



EFFICACY OF PERACETIC ACID IN RAPID DISINFECTION OF NEW ENDODONTIC FILES COMPARED WITH SODIUM HYPOCHLORITE, CHLORHEXIDINE AND POVIDINE IODINE

Nandhini T., Subash Sharma S and Gopinath P

Saveetha dental college

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ABSTRACT

Aim: The purpose of this study was to compare 4 methods of disinfecting new endodontic files in chair side practice using chemicals and recommend the effective method from among these.

Objective: The objective of this study was to compare the effectiveness of 3 % sodium hypochlorite (NaOCl), 2% chlorhexidine, 5% peracetic acid and 10% povidine iodine in the rapid disinfection of new endodontic files with *Bacillus subtilis*.

Background: Some study has been previously done on comparing the efficacy of peracetic acid in rapid disinfection of resilion and gutta perchah cones with sodium hypochlorite, chlorhexidine and povidine iodine. But this study is on disinfecting the new endodontic files using above mentioned solutions. The reason is to evaluate the new endodontic files sterilised or not.

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INTRODUCTION

Cleaning and shaping is an essential phase of endodontic treatment. This is more often than not performed on hand and rotary instruments which are habitually reused (1, 2). In view of the fact that root canal instrumentation results in growth of debris on the flutes of the file, these instruments have to be cleaned, disinfected and sterilized efficiently. This is more than ever significant in endodontics for the reason that during root canal instrumentation all types of debris such as necrotic and vital tissue, bacteria, dentin chips, blood by products and previous by potential irritants are encountered. The substitute of this fragments through instruments commencing one patient to another is detrimental as they may take steps as antigens, infecting agents or non specific irritants (1).

Sterilization prevent the extend of infectious diseases. In dentistry, it is the first and foremost relate towards the dealing out the reusable instruments to prevent cross-infection. In endodontic, various instruments like files, reamers, gates glidden drill and peeso reamers are used for clean and shape the root canal and to eliminate the bacterial population in pulp canal space (2). There are various methods to sterilize these instruments, such as dry heat sterilizer, autoclave, ethylene oxide gas, glass-bead sterilizer or hot-salt sterilizer, etc.(3). Besides a rapid chair side chemical disinfection using sodium hypochlorite, per acetic acid, povidine iodine, chlorhexidine, glutaraldehyde were also been used.

Sodium hypochlorite solution, at different concentrations, is one of the on the whole employed solutions in endodontics since of low superficial tension, capacity of dissolving organic matter, and deodorizing, bleaching, lubricating and antimicrobial actions. Peracetic acid is a runner to designate as a alternative irrigant solution. This acid show antimicrobial activity still at low concentrations (4).

Thus, the objective of this study was to assess the effectiveness of four chemical disinfectants: 5% peracetic acid (PAA), 3% sodium hypochloride (NaOCl), 2% chlorhexidine (CHX) and 10% povidine iodine (PI) in disinfecting new endodontic files in chair side practice using the above chemicals and recommend the effective method from among these.

MATERIALS AND METHODS

In the present study, stainless steel files were used and they divided into to 4 groups based on their type of antibacterial agents used for sterilization.

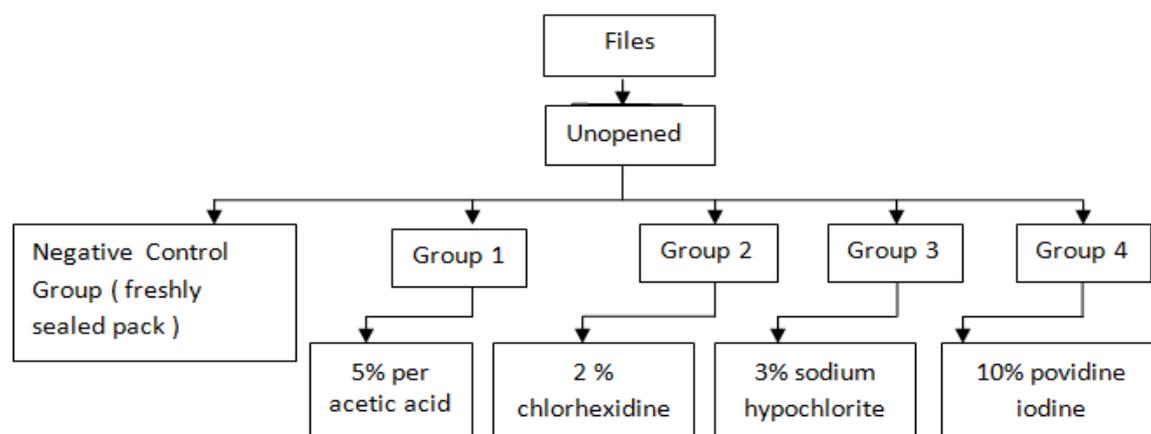
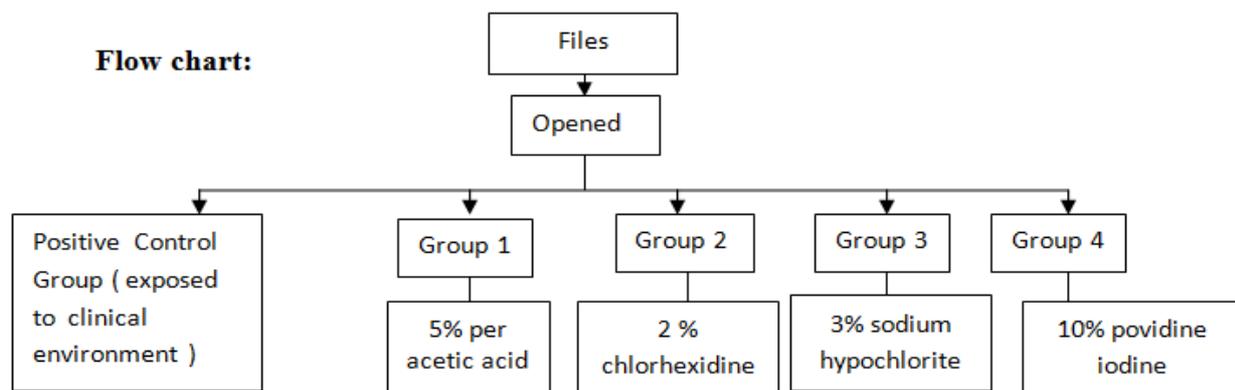
Control group

Positive control: A file was used as positive control from the pack exposed to dental chair-side clinical environment. The file was directly transferred to the culture media without disinfection.

Negative control: A file was taken from freshly sealed pack not exposed to dental chair. The file was then transferred to culture media without disinfection.

*Corresponding author: Nandhini T
Saveetha Dental College

Flow chart:



- Group 1: 5% peracetic acid (PAA)
- Group 2: 2% chlorhexidine (CHX)
- Group 3: 3% sodium hypochlorite (NaOCl)
- Group 4: 10% povidine iodine (PI)

Had a two set of files which were named as open (exposed to clinical environment) and unopen (freshly sealed pack). In open file we have four groups which was mentioned above. Each group will be dip in respective disinfectant solution, for 5 minutes. Similarly as open file, unopen file also have same procedure. Then the two set of files were incubated at 37 degree Celsius in Mueller Hinton broth. Here we collected the swab. The swab was cultured using Mueller Hinton agar. After a day we observed the growth of microbes.

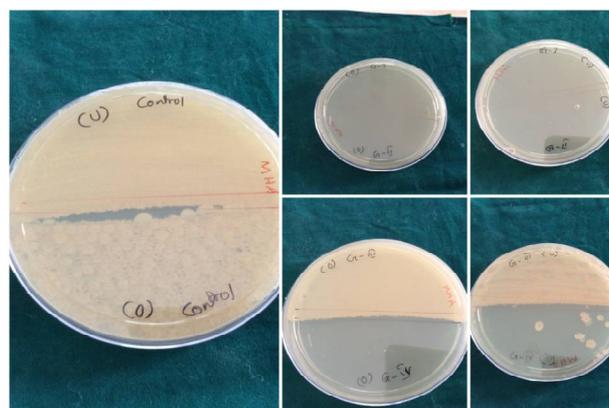
RESULTS

For Unopened Files

Negative Control Group	GROUP 1 5% Peracetic acid (PAA)	GROUP 2 2% Chlorhexidine (CHX)	GROUP 3 3% Sodium hypochloride (NaOCl)	GROUP 4 10% Povidine iodine (PI)
Bacillus species More than 1,50,000 CFU/ml	Nil 0	Staphylococcus species (+) 4 CFU/ml	Bacillus species (++++) More than 1,50,000 CFU/ml	Bacillus species (++) 35 CFU/ml

For Opened Files

Positive Control Group	Group 1 5% Peracetic acid (PAA)	GROUP 2 2% Chlorhexidine (CHX)	GROUP 3 3% Sodium hypochloride (NaOCl)	GROUP 4 10% Povidine iodine (PI)
Bacillus species More than 1,50,000 CFU/ml	Nil 0	Nil 0	Bacillus species (++++) More than 1,50,000 CFU/ml	Staphylococcus species (+) More than 1,50,000 CFU/ml



DISCUSSION

Peracetic acid plays a significant role in decontamination and disinfecting the thermo sensitive medical and hospital equipments. Peracetic acid is the most effective against bacteria, fungi, viruses and even vegetative spores and one of the most unique property is not inactivated in the presence of inorganic materials. The main mechanism of action of per acetic acid involves releases of free oxygen radicals and hydroxy radicals decomposing in oxygen, water and acetic acid.

Presence study shows that 5% peracetic acid show better result than 3% sodium hypochlorite and 2% chlorhexidine

solution. Similarly other studies also shown than per acetic acid solution has been found to be more effective against micro organism in suspension than against bacterial biofilms on stainless steel and glass surfaces (5).

In the other hand, Marques *et al* stated that 3% per acetic acid solution was not efficient enough to eliminate streptococcus aureus which are added to stainless steel and glass surfaces (6).

K files which are used for root canal treatment were one of the common reused instruments. The survey of general dentist in United Kingdom, Bagg *et al* (7) found that 88% of practioners users endodontic files and Smith *et al* (8) compared used endodontic files that has been collected from general practice with files from a dental practice and found that 76% of the files were visibility contaminated viewed under dissecting. Using contaminating instrument will increase in the risk of cross contamination. Cross contamination will depends on various factors such as pathogen transport, infectivity of pathogens and host resistance (9).

In this presence study, per acetic acid shows 100% sterilisation and sodium hypochlorite shows 60% sterilisation and povidine iodine shows 40-50% sterilisation by immersing the files for 5 mins. Hence 2% chlorhexidine, 3% sodium hypochlorite, 10% povidine iodine solutions cannot be relied on completely to sterilise the endodontic files.

CONCLUSION

Based on the results and discussion further studies are necessary to clarify the composition, mechanism and the application of per acetic acid as a chemical disinfecting solutions. To conclude that peracetic acid can be used as a better alternate than sodium hypochlorite than disinfecting the files in chair side manner.

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