Turkish Journal of Public Health Dentistry
Volume 2, Page No: 6-10
Available Online at: www.tjphd.com

Original Article

Disinfection of Dental Impression: Knowledge, Attitude, and Practice Among Dental Specialists, Postgraduates, and Dental Technician

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ABSTRACT

Dental impressions serve as a source of infection transmission from dental clinics to dental labs. To evaluate the knowledge, attitude, and practice of disinfection methods for dental impressions among dental specialists, post-graduates, and dental technicians through an online survey. It's a descriptive and analytical online survey on knowledge, attitude, and practice of disinfection of impressions was conducted among 112 dental specialists, postgraduates, and dental technicians in the southern part of India from January 2024 to March 2024. The study consists of 20 questions and the participants are 23 postgraduates, 40 academicians and private practitioners, 31 private practitioners, 13 academicians, and 5 technicians. Most of the participants were known the types of disease transmission through impression but they thought that washing the impression under running tap water remove all types of infection which is wrong. Only 60% of the infection is removed through this method. Also, most of the participants do not know the composition of the disinfectant solution. Most of the participants are not aware of the level of disinfection of the disinfectant and specific disinfectant for various impression materials. Hence vigorous awareness and continuing education programs to be insisted on among dentists to prevent cross-contamination in the dental office and laboratory.

Keywords: Contamination, Dental impression, Disinfection, Knowledge

Introduction

Dentists are at high risk of getting the infections caused by many microorganisms such as Mycobacterium tuberculosis, hepatitis B and C viruses, herpes simplex virus type 1, human immunodeficiency virus (HIV), influenza, and rubella [1, 2].

Dental impressions contaminated with patient´s blood and saliva transmit the infection to stone casts [3, 4]. In 2003, the Centre for Disease Control and Prevention of the United States of America (CDC) updated its guidelines for infection control in dental office. These guidelines assured a safe and sound working atmosphere which prevents further transmission of infection to professionals like dentists, dental health care professionals, and their patients [5].

Many microorganisms survive for a very long time in the atmosphere and questioning potential health risk [6]. Hence, all the impressions must be disinfected before transport to prosthetic laboratories prevent the spread of infection [7]. The selected disinfectant agent should have a broad spectrum of action without altering the properties [8, 9]. Other factors, like percentage, compatibility, and duration of disinfection of material are also important [10].

Dental casts obtained from infected dental impressions may transmit the pathogens to dental lab technician [11]. Contaminated dental casts carry the micro-organisms from the mouth which survive for longer periods and can infect the dental technicians working on the casts [12]. Therefore, it is very important to evaluate the knowledge of professors and students, future health professionals, through the situations that offer contamination risk. Hence

HOW TO CITE THIS ARTICLE: Chidambaranathan AS, Rajendiran S, Balasubramanium M. Disinfection of Dental Impression: Knowledge, Attitude, and Practice Among Dental Specialists, Postgraduates, and Dental Technician. Turk J Public Health Dent. 2024;2:6-10.

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Received: 29/05/2024
Accepted: 10/09/2024

this study aimed to evaluate the knowledge of dental specialists, postgraduates, and dental technicians considering the need and methods of disinfection of impressions.

Materials and Methods

A randomized cross-sectional survey was initiated among 114 dental specialists, postgraduates, and dental technicians in the southern part of India from January 2021 to March 2024. The study was initiated after obtaining approval from the Institutional Review Board of SRM Dental College, Bharathi Salai, Ramapuram, Chennai, India. (SRMU/M&HS/ SRMDC/2021/S/004) A self-administered open and close-ended questionnaire consists of 21 variables was distributed among the participants. The first three questions were related to socio-demographic details, whereas the remaining variables were used to assess the sample's knowledge, attitude, and practices about disinfection of dental impressions.

Results and Discussion

A total of 112 participants responded to the survey. Among them 42.9 % were in the age range of 20 to 30 years, 37.5 % were in the age range of 31 to 45 years, 17.9 % were in the age range of 46 to 55 years and the rest were above 55 years of age. 48.2 % of respondents were male and 51.8 % of respondents were female. 35.7 % of the participants were both in academics and private practice, 27.7 % of participants were in private practice alone, 20.5 % of participants were postgraduate students, 11.6 % were academicians alone and the rest were dental technicians **(Table 1)**.

Table 1. Descriptive statistics for the respondents

Groups	No of respondents	Years practice
Postgraduates	23	< 5 years
Private practitioner	31	6-10 years
Academician	13	6 to 10 years
Academician and Private practitioner	41	>20 years
Dental technician	4	10 years

For the question, “What are the diseases transmitted through ineffective disinfection methods?”, 8.9 % of the participants responded with the answer Herpes and Hepatitis and the rest 91.1% of the participants responded with the response all the above which includes, Herpes & Hepatitis, Tuberculosis and HIV as the options **(Figure 1)**.

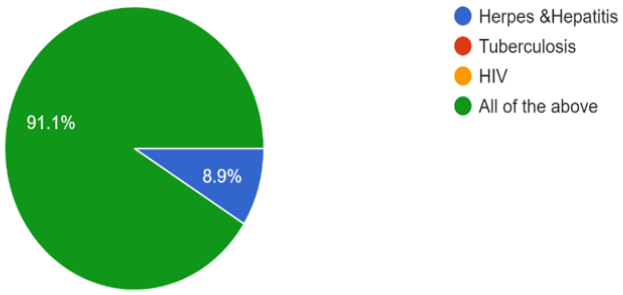

Figure 1. Diseases transmitted through ineffective disinfection methods

For the question, “Running water eliminates what percentage of microbes from the impressions?”, 52.6 % of the respondents answered it as 20 %, 33.3 % of the respondents answered it as 40 %, 12.3 % of the respondents answered it as 60 % and the rest answered it as 80 % **(Figure 2)**.

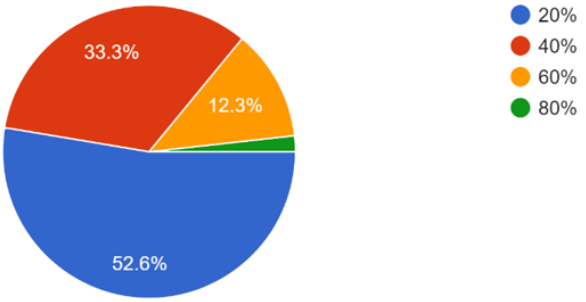

Figure 2. Running water eliminates what percentage of microbes from the impressions.

For the question, "Are you aware that impression materials are available with self disinfectant properties?" 69.3 % were aware of the impression materials with self-disinfection properties and 98.2 % of the participants were aware that impression material has to be disinfected after it is removed from the mouth. 69.3 % of the participants were aware of the impression materials with self-disinfection properties and 98.2 % of the participants were aware that impression material has to be disinfected after it is removed from the mouth.

For the question, "Which of the following can be used for disinfection of alginate impression material?", 54.4 % of the participants answered it as glutaraldehyde, 32.5 % of the participants answered it as sodium hypochlorite, 11.4 % answered it as isopropyl alcohol and the rest answered it as Benzalkonium chloride. For the question, "Which of the following can be used for disinfection of silicone impression material?", 45.6 % of the participants answered it as glutaraldehyde, 30.7 % of the participants answered it as sodium hypochlorite, 15.8 % answered it as isopropyl alcohol and the rest answered it as Benzalkonium chloride.

For the question, "Which of the following can be used for disinfection of polyether impression material?", 55.3 % of the participants answered it as glutaraldehyde, 23.7 % of the participants answered it as sodium hypochlorite, 14.9 % answered it as isopropyl alcohol and the rest answered it as Benzalkonium chloride. For the question, "What is the ADA recommended time for disinfection of dental impressions?", 34.2 % of the respondents answered it as 2 minutes, 25.4 % of the participants answered it as 5 minutes, 25.4 % of the participants answered it as 10 minutes and the rest 14.9 % of the participants answered it as 15-30 minutes.

For the question, "What is the ADA recommended level of disinfection of dental impressions?", 40.4 % of the participants 37.7 % of the participants answered it as high-level disinfection, 8.8 % of the participants answered it as low-level disinfection and the rest 13.2 % answered it as all the above. For the question, "Which of the following is a high-level disinfectant?", 43 % of the participants answered it as sodium hypochlorite, 38.6 % of the participants answered it as glutaraldehyde, 13.2 % of the participants answered it as isopropyl alcohol and the rest answered it as Benzalkonium chloride.

For the question, "Which of the following is an intermediate-level disinfectant?", 38.9 % of the participants answered it as glutaraldehyde, 30.1 % of the participants answered it as isopropyl alcohol 30.1 % of the participants answered it as sodium hypochlorite, and the rest answered it as Benzalkonium chloride. For the question, "Which disinfectant can be used for disinfecting all kinds of dental impressions?", 49.6 % of the participants answered it as glutaraldehyde, 23 % of the participants answered it as sodium hypochlorite, 11.5 % answered it as isopropyl alcohol and the rest 15.9 % of the participants answered it as Povidone iodine.

31.3 % of the participants responded that 10% povidone-iodine is the disinfectant ingredient in the impression material with self-disinfection properties, 30.4 % of the participants answered it as chlorhexidine, 24.1 % of the participants answered it as sodium hypochlorite and the rest 14.3 % answered it as isopropyl alcohol.69.3 % of the participants were aware of ozone water as a disinfection agent, 75.4 of the participants were aware of nano-silver particles as a disinfection agent, and 97.4 % of the participants were aware of UV light as a disinfection agent.

For the question, "What is the correct method of discarding the used dental impressions?" 52.6 % of the participants responded a Chemical disinfection and disposal, 18.4 % of the participants responded a burying with other medical wastes, 17.5 % of the participants answered incineration, and the rest 11.4 % of the participants answered autoclave and disposal. 52.6 % of the participants responded that disinfection will not affect the surface quality and accuracy of the cast made from the impression materials and the rest 47.4 % responded otherwise.

For the question, "After how many times of usage, the solution used for immersion disinfection should be changed?", 39.5 % of the participants responded as every day, 33.3 % responded as after every usage for a patient, 16.7 % responded with the answer after visible deposits are floating and the rest answered it as every week. For the question, "After disinfection of dental impression, how long do you have to wait before pouring gypsum product into the mold?", 47.4 % of the participants answered that the cast should be poured after 5 minutes, 35.1 % of the participants responded that the cast should be poured immediately, 15.8 % of the participants answered that the cast should be poured after 30 minutes and the rest answered that the cast should be poured after 1 hour.

Dental procedures entail with dental impressions may transmit microorganisms from the patient to dentist and auxiliary persons [13]. All impressions should be washed in running tap water and disinfected with an appropriate disinfecting agent before transport to the dental laboratory [14]. 5% phenol and 2% Glutaraldehyde have proved to be beneficial for the same. Articles like articulators and lathes should be disinfected and the technicians should wear gloves while handling the dental impressions. Transfer of oral microorganisms via dental impressions to dental casts has been reported [15].

This cross-sectional subject was used for this study to evaluate the knowledge, attitude, and practice among dental specialists, postgraduates, and dental technicians. Most of the academicians and private practitioners used running tap water to clean the impression and didn´t disinfect the impression. But running tap water eliminates only 60% of the micro-organisms. Alginate and silicone are the most used materials in dental practice. But they are not aware of the specific disinfectant for alginate (54.4%) and silicone (10%).

The knowledge and practice about disinfecting alginate impressions was also observed to be inadequate with respect to alginate impressions. Also, post-graduates and private practitioners are not aware of the various disinfection with their levels of disinfection. (61.4%) Of the academician private practitioners 35.4% only do disinfection in their practice 50.4% of the participants answered spray method is the best method of disinfection. But immersion is the proper method which guarantees the contact of all surfaces with disinfectant and the removal of micro-organisms from the impression.

30.4% of participants were aware of the self-disinfecting impression materials and the ingredients in the impression 39.5% of the academician and private practitioners discarded the disinfectant solution every day 47.4% of the private practitioners poured the impression after 5 of disinfection. However, the impression can be poured with gypsum product immediately 52.6% of the practitioners dispose of the dental impression after disinfection. It is recommended that dentists should attach a regarding the disinfection status of the impressions. Because repeated disinfection might change the dimensional stability and surface detail; hence communication between dentists and the dental lab persons is very essential [16].

Nowadays, dental impressions and dental stones are considered as the highest source microorganisms. To remove the microorganisms, infection control programs are recommended to universities and health institutes. So, it is necessary to modify the teaching-learning process, on disinfection [17]. Hence, infection control courses and guidelines are an important strategy for health process [18]. However, the biggest challenge is learning the new thoughts and knowledge in an articulated and integrated way, with the concept of mandatory continuing education that includes a specific component of infection control.

The weakness of the study was that the study was that it was conducted online, hence no option to explain the disinfection methods and disinfection in detail to the participants.

Conclusion

Only the academicians knew running water removes only 60% of the microorganisms. Also, private practitioners and academicians are aware of the various methods of disinfection and the duration of disinfection. However, the majority of the participants are not aware of the level of disinfection of the disinfectant and specific disinfectant for various impression materials. Hence awareness programs are to be conducted on infection control and prevention of infection through contaminated impressions in dental laboratories.

Acknowledgments: None

Conflict of Interest: None

Financial Support: None

Ethics Statement: It was an online survey conducted after approval from the Institutional Review Board of SRMDC. All raw data are available upon request from the corresponding author.

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