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Assessment of the Practice Regarding Infection Control in Dental Prosthetic

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Abstract:

Background: Infection prevention and control (IPC) is vital in dental clinics for safeguarding the health of practitioners, auxiliary staff, and patients by limiting the spread of contagious illnesses during treatment. To maintain a safe and hygienic clinical environment, dental professionals must have sufficient knowledge and consistently adhere to IPC guidelines. Disease transmission is an unavoidable hazard in dentistry, as numerous bacteria and viruses present potential threats to both dental students and clinical workers.

Material and Methods: A descriptive cross-sectional study was conducted at the prosthodontic clinic of Al-Turath University College of Dentistry, Baghdad, Iraq, from March 1 to May 1, 2026. Data were collected using an online questionnaire consisting of three sections. The first section collected sociodemographic information. The second section assessed hepatitis B vaccination status, history of previous work-related injuries, attendance at infection control lectures or training sessions, and the availability of written infection control protocols in the training clinics. The third section assessed students' infection control practices.

Results: The study included 294 participants with a mean age of 20.8 ± 1.5 years. Most participants (79.3%) were third-year dental students. Overall, 62.9% of the students demonstrated good infection control practices. A statistically significant association was found between good infection control practices and both previous attendance at theoretical infection control lectures and the availability of written infection control protocols.

Conclusion: The dental students demonstrated generally good infection control practices. However, approximately three-quarters of the participants had not received hepatitis B virus (HBV) vaccination, indicating the need to strengthen HBV vaccination coverage and reinforce infection control education among dental students.

Key words: Dental Prosthetic, Infection Control, Practice

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1. INTRODUCTION

The oral cavity creates a suitable environment for the transfer, entry, and growth of many harmful microorganisms. Disease transmission can easily take place in dental clinics through several routes, including direct exposure to blood, saliva, or other fluids; indirect contact with contaminated instruments, clinic furniture, or environmental surfaces; or breathing in airborne particles. Since dental practitioners frequently handle patient blood and saliva-mixed fluids during treatment, the highest infection risk moves from patient to clinician. This highlights why infection control strategies are essential to dental practice. These approaches aim to prevent or minimize infection spread, particularly because the oral environment supports numerous disease-causing microbes. During clinical procedures, providers are constantly exposed to fluids, increasing the chance of pathogen transfer to both the dental team and their patients. Because cross-infection is always possible, every patient should be managed as though potentially infectious. Compared to the general population, dental healthcare workers face a greater likelihood of contracting specific illnesses during patient care, including hepatitis B and tuberculosis [1].Infection prevention and control (IPC) is vital in dental clinics for safeguarding the health of practitioners, auxiliary staff, and patients by limiting the spread of contagious illnesses during treatment. To maintain a safe and hygienic clinical environment, dental professionals must have sufficient knowledge and consistently adhere to IPC guidelines. Disease transmission is an unavoidable hazard in dentistry, as numerous bacteria and viruses present potential threats to both dental students and clinical workers. According to various reports, pathogens including herpes simplex virus, varicella-zoster virus, HIV, hepatitis B, C, and D viruses, mycobacterium species, and multidrug-resistant bacteria represent significant cross-infection risks in dental settings. Evidence suggests that up to 70% of healthcare-associated infections could be prevented through rigorous compliance with IPC standards, together with preventive measures such as vaccination and appropriate post-exposure protocols [2].To address surface contamination, various disinfectants are advised, including alcohol-based solutions, iodophors, phenolic compounds, and chlorine-based agents such as sodium hypochlorite. Conventional disinfection protocols typically require removing visible contamination before applying a suitable disinfectant and allowing a recommended contact period of at least ten minutes. While both surface disinfection and the use of protective barriers effectively reduce microbial load, the preferred method depends on the surface type and practitioner preference. For optimal infection control, a combined approach integrating both strategies is generally recommended [3].Within dental settings, infections may also spread via tooth fragments, calculus, plaque, restorative materials, and aerosols generated during treatment. Numerous procedures produce considerable aerosols and splatter, such as prosthodontic tooth preparation, cavity excavation, and periodontal scaling. The main sources of airborne contamination during dental care are saliva, respiratory secretions, dental instruments, and the operative area. Studies show that the most intense and concentrated aerosol and splatter originate from the tip of ultrasonic scalers and the bur attached to a high-speed hand piece. Infectious microbes can stay suspended in the air, leading to serious health issues for both patients and dental staff, including the common cold, pneumonia, tuberculosis, herpes, SARS, COVID-19, as well as skin and eye infections. Although vaccines have prevented many infectious diseases, following measures that lower transmission risk in the dental office remains crucial[4].While the infection control guidelines described above are well established, their effective application depends largely on the knowledge and adherence of dental healthcare providers, especially dental students who are still developing their clinical habits within prosthodontic clinics. Therefore, the present study **aimed** to assess the the practice regarding infection control measures among dental students working in prosthodontic clinics and the infection control education received during their academic study.

Study Design

A descriptive, cross-sectional study with analytic components was conducted.

Study Setting

The study was conducted at the prosthodontics clinic of Al Turath University College of Dentistry in Baghdad, Iraq.

Time of Data Collection

Data collection took place over a two-month period, from March 1st to May 1st, 2026.

Sample Population

The study population included third- and fourth-year dental students working in the prosthodontics clinic during the data collection period.

InclusionCriteria

All dental students working in the prosthodontics laboratory during the study period who agreed to participate were included.

ExclusionCriteria:

Students who declined to participate were excluded.

Data Collection Tool and Process

An online questionnaire was developed following an extensive review of similar studies and consultation with professionals in the field. Data were collected with an electronic form distributed to the participants.

The questionnaire consisted of three main sections:

- The **first section** gathered sociodemographic data, including age, gender, and educational level (third or fourth grade).
- The **second section** addressed hepatitis B vaccination status, history of previous work-related injuries, whether the student had received lectures on infection control during college studies or attended infection control training sessions, and whether a written infection control protocol was available at the clinics where they trained.
- The third section assessed students' infection control practices in the prosthodontic clinic.

Scoring System

Practice items were assessed using a three-point Likert scale (Always = 3, Sometimes = 2, Never = 1). The total mean score for each participant was calculated by summing the scores of all items and dividing by the total number of items. The mean score was then converted into a three-level rating system based on the following cut-off points:

- **Good practice :** Mean score > 2.25 (equivalent to > 75%)
- **Fair practice :** Mean score > 1.5 to ≤ 2.25 (equivalent to 50–75%)
- **Poor practice:** Mean score ≤ 1.5 (equivalent to ≤ 50%)

Pilot Study

The questionnaire was pretested prior to the main data collection on a convenient sample of 20 dental students from the same college. Based on the pilot findings, several modifications were implemented, including revisions to certain questions and adjustments to phrasing. Participants involved in the pilot study were not included in the main study sample.

Administrative Approval and Ethical Considerations

Administrative and ethical approval was obtained from the Ethical Committee of Al Turath University College of Dentistry, Baghdad, Iraq. Participation was voluntary, and the study objectives were clearly explained to all participants by the researcher. Informed consent was obtained electronically before completion of the questionnaire. The questionnaires were completed online, and all collected data were treated with confidentiality. Participants were assured that the data would be used for research purposes, and personal information was recorded using serial identification numbers to ensure anonymity.

Statistical Analysis

Data were entered and analyzed using the Statistical Package for the Social Sciences IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Results were presented in tables and figures. Frequencies and percentages were

calculated to summarize categorical variables and participants' characteristics. The chi-square test was employed to examine associations between categorical variables. A p-value of less than 0.05 was considered statistically significant.

Results

Demography:

The study included 294 participants with a mean age of 20.8 ± 1.5 years (range: 19–29 years). Females constituted the majority of the participants (173, 58.8%), as shown in Figure (1).

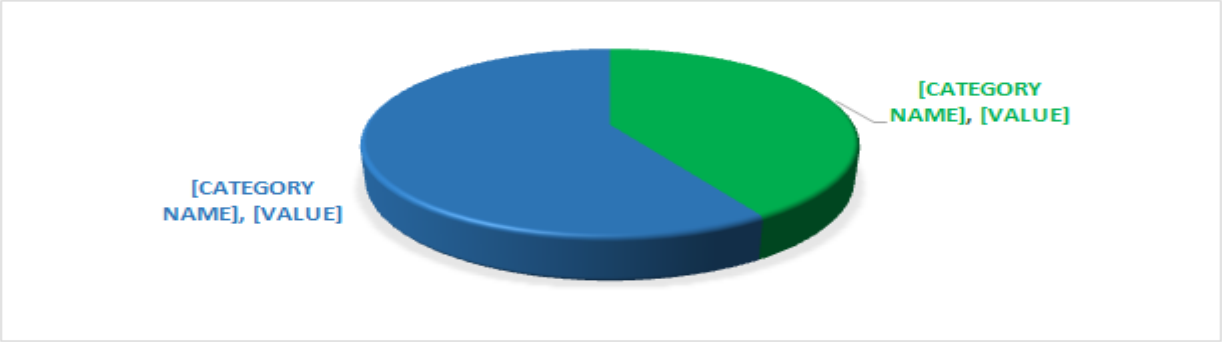

Figure (1). Gender distribution of the participants.

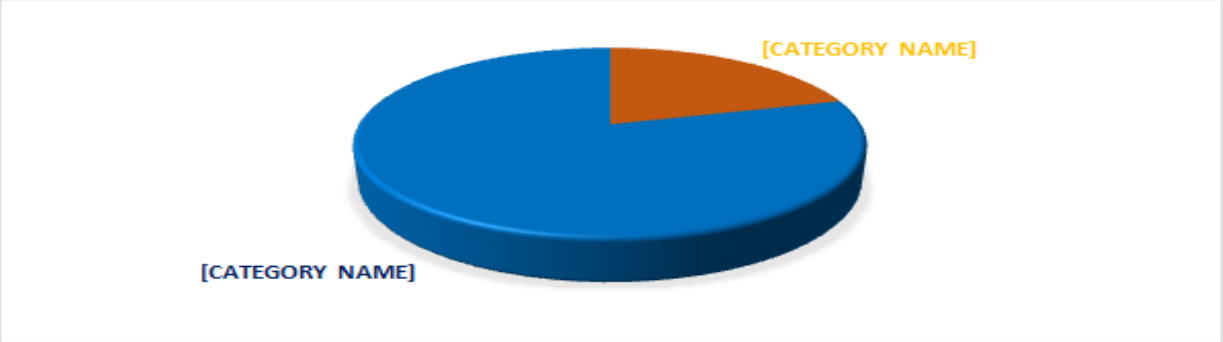

Figure (2). Distribution of participants according to academic year.

Regarding academic level, 233 participants (79.3%) were in the third academic year, as illustrated in Figure (2)

A total of 220 participants (74.8%) had not received hepatitis B virus (HBV) vaccination. Regarding previous occupational injuries, 239 (81.3%) reported no history of injury, whereas 48 (16.3%) had experienced eye splashing, as shown in Figure (3).

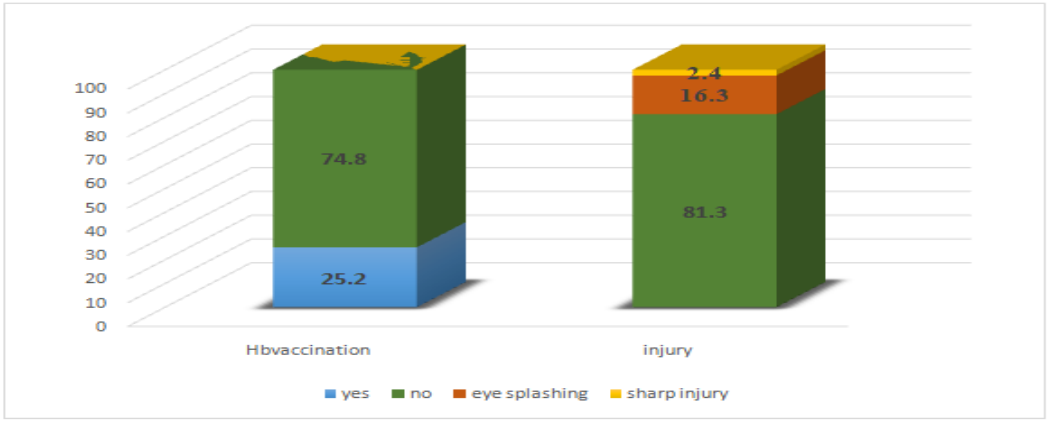

Figure (3). Distribution of participants according to HBV vaccination status and history of occupational injuries.

Table (1). Attendance of infection control education during undergraduate study.

Variable n=294		f	%
Attendance of didactic (theory) lectures on infection control during undergraduate or internship programs	yes	184	62.6
	no	110	37.4
Attendance of clinical demonstration/hands-on workshops on infection control during undergraduate programs	yes	31	10.5
	no	263	89.5

As presented in Table (1), 184 participants (62.6%) had attended theoretical lectures on infection control, whereas 263 (89.5%) had not attended any clinical demonstrations or hands-on workshops on infection control during their undergraduate education.

Table (2). Use of personal protective barriers among participants.

Do you regularly wear the following barrier during dental procedure in prosthodontic clinic n=294	Distribution of answers					
	Yes	F %	No	F %	Sometimes	F %
Gloves	215	73.1	29	9.9	50	17
Face mask	182	61.9	50	17	62	21.1
Protective glass	116	39.5	102	34.7	76	25.9
Protective gowns	173	58.8	63	21.4	58	19.7
Head cap	91	30.9	134	45.6	69	23.5

Regarding the use of personal protective barriers, gloves were the most frequently used protective measure, with 215 participants (73.1%) reporting regular use, followed by face masks (182, 61.9%) and protective gowns (173, 58.8%). In contrast, only 116 participants (39.5%) regularly wore protective eyewear, while 134 (45.6%) reported not wearing head caps, as shown in Table (2).

Table (3). Participants' practice regarding disinfection of dental items between patients

Do you (or your dental assistant) regularly disinfect the following items between patients n=294	Distribution of answers					
	Yes	F %	No	F %	Sometimes	F %
Rubber bowl	187	63.7	71	24.1	36	12.2
Alginate mixing spatula	192	65.3	62	21.1	40	13.6
Face bow	158	53.7	66	22.4	70	23.8
Shade guide	134	45.6	78	26.5	82	27.9

Among the dental instruments assessed, the alginate mixing spatula demonstrated the highest disinfection compliance, with 192 participants (65.3%) reporting regular disinfection, followed by the rubber bowl (187, 63.7%). The face bow was regularly disinfected by 158 participants (53.7%), whereas the shade guide showed the lowest compliance, with only 134 participants (45.6%) reporting routine disinfection (Table 3).

Table (4). Participants' practice regarding impression disinfection procedures.

When taking primary (alginate) or final impression, do you (or your dental assistant) n=294	Distribution of answers					
	Yes	F %	No	F %	Sometimes	F %
Applied a barrier (plastic/rubber) or disinfectant on the impression gun between patients	180	61.2	56	19.1	58	19.7
Rinsed the impression under running water immediately after removal from the patient's mouth	170	54.7	72	24.5	62	21.1
Applied disinfectant on the impression after rinsing with water	180	61.2	58	19.6	56	19.1
Applied disinfectant on the outer side of the tray when applying it on the impression	184	62.6	52	17.8	58	19.6

Regarding impression disinfection procedures, 180 participants (61.2%) reported applying a barrier or disinfectant to the impression gun between patients. In addition, 170 (54.7%) rinsed impressions under running water immediately after removal from the patient's mouth, 180 (61.2%) applied disinfectant after rinsing, and 184 (62.6%) disinfected the outer surface of the impression tray before laboratory procedures (Table 4).

Table (5). Participants' practice regarding disinfection of dental items before laboratory transfer.

Do you regularly disinfect the following items before sending it to dental laboratory n=294	Distribution of answers					
	Yes	F %	No	F %	Sometimes	F %
Dental cast	184	62.6	48	16.3	62	21.1
Denture prosthesis	186	63.3	48	16.3	60	20.4
Metal framework for removable or fixed prosthesis after try in	186	63.3	42	12.3	66	22.5
Bite registration or wax rim	178	60.5	52	17.7	64	21.8
Face bow and fork	178	60.5	46	15.6	70	23.8

Regarding disinfection before sending items to the dental laboratory, more than 60% of participants reported routinely disinfecting all assessed items. Compliance ranged from 60.5% for bite registrations and face bows to 63.3% for denture prostheses and metal frameworks. However, a considerable proportion of participants reported either inconsistent or no disinfection practices, ranging from 12.3% to 23.8% across the evaluated items (Table 5).

Table (6). Participants' compliance with sterilization of dental items before patient use.

Do you sterilize (autoclaved) the following items before being used with patient n=294	Distribution of answers					
	Yes	F %	No	F %	Sometimes	F %
Face bow fork	182	62	56	19	56	19
Fox occlusal plane	184	62.6	56	19	54	18.4

Approximately 62% of the participants reported routinely sterilizing both the face bow fork (182, 62.0%) and the Fox occlusal plane (184, 62.6%) before patient use. Conversely, 56 participants (19.0%) reported that they never sterilized either item (Table 6).

Overall, 185 participants (62.9%) demonstrated good infection control practices, with a mean practice score of 2.51 ± 0.69 (range: 1–3), as shown in Figure (4).

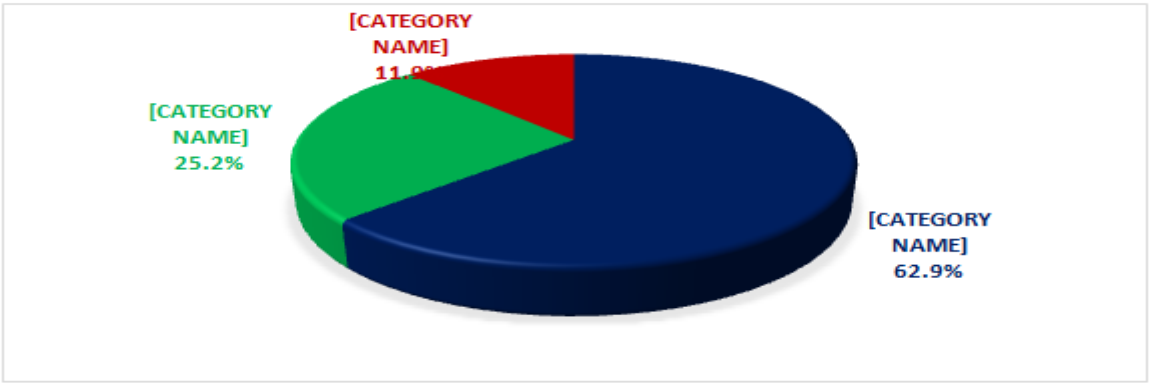

Figure (4). Overall level of infection control practices among dental students.

Table (7). Association between infection control practice and history of occupational injuries.

		practice						
Types of injuryn=294		Good		Fair		Poor		P value
		F	%	F	%	F	%	
	Sharp injury	31	10.5	11	3.8	6	2.1	
	Eye splashing	6	2.1	1	0.3	0	0	
	No injury	148	50.3	62	21.1	29	9.8	*0.907

No statistically significant association was observed between infection control practice and participants' previous history of occupational injuries (p = 0.907), as shown in Table (7).

Table (8). Association between infection control practice and previous attendance at theoretical infection control lectures.

		Practice						
Variable n=294		Good		Fair		Poor		P value
		F	%	F	%	F	%	
Received theory lectures n=294	Yes	121	41.2	49	16.7	14	4.8	
	Not sure	36	12.2	14	4.7	9	3.1	0.033 Sig
	No	28	9.5	11	3.7	12	4.1	

A statistically significant association was found between infection control practice and previous attendance at theoretical infection control lectures (p = 0.033), as presented in Table (8).

Table (9). Association between infection control practice and attendance at clinical demonstration sessions.

		Practice						
Clinical demonstration lectures on infection control n=294		Good		Fair		Poor		P value
		F	%	F	%	F	%	
	yes	20	6.8	10	3.4	1	0.3	0.49
	Not sure	20	6.8	9	3.1	3	0.9	
	No	145	49.4	55	18.8	31	10.5	

No statistically significant association was observed between infection control practice and attendance at clinical demonstration sessions on infection control (p = 0.49), as shown in Table (9).

Table (10). Association between infection control practice and the availability of written infection control protocols.

		Practice						
written protocol n=294		Good		Fair		Poor		P value
		F	%	F	%	F	%	
	yes	72	24.5	23	7.8	6	2.1	0.03 Sig.
	Not sure	54	18.3	26	8.8	6	2.1	
	No	59	20.1	25	8.5	20	6.8	

A statistically significant association was identified between infection control practice and the availability of written infection control protocols in the clinic (p = 0.03), as presented in Table (10).

Table (11). Association between infection control practice and gender.

		Practice						
Gender n=294		Good		Fair		Poor		P value
		F	%	F	%	F	%	
	Male	76	25.8	31	10.5	14	4.7	0.982
	Female	109	37.3	43	14.6	21	7.1	

No statistically significant association was observed between participants' infection control practices and gender (p = 0.982), as shown in Table (11).

Table (12). Association between infection control practice and academic year.

		Practice						
Year of academic education n=294		Good		Fair		Poor		P value
		F	%	F	%	F	%	
	2nd year	37	12.5	8	2.7	16	5.5	<0.001
	3rd year	148	50.3	66	22.5	19	6.5	

A statistically significant association was observed between participants' infection control practices and their academic year (p < 0.001), as shown in Table (12).

Discussion

The present study was conducted to evaluate the infection control practices of dental students in the prosthodontic clinic at Al-Turath University. Infection control is an important aspect of dental education, especially during the early stages of clinical training, as it helps reduce the risk of cross-infection and ensures a safe clinical environment.The findings showed that 62.9% of the students demonstrated good infection control practices. More than half of the participants were female, and 79.3% were third-year students. Most participants had not received hepatitis B virus (HBV) vaccination, while 81.3% reported no previous occupational injury. Although more than half of the participants had attended theoretical lectures on infection control, only 10% had participated in practical clinical demonstrations, there was significant association between students infection control practice and academic year of the students, written protocol in the clinic and taking theory lectures. These findings indicate that, despite the satisfactory level of infection control practices, deficiencies remain in HBV vaccination coverage and in infection control training.In the present study, only 25.2% of the students had been vaccinated against hepatitis B virus. This proportion was considerably lower than that reported by Benarji et al. [5], who conducted a cross-sectional study among 2,701 students in Andhra Pradesh, India, in 2022 and found that 66.8% had received HBV vaccination. Likewise, Raheem et al. [6], in a recent Iraqi cross-sectional study involving 426 students in 2025, reported vaccination rates of 57.3% among dental students and 29.7% among medical students. Similarly, Elgatlawi et al. [3] reported higher vaccination coverage among Libyan students, with 58.8% vaccinated and 41.2% unvaccinated. The lower vaccination rate observed in the present study may be explained by limited awareness of the importance of HBV vaccination, inadequate institutional encouragement, and the absence of mandatory vaccination requirements during dental school registration.Overall, 62.9% of the dental students demonstrated good infection control practices. This finding is comparable to that reported by Vidyalakshami et al. [8], who conducted a cross-sectional study involving 370 participants in India in 2026 and found that 63.5% of students exhibited good infection control practices. The similarity between the two studies may reflect the beneficial effect of theoretical infection control education in promoting acceptable infection prevention practices among dental students.Regarding the use of personal protective equipment, 73.1% of the students reported routinely wearing gloves, whereas 61.9% reported wearing face masks during clinical procedures. Compliance with protective eyewear and head caps, however, was noticeably lower. These findings are similar to those reported by Elgatlawi et al. [7], who found that approximately 70.7% of third-year students routinely wore gloves and 67.7% wore face masks. In contrast, Rehman et al. [9], in a cross-sectional study of 132 participants conducted in Rawalpindi in

2022, reported higher compliance rates of 84.1% for glove use and 75% for face mask use. The lower adherence to complete personal protective equipment observed in the present study may indicate insufficient awareness of disease transmission through blood splashes and aerosols. Therefore, strengthening infection control education and emphasizing the consistent use of all recommended protective barriers during clinical practice are essential to reduce the risk of cross-infection.With regard to instrument decontamination, more than half of the participants reported that they or their assistants always disinfected reusable items between patients, including rubber bowls (63.7%), alginate mixing spatulas (65.3%), and face bows (53.7%). These percentages were considerably higher than those reported by Rehman et al.[9], who found compliance rates of 22.7%, 23.9%, and 27.3%, respectively. However, they were comparable to the findings of Elgatlawi et al.[7], who reported corresponding rates of 56.1%, 54.3%, and 45.1%, respectively. The relatively higher compliance observed in the present study may indicate better awareness of instrument decontamination procedures and the implementation of infection control protocols within the teaching clinics.Approximately 62% of the participants reported sterilizing the facebow fork and the Fox occlusal plane using an autoclave. This finding is consistent with that reported by Elgatlawi et al. 7, who found sterilization rates of 61.1% and 59.1% for the facebow fork and Fox occlusal plane, respectively. Although these findings demonstrate acceptable compliance, complete adherence to recommended sterilization procedures remains essential to eliminate the risk of cross-contamination associated with reusable prosthodontic instruments.

Limitations of the Study

This study has several limitations. First, a convenience sampling technique was used, and the study population consisted only of undergraduate dental students from Al-Turath University and the findings cannot be generalized to dental students from other universities or educational settings. Second, because the study used a cross-sectional design, infection control practices were assessed at a single point in time. Therefore, causal relationships between the studied variables cannot be established.

Conclusions:

1- The participating dental students demonstrated good infection control practices.

2- There was a statistically significant association between good infection control practices and both previous attendance at theoretical infection control lectures and the availability of written infection control protocols.

3- Approximately three-quarters of the participants had not received hepatitis B virus (HBV) vaccination, indicating suboptimal vaccination coverage among the study population.

Recommendations:

1- Hepatitis B vaccination should be mandatory for all dental students before they begin clinical practice to reduce the risk of occupational exposure to blood-borne infections.

2- Infection control education should be strengthened by integrating comprehensive theoretical instruction with regular hands-on clinical training. In addition, written infection control protocols should be made readily available in all dental clinics to promote adherence to standard infection prevention practices.

3- Dental students should receive continuous education on the routes of infection transmission and the mechanisms of cross-infection between patients, dental healthcare personnel, and the clinical environment to improve compliance with evidence-based infection control measures

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