

Knowledge and Efficiency of Sterilization of Endodontic Instruments in Dentistry: A Cross-Sectional Survey



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Introduction

Sterilization of instruments is the main concern for infection control in all health care procedures. According to CDC (Centres for Disease Control and Prevention) guidelines endodontic instruments (files) are classified as critical instruments^[1]. Thus, all the endodontic files should be adequately cleaned and sterilized before use and re-use. Endodontic files are considered as re-usable instruments^[2].

As a healthcare worker, dentists play a critical role in infection control. Thus, they are an important population to study their level of knowledge, attitude and behaviour regarding sterilization. Thus, the aim of the present survey is to study and evaluate dentist's knowledge of sterilization of endodontic instruments and to explore the need for a new device for sterilization of endodontic files that can be done chair-side in between two consecutive appointments.

Materials and Methods

A cross-sectional study was performed which included general dental practitioners, post-graduate students, Endodontists and other specialist dentists. A questionnaire was prepared which comprised several questions that helped in the assessment of the knowledge of the dentists (Fig.1). This questionnaire was distributed to 169 dentists all over India using online survey method. The emails were sent randomly without knowing the location of the dentists for random and blind sampling of the participants. Based on the answers received, the data was subjected to statistical analysis.

1. On the average, how many root canal therapies do you perform per day?
 a. 1 c. 5-10
 b. 1-5 d. more than 10

2. Do you sterilize the new file after removal from the packet before use?
 a. Yes b. No

3. Do you re-use the endodontic instruments (files)?
 a. Yes b. No

4. If yes, do you sterilize the endodontic instruments (files) before re-use?
 a. Yes b. No

5. If yes, which method?
 a. Autoclave c. Hot salt sterilizer
 b. Glass bead sterilizer d. Cold sterilization

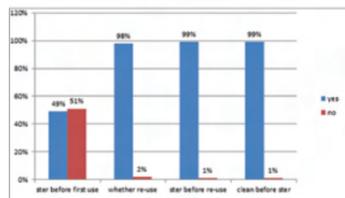
6. Do you clean the endodontic instruments (files) before sterilization?
 a. Yes b. No

7. If yes, which method?
 a. Manual c. Synthetic sponge
 b. Ultrasonic bath

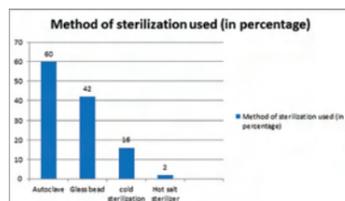
8. If you get a sterilization device with following qualities,
 a. Easy to use
 b. Easy to maintain
 c. Less time consuming
 d. Compact
 e. Can be done chair-side in between two consecutive appointments
 Would you like to buy such product?
 a. Yes b. No

Results

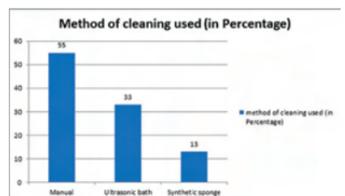
98% of the dentists agreed that endodontic files can be re-used. 49% of the dentists recognized that new endodontic files should be sterilized before first use (Fig.2).



99% of the dentists surveyed practiced sterilization of files before their re-use (Fig.2) Out of these, 60% used autoclave, 41% glass bead sterilizer, 16% cold sterilization and 2% hot salt sterilizer. (Fig.3)



98% of the dentists clean the files before sterilization (Fig.2) Out of these, 55% used manual technique, 32% ultrasonic bath and 13% synthetic sponge method. (Fig.4)



The participants were questioned about their interest in a new device that is quick, compact, and can be used chair-side in-between two consecutive appointments. 96% of the participants were interested in pursuing such device. Thus, there is a need of a small, easy to use, device that can sterilize the endodontic instruments in few minutes. Also the equipment should have appendages for adequate pre-cleaning of the endodontic instruments.

Discussion

The goal of sterilization is to protect patients and health care workers by preventing cross-contamination from instruments. The process involves a series of sequential steps aimed at removing and killing microbes on contaminated instruments and maintaining those instruments in an aseptic state until they are reused^[3]. These steps must be conducted judiciously to assure success and to reduce chances of disease spread or physical injury to those handling the contaminated instruments. Thus, a thorough knowledge of sterilization procedure is essential for a dentist. This

survey aims to evaluate the knowledge and attitude of dentists towards sterilization of endodontic instruments.

Several studies demonstrated that new files removed from the manufacturer's packet contained debris^[4,5]. Eldik et al^[4] also showed that new files removed from manufacturer's packet were not sterilized. Thus, the new file should be sterilized before use. The 169 dentists were asked whether they were sterilizing the new files before use. 51% accepted that they were not sterilizing the new files. Thus, there is a need to educate and train the dentists that even new files need cleaning and sterilization before their use.

Various methods of sterilization of endodontic instruments can be enlisted as steam sterilization (autoclave), dry heat sterilization which includes glass bead and hot salt sterilizer, cold sterilization that includes use of enzymes like glutaraldehyde, alcohol or sodium hypochlorite. Venkatasubramanian et al compared 4 different methods of sterilization of endodontic files and suggested that autoclave sterilized the endodontic instruments completely, whereas files placed in glass bead were 90% sterile and in glutaraldehyde they were 80% sterile. Jonhson et al suggested that hot salt, glass bead sterilization methods were effective for working ends of hand files but it was ineffective for completely sterilizing hand files, i.e., plastic handles of the files. In the present survey 60% dentists used autoclave, 41% used glass bead, 2% hot salt sterilizer and 16% used cold sterilization method.

Steam sterilization (Autoclave) is the best proven and most commonly used method for sterilization. All the 169 dentists were asked about the number of cases they performed per day. On an average, a majority of dentists performed one to five cases per day. So either the dentist had to purchase multiple endodontic files or had to undergo the process of cleaning and autoclaving after every case.

But few factors like time required and need of separate sterilization room can prohibit a dentist from using autoclave after every case. This can have an impact on the cost factor invested by the dentist on one's inventory as more number of files will be needed. Thus, there is a need of a new device for sterilization of endodontic instruments that can be used chair-side in between two consecutive appointments.

Various methods of pre-sterilization cleaning include manual method, ultrasonic bath

and use of synthetic sponge. Sousa et al suggested that manual scrubbing with brush and ultrasonic cleaning are the two most popular means for cleaning the instruments. The present survey was in accordance with the review given by Sousa et al. 55% of the dentists used manual technique of cleaning, 23% used ultrasonic bath and 13% used synthetic sponge. Manual technique is clinically more popular because of its advantage of being economical. But disadvantages of this technique are requirement of time, separate cleaning space and its effectiveness depends greatly on the dedication of the assistant. Thus, there is a need for a compact device that can comprise facility for efficient cleaning of the instruments along with the sterilization unit. This device should be so compact and user friendly that it can be used chair-side without any hassle.

All the 169 dentists were asked about their interest in a sterilization device that is user friendly, easy to maintain, quick, compact and can be done chair-side in between two consecutive appointments. About 96% of the dentists were interested and keen to know about such a device.

Conclusion

The knowledge of dentists regarding sterilization in Endodontics was found adequate, but needed to be upgraded. Also there is a need for a new sterilization device that can enhance the quality of work done by a dental professional. The new device can help the clinician to clean and sterilize the endodontic instruments chair-side within few minutes between appointments. Such a device is the need of the hour in current global dental market. The research for designing such a device is ongoing.

Advantages of the device

- Less time consuming
- No corrosion (as no moist heat)
- Portable & Compact
- Cleaning and sterilization both procedures provided in one single compact device
- Easy to use
- Can be used chair-side
- Can be used in-between two consecutive appointments

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Message for Readers:

Anyone interested in dealership or purchase of the said device should contact at drnomalshah@gmail.com

Note: All the intellectual property rights are reserved. The study and design of the device are already patented.

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