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Original Article

Attitude of General Dental Practitioners and Specialists Toward Infection Control Measures in Prosthodontics Clinics in Tripoli, Libya

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ABSTRACT

***Background and objectives**. Prosthodontics clinics require a high degree of concern regarding cross-infection of patients, personnel, unsterilized instruments, and equipment. Prosthodontics treatment undertaken in the clinics should be supplemented by the laboratory, and hence cross-infection chances have to be halted on both the fronts. The aim of this study was to evaluate attitudes regarding infection control procedures in prosthodontics clinics among general dentists, and specialists in Tripoli, Libya. **Methods.** A questionnaire of 11 questions was created and randomly distributed to 150 general dentists and specialists working in Tripoli's private clinics and public health centers. The questionnaire was anonymous and consisted of questions related to vaccination status, attitude and awareness towards infection control in prosthodontics clinics. Out of which (123) questionnaires were filled, giving a response rate of 82%. The data were sorted, checked, tabulated, and statistically analyzed. **Results.** A total of 123 dentists (68.3%) were general practitioners and (31.7%) were specialists, (39.9%) were males, and (60.1%) were females. In this study there was a positive correlation between vaccination status and the qualification (P =0.044). As (89.7%) of the specialists stated that they had been vaccinated against Hepatitis B virus, while only (73.8%) of general dentists had been vaccinated. The study also showed statistical significance when qualification was cross-tabulated against the responses for various questions, that is, disinfection of rubber bowl (P = 0.027), sterilization of dental cast (P = 0.032), sterilization of metal framework (P =0.009), bite registration and bite block sterilization before sending to the dental laboratory (P =0.005), custom trays sterilization (P =0.005), and sterilization of the handpiece between cases (P = 0.000). The study also revealed that while just 11.9% of general dentists disinfect the impression prior to sending it to the dental laboratory, 23.1% of specialists do so after rinsing the impression. **Conclusion.** The findings of this study suggest that there are insufficient attitudes toward infection control procedures in prosthodontics practice. Furthermore, the implementation of selective standard precautions, such as hand hygiene compliance, was widely practiced by the Tripoli dentists surveyed.*

Keywords: Infection Control, Attitude, Dentists, Prosthodontics Clinics, Impression Disinfection.

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INTRODUCTION

Human oral cavity provides an ideal environment for the transmission, inoculation and growth of a variety of agents that can be infectious or detrimental to others [1]. The dental clinic is an environment where disease transmission occurs easily. Prevention of cross-infection in the dental clinic is therefore a crucial aspect of dental practice, and dental clinic

workers must adopt certain basic routines while practicing [2]. Dental staff are exposed to various risk factors that can lead to the spread of countless diseases. These, particularly Hepatitis B and HIV, which are major public health issues, could be transmitted through various types of fluids such as saliva and blood [3]. For example, a 2010 study discovered that dentists and dental staff are more likely than any other occupation to be infected with and transmit the Hepatitis B virus to their patients [4]. Wearing gloves by dental personnel has been advised as an essential element of cross-infection control in dental surgery. Hands are considered to be a major source of infection, and potentially infected blood may be retained beneath the fingernails for up to five days [2].

Prosthodontics clinics require a high degree of concern regarding cross-infection patients, personnel, unsterilized instruments, and equipment. Prosthodontics treatment undertaken in the clinics should be supplemented by the laboratory, and hence cross infection chances have to be halted on both the fronts. The fabrication of prostheses for infectious disease carriers presents a cross-contamination hazard. Dental impressions, maxillo-mandibular registration bases and apparatus, trial and final prostheses are all exposed to contamination in the patient's mouth. Such items have the potential to spread infectious agents to the clinician, other patients, and the dental laboratory staff [5]. For instance, in 2018, a previous study conducted in Tripoli discovered that, sterilization of dental impressions was not a routine practice [6].

Infection control, which is one of the most discussed topics in dentistry, has become such an integral part of the practice to the extent that dental health workers no longer question its necessity [7]. Only a few surveys and studies have been carried out in Tripoli to assess the level of adherence to infection control policies and procedures in dental clinics. These studies did not address the important infection control procedures in prosthodontics clinics. Thus, a questionnaire was used in this survey to assess and investigate attitudes toward infection control procedures in prosthodontics clinics among general dentists, and specialists in Tripoli, Libya.

METHODS

A questionnaire consisting of 11 questions was prepared and randomly distributed among (150) general dentists and specialists who work in private clinics and public health centers in Tripoli. Demographic details were obtained including educational qualifications, gender, and years of experience. The questionnaire was anonymous and consisted of questions related to vaccination status, the use of personal protective equipment, sterilization methods, and attitude and awareness towards infection control in prosthodontics clinics

Before distributing the questionnaire. A pilot study was performed on a random sample of dentists (n = 20), and the questionnaire was modified according to the feedback obtained. A portion of the questionnaires were distributed personally, while the remainder were distributed electronically.

Out of which (123) questionnaires were filled (49 males, 74 females) (84 general dentists, 39 specialists) giving a response rate of (82 %). Then the data were sorted, checked for completeness and consistency, summarized, tabulated, and statistically analyzed. Statistical analysis was performed using SPSS IBM V.22.

The chi-square and Fisher's exact tests were employed when indicated in the statistical analysis to compare differences in the proportion of infection control attitudes according to gender, qualification (general practitioners versus specialists), years of experience, and $P < 0.05$ was considered statistically significant.

RESULTS

The data were collected anonymously. This study included a total of 123 dentists, forming a response rate (82%), [39.9% were males, and 60.1% were females] [68.3% were bachelor degree holders

(general dentists)], and [31.7% were master degree and PhD degree holders (specialists)] (Table 1).

In this study there was a positive correlation between vaccination status and the qualification (P =0.044). That is, (89.7%) of the specialists stated that they had been vaccinated against Hepatitis B virus, whereas only (73.8%) of general dentists had been vaccinated (Table 2) (Figure 1).

The percentage distributions of the answers regarding the protective barriers used during dental procedures are shown in (Table 3). Also, the answers regarding cleaning, disinfection, and sterilization of the items between patients and before sending to the dental laboratory are shown in (Table 4) (Table 5).

The study showed that 100% of all the surveyed dentists (general dentists and specialists) always wash their hands before and after treatment, and all of our participants use the autoclave as a method of instruments sterilization (Table 4).

When qualification was cross-tabulated against handpiece sterilization between cases in this study, a statistically significant difference between general dentists and specialists was discovered (P = 0.000). As (97.4%) (45.2%) of specialists and general dentists stated that they sterilize the handpiece between cases, respectively (Table 4).

The study showed statistical significance when qualification was cross-tabulated against the responses for various questions. Such as, disinfection of rubber bowl (P = 0.027) (Table 4), sterilization of dental cast (P = 0.032), sterilization of metal framework (P =0.009), bite registration and bite block sterilization before sending to the dental laboratory (P =0.005), and custom trays sterilization (P =0.005) (Table 5) (Figure 2).

Surprisingly, the study also reported that (23.1%) of the specialists apply disinfectant on the impressions after being rinsed, while only (11.9%) of the general dentists disinfect the impressions before sending them to the dental laboratory (Table 4). Dentists who stated that they do disinfect impressions (42.8% of them use alcohol, 50% use cidex, and only 7.2% use sodium hypochlorite) for impression disinfection.

With respect to gender and years of experience, no statistically significant differences were found.

Table 1. Gender and educational information of the participants (n=123)

Characteristic	Frequency	%
Gender		
Male	49	39.8%
Female	74	60.1%
Qualifications		
General Dentist	84	68.3%
Specialist	39	31.7%
Years of Experience		
1 - 5	36	29.3%
6 - 10	34	27.6%
11 - 15	31	25.2%
> 15	22	17.8%

Table 2. Hepatitis B vaccination status of the surveyed dentists (n=123)

Barrier	General dentists	Specialists	*P value**
Hepatitis B vaccination			
Yes	73.8%	89.7%	0.044*
No	26.2%	10.3%	

**Result of Chi-square statistic. P≤0.05 was considered significant for this study.*

Table 3. The answers of the participants related to barriers used during dental procedures (n=123)

Barrier	General dentists	Specialists	*P value**
Gloves			
Always	98.8%	100%	0.494
Sometimes	1.2%	0.0%	
Never	0.0%	0.0%	
Face Mask			
Always	95.2%	100%	0.166
Sometimes	4.8%	0.0%	
Never	0.0%	0.0%	
Protective Glass			
Always	63.1%	53.8%	0.276
Sometimes	27.4%	41.0%	
Never	9.5%	5.1%	

		Protective Gowns	
Always	78.6%	74.4%	0.702
Sometimes	19%	20.5%	
Never	2.4%	5.1%	
Head Cap (cover)			
Always	47.6%	41.0%	0.687
Sometimes	28.6%	28.2%	
Never	23.8%	30.8%	

**Result of Chi-square statistic. P≤0.05 was considered significant for this study.*

Table 4. The answers of the participants regarding cleaning, disinfection, and sterilization questions (n=123)

Question	**General dentists**	**Specialists**	***P value****
Do you wash your hands before and after patient examination?			
Always	100%	100%	-
Sometimes	0.0%	0.0%	
Do you prefer oral mouth rinse before commencement of any treatment procedure?			
Yes	75%	74.4%	0.939
No	25%	25.6%	
Which of the following do you use to sterilize the instruments in dental clinic?			
Autoclave	100%	100%	-
Boiling	0.0%	0.0%	
Chemicals	0.0%	0.0%	
Washing	0.0%	0.0%	
When do you or your dental assistant drain the autoclave water?			
Daily	50.0%	59.0%	0.593
Weekly	14.3%	12.8%	
Monthly	2.4%	0.0%	
Never	3.6%	0.0%	
I don't know	29.8%	28.2%	
Do you disinfect dental chair, clinic, and dental office between patients?			
Yes	98.8%	100.0%	0.494
No	1.2%	0.0%	
Do you regularly sterilize the hand piece and burs between cases?			
Yes	45.2%	97.4%	0.000
No	54.8%	2.6%	
Do you or your dental assistant rinse the impression under running water after being removed from patients mouth?			
Yes	76.9%	78.6%	0.873
No	23.1%	21.4%	
Do you or your dental assistant apply disinfectant on the impression after being rinsed?			
Yes	11.9%	23.1%	0.111
No	88.1%	76.9%	

**Result of Chi-square statistic. P≤0.05 was considered significant for this study.*

Table 5. The answers of the participants regarding cleaning, and disinfection questions (n=123)

Question		**General dentists**	**Specialists**	***P value****
Do you (or your dental assistant) regularly disinfect the following items between patients?				
Rubber Bowl	Yes	71.4%	92.3%	0.027*
	No	7.2%	0.0%	
	I don't Know	21.4%	7.7%	
Alginate mixing spatula	Yes	82.1%	84.6%	0.372
	No	4.8%	0.0%	
	I don't Know	13.1%	15.4%	
Shade guide	Yes	56.0%	74.4%	0.136
	No	16.7%	7.7%	
	I don't Know	27.3%	17.9%	
Glass Slab	Yes	78.6%	84.6%	0.716
	No	9.5%	7.7%	
	I don't Know	11.9%	7.7%	
Do you regularly disinfect the following items before sending them to the dental laboratory?				
Dental cast	Yes	20.2%	38.5%	0.032*
	No	79.8%	61.5%	
Dental	Yes	27.4%	43.6%	0.074

prosthesis	No	72.6%	56.4%	
Metal framework for fixed prosthesis	Yes	25%	48.7%	0.009*
	No	75%	51.3%	
Bite registration/ Bite block	Yes	21.4%	46.2%	0.005*
	No	78.6%	53.8%	
Custom tray	Yes	15.5%	38.5%	0.005*
	No	84.5%	61.5%	

**Result of Chi-square statistic. P≤0.05 was considered significant for this study.*

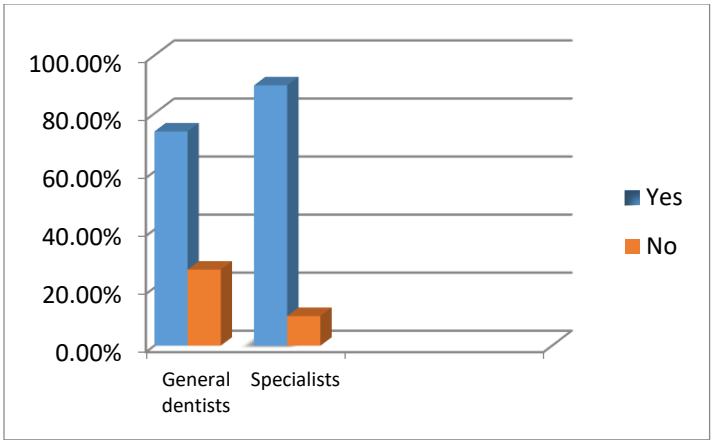

Figure 1. Hepatitis B vaccination status of the surveyed dentists (in percentages).

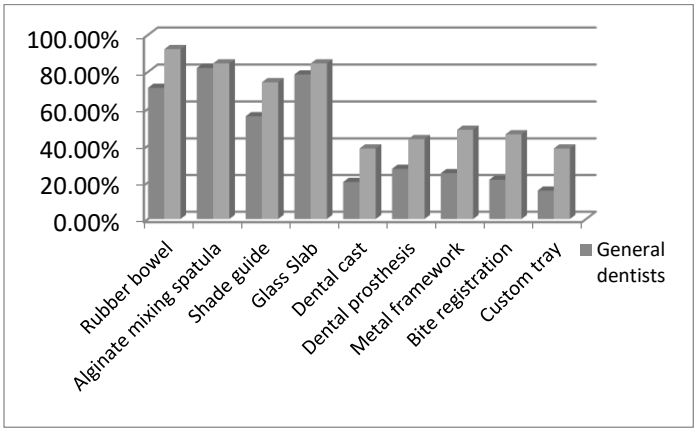

Figure 2. The compliance of the surveyed dentists with disinfection of prosthodontics items (in percentages).

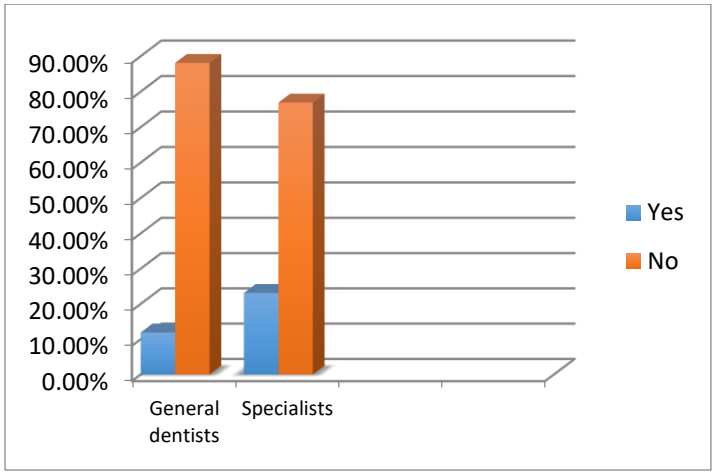

Figure 3. The compliance of the surveyed dentists with impressions disinfection after being rinsed (in percentages).

DISSCUSION

It is critical for any dental clinic to implement its own measures to prevent the spread of infectious diseases, and dental health care professionals must be aware of the risks of infections. This survey was carried out to assess dentist's adherence to the infection control measures in prosthodontics clinics in Tripoli, Libya. However, not all infection control measures were investigated due to concerns that increasing the number of questions would reduce response accuracy and response rates.

Completed questionnaires were obtained from 123 dentists, giving an overall response rate of 82% which is considered adequate and comparable with responses obtained from similar previous studies. Most respondents were general dentists (68.3%), while a significant number were specialists (31.7%), and almost two-thirds of the respondents were females (60.1%).

Healthcare providers are at three to six times greater risk of blood-borne infections than other populations [8]. Proper Hepatitis B vaccination is the best procedure to prevent contagious transmission during dental treatments [9]. It should be noted that vaccination rates among dental health professionals vary considerably worldwide and have been reported to range from 33% to 97% [10]. The findings

of the present study indicated that only 73.8% of the general dentists were vaccinated against Hepatitis B, while 89.7% of the specialists were vaccinated, with a statistically significant difference (P =0.044). This discrepancy could be due to the fact that specialists might have had considerable knowledge and information related to vaccination and infection control measures during their postgraduate studies.

Hand hygiene is considered the single most effective method for the prevention and control of healthcare-associated infections [11]. Compliance with hand hygiene procedures is essential as the hands of healthcare workers may serve as reservoirs for many pathogens [10,11]. Consequently, the most outstanding result of the current study was the compliance of the participants with hand hygiene as (100%) of specialists and general dentists always wash their hands before and after treatment. The outcomes are consistent with the findings of a recent study conducted during the COVID-19 outbreak in Tripoli, which found that all dentists use Alcohol-based Hand Rub (ABHR) or water and soap on a regular basis [12]. On the other hand, the results are much better than older studies reported from Lebanon [13], Yemen [10], and UAE [14]. This disparity could be attributed to the fact that there was less fear of dental cross-infection during the conduction of the previous studies. However, it is worth noting that this study was conducted during the COVID-19 outbreak, which could explain our participants' adherence to hand hygiene.

The practice of standard precautions including the use of barrier techniques has been shown to be the best prevention strategy against occupational transmission of infectious diseases in health care settings [9]. In the present study, most of our participants had positive attitudes towards using of barrier methods (gloves, facemasks, ect.) It was found that most of the specialists and general dentists care about protective barriers like gloves (100%-98.8%), and facemasks (100%-95.2%). However, they were less concerned in using other protective items such as protective glasses (53.8%-63.1%), protective gowns (74.4%-78.6%), and head caps (47.6%-41%) respectively. These results are comparable to previous studies [1,5,9,13,14] which showed that using protective glasses and head caps was low.

Autoclave is considered the preferred method of sterilization due to its safety, quickness, and its lethal effect of pressurized steam on all microorganisms [15]. Dental handpieces and associated attachments should always be sterilized between patients and not high level or surface disinfected. Although these devices are considered semicritical, studies have shown that their internal surfaces can become contaminated with patient materials during use. If these devices are not properly cleaned and heat sterilized, the next patient may be exposed to potentially infectious materials [16]. In this study there was a positive correlation between qualification and sterilizing the handpiece between cases (P = 0.000). The percentages of specialists and general dentists who stated that they sterilize the handpiece between cases were (97.4%) (45.2%) respectively. The main reason for not sterilizing handpieces could be the fear of the item being damaged by steam.

Prosthodontists, their staff and also their patients are at a higher risk for possible transmission of microorganisms and cross-infection due to the use of added equipment and material in the clinic and the laboratory [17]. Risk of infection of laboratory technicians by saliva or blood-borne infections such as HBV has been documented [5,18]. Therefore, items such as impressions, dental cast, denture prosthesis, metal framework for removable or fixed prosthesis, bite registration or wax rim must be disinfected before they are sent to the dental laboratory [5]. The current study showed statistical significance when qualification was cross-tabulated against the responses for various questions. Such as, disinfection of rubber bowl (P = 0.027), sterilization of dental cast (P = 0.032), sterilization of metal framework (P =0.009), bite registration and bite block sterilization before sending to the dental laboratory (P =0.005), and custom trays sterilization (P =0.005). This

discrepancy between general dentists and specialists might be due to the fact that specialists might have had more knowledge related to infection control measures during their postgraduate studies. Nonetheless, these outcomes could be improved if general dentists attend ongoing infection control training and workshops

The most surprising result of the study was that (23.1%) of specialists apply disinfectant on the impressions after being rinsed, while only (11.9%) of general dentists disinfect the impressions before sending them to the dental laboratory. These finding are similar to a previous study conducted in Jordan, which showed that only 18% of dentists disinfect impressions before sending them to the lab [19]. Nevertheless, these findings are lower than those of a previous study conducted in KSA, which found that 96.5% of respondents rinsed the impressions and applied disinfectant before sending them to the dental laboratory [5]. The correct type of disinfectant for impressions is also critical, as improperly chosen disinfectants can cause changes in both the accuracy and details of impressions [20]. In this study dentists who stated that they do disinfect impressions mentioned commercial names of disinfectants they use (42.8% use alcohol, 50% use cidex, only 7.2%, and use sodium hypochlorite). Most of these disinfectants are not suitable for use with impression materials. These results revealed that additional education is required to promote routine disinfection of impressions and prosthodontics items.

CONCLUSION

Taking the limitations of the study into account, the findings indicate insufficient attitude toward infection control procedures related to prosthodontics practice. Disinfection of impression and other prosthodontics items, as well as the implementation of selective standard precautions such as hand hygiene compliance, were highly practiced by the surveyed dentists in Tripoli.

RECOMMENDATIONS

Extensive educational programs on infection control in Libyan dental schools are necessary to increase the student knowledge about infection control measures and policies. Following graduation, they will put what they have learned into practice in their jobs.

Disclaimer

The article has not been previously presented or published, and is not part of a thesis project.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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