

Compliance of Dental Students toward Infection Control in Dental Teaching Hospital at Tamar University – Yemen

Conformidade dos Estudantes de Odontologia no Controle de Infecção no Hospital de Ensino Odontológico da Universidade de Tamar - Iêmen

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ABSTRACT

Objective: The aim of the study was to assess the knowledge, attitude and practice related to gender and study level toward infection control among senior dental students. **Materials and Methods:** A self-administered questionnaire was distributed among the pre-doctoral dental students (4th and 5th levels) in the Dental Teaching Hospital at Tamar University. It included questions related to vaccinations as well as knowledge and practice toward infection control. The collected data was analyzed using Chi-squared test with significant level P-value < 0.05. **Results:** Response rate was 63%. Distribution of gender among the participants was almost equal with slight increase in number of male subjects. Participated students from 4th-year level were also close to the number of students from 5th-year level. Hepatitis immunization was completed by only 12.9% male students and 17.3% females with no significant difference. Likewise, no significant difference was found among the participants by study level. More than 90% of participants reported always wearing gloves during dental treatment. Unexpectedly, however, using of other protective barriers was low. More than 90% of students, with no significant difference between genders or study levels, reported sterilizing instruments after each dental procedure. **Conclusion:** The present study showed that the level of knowledge and practice of infection control measures was poor among dental students. The attitude towards infectious control measures was positive, but a greater compliance was needed. Rigorous infection control training

RESUMO

Objetivo: O objetivo do estudo foi avaliar os conhecimentos, atitudes e práticas relacionadas ao gênero e nível de estudo para o controle da infecção entre estudantes de odontologia sênior. **Materiais e Métodos:** Foi distribuído um questionário auto-administrado entre os alunos de final de curso (4º e 5º níveis) do Hospital de Ensino Dentário da Universidade de Tamar. Ele incluiu questões relacionadas à vacinação, bem como conhecimento e prática para controle de infecção. Os dados coletados foram analisados pelo teste Qui-quadrado, com valor de significância $p < 0,05$. **Resultados:** A taxa de resposta foi de 63%. A distribuição de gênero entre os participantes foi quase igual com ligeira superioridade de indivíduos do sexo masculino. O número de alunos de 4o e 5o anos também foi similar. A imunização contra hepatite foi concluída por apenas 12,9% de estudantes do sexo masculino e 17,3% do sexo feminino sem diferença significativa. Da mesma forma, não houve diferença significativa entre os participantes por nível de estudo. Mais de 90% dos participantes relataram usar luvas durante o tratamento odontológico. Inesperadamente, entretanto, o uso de outras barreiras protetoras foi baixo. Mais de 90% dos alunos, sem diferença significativa entre os sexos ou os níveis de estudo, relataram esterilizar instrumentos após cada procedimento odontológico. **Conclusão:** O presente estudo mostrou que o nível de conhecimento e prática das medidas de controle de infecção foi pobre entre os estudantes de odontologia. A atitude em relação às medidas de controle infeccioso foi positiva, mas foi necessário um maior envolvimento. Rigoroso treinamento de controle de infecção para os alunos

for students prior to graduation is also highly recommended.

KEYWORDS

Infection control; Compliance; Dental students; Yemen.

antes de finalizar a graduação também é altamente recomendado.

PALAVRAS-CHAVE

Controle de infecção; Envolvimento; Estudantes de odontologia; Yemen.

INTRODUCTION

The dental clinic is considered as an environment for easy transmission of diseases. [1] Working in the dental environment exposed the Dental Healthcare Personnel (DHCP) and the students to potential risk of cross-infection via blood-borne pathogens. [2] During the different dental procedures, the exposure to blood or blood-contaminated saliva increases the possibility of transmission of blood-borne diseases. Various microorganisms such as human immunodeficiency virus (HIV), hepatitis B and hepatitis C viruses, Mycobacterium tuberculosis, herpes simplex virus types 1, mumps, influenza, and rubella could be easily transmitted to the DHCPs during dental treatment. [3] Transmission of the infection in the dental environment may take several ways; either directly through contact with infected blood, saliva or indirectly through contacting contaminated instruments or surfaces or even airborne contaminants. [4, 5] Preventing such infections can be guaranteed by using safety precautions and implementing infection control measures alongside with vaccination and accurate post-exposure management.

Prevention of cross-infection in the dental clinic is, therefore, a crucial aspect of dental practice, and DHCPs must adopt certain basic routines while practicing. The guidelines related to infection control measures in dental setup have been updated by the Centers for Disease Control (CDC) in 2003. [6] The main aim of these guidelines is to provide a safe dental operatory environment to prevent the

potential transmission of occupational and nosocomial infections among DHCPs and their patients.

Unfortunately, despite the considerable emphasis placed on the importance of adherence to these protocols, studies have shown that there are inappropriate knowledge, attitude, and practice regarding proper measures of infection control among dentists. [7-9] Moreover, several studies have been conducted to assess the knowledge and attitude of undergraduate students regarding infection control in the dental schools. The results of these studies were disappointing regarding compliance with infection control guidelines and protocols. [10-15]

In Yemen, a study conducted in Sana'a also demonstrated a lower-than-standard attitude and practice regarding infection control among undergraduate students in dental school at Sana'a University. [16] Dental education can play an important role in the training of dentists, helping them to adopt adequate knowledge and attitudes related to infection control measures. The responsibility of academic institutions and dental schools is to provide infection control training to protect patients and students, and to educate the future DHCPs in safety work practices. Studies monitoring occupational injuries and infection control practices among students and healthcare workers are necessary to assess the efficacy of infection control training and help to develop educational interventions to improve adherence to guidelines and reduce injuries. The aim of this study was to investigate the knowledge, attitudes, and practice regarding

infection control measures among dental students in Tamar University, Yemen.

MATERIAL AND METHODS

This study was conducted between January and April 2016. Ethical approval was obtained from Ethics Committee, Tamar University and an informed consent was also obtained from each participant. Self-administered questionnaire contained 18 close-ended and one open-ended questions was adopted from previous studies [10, 16] and distributed among the pre-doctoral dental students (4th and 5th levels). The questions related to vaccination of hepatitis B, personal barriers as protective equipments, exposure to harming instruments, and attitude toward dental treatment of patients with infectious disease(s). Dental students were asked to fill the questionnaire after the lecture within 15 minutes and without any discussion and/or contacting between each other. The gathered data were entered into a master sheet (MS. Excel 2013) and then analyzed using SPSS v.22. Distribution of the participants was expressed by frequencies and percentages. Chi-squared test was used to identify the significant differences between both genders as well as between both study levels in relation to the study variables.

RESULTS

Out of 180 distributed questionnaires only 114 questionnaires were returned back. The overall response was 63%. Age of the participants ranged from 21-28 years with an average age of (23.62 + 1.82) years old. Distribution of gender among the participants was almost equal with slight increase in number of male subjects. Participated students from 4th-year level were also close to the number of students from 5th-year level (51.8% vs. 48.2%) (Table 1).

As illustrated in (Table 2), hepatitis immunization was completed by only 12.9% male

students and 17.3% females with no significant difference ($P = 0.346$). Likewise, no significant difference was found among the participants by study level. Regarding the number of doses, 25% of the vaccinated males completed 3 doses, 25% reported that they didn't remember how many doses they took. Less than 3 doses were reported by 50% of vaccinated males. However, more than half of vaccinated females did not remember the number of doses, only 33.3% completed 3 doses and 11.1% had less than 3 doses. No significant difference was found regarding number of the doses either between both genders or between the study levels.

More than 90% of participants reported always wearing gloves during dental treatment. Unexpectedly, however, using of other protective barriers was low. With regard to protective eye wears, more than 50% of the students reported never protect their eyes during work. No significant differences were found between both genders as well as between both study levels ($P > 0.05$). Significant difference was found between genders in relation to always wearing caps and gowns (90.4% females compare to 66.1% males). However, this difference was not significant when related to study level (Table 3). The majority of participants reported wearing gloves for examination and activities. There was no relation between these items and gender or study level ($P > 0.05$, Table 4). Changing gloves between patients was significantly lower in 5th-year students ($P < 0.05$).

Table 1 - Distribution of the study sample by gender and study level

	Frequency	Percent
Gender		
Male	62	54.4%
Female	52	45.6%
Study Level		
4th	59	51.8%
5th	55	48.2%

Table 2 - Proportions of vaccination, doses, and serology test among participants

	Gender		P-value	Study Level		P-value
	Male	Female		4th	5th	
Vaccination for hepatitis B						
Yes	12.9%	17.3%	0.346	16.9%	12.7%	0.357
No	87.1%	82.7%		83.1%	87.3%	
How many doses?						
Don't remember	25%	55.6%	0.198	50%	28.6%	0.551
Less than three	50%	11.1%		30%	28.6%	
Three doses	25%	33.3%		20%	42.9%	
HBV serology test						
Yes	37.5%	11.1%	0.241	20%	28.6%	0.559
No	62.5%	88.95		80%	71.4%	
Vaccination should be obligatory						
Yes	83.9%	90.4%	0.229	91.5%	81.8%	0.105
No	16.1%	9.6%		8.5%	18.2%	

Table 3 - Proportions of using barriers among subjects by gender and study level

	Gender		P-value	Study Level		P-value
	Male	Female		4th	5th	
Gloves						
Always	91.9%	98.1%	0.149	91.5%	98.2%	0.120
Sometimes	8.1%	1.9%		8.5%	1.8%	
Never	0.0%	0.0%		0.0%	0.0%	
Masks						
Always	66.1%	28.8%	0.001	47.5%	50.9%	0.095
Sometimes	29.1%	50%		45.8%	30.9%	
Never	4.8%	21.2%		6.8%	18.2%	
Eyewear						
Always	8.1%	5.8%	0.891	3.4%	10.9%	0.216
Sometimes	32.3%	32.7%		30.5%	34.5%	
Never	59.7%	61.5%		66.1%	54.6%	
caps or hair cover						
Always	1.6%	32.7%	0.001	8.5%	23.6%	0.065
Sometimes	8.1%	3.8%		5.1%	7.3%	
Never	90.3%	63.5%		86.4%	69.1%	
Gowns/lab coat						
Always	66.1%	90.4%	0.004	79.7%	74.5%	0.436
Sometimes	12.9%	0.0%		8.5%	5.5%	
Never	21.0%	9.6%		11.9%	20%	

Table 4 - Knowledge, practice, and attitude of participants by gender and study level

		Gender		P-value	Study Level		P-value
		Male	Female		4th	5th	
Wearing gloves for examination							
	Yes	98.4%	98.1%	.706	100.0%	96.4%	.231
	No	1.6%	1.9%		0.0%	3.6%	
Wearing gloves for activities							
	Yes	100.0%	98.1%	.456	100.0%	98.2%	.482
	No	0.0%	1.9%		0.0%	1.8%	
Changing gloves between patients							
	Yes	95.2%	96.2%	.583	100.0%	90.9%	.024
	No	4.8%	3.8%		0.0%	9.1%	
Washing hands before each gloves change							
	Yes	27.4%	28.8%	.515	37.3%	18.2%	.019
	No	72.6%	71.2%		62.7%	81.8%	
Removing gloves/masks while walking around							
	Yes	72.6%	63.5%	.200	78.0%	58.2%	.019
	No	27.4%	36.5%		22.0%	41.8%	
Changing gown/lab coats if contaminated							
	Yes	93.5%	94.2%	.598	94.9%	92.7%	.461
	No	6.5%	5.8%		5.1%	7.3%	
Sterilizing instruments after each dental procedure							
	Yes	93.5%	98.1%	.242	98.3%	92.7%	.161
	No	6.5%	1.9%		1.7%	7.3%	
Removing watches/ jewelry during procedures							
	Yes	25.8%	34.6%	.206	25.4%	34.5%	.195
	No	74.2%	65.4%		74.6%	65.5%	
Dental schools are responsible for infection control							
	Yes	93.5%	88.5%	.266	93.2%	90.9%	.455
	No	6.5%	11.5%		6.8%	9.1%	
Following the same infection control							
	Yes	83.9%	86.5%	.449	84.7%	85.5%	.563
	No	16.1%	13.5%		15.3%	14.5%	
Suffered from injuries							
	Yes	43.5%	71.2%	.003	40.7%	72.7%	.001
	No	56.5%	28.8%		59.3%	27.3%	
Is it OK to treat patient with infectious disease							
	Yes	43.5%	71.2%	.003	37.3%	58.2%	.020
	No	56.5%	28.8%		62.7%	41.8%	

More than 90% of students, with no significant difference between genders or study levels, reported sterilizing instruments after each dental procedure. Slight increase in number of males over females was found, with no significant difference, regarding removal of watches or jewelry during procedures. Similarly, there was no significant difference between 4th and 5th levels regarding this item (Table 4). From both genders and both study levels, nearly 90% thought that dental schools are responsible to implement the infection control guidelines, and more than 80% of both genders and both levels had the willing to follow the same infection control guides in their future work. Suffering from injuries was significantly reported from females and 5th-year dental students. Most injuries were caused by other instruments than those mentioned in the questionnaire, followed by anesthesia needles, then more than one instruments (Figure 1). Treating patients with infectious disease(s) was also positively reported from female and 5th-year dental students, with

significant difference between both genders and both study levels (Table 4).

DISCUSSION

Measuring the compliance of dental students toward infection control during their study in dentistry is important to be conducted in the years of practice. The dental students should be enhanced and motivated to adopt attitudes and behaviors they were learned on infection control to be practiced in their carrier. In the present study, the questionnaire evaluated the compliance of dental students towards infection control measures in the educational dental hospital of the Faculty of Dentistry at Tamar University, Yemen.

Proper hepatitis B vaccination is the best procedure to prevent contagious transmission during dental treatments. [11] The prevalence of hepatitis B vaccination among dental health workers varies from 38% to 100%. [10,11,13-15,17,18] The most surprising result of the

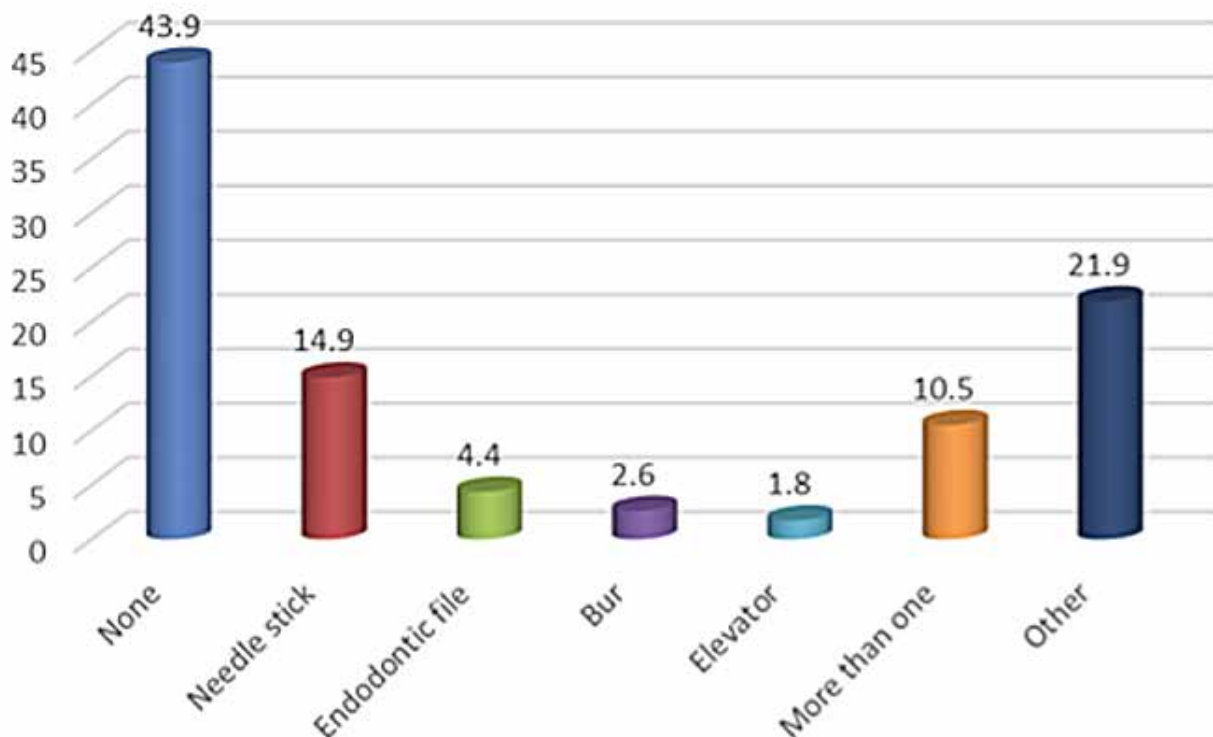


Figure 1 - Proportions of exposure to different instruments caused injuries.

study was that only 12.9% of males and 17.3% of females (14.9% of all participants) of the undergraduate dental students reported having been vaccinated against HBV. In addition, about half of them did either not take the three doses or not remember how many doses they took. However, this rate is much lower than that reported by other studies in Brazil (90.8%), Canada (100%), UAE (95.8%) and Iran (24.7%). [10,11,13,18]

Despite the awareness of the students (86.8% of total) about the importance of vaccination, only few have been vaccinated. The findings of the present study indicate an inappropriate level of taking necessary actions for making the HB vaccination mandatory for dental students prior to admission. Furthermore, the cost of the vaccination and a lack of awareness about the importance of vaccination among dental students might also be contributing factors.

Using of barrier techniques is considered one of the best prevention strategies against occupational cross infection during the work in the dental field. Regarding the student's compliance toward infection control during the different dental procedures, most of the students (more than 90%) aware about wearing gloves. However, their awareness about using other protective barriers (face mask and protective gown and caps) were lesser. This unsatisfactory results, however, is not limited for the present study, as many other studies in the UK, UAE, and Nigeria have also shown that the majority of dental students did not use eye protection most of the time. [10, 19, 20] This poor compliance reflects the low level of awareness among dental students about the probability of cross infection via contaminated aerosols and blood splashes. Therefore, it is very important to encourage dental students to wear face masks and protective eyewear to minimize the chance of disease transmission via airborne pathogens.

Hand disinfection of the DHCPs is considered the most effective method for

prevention and control of health-care-associated infections. [17] The hands of DHCPs may serve as reservoirs for many pathogens which necessitates the compliance with hand hygiene procedures. [17, 21, 22] In the present study, the compliance with hand hygiene procedures was unsatisfactory as only (18.2% - 37.3%) reported washing hands between each glove change. However, this result was similar to that of an earlier studies. [10, 23-26] This low compliance with regular hand disinfection necessitates stricter measures to obligate the students for disinfection of their hands between each glove change.

Most students (more than 90%) in our study used the autoclave to sterilize instruments after each use. This high percentage revealed a good knowledge. Abreu et al. [27] conducted a ten-year study to assess attitudes and behavior of dental students concerning infection control rules. In 1995, most students used the autoclave to sterilize instruments (83.8 %), and this percentage increased in 2005 (95.9%). However, other previous studies showed a lesser percentage than that of our study. [28-30] Bentley and Sarll [31] in 1995 found that at least one in five dentists did not regularly autoclave their hand-pieces between patients. In the present study, more than 90% of the students thought that dental schools bear the responsibility for implementing infection control recommendations, and around 85% from both genders and both study levels were planning on following the same infection control procedures in their clinics/practices after graduation.

Approximately more than half of the students reported that they had non-sterile percutaneous injuries mostly by sharp instruments other than mentioned in the questionnaire. This prevalence rate was higher than that reported in a similar study conducted in Brazil. [11] However, this rate was much lower than that reported among dental students in Canada, where over 80% of dental, medical and nursing students reported certain types

of occupational injuries. [13] These results are alarming and demonstrate that the dental students are at high risk to be infected by serious diseases with blood-borne pathogens including HIV. For example, in a previous study conducted in the UK, it has been found that the estimated risk of acquiring infection with hepatitis B virus from a percutaneous injuries ranges from 5% to 45%. [32]

Regarding the accidental injuries, the results from the present study showed a higher prevalence rate among final-year students (fifth year) than fourth year students. A reasonable explanation for such result is related to the time that the students spend in the clinic, where fifth-year students had longer clinical exposure than fourth year students did. This result supports a previous study. [10] Regarding the attitude of dental students toward treating patients with infectious diseases, fifth-year students showed a more positive attitude than fourth year students. This result is in accordance with previous studies. [10, 18] Furthermore, a significant correlation had been found between gender and the positive attitude to treat patients with infectious diseases (female students were more willing to do so). This result is in agreement with previous studies. [18, 33] The theoretical and practical trainings for protection against HIV and HBV in the dental clinic can improve and enhance students' positive attitudes about treating such patients.

Despite the low response rate, this study exposed several potential limitations should take into consideration. First, the subjective responses (i.e. based on students' self-assessment) rather than being provided under academic supervision in a clinical environment, and therefore the results may not necessarily fully reflect students' real knowledge and daily professional practice. Second, the number and the way of questions cannot reflect the real knowledge and practice of the respondents. Nevertheless, the number of questions was kept to a minimum to improve the response rate, which appeared to work well. Finally, the data represented in this study were

for one dental school, not the entire country. However and despite these limitations, this study provides some important information about Yemeni dental students' knowledge, opinions, and practices regarding infection control in the dental environment. In addition, this is the first study reflect conducted on the first governmental dental school in Yemen.

CONCLUSION

The level of knowledge and practice of infection control measures was poor among dental students. The attitude towards infectious control measures was positive, but a greater compliance was needed. Improving the compliance of the dental students can be completed by continuous education programs, practical lessons on sterilization procedures and use of barrier protection. Rigorous infection control training for students prior to graduation is also highly recommended. The findings should alert dental educators about the importance of educating their students clearly and comprehensively about infection control measures. In educating our students we need to convince them that the omission of a particular step in the control of cross infection would be detrimental to the patient, i.e. evidence-based learning. A lack of academic status for the subject of cross infection may be one reason for this. Formal class examination may help improve both knowledge and clinical practice. It is also intended to include a relevant 'exercise' in the objective structured clinical examination (OSCE) that has recently been introduced into our dental curriculum.

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