

Evaluation of methods of sterilization in Orthodontic practice: questionnaire study

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Abstract

Background: The process of cleaning and sterilization of the orthodontic instruments is an important task. For protection of both the doctor and patient, infection control is of utmost importance in preventing the spread of infectious disease. As the maximum number of microorganisms are found in the oral cavity than in any

other part of the body, they have special significance in dentistry

Aim & objectives: The aim of this study is to evaluate method of sterilization commonly employed by orthodontist in central India. To investigate the various methods of sterilization in practice.

Methodology: Total 13 questions are selected for the Study. These questions will be sent to 200 orthodontists in Central India

Result: For Archwire majority of participants with 110(59.78%) following steam autoclave, whereas dry heat sterilization method was followed by none of the participants, for Preform Band majority 154(83.69%) of participants preferred disinfection solution, while none of the participants preferred Ortho- Management system (OMS-ASAP System) for sterilization of performed bands, For Elastomeric Ligature and Chains 10(5.43%) of the participants preferred 5% Bibforte solution, none amongst participant followed vapoclave (ethylene oxide for sterilization while majority of participants of study 174(94.56%)

Conclusion: It was concluded that Orthodontists are aware of sterilization protocol and the different methods of sterilization for arch wires, bands, elastomeric ligature and chains still it was seen that the proper protocols were not followed hence there is need to follow proper protocol and the methods to prevent cross contamination in orthodontic practice

Keywords: Sterilization, Archwire, Performed bands, Elastomeric.

Introduction

Orthodontists are exposed to more variety of microorganisms in their clinical practices by contaminated instruments, percutaneous injuries with archwires, ligature wires, band material and other sharp cutting instruments or inhalation of aerosols while performing the finishing of the composite from tooth with the help of airrotor.¹

The possibility of cross-contamination in the orthodontic clinical practices is from the patient to the practitioner; from the practitioner to the patient; from the patient to the

patient and from the practitioner to the community, including the practitioner's families.²

In orthodontic clinical practice the attachments on posterior teeth are commonly the stainless steel preformed molar bands are cemented into position within the oral cavity.³ Unlike directly bonded attachments, where one size fits all, bands have to be selected according to the size of the tooth to which they are to be cemented.⁴ During appliance placement several bands may be tried in the mouth before the appropriate size is selected.⁵

Infection control is crucial for orthodontists and for patient health.⁶

Awareness of efficient sterilization techniques occupies centre-stage in the prevention of the spread of infectious diseases.⁷ As the organisms are easily transmitted from the oral cavity and having long latent period of incubation causing risk for many oral and systemic disease. The concern about the transmission of infectious-contagious diseases, such as hepatitis B, herpes, AIDS, pneumonia, and tuberculosis, between the patients, orthodontists, Clinician, dental staff, and dental laboratory has brought the importance of the control of cross infection back into the more.⁸ Orthodontists are at an ever greater risk to exposure of serious pathogens and must take adequate precautions to guard themselves against their transfer.⁹

Terminology

1. Sterilization: The process of destroying all forms of microbial life. A sterile object, in the microbiological sense, is free of living microorganisms.
2. Disinfection: It is defined as a process of destruction and removal of organisms capable of giving rise to infection.

Different methods of Sterilization for the Following Orthodontic Materials:

Arch wires

- i) Steam autoclave

- ii) Dry heat
- iii) Cold solution sterilization

Bands

- i) Ultrasonic cleaner
- ii) Disinfection solutions
- iii) Glass bead sterilization
- iv) Ortho management system (OMS-ASAP system)

Elastomeric ligatures and chains:

- i) 5% Bibforte solutions
- ii) Vapoclave (Ethylene oxide)

Materials and Method

Questionnaire consisting of 13 questions was designed and Pilot study was conducted to validate the questionnaire, 200 orthodontist were selected randomly from CDE program and were mailed questionnaire for the study. One follow-up mailing of questionnaire was done to same samples, 184 orthodontist filled and mailed questionnaire. Responses were statistically analysed and displayed in results

Materials Used

The main utilities that played the part of field kit was a questionnaire which consisted of 13 questions.

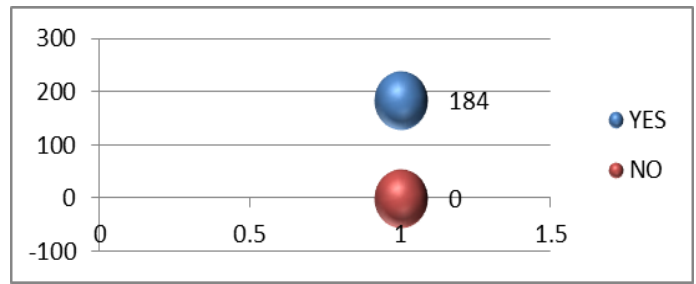
Ethical Clearance: Study was presented to the ethical review board of VSPM Dental College & Research Centre and ethical clearance approval was allotted after which the sample recruitment procedure was started.

Results

1) Are you aware of sterilization protocols in orthodontics?

- I. Yes II. No

All 184 samples included in the study were aware of sterilization protocol to be used in practice. None of the samples refused to have knowledge about orthodontic sterilization protocol.

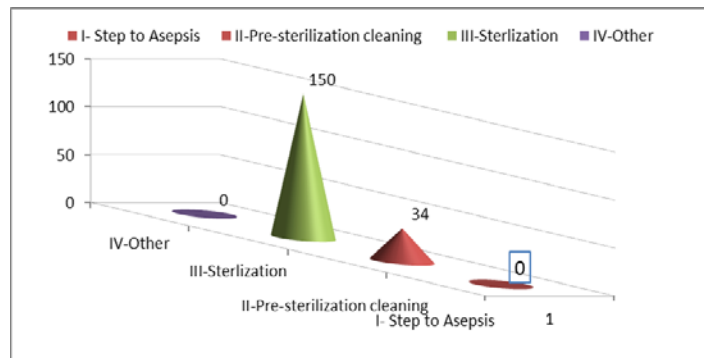


Graph 1: Showing awareness of sterilization protocol among Orthodontist.

2) Which sterilization protocol do you know that are used in orthodontics practice?

- I. Step to Asepsis
- II. Pre-sterilization cleaning
- III. Sterilization
- IV. Other

Second question asked was about the knowledge regarding the sterilization protocols used in orthodontic practice 81.52% (150) of the orthodontist had knowledge regarding Sterilization while 18.47%(34) of orthodontist had knowledge about pre sterilization cleaning. None of the participant selected option first and option fourth which was step to asepsis and others respectively.

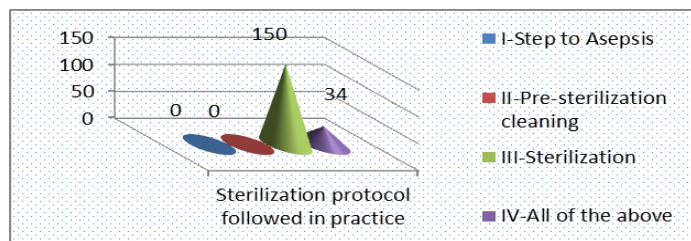


Graph 2: Showing Knowledge of different sterilization protocols used in orthodontic practice.

3) What type of sterilization protocol do you follow in your practice?

- I. Step to Asepsis
- II. Pre-sterilization cleaning
- III. Sterilization
- IV. All of the above

Third question asked was of sterilization protocol which the participant? Sample used to follow in his personal practice. 150(81.52%) majority the participants accepted to follow option number 3 which was Sterilization. None responded particularly to option number first and second which was Step to Asepsis and Pre-sterilization cleaning while 34 (18.47%) of the participants in the study said they were following all of the above Sterilization protocol.

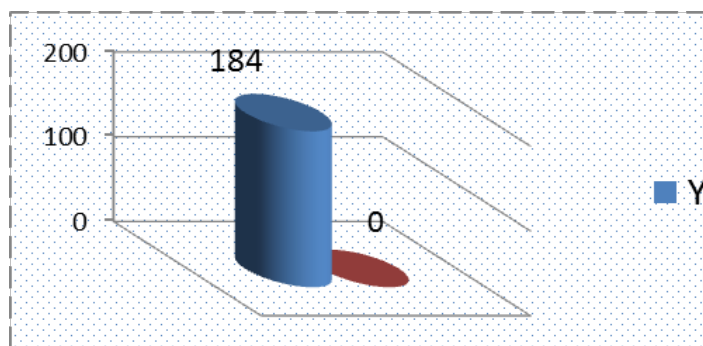


Graph 3: Showing various types of sterilization protocol followed in the practice by orthodontists in the study.

4) Is sterilization of the Archwires, Preformed Bands & Elastomeric ligature and chains important?

- I. Yes
- II. No

Fourth question was asked for opinions of participants in the study regarding importance for sterilization of Archwires, Preformed Bands & Elastomeric ligature and chains. All 184 (100%) participants in the study said it is important to sterilize archwires, preformed bands and elastomeric ligature and chains.

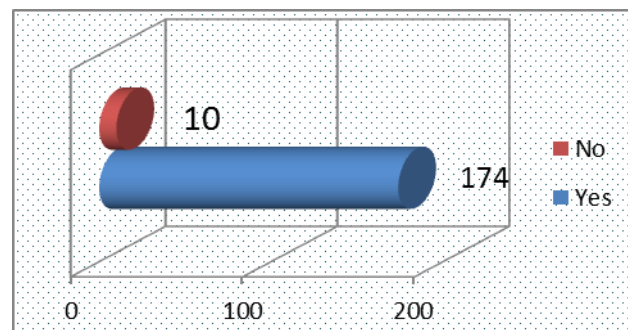


Graph 4: Cylindrical column showing numbers of orthodontist in the study performing sterilization of the archwires, performed bands, elastomeric ligature and chains.

5) Do you sterilize the Archwires, Preformed Bands & Elastomeric ligature and chains?

- I. Yes
- II. No

Fifth question was whether the sterilization of Archwires, Preformed Bands, Elastomeric ligature and chains is followed by the orthodontist participants in the study. Participants who sterilized were 174 (94.56%) in number while who do not sterilize were 10(5.43%) in number.

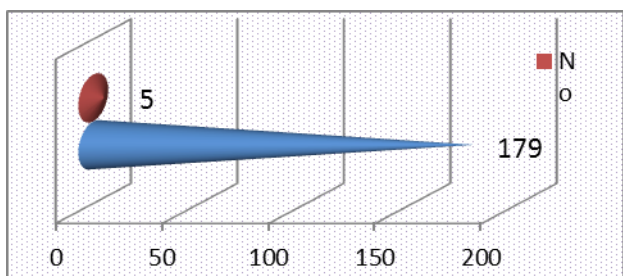


Graph 5: Cylindrical column showing practice of participant orthodontists in performing sterilization of the archwires, performed bands, elastomeric ligature and chains.

6) Do you face difficulty in sterilization of the Archwires, Preformed Bands & Elastomeric ligature and chains are in your practice?

- I. Yes
- II. No

Participants in the study were asked for difficulties faced in sterilization of the Archwires, Preformed Bands & Elastomeric ligature and chains are in their practice. 179(97.28%) of the participant orthodontist said they faced no difficulties in performing sterilization while 5(2.71%) of the participants agreed to face difficulty in sterilization of the Archwires, Preformed Bands, Elastomeric ligature and chains.

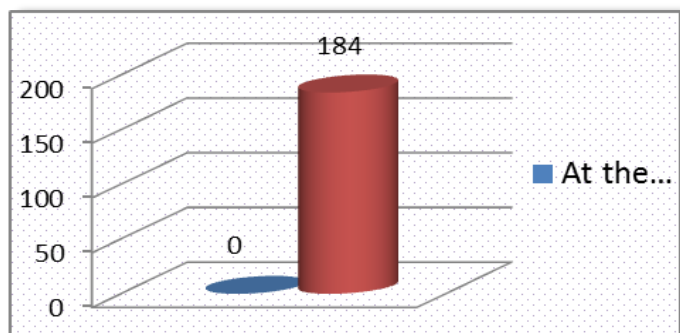


Graph.6: Cone bar showing difficulties faced by participant orthodontists in sterilization of the Archwires, Prefomed Bands, Elastomeric ligature and chains.

7) At what time do you prefer to sterilize the Archwires, Prefomed Bands & Elastomeric ligature and chains?

I. At the time of storage II. At the time of placement

Question number seven was about time details followed by the orthodontist participants in the study for sterilization of archwires, performed bands, elastomeric ligature and chains. All 184 (100%) of the study participants responded with option B which meant the time they preferred for sterilization was at the time of placement of archwires, Prefomed Bands, Elastomeric ligature and chains.



Graph 7: Cylindrical column showing time preferred by orthodontist participant in the study for sterilization of archwires, Prefomed Bands, Elastomeric ligature and chains

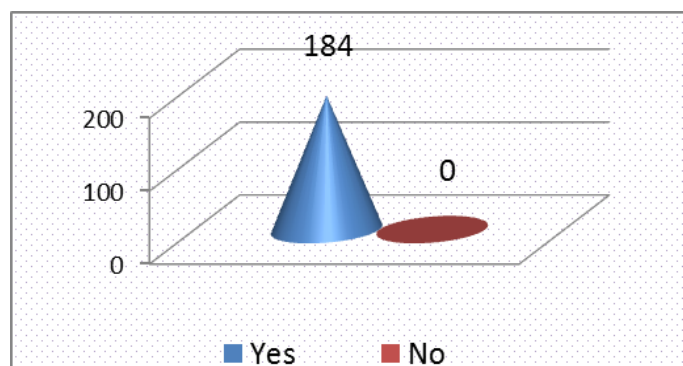
8) Are you aware of methods for sterilization of contaminated

Archwires, Prefomed Bands & Elastomeric ligature and chains?

I. Yes

II. No

Question number 8 was asked about awareness of orthodontist regarding various methods used for sterilization of archwires, Prefomed Bands, Elastomeric ligature and chains. All 184 (100%) of the participants were aware of the methods used for sterilization of contaminated archwires, Prefomed Bands, Elastomeric ligature and chains.



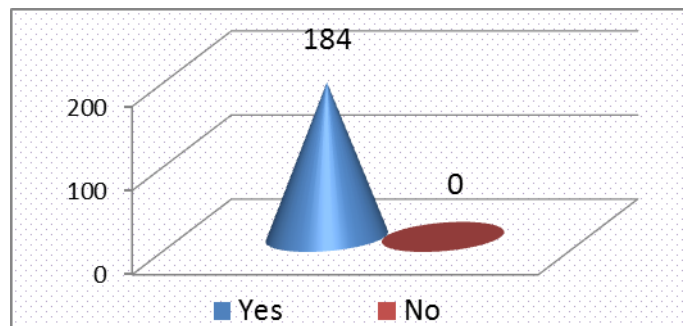
Graph 8: Cone bar showing awareness of participant orthodontists for sterilization of the contaminated Archwires, Prefomed Bands, Elastomeric ligature and chains.

9) Do you sterilize contaminated Archwires, Prefomed Bands & Elastomeric ligature and chains?

I. Yes

II. No

This question marks the practice of participant orthodontist regarding the sterilization of contaminated Archwires, Prefomed Bands, Elastomeric ligature and chains. All 184 (100%) of the participant agreed to practice sterilization of contaminated Archwires, Prefomed Bands, Elastomeric ligature and chains.



Graph 9: Cone bar showing sterilization practice of

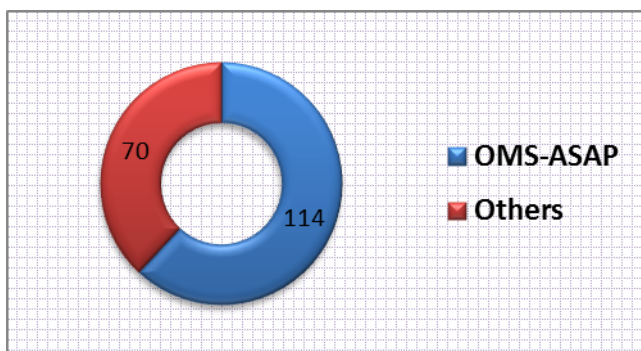
participant orthodontists of the contaminated Archwires, Prefomed Bands, Elastomeric ligature and chains.

10) If yes, which methods of sterilization do you prefer for contaminated Archwires, Prefomed Bands & Elastomeric ligature and chains?

I. Ortho management system (OMS-ASAP system)

II. Others

Tenth question was about the preferred method for sterilization of contaminated Archwires, Prefomed Bands, Elastomeric ligature and chains. 114 (61.95%) from 184 participants selected Ortho management system (OMS-ASAP System) for sterilization whereas 70(38.04%) participants preferred to use other methods for sterilization of contaminated Archwires, Prefomed Bands, Elastomeric ligature and chains.



Graph 10: Doughnut chart showing preferred method for sterilization of contaminated archwires, Prefomed Bands, Elastomeric ligature and chains.

11) Which type of sterilization do you prefer for Archwires in your practice?

I. Steam autoclave

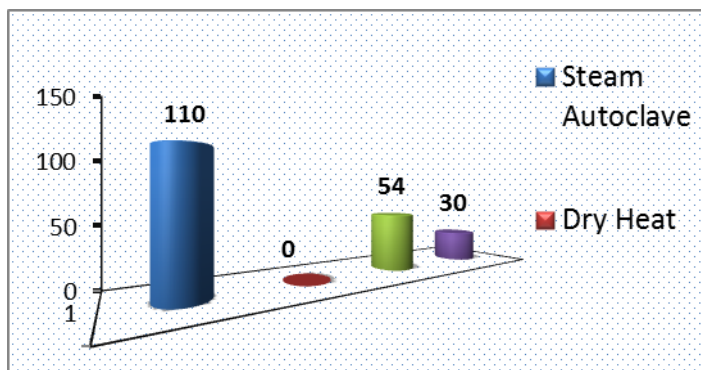
II. Dry heat

III. Cold Solution sterilizer

IV. Others

Eleventh question was about the type of sterilization preferred by participants especially for archwires. Steam Autoclave was the method followed by majority of participants with 110(59.78%) of participants following it, while 54(29.34%) of the participants followed method of Cold Solution sterilizer for archwires, whereas dry heat sterilization method was followed by none of the

participants, remaining 30(16.30%) followed other methods of sterilization for archwires.



Graph 11: Showing type of sterilization for archwire preferred by orthodontists in practice.

12) Which methods of sterilization do you prefer for Prefomed Bands in your practice?

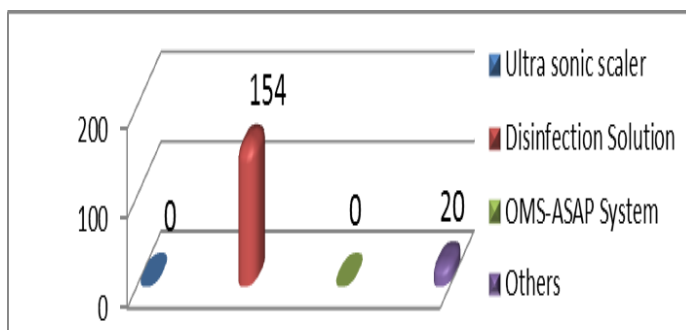
I. Ultra-sonic cleaner

II. Disinfection solutions

III. Ortho-Management system (OMS-ASAP system)

IV. Others

Twelfth question marks the preferred methods for sterilization of Prefomed bands. Majority 154(83.69%) of participants preferred disinfection solution. 20(10.86%) preferred other methods of sterilization while none of the participants preferred Ortho- Management system (OMS-ASAP System) for sterilization of performed bands in their respective clinical practice.



Graph 12

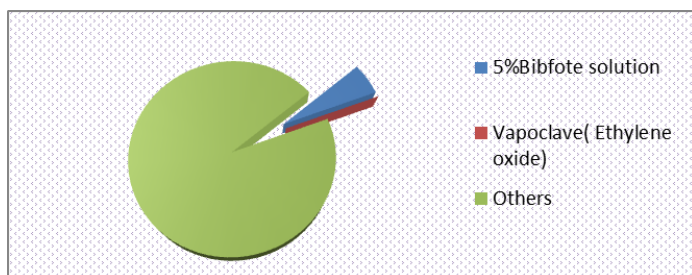
13) Which methods of sterilization do you prefer for Elastomeric ligature and chains in your practice?

I. 5% Bibforte solution

II. Vapoclave (Ethylene oxide)

III. Others

Last question to end the questionnaire was about the preferred method for sterilisation of ligature and chains in practice of participant orthodontists. 10(5.43%) of the participants preferred 5% Bibforte solution, none amongst participant followed vapoclave (ethylene oxide for sterilization while majority of participants of study 174(94.56%) followed other method for sterilization of elastomeric ligature and chains.



Graph 13: Pie Chart showing methods preferred by orthodontist participants for sterilization of Elastomeric ligature and chains.

Discussion

Instrument sterilization has always played a key role in any infection control program. Efforts in orthodontics for more than a decade have included cleaning and heat sterilization of instruments contaminated with saliva and blood.⁷ It was proposed that all metal and heat-stable dental instruments should be sterilized with steam under pressure, dry heat, or chemical vapor sterilization after use with each patient.¹⁰ The Association adds that "cold sterilization" solutions should not be used routinely where heat sterilization is indicated.¹¹

Orthodontic wires:

Smith et al¹⁸ evaluated the effect of clinical use and various sterilization/disinfection protocols on three types of nickel-titanium, and one type each of β -titanium and stainless steel arch wire.¹¹ The sterilization/disinfection procedures included disinfection alone or in concert with dry heat, steam autoclave, or cold solution sterilization.¹²

Although sterilization of NITI wires is very useful in case of NITI wires as they have the super elasticity and can be reused, where stainless steel wire is not of much use as most of them have bends and do not fit in another patients mouth.¹ According to the study majority of participants with 110(59.78%) following steam autoclave, whereas dry heat sterilization method was followed by none of the participants

Stainless Steel Molar Bands

They are one of the most overlook material in orthodontics armamentarium. The sterilization of tried-in pre-formed bands has received attention of late and numerous protocols are rife orthodontic literature.¹¹ Preformed bands are first checked on the patient cast, if in case they don't fit intra-orally then these tried bands are cleaned in ultrasonic cleaner and disinfected with disinfectant solution for recommended time as per manufacturer before placing it back in the box.¹³ According to the study majority 154(83.69%) of participants preferred disinfection solution, while none of the participants preferred Ortho- Management system (OMS-ASAP System) for sterilization of performed bands

Elastomeric Ligature and Chains

They are not suited for chemical disinfection as they are known to alter the physical characteristics.¹¹ Single patients pack are the best insurance against cross-contamination risk at present and where this is not feasible as in case of E-chain spools, it is better to cut a little extra than required and discard the rest.¹² Elastomeric Rings, Chains etc are sterilized by immersing in 5% Bibforte Solution for 30 Minutes. Vapoclave (ethylene oxide) is preferred for E-chain and ligature wires.¹ According to the study 10(5.43%) of the participants preferred 5% Bibforte solution, none amongst participant followed vapoclave (ethylene oxide for sterilization while majority of participants of study 174(94.56%)

Conclusion

Disinfection and sterilization can ensure the safe use of invasive and non-invasive orthodontic armamentarium, sterilization of orthodontic armamentarium is important in orthodontic practice when properly used. It was concluded that Orthodontists are aware of sterilization protocol and the different methods of sterilization for arch wires, bands, elastomeric ligature and chains still it was seen that the proper protocols were not followed hence there is need to follow proper protocol and the methods to prevent cross contamination in orthodontic practice.

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