments were analyzed. These instruments were subjected to different decontamination protocols using mechanical, chemical or a combination. The presence of organic debris was detected by the use of Van Gieson's stain using a stereomicroscope. The highest mean value of maximum biological contamination (MBC) was found in instruments immersed in 2% glutaraldehyde and lowest in instruments that were cleaned manually with brush, immersed in sodium hypochlorite and ultrasonically cleaned with an enzymatic solution. This difference was found to be statistically significant. The most efficient cleaning protocol was found in instruments that were cleaned by a combination of mechanical, chemical and ultrasonic cleaning. The limitation of the study is selection of limited cleaning methods.

CONCLUSION

This is to found that manual brushing + ultrasonic bath is better than underwent manual brushing + 3% H₂O₂ in cleaning of endodontic instruments.

REFERENCES

1. Popovic J, Gasic J, Zivkovic S, Petrovic A & Radicevi G. Evaluation of biological debris on endodontic instruments after cleaning and sterilization procedures. *Int Endod J* 2010;43(4):336–341.
2. Aravind L, Kumar A, Sam JE, Ignatius RS. A comparative evaluation of the cleaning efficacy of three different agents on rotary nickel-titanium endodontic instruments-An in-vitro study. *J Conserv Dent* 2006;9(2):72-77.
3. Johnson MA, Primack PD, Loushine RJ, Craft DW. Cleaning of Endodontic files, Part I: The Effect of Bio burden on the Sterilization of Endodontic Files. *J Endod* 1997;23(1):32-34.
4. Smith A, Dickson M, Aitken J, Bagg J. Contaminated dental instrument. *J Hosp Inf* 2002; 51(3):233–5.
5. Segall RO, del Rio CE, Brady JM, Ayer WA. Evaluation of debridement techniques for endodontic instruments. *Oral Surg Oral Med Oral Pathol* 1977;44(3):463-7.
6. Murgel CAF, Walton RE, Rittman B, Pecora JD. A comparison of techniques for cleaning endodontic files after usage: A quantitative scanning electron microscopic study. *J Endod* 1990;16(5):214–7.
7. Linsuwanont P, Parashos P, Messer HH. Cleaning of rotary nickel–titanium endodontic instruments. *Int Endod J* 2004;37(1):19–28.
8. Van Eldik DA, Zilm PS, Rogers AH, Marin PD. A SEM evaluation of debris removal from endodontic files after cleaning and steam sterilization procedures. *Aust Dent J* 2004;49(3):128-35.
9. Sheno PR, Mute WR, Makade CS, Mahajan AK, Singh H. To ascertain effectiveness of pre-sterilization cleaning of endodontic instruments before placement in glass bead sterilizer – An in vitro study. *Ind J Conserv Endod* 2016;1(2):42-46.
10. Craig A. Hurtt, Louis E. Rossman. The Sterilization of endodontic hand files. *Journal of endodontics* 1996;22:321-22.