Original Article

DISINFECTION OF DENTAL IMPRESSION: KNOWLEDGE, ATTITUDE, AND PRACTICE AMONG DENTAL SPECIALISTS, POST-GRADUATES, AND DENTAL TECHNICIANS

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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. A descriptive and analytical online survey on the knowledge, attitudes, and practices of disinfection of impressions was conducted among 112 dental specialists, post-graduates, and dental technicians in the southern part of India from January 2024 to March 2024. It consists of 20 questions, and the participants include 23 post-graduates, 40 academicians and private practitioners, 31 private practitioners, 13 academicians, and 5 technicians**.** The majority of the participants were aware of the types of disease transmission through impression. Still, they thought that washing the impression under running tap water removes all types of infection, which is wrong. Only 60% of the infection is removed through this method. Additionally, the majority of participants are unaware of the composition of the disinfectant solution. Most participants are unaware of the level of disinfection of disinfectants and the specific disinfectants suitable for various impression materials. Hence, vigorous awareness and continuing education programs should be insisted upon among dentists to prevent cross-contamination in dental offices and laboratories.

Key words: Contamination, Dental impression, Disinfection, Knowledge.

Introduction

Dentists are at high risk of infections caused by various microorganisms, including Mycobacterium tuberculosis, hepatitis B and C viruses, herpes simplex virus types 1 and 2, human immunodeficiency virus (HIV), influenza, and rubella [1, 2].

Dental impressions contaminated with patients' blood and saliva cause contamination of the stone cast models [3, 4]. In 2003, the Centers for Disease Control and Prevention of the United States of America (CDC) updated their guidelines for infection control in dental settings. These guidelines include standard precautions intended to ensure a safe and healthy working environment, as well as prevent the potential transmission of professional and nosocomial infections among dentists, dental healthcare professionals, and their patients [5].

Many microorganisms can survive for a very long time, even when they are outside the mouth's fluids, and this poses a potential health risk [6]. In this way, all impressions must be disinfected before being sent to prosthetic laboratories or by the time they arrive there, avoiding the spread of cross-infection [7]. Although disinfection is a straightforward procedure, it must be performed carefully. The selection of the disinfection agent is crucial because it must have a broad action spectrum without altering the physicochemical properties [8, 9]. Other factors, as concentration, compatibility, and time of disinfection for each impression material, are also very important in this procedure [10].

Dental casts obtained from infected impressions can transmit pathogens to dental laboratory personnel [11]. Contaminated dental casts carry the microorganisms 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, this study aimed to evaluate the knowledge of dental specialists, post-graduates, and dental technicians regarding the need and methods of disinfection of impressions.

Materials and Methods

A randomized cross-sectional survey was initiated among 114 dental specialists, post-graduates, 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-ended, and closed-ended questionnaire consisting of 21 variables were distributed among the

participants. The first three questions pertained to socio-demographic details, whereas the remaining variables were used to assess the sample's knowledge, attitudes, and practices regarding the disinfection of dental impressions.

Results and Discussion

A total of 112 participants responded to the survey. Among them, 42.9% were in the 20- to 30-year age range, 37.5% were in the 31- to 45-year age range, 17.9% were in the 46- to 55-year age range, and the rest were above 55 years of age. 48.2 % of respondents were male and 51.8 % respondents were female. 35.7% of the participants were involved in both academics and private practice, 27.7% of participants were in private practice alone, 20.5% of participants were post-graduate 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 remaining 91.1% of the participants responded with 'all the above', which includes 'Herpes & Hepatitis', 'Tuberculosis', and 'HIV' as options **(Figure 1)**.

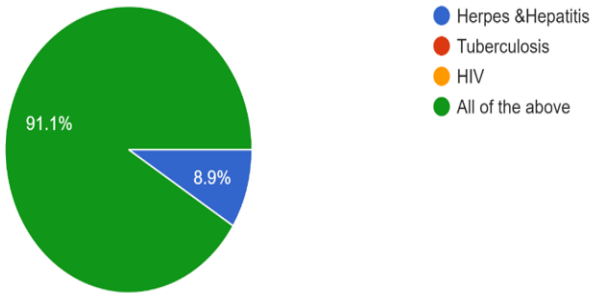

Figure 1. Diseases transmitted through ineffective disinfection methods

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)**.

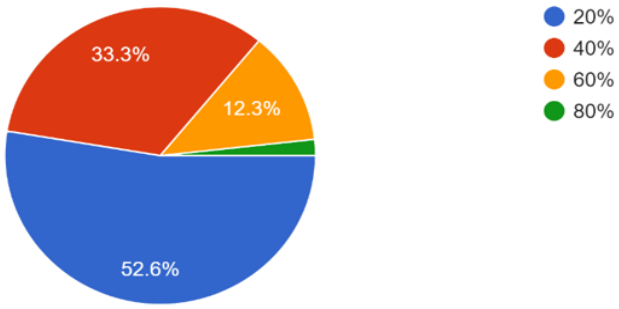

Figure 2. Running water eliminates what percentage of microbes from the impressions

69.3% of the participants were aware of impression materials with self-disinfection properties, and 98.2% of the participants were aware that impression materials must be disinfected after they are removed from the mouth. 69.3% of the participants were aware of impression materials with self-disinfection properties, and 98.2% of the participants were aware that impression materials must be disinfected after they are 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 2 minutes, 25.4% of the participants answered 5 minutes, 25.4% of the participants answered 10 minutes, and the remaining 14.9% of the participants answered 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 remaining 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 remaining 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 was chlorhexidine, 24.1% of the participants answered it was sodium hypochlorite, and the remaining 14.3% answered it was 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 to Chemical disinfection and disposal, 18.4% of the participants responded to burying with other medical waste, 17.5% of the participants answered incineration, and the remaining 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, while the remaining 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 that it occurs every day, 33.3% responded that it occurs after every usage for a patient, 16.7% responded that it occurs after visible deposits are floating, and the rest responded that it occurs every week. For the question, "After disinfection of dental impression, how long do you have to wait before pouring gypsum product in 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 involved with dental impressions may transmit microorganisms from the patient to the dentist, assistants, and laboratory technicians due to cross-contamination [13]. All impressions should be rinsed in running water to remove all visible signs of contamination and be disinfected with an appropriate disinfecting agent before being sent to the dental laboratory [14]. 5% phenol and 2% Glutaraldehyde have proved to be useful. Items like articulators and lathes should be cleaned and sterilized. A technician should wear gloves when handling impressions and pouring models. The transfer of oral microorganisms onto and into impressions and dental casts has been reported [15-18].

This cross-sectional study aimed to evaluate the knowledge, attitudes, and practices among dental specialists, post-graduates, and dental technicians. The majority of the academician and private practitioners used to run tap water to clean the impression and didn´t disinfect the impression. But running tap water eliminates only 60% of the microorganisms. Alginate and silicone are the commonly 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 were also observed to be inadequate with respect to alginate impressions. Additionally, post-graduates and private practitioners are often unaware of the various disinfection methods applicable to their level of disinfection. (61.4%) The academician comes to private practitioners, 35.4% only do disinfection in their practice 50.4% of the participants answered that the spray method is the best method of disinfection. However, immersion is the proper method that ensures contact of all surfaces with disinfectant and the removal of microorganisms 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 private practitioners poured the impression after 5 days of disinfection. However, the impression can be poured with a gypsum product immediately, and 52.6% of practitioners dispose of the dental impression after disinfection. It is recommended that dentists attach a note regarding the disinfection status of the impressions. Because repeated disinfection may alter the dimensional stability and surface detail, effective communication between dentists and dental lab personnel is essential [19, 20].

Nowadays, it is very important to consider impressions and stones as the highest source of contamination. To eliminate possible contamination, infection control programs must be recommended to Universities and Technical Health Schools. Therefore, it is necessary to rethink the teaching-learning process in terms of programmatic content and teaching processes [21-23]. In this way, obligatory infection control courses and guidelines for professional graduation are an important strategy in the care-disease-health process [24-26]. However, the biggest challenge is presenting ideas and knowledge in an articulated and integrated way, with the concept of mandatory continuing education that includes a specific component.

The weakness of the study was that it was conducted online, which meant there was no opportunity to explain the disinfection methods and disinfection in detail to the participants.

Conclusion

Only the academician knew that running water removes only 60% of the microorganisms. Additionally, private practitioners and academics are aware of the various methods of disinfection and the duration required for disinfection. However, the majority of participants are unaware of the level of disinfection of disinfectants and the specific disinfectants suitable for various impression materials. Hence, an awareness program is to be conducted on infection control and prevention of infection through contaminated impressions in the dental laboratory.

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