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Original Research

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

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ABSTRACT:

Background: Root canal instrumentation results in accumulation of debris on the flutes of the file, these instruments have to be cleaned, disinfected and sterilized effectively. The present study was conducted to evaluate utility of pre-sterilization cleaning of endodontic instruments before placement in glass bead sterilizer. **Materials & Methods:** The present study was conducted on 40 K files used in patients and were divided into 4 groups. In group I, we used contaminated files without any cleaning protocol, in group II, we used files which underwent manual brushing + 3% H₂O₂ and in group III files underwent manual brushing + ultrasonic bath for 5 min and in group IV, non contaminated files were used. Debris on files were examined using Linsuwanont et al criteria. **Results:** It was found that score 4 was seen in 2 in group II, score 3 was used in 4 in group II, score 2 was seen in 4 in group II and 2 in group III. Score 1 was seen in 3 in group I and 8 in group III. Score 0 was seen in 7 in group I. The difference was significant (P < 0.05). **Conclusion:** Among various methods of sterilization of files, manual brushing + ultrasonic bath is better than manual brushing + 3% H₂O₂ alone.

Key words: Instruments, Ultrasonic bath, Hydrogen peroxide.

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INTRODUCTION

The oral cavity has a huge variety of microorganisms that forms a complex environment with diverse and often pathogenic microbiota.¹ Some of the potentially transmissible pathogens are HBV, HCV, herpes simplex and HIV viruses, Mycobacterium tuberculosis, different Staphylococcal and Streptococcal strains and other microorganisms responsible for upper respiratory tract infections. Not all individuals with infectious diseases can be identified before a procedure is performed; therefore, all patients, indiscriminately, should be considered potentially infectious, and consequently, standard precautions should be taken in all procedures with all patients.²

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.³ 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.⁴The present study was conducted to evaluate utility 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 40 K files used in patients and were divided into 4 groups. In group I, we used contaminated files without any cleaning protocol, in group II, we used files which underwent manual brushing + 3% H₂O₂ and in group III files underwent manual brushing + ultrasonic bath for 5 min and in group

IV, non contaminated files were used. Following this instruments were immersed in Van- Gieson's stain for 3 minutes.

Debris on files were examined using 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. Results were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of instruments

Group I	Group II	Group III	Group IV
Non contaminated files (Negative control)	No cleaning (Positive control)	Manual brushing + 3% H ₂ O ₂	Manual brushing + ultrasonic bath
10	10	10	10

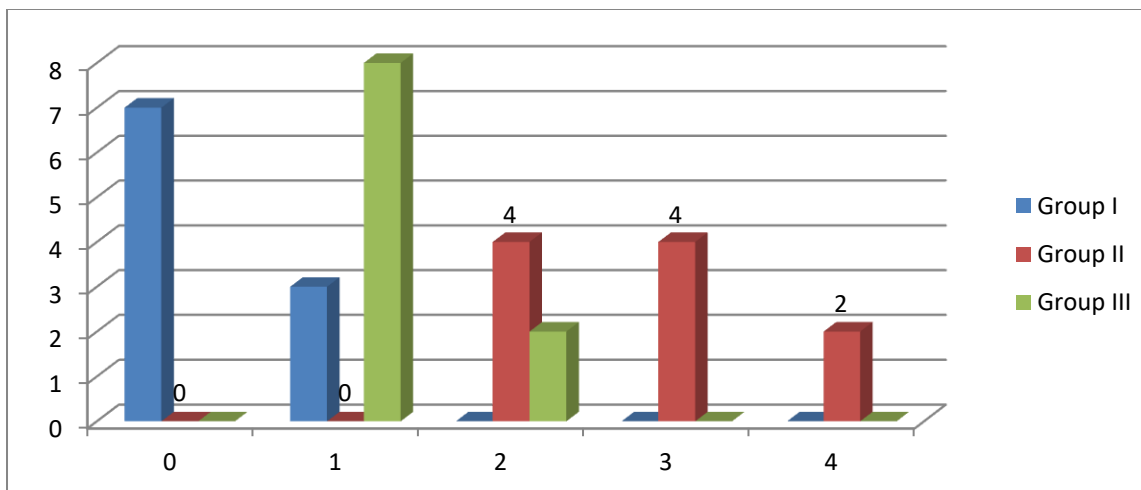
Table I shows that group I had non contaminated files (Negative control), group II had contaminated files were without any cleaning protocol (Positive control), group III had files which underwent manual brushing + 3% H₂O₂ and group IV files underwent manual brushing + ultrasonic bath for 5 min. Each group had 10 files each.

Table II Assessment of debris score in groups

Score	Group I	Group II	Group III	P value
0	7	0	0	0.01
1	3	0	8	0.02
2	0	4	2	0.03
3	0	4	0	0.01
4	0	2	0	0.05

Table II, graph I shows that score 4 was seen in 2 in group II, score 3 was used in 4 in group II, score 2 was seen in 4 in group II and 2 in group III. Score 1 was seen in 3 in group I and 8 in group III. Score 0 was seen in 7 in group I. The difference was significant (P< 0.05).

Graph I Debris score in groups



DISCUSSION

Infection control is a major concern due to risk of transmission of communicable diseases. According to the universal guidelines, dental practitioners are required to sterilize instruments that come in contact with the saliva and blood during dental procedures. Proper sterilization of the dental instruments by adhering to the universal infection control protocols can prevent the spread of infection. Various doubts have been raised over the effectiveness of instrument cleaning in the dental practices.⁵

It is seen that for effective sterilization it is important to remove residual organic debris, which may prevent 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 include mechanical cleaning using different kinds of brushes and sponges, chemical cleaning by immersion in different concentrations of sodium hypochlorite, hydrogen peroxide, detergents, enzymatic cleaners, a combination of mechanical and chemical cleaning, or the use of ultrasonics.⁷ The present study was conducted to evaluate usefulness of pre-sterilization cleaning of endodontic instruments before placement in glass bead sterilizer.

In this study, group I had non-contaminated files (Negative control), group II had contaminated files without any cleaning protocol (Positive control), group III had files which underwent manual brushing + 3% H₂O₂ and group IV files underwent manual brushing + ultrasonic bath for 5 min. Each group had 10 files each.

Segall et al.⁸ 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.

We found that score 4 was seen in 2 in group II, score 3 was used in 4 in group II, score 2 was seen in 4 in group II and 2 in group III. Score 1 was seen in 3 in group I and 8 in group III. Score 0 was seen in 7 in group I. The difference was significant ($P < 0.05$). In study by Shenoi⁹, 50 K files were contaminated by preparing canals of extracted human mandibular teeth. 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 protocols applied.

CONCLUSION

Among various methods of sterilization of files, manual brushing + ultrasonic bath is better than manual brushing + 3% H₂O₂ alone.

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