

# Knowledge and Practice of Dentists Regarding Disinfection of Impressions Sent to Laboratory

## Original Article

HamidReza Zaker Jafari<sup>1</sup>, Saloomeh Dadashi<sup>2</sup>, Reihaneh Aghajani<sup>3</sup>, Zahra Pourhabibi<sup>4</sup>

<sup>1</sup>Assistant professor, Prothesis Department, Faculty of Dentistry, Guilan University of Medical Sciences, Rasht, Iran.

<sup>2</sup>Dentists, Guilan University of Medical Sciences, Rasht, Iran.

<sup>3</sup>Assistant professor, Prothesis Department, Faculty of Dentistry, Guilan University of Medical Sciences, Rasht, Iran.

<sup>4</sup>Biostatist, Faculty of Dentistry, Guilan University of Medical Sciences, Rasht, Iran.

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### Corresponding Author:

**Zahra Pourhabibi**

#### Address:

Biostatist, Faculty of Dentistry, Guilan University of Medical Sciences, Rasht, Iran.

**E-mail:** zahra.pourhabibi@gmail.com

**Telephone:** +98 33486428

**Fax:** +98 33486423

## Abstract

### Introduction:

Infection control procedures are essential for dentists. Oral and dental impressions can act as carriers of contaminants that can increase the risk of infections while being transferred from the laboratory to the dental office. Therefore, the aim of this study was to evaluate the knowledge and practice of dentists regarding disinfection of impressions sent to the laboratory.

**Materials and methods:** In this sectional descriptive study, 166 dentists in Rasht were randomly surveyed using a questionnaire that included routine demographic questions, including 10 on knowledge and 15 on practice. Each correct answer was scored +1 in the two-choice questions, and each choice was graded as weak, moderate, or good in the multiple-choice questions. Chi-square and Wilcoxon–Mann–Whitney tests were performed using SPSS 19.0 software to analyze the data.

**Results:** The total mean and standard deviation values for dentists' knowledge were found to be  $2.11 \pm 0.562$ , and 18 (10.8%), 112 (67.5%), and 36 (21.7%) of the 166 dentists demonstrated good, moderate, and weak knowledge, respectively. The total mean and standard deviation values for dentists' practice were  $1.67 \pm 0.663$ , and 72 (43.4%), 76 (45.8%), and 18 (10.8%) dentists demonstrated good, moderate, and weak practice, respectively.

**Conclusion:** Most dentists demonstrated moderate knowledge and practice of disinfection of dental impressions, and in many cases, the knowledge was not commensurate with the practice. Thus, despite the moderate and upward knowledge, the practice was weak. Furthermore, the dentists' knowledge and practice were not sufficient to ensure disinfection of impressions. Better training and careful monitoring is needed in this regard.

### Key words:

• Dentists • Impression Materials • Infection Control • Knowledge • Practice

## Introduction

Infection control is a very important issue in the health care system.<sup>(1)</sup> In recent years, prevention of cross-infection between dental care professionals and patients has been the focus for control of infectious diseases.<sup>(2)</sup> Infection control in dentistry is very essential as it directly affects the health of dentists, patients, residents, and dental technicians.<sup>(3)</sup>

The microbial flora of the oral cavity is rich and variable owing to the abundance of food, moisture, proper temperature, and the different types of surfaces available for microbial accumulation. Hepatitis B is considered a great potential risk for dental personnel; dental technicians exhibit the highest prevalence and serological markers for Hepatitis B. Earlier reports have suggested that all practitioners in the dental profession are exposed to Hepatitis B infection and are carriers of this disease three times more often than common people are.

Dental infections are generally transmitted from person to person; however, they are sometimes transmitted due to lack of hygiene standards and disinfection and sterilization procedures.<sup>(3)</sup> Factors such as knowledge of microbiology, infections, and the material components of the tools utilized play an important role in the selection and practice of correct sterilization and disinfection procedures. The tools and devices used in dentistry are classified based on the application and the potential risk of transmission of infections into three groups: critical, semicritical, and non-critical. Impressions and their materials fall in the second category because of their contact with mucous membranes or unhealthy skin. Hence, it is necessary to use heat sterilization or powerful disinfection methods.

It is noteworthy that usually dental impressions are sent to the laboratory without prior disinfection owing to the fear of distortion. Therefore, laboratory personnel are always at risk. It should be noted that nowadays large companies manufacturing disinfectant solutions that do not cause distortion of impressions solve the problem.<sup>(3, 4)</sup>

Due to the nature of dental treatment, both patients and dental personnel are exposed to pathogens through contact with the oral cavity, blood, saliva, and respiratory secretions. The purpose of cross-infection control procedures is to break the

cycle of infection.<sup>(5)</sup>

## Materials and Methods

This cross-sectional descriptive study was conducted in the form of a questionnaire survey among general dentists or specialists randomly selected from Rasht in 2013. Dentists who did not want to participate were excluded from the study. A total of 166 general dentists and specialists participated in the study.

Given the lack of a questionnaire to assess the knowledge and practice of dentists with regard to disinfection of dental impressions sent to the laboratory, a number of questions were gathered under the supervision of our advisor. Thereafter, the validity of the questionnaire was assessed by a number of professors of prosthodontics and periodontics at a school of dentistry in Rasht using feedback forms.

The test-retest reliability of the questionnaire was measured after its distribution among 7 professors with an interval of one week, and the Pearson correlation coefficient was obtained from 80% of the gained scores with  $P < 0.05$ . The number of questions was then reduced to 25 (10 knowledge-related, 15 practice-related), following changes proposed by the professors. Knowledge scores of 8–10, 5–8, and  $<5$  were considered good, moderate, and weak, respectively. Practice scores of 11–15, 7–11, and  $<7$  were considered good, moderate, and weak, respectively.

The two-page anonymous questionnaire contained questions on personal information such as name, age, sex, duration of undergraduate study, work experience, university attended, number of working hours per day, number of patients admitted in a day, and type of practice (general/specialist).

This was followed by multiple-choice questions to evaluate the knowledge and practice regarding disinfection of oral and dental impressions sent to the laboratory. The following subjects incorporated in the questionar; such as the bacteria and diseases that are transmitted through impressions, procedure for dispatch of impressions to the laboratory, procedure for disinfection of impressions, impression disinfection techniques, earnestness in notifying the laboratory regarding the status of disinfection, essential recom-

recommendations to the laboratory in this regard, familiarity with appropriatedisinfection methods and materials for different trays and impression materials, and the preferred mode for advancement of knowledge on infection control. The researcher surveyed 166 dentists in Rasht after obtaining their written consent. All 166 completed questionnaires were collected and evaluated as follows: for two-choice questions, the values assigned for correct and incorrect answers were +1 and 0, respectively, and for multiple-choice questions, the choices were graded as weak (0), moderate (+1), or good(+2). Data were analyzed using SPSS 19.0 software (SPSS Inc, Chicago, IL, USA), and Chi-square and Wilcoxon–Mann–Whitney tests were performed. The significance level was set at  $P < 0.05$ .

## Results

Among the 166 dentists surveyed, 88.6% (147) were general dentists and 11.4% (19) were specialists. Generally, the majority of good and weak answers belonged to male (70.5%) and female (57.1%) dentists, respectively.

There was a significant difference between knowledge and practice among general dentists in a comparative study using the Wilcoxon test ( $P < 0.001$ ). This shows that practice was not commensurate with knowledge among general dentists. However, there was no significant dif-

ference between knowledge and practice among specialists ( $P < 0.998$ ).

As for the dentists' knowledge regarding disinfection of impressions, the Wilcoxon test revealed a significant difference in relation to the university attended ( $P < 0.001$ ), but there was no significant difference between practice and the university attended ( $P < 0.225$ ). The knowledge and practice of 26.5%, 60.8%, and 12.7% of the dentists were found to be good, moderate, and weak, respectively. Upon evaluation of data related to practice alone, 72 (43.4%), 76 (45.8%), and 18 (10.8%) of the 166 dentists demonstrated good, moderate, and weak practices, respectively. The Mann-Whitney test was used to analyze data related to practice based on gender, and no significant difference was seen ( $P < 0.133$ ).

In terms of knowledge, 10.8%, 67.5%, and 21.7% of the dentists demonstrated good, moderate, and weak knowledge of disinfection of impressions, respectively. Further, there was a significant difference between the genders ( $P < 0.023$ ). It was found that 83.3% and 16.7% of the knowledge in dentists belonged to males and females, respectively. There was no significant difference in relation to age for both knowledge and practice ( $P < 0.123$ ,  $P < 0.104$ , respectively). However, the highest level of good knowledge and practice was found in the age group of 60–70 years, as seen in Figure 2.

Table 1. Knowledge of dentists regarding disinfection of impressions sent to the laboratory

Knowledge Questions		Good	Moderate	Weak	Total
1	Correct	18(30.5%)	10(16.9%)	31(52.6%)	59(100%)
	Incorrect	0(0%)	4(44.4%)	5(55.6%)	9(100%)
2	Answers to all choices	10(18.9%)	39(73.6%)	4(7.5%)	53(100%)
	Answers to 3/4 choices	7(11.5%)	46(75.4%)	8(13.1%)	61(100%)
	Answers to 1/3 choices or I don't know choice	1(1.9%)	27(51.9%)	24(46.2%)	52(100%)
6	Answers to all choices	11(26.2%)	29(69%)	2(4.8%)	42(100%)
	Answers to 3/4 choices	5(7.4%)	50(73.5%)	13(19.1%)	68(100%)
	Answers to 1/3 choices or I don't know choice	2(3.6%)	33(58.9%)	21(37.5%)	56(100%)
10	Academic periods	5(11.6%)	30(69.8%)	8(18.6%)	43(100%)
	Academic workshops and conferences	13(11.8%)	73(66.4%)	24(21.8%)	110(100%)
	Pamphlets	0(0%)	9(69.2%)	4(30.8%)	13(100%)

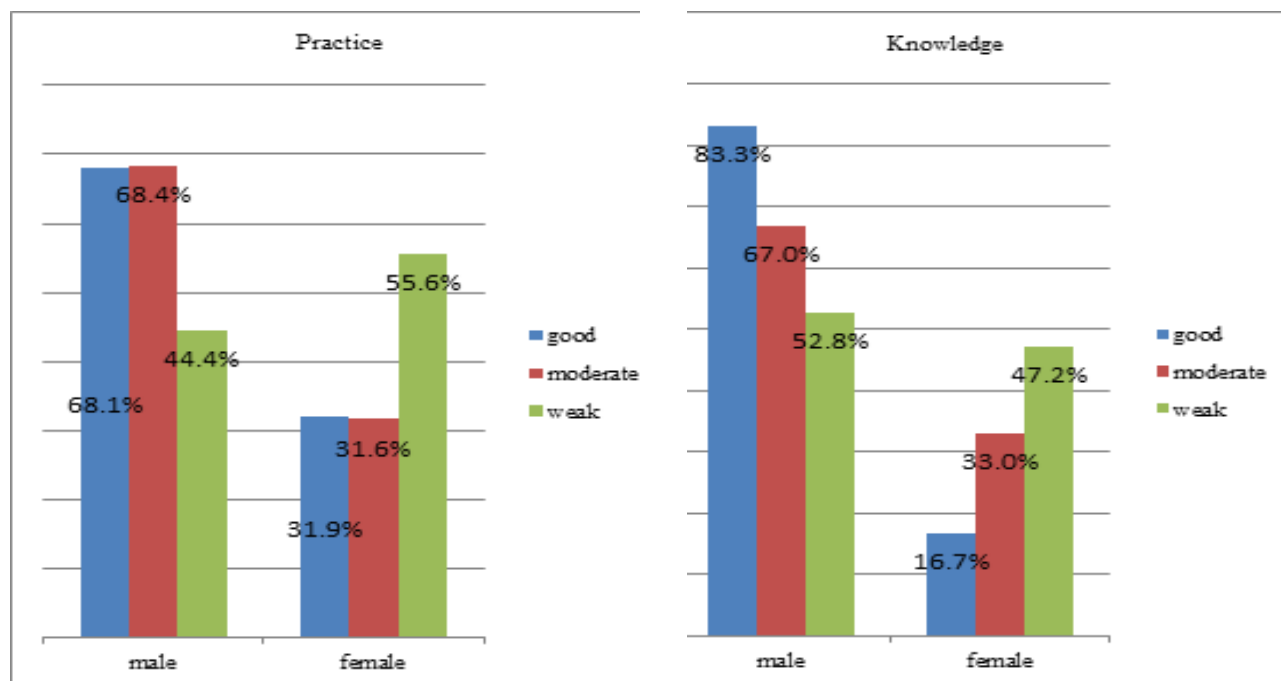


Figure 1. Relative frequency distribution of dentists' knowledge and practice regarding disinfection of impressions sent to the laboratory, based on gender

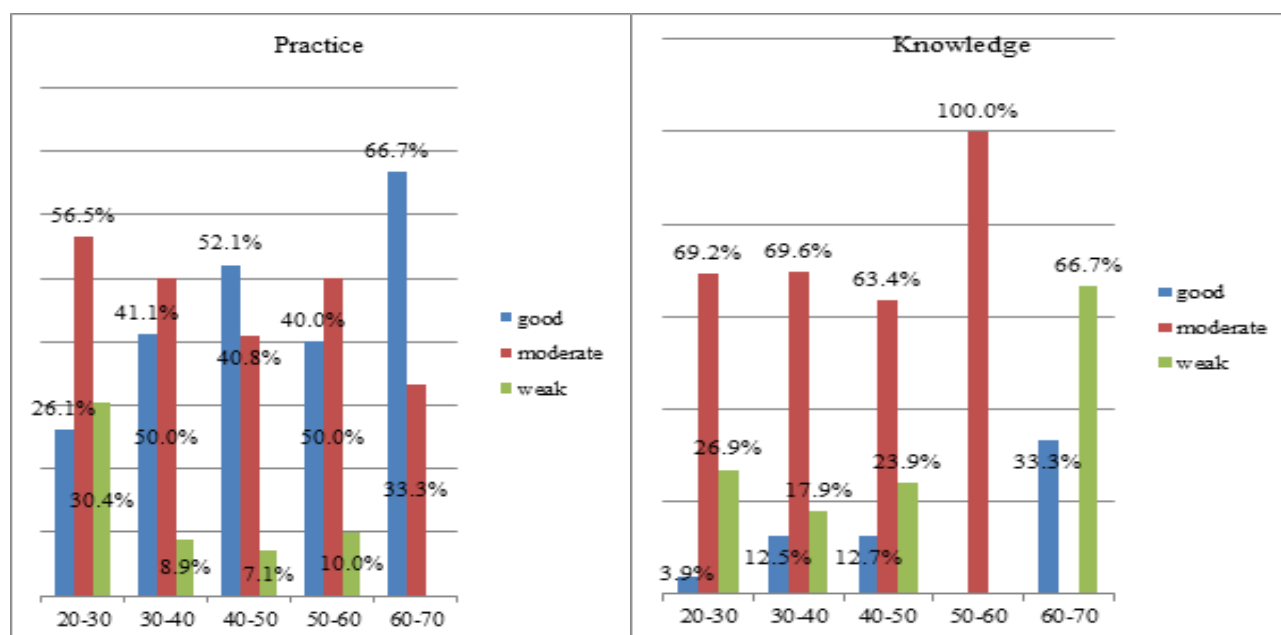


Figure 2) Relative frequency distribution of dentists' knowledge and practice regarding disinfection of impressions sent to the laboratory, based on age

No significant difference based on experience was observed in relation to knowledge in dentists using the Mann-Whitney test ( $P < 0.037$ ) (Figure 3).

Of the 154 (92.8%) dentists who sent less than five impressions to the laboratory in a day, the practice of 71 (46.1%) was found to be moderate. Of the 12 (7.2%) dentists who sent more than five impressions in a day, the practice of 6 (50%) was found to be moderate.

The chi-square test was employed to evaluate answers to the questions on knowledge (ques-

tions 1, 2, and 6). The results demonstrated a significant relationship with the level of knowledge ( $P < 0.001$ ) and most of them had moderate knowledge in these cases. Further, in relation to knowledge advancement (question 10), the majority (66.3%) stated that the effect of academic workshops and conferences was useful, while the others believed that educative pamphlets were effective. In this regard, no significant relationship was observed with the level of knowledge. The chi-square test was also used to evaluate the answers on practice. There was a significant

relationship between the results of the test and dentists' practice regarding disinfection of prostheses before delivery to patients (question 17) ( $P = 0.001$ ). Further, the relationships with dentists' awareness of transferability of infections through impressions and avoidance of disinfection of impressions owing to fear of distortion (question 24) were significant too ( $P = 0.001$ ). Majority of the dentists followed good practices but no significant relationship was found in practices related to disinfection of silicone, alginate, and polyether impressions. Most of them (60.8%) followed weak practices (Table 2).

It was also found that 31.9%, 36.7%, and 31.3% of dentists had good, moderate, and weak awareness of transferability of infections through impressions. Moreover, there was a significant relationship between this awareness and the dentists' knowledge ( $P < 0.001$ ). Dentists with good knowledge showed better awareness of transferability of infections through impressions. There was also a significant relationship between awareness and gender; awareness was greater among males.

Table 2. Practice of dentists regarding disinfection of impressions sent to the laboratory

Practice Questions	Good	Moderate	Weak	Total
9 Immersion	25(38.5%)	34(52.3%)	6(9.2%)	65(100%)
Spraying	47(46.5%)	42(41.6%)	12(11.9%)	101(100%)
8 Immersion	24(36.9%)	33(50.8%)	8(12.3%)	65(100%)
Spraying	48(47.5%)	43(42.6%)	10(9.9%)	101(100%)
17 Positive	65(53.7%)	54(44.6%)	2(1.7%)	121(100%)
Negative	7(1.6%)	22(48.9%)	16(35.5%)	45(100%)
20 Positive	71(45.5%)	73(46.8%)	12(7.7%)	56(100%)
Negative	1(10%)	3(30%)	6(60%)	10(100%)
Disinfection of impressions	66(52.4%)	56(44.4%)	4(3.2%)	126(100%)
24 Avoidance of disinfection of impressions due to dimensional changes	6(15%)	20(50%)	14(35%)	40(100%)

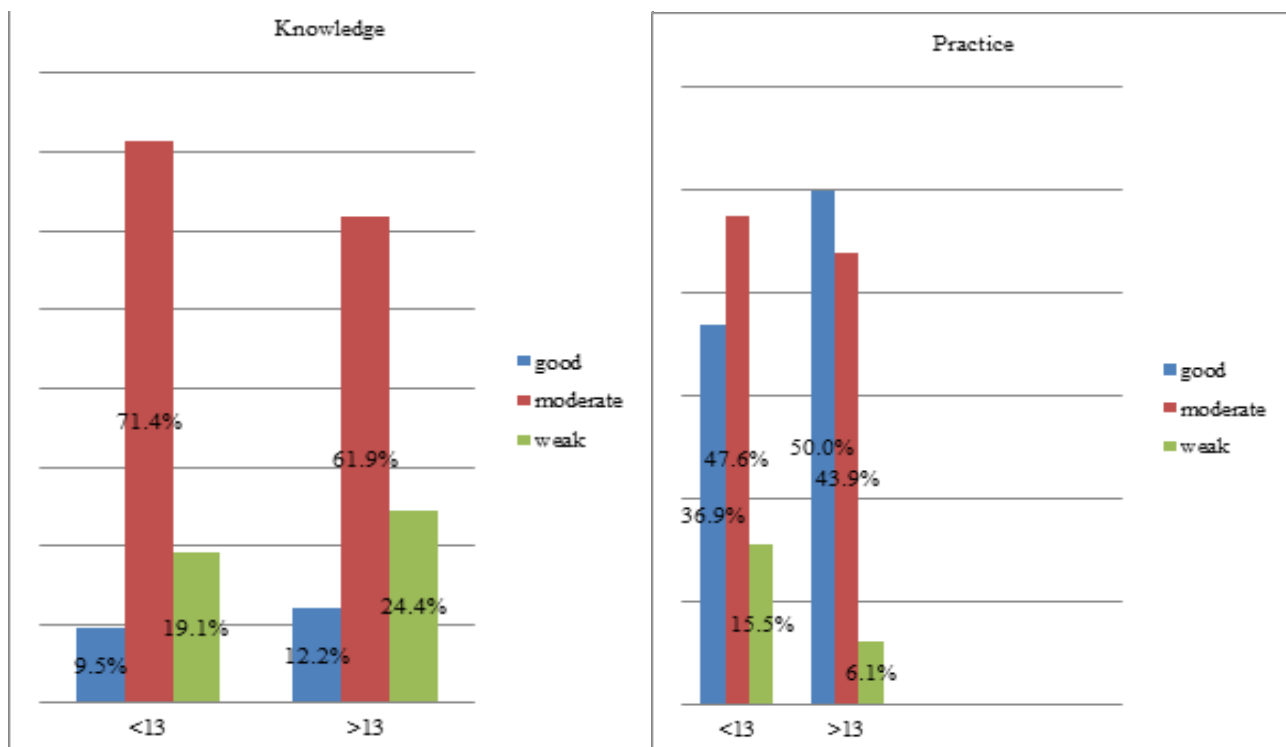


Figure 3. Relative frequency distribution of dentists' knowledge and practices regarding disinfection of impressions sent to the laboratory, based on experience

## Discussion

Lavvaf et al. <sup>(6)</sup> conducted a study in Ahvaz, in which the knowledge of 70.96%, 22.58%, and 6% of the dentists was found to be weak, moderate, and good, respectively. However, unlike in the present study, the knowledge was found to be greater in females than in males. In another study by Maleki et al. <sup>(7)</sup>, the effect of gender on knowledge was negligible. Further, there was no significant relationship between knowledge and age of dentists ( $P < 0.123$ ), indicating a corresponding increase in knowledge with an increase in experience. Maleki et al. <sup>(7)</sup> found that there was no significant relationship between experience and knowledge, and the relationship further deteriorated in the study by Lavvaf et al. ( $P < 0.01$ ).<sup>(6)</sup>

There was a significant relationship between practice and experience of dentists (<13 years and >13 years), indicating that an increase in experience had a positive effect on the disinfection of impressions.

The relationship between experience and knowledge was found to be significant in the study by Lavvaf et al. <sup>(7)</sup> where knowledge decreased with increasing experience, indicating a need for academic workshops. There was no significant relationship between practice and the type of university attended (types 1, 2, 3, or abroad) ( $P < 0.225$ ). However, upon evaluation for practice, dentists from type 1 universities accounted for most of the good answers (55.6%) and dentists from universities abroad accounted for least of the weak answers (0%).

As mentioned earlier, 88.6% of participants in this study were general dentists and 11.4% were specialists. There was no possibility of comparison between the two groups owing to their disproportionate sizes. Therefore, an individual assessment of knowledge and practice in each group was performed after an overall study of knowledge and practice in all the 166 dentists. Surgery specialists, compared with other specialist groups, had the highest level of knowledge, while the orthodontic specialists had better practice. A study by Al Omari et al. <sup>(3)</sup> showed that only 18% of dentists disinfected the oral and dental impressions before dispatching them to the laboratory. Al Mortadi et al. <sup>(2)</sup> reported that 37.2% of dentists washed and 2.7% cleaned the

impressions with a brush before dispatch.

Zaker Jafari et al. <sup>(8)</sup> reported that dental students transferred impressions to the laboratory without proper cleaning, disinfection, or packaging, owing to a lack of information as per the students' own admission. They also stated that this practice had never been questioned before. Further, a study by Ajami et al. <sup>(9)</sup> demonstrated that students' theoretical knowledge alone was insufficient and that practical experience of infection control procedures was necessary.

In the study by Lavvaf et al. <sup>(6)</sup>, the knowledge of dentists regarding disinfection techniques for impression materials was found to be moderate. In the present study, 94.6% of the dentists were aware that impressions, prostheses, and other items sent to or received from the laboratory were sources of infection. This awareness had a significant relationship with good knowledge ( $P < 0.023$ ). It also had a significant correlation with gender ( $P < 0.005$ ); 68.2% (107) of dentists who were aware were males and 31.8% (50) were females. The current study indicates that 42% of dentists had good awareness and this had a significant relationship with their knowledge ( $P < 0.001$ ).

In a study by Maleki et al. <sup>(7)</sup>, 43% of dentists demonstrated good awareness regarding impression disinfectants. Dentists' earnestness in notifying the laboratory regarding the disinfection status of impressions was determined; it was found that only 52.4% reported the disinfected condition and 45.8% reported the non-disinfected condition of impressions. Further, the latter also notified the laboratory regarding the need for disinfection. However, only 24.7% of dentists notified the laboratory regarding this issue in a study by Al Mortadi et al. <sup>(2)</sup> Yet, it was found that only 50% of lab technicians disinfected all impressions and 64% were sure that the impressions received from the dentists had already been disinfected. This discrepancy between perception and reality is disturbing. Further, in this study, it was found that only 72.9% of dentists disinfected the prostheses, crowns, and other items received from the laboratory before delivering them to the patients.

In the current study, 74.1% of dentists opined that disinfection of impressions was neither expensive nor time-consuming. Yet, there was no significant relationship between this awareness

and the practice ( $P = 0.351$ ). Thus, disinfection practices of dentists were moderate or weak despite their opinion that disinfection not expensive or time-consuming.

Lavvaf et al.<sup>(6)</sup> demonstrated that dentists did not consider cost and time as important factors influencing their weak practice of disinfection. It was rather due to a lack of attention to the need for disinfection, owing to insufficient emphasis on this during the undergraduate course. The results of the present study showed that 25.9% of dentists considered the undergraduate course to be adequate for acquiring good knowledge, 66% believed that workshops, seminars, and academic conferences were useful, and 8.7% considered pamphlets necessary and suitable for advancing their knowledge and consequently, practice.

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## Conclusion

The results of this study indicate that despite the moderate and upward knowledge of all dentists, there was no significant relationship between the knowledge and practice of disinfection among general dentists. Therefore, there exists a need to promote both knowledge and practice of disinfection. Further, emphasis on the principles of infection control and regulation of procedures applied to the disinfection of impressions sent to the laboratory are recommended.

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