

Current status of disinfection of dental impressions in Indian dental colleges: a cause of concern

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Abstract

Introduction: Dentistry is predominantly a field of surgery, involving exposure to blood and other potentially infectious materials and therefore requires a high standard of infection control and safety practice in controlling cross-contamination and occupational exposures to blood- and saliva-borne diseases.

Methodology: A questionnaire survey was conducted in 60 dental colleges throughout India to establish routine methods of treating impressions of the oral cavity for disinfection. An email describing the purpose of the study along with a short questionnaire was sent to one of the teaching faculty of concerned departments of the colleges. Questions were asked regarding availability of materials required to disinfect the impressions, the preferred method to treat the impression, and whether postgraduate courses were offered by the department.

Results: The routine method of treating the impression reported by 75.9% of the respondents was washing under running water, while 24.1% of the respondents reported that impressions were treated by chemical disinfectants.

Conclusion: Strict infection control measures are necessary to ensure the health and safety of dental workers and patients. The present study showed that there is a lack of commitment to high standards of infection control practices in dental colleges in India.

Key words: disinfection; dental; impression

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Introduction

The microbial flora of the oral cavity is rich and extremely diverse. This reflects the abundant nutrients, moisture, hospitable temperature and availability of surfaces on which microbial populations can develop. The majority of these organisms pose no significant risk to dental professionals; however, a number of them cause infections that may be difficult to cure [1]. In the United States alone, it is estimated that about 2.7 million people are chronically infected with Hepatitis C virus [2]. Hepatitis B virus (HBV) poses a greater risk to dental staff with its ability to be transmitted in minute quantities in bodily fluids and remain virulent outside the body for lengthy periods [3-5]. Dental technicians have a significantly high prevalence of hepatitis B serological markers [3]. Previous reports confirmed that all members of the dental profession are at a risk at least three times greater than the general population of contracting HBV infection and developing the carrier state [6].

Dental impressions can become contaminated

with microorganisms from a patient's saliva and blood, which then cross-infects stone casts poured against them. Several studies have shown that pathogenic microorganisms were recovered from casts obtained from contaminated impressions [7-10]. Casts can be treated by immersing the casts or spraying them with disinfecting solutions [11-13]. Chemical disinfectants can also be added directly to the dental stone [1,14]. However, these methods, as well as adding disinfectants in dental stone, have been reported to compromise critical properties of the cast, such as compressive strength, setting time and dimensional accuracy [15,16]. Prevention of contaminated dental impressions and other dental items leaving the immediate chair side area is an ideal way to control cross-contamination [1].

Efficacy of the process used to disinfect the impression prior to pouring the cast is long proven. Recent studies related to evaluate dimensional stability and other properties of both elastomeric and nonelastomeric impressions have been favorable [17,18]. Until 1991 rinsing impressions under running

Table 1. Availability of disinfectants in departments

Routine method of disinfecting impressions	Availability of common disinfectants		Total
	No	Yes	
Washing impression under running water	18 (100%)	23 (63.88%)	41
Immersion or spraying with Gluteraldehyde	0 (0%)	7 (19.44%)	7
Immersion or spraying with Sodium Hypochlorite	0 (0%)	6 (16.67%)	6
Total	18	36	54

Chi Square = 8.561 ; p value = 0.014 ; Significant

water was the recommended practice [19] and has been shown to reduce the count of microorganisms present on the impression surface by approximately 90%, but a measurable bacterial load still remains on impressions and can be transferred to casts [20,21].

Current recommendations advocate the use of disinfecting solutions such as formaldehyde, chlorine compounds, gluteraldehyde, iodofer, and phenolic compounds in adequate concentrations [22-24].

The aim of the study was to establish the current status of disinfection of dental impressions in Indian dental colleges.

Methodology

A survey was conducted in 60 randomly selected dental colleges in various parts of India to establish the routine method of treating the impressions prior to pouring of casts. Dental colleges throughout India irrespective of region were selected by simple random sampling using a lottery method. An email describing the purpose of the study along with a short questionnaire was sent to one of the randomly selected teaching faculty of concerned departments of the colleges. Those departments where impressions are routinely made were selected for the survey. The following departments were considered suitable for the survey: Prosthodontics, Orthodontics, Conservative Dentistry/Endodontics, and Pedodontics.

Only one participant from each department was selected to prevent repetition of the same data. Questions were asked regarding the availability of materials required to disinfect the impressions, the preferred method to treat the impression, and whether post graduate courses were offered by the department.

The study was designed as a three-wave mailing. Participants who did not respond to the first mailing received a reminder mail two weeks later. Those

participants who had still not responded after another two weeks' time received a second complete package consisting of the study objectives and the questionnaire.

Results

Emails were sent to 60 participants at the beginning of study. After two weeks' time, 41 participants had responded to the questionnaire. Reminder mail was sent to the remaining 19 participants. After two weeks' time, 13 more participants had responded. After the third wave of mailing, a total 57 participants had responded. Out of the 57 responses which were received, three were not considered at the time of analysis of data as they were found to be incomplete. The maximum number of responses was from the following departments: Prosthodontics (25), Conservative Dentistry/Endodontics (13), Orthodontics (10), and Pedodontics (4). Two of the participants did not disclose the identity of the department.

Chemical disinfectants were available in 36 departments (66.7%) [Table 1] and postgraduate courses were being offered in 38 departments (70.4%).

Out of 38 departments where postgraduate courses were being offered, only 10 (26.3%) were using chemical disinfectants to treat impressions routinely while the majority (73.7%) were not using any chemical disinfectants, though chemical disinfectants were available in all these departments.

Forty-one participants (75.9%) reported that the routine method of treating impressions was washing under running water, while thirteen (24.1%) reported that impressions were treated by chemical disinfectants [Table 2].

Table 2. Routine method of disinfecting impressions

Routine method of disinfecting impressions	Departments where responses were collected					Total
	Orthodontics	Conservative Dentistry and Endodontics	Prosthodontics	Pedodontics	Not disclosed	
Washing impression under running water	8 (80%)	6 (46.15%)	21 (84%)	4 (100%)	2 (100%)	41
Immersion or spraying with Gluteraldehyde	2 (20%)	4 (30.77%)	1 (4%)	0 (0%)	0 (0%)	7
Immersion or spraying with Sodium Hypochlorite	0 (0%)	3 (23.08%)	3 (12%)	0 (0%)	0 (0%)	6
Total	10	13	25	4	2	54

Chi Square = 11.572 ; p value = 0.171 ; Not Significant

Discussion

This investigation reports the results from a survey conducted in various dental colleges in India. The regulatory body of the dental profession in India (*i.e.*, the Dental Council of India) recommends strict disinfection procedures but no studies demonstrating whether these norms are being followed routinely were available. The survey used in this study was designed to establish the actual methods used in Indian dental colleges to treat impressions prior to the pouring of casts.

The survey was conducted as a three wave mailing procedure. This was based on research that showed four wave mailing procedures do not result in significantly higher response rates [25,26].

Although concepts in dental infection control were developed in the 1960s (due to hepatitis B viral infections), this field gained priority and was implemented only after human immunodeficiency virus (HIV) infections reached epidemic proportions. Infection control gained further momentum in the United States of America after patients treated by a dentist infected by HIV virus later tested positive for the same, and also after health care workers became infected while involved in patient care activities [6].

Prevalence of infectious diseases is relatively higher in India than in other countries. For nearly two decades India has been one of the leading countries as far as AIDS infections are concerned and if the situation remains unchanged, India could have an estimated 50 million HIV cases by 2025 [6].

Tuberculosis remains one of the leading infectious causes of mortality in India, resulting in 364,000 deaths annually. There were more than 1.8 million new tuberculosis cases in India in 2004, representing over one-fifth of all tuberculosis cases worldwide [6]. Hepatitis B is a major cause worldwide of acute and chronic hepatitis, cirrhosis and primary hepatocellular carcinoma. Approximately 400 million people are chronic HBV carriers worldwide. Several studies from India have reported an HBV prevalence rate of 3% to 6%. India, with a population of approximately one billion and assuming a lower prevalence rate of 3%, still harbors approximately 30 million HBV carriers [6].

Today it is globally known and evidence-based that HIV viral particles have been isolated from saliva, and the latter is one of the primary screening methods for HIV infection [6]. Saliva is normally contaminated with blood from gingival inflammatory tissue and therefore it is possible that HIV and HBV could spread from one individual to another through saliva. Previous microbiological reports found that non-disinfected impressions are capable of transmitting microorganisms to dental laboratory technicians and alginate material transmits more bacteria than silicon impressions [27,28]. The literature indicates that the pathogen of tuberculosis (*Mycobacterium tuberculosis*) remains dangerous for several weeks [29,30]. Other studies showed that HBV could survive in dried blood at room temperature on environmental surfaces for up to one

week [31]. Therefore, saliva must be treated as potentially infectious as blood or other body fluids with respect to HIV and other blood-borne diseases. An appropriate level of infection control measures, such as the use of personal protective equipment or other levels of control, should be practiced for all patients [6].

Various regulatory bodies in the dental profession have provided guidelines regarding the disinfecting of impressions. The Centers for Disease Control and Prevention recommends that all patients be treated as potentially infectious [6,28]. The British Dental Association (BDA) stated that "infection control is a core element of dental practice" and the BDA fully supports its members in achieving excellence in this area [31]. Disinfection of impressions is now considered a routine procedure in dental settings in most countries [32,33].

Laboratory personnel cannot always use personnel protective devices such as gloves, especially working on the lathe machines; therefore, infections can be acquired through skin abrasions or scratches of bare hands. Several serological studies have shown that dental health care personnel have a significantly higher prevalence of HBV infection than the general population [34,35]. An impression, if not disinfected, can cross-contaminate the entire laboratory area, allowing microorganisms to travel back and forth from the laboratory to the clinical area.

Although awareness of cross-infection was high in India, this study showed a lack of commitment in following essential procedures to prevent cross-contamination. The results of our survey showed that in most of the dental colleges, washing the impressions under running water was a routine practice, even though the literature clearly states that this practice can leave a substantial load of microorganisms on impression surfaces. The lack of positive attitudes toward infection control is emphasized by the fact that disinfectants suitable for cleaning impressions were mostly available in departments.

Conclusion

The level of infection control in India is many years behind that of the United States and other European countries. The present study showed that there was a lack of commitment to the standards of infection control practices in dental colleges in India. The crucial emphasis on cross-infection control is relatively recent in the field of clinical dentistry and

as a profession our perception of its importance is taking longer than it should to treat the matter seriously.

Dental colleges in India should not only ensure that disinfection protocols are being followed routinely in each department but also train dental technicians and other dental auxiliary personnel in the proper techniques and reinforce the importance of following them.

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