

To What Extent Does Isolation Precaution Training Affect the Mean Scores of Knowledge, Attitude, and Practice among Iranian Dental Students?

Maryam Hejazi ¹ , Fateme Eskandari ², Iman Saheb Karam ², Bahar Asheghi ³  

¹ Department of Prosthodontics, School of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran, ² School of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran, ³ Department of Endodontics, School of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran.

✉ Corresponding author:

Bahar Asheghi, Department of Endodontics, School of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran.

Bahar64a@gmail.com

Article History

Received: 27 December 2022

Accepted: 22 February 2023

Abstract

Background and Aim: Dental healthcare professionals may encounter various infectious diseases which necessitate the application of isolation precautions. This study aimed to assess the effects of isolation precaution training on the mean scores of knowledge, attitude, and practice of Iranian dental students.

Materials and Methods: This questionnaire-based study was carried out on 80 participants including 40 undergraduate and 40 postgraduate dental students of Shiraz University of Medical Sciences, Shiraz, Iran. A self-administered questionnaire including three scales of knowledge, attitude, and practice was used for data collection. A pamphlet was also distributed among the participants regarding infection control isolation precautions. After 4 weeks, the participants were asked to fill out the same questionnaire again. Paired t-test and Pearson's correlation test were used to statistically analyze the data ($\alpha=0.05$).

Results: The mean knowledge score was significantly higher in postgraduate than undergraduate dental students ($P=0.030$). The mean knowledge scores of postgraduate ($P=0.032$) and undergraduate ($P=0.001$) dental students significantly improved after the intervention. The intervention also significantly increased the mean attitude score of postgraduate dental students ($P=0.016$). A positive linear correlation was detected between practice and attitude ($r=0.244$, $P<0.05$).

Conclusion: The mean knowledge and attitude scores of postgraduate and undergraduate dental students in the present study were higher than those of previous studies. However, the mean practice score was poor. Moreover, isolation precaution training increased the mean scores of knowledge and attitude. More equipment and continuous educational programs in accordance with the guidelines are needed.

Key Words: Attitude; Dentistry; Infection Control; Knowledge

Cite this article as: Hejazi M, Eskandari F, Saheb Karam I, Asheghi B. To What Extent Does Isolation Precaution Training Affect the Mean Scores of Knowledge, Attitude, and Practice among Iranian Dental Students? *J Res Dent Maxillofac Sci.* 2024; 9(1):8-14.

Introduction

Despite novel developments in dental facilities, dentists are still challenged by several occupational health-related issues [1]. Dental staff are at risk of HBV, HCV, HIV, measles,

tuberculosis, and SARS transmission [2-4]. Furthermore, since the coronavirus disease-2019 (COVID-19) outbreak, dental healthcare workers have encountered unfamiliar predicaments [5-7]. The main transmission

routes of COVID-19 include respiratory droplets and direct contact with infected patients and contaminated items/surfaces [8]. Furthermore, airborne and droplet aerosols, which can be produced by all dental procedures, can transmit microorganisms to dental healthcare professionals and patients [2, 9, 10]. Therefore, effective infection control precautions would be helpful to combat virus transmission through droplets and airborne particles in a dental care setting [11].

Considering the common transmission pathways of contagious diseases (contact, airborne particles, and droplets) and also the emergence of COVID-19 pandemic, it is necessary for dental healthcare workers to keep up with infection control isolation precautions. Several studies evaluated the infection control precautions and emphasized on the need to apply continuous educational programs to improve the knowledge of dental healthcare professionals regarding infection control precautions [12-15].

Thus, this study aimed to assess the effects of isolation precaution training on the mean scores of knowledge, attitude, and practice of postgraduate and undergraduate dental students.

Materials and Methods

Participants and setting:

The study sample of this questionnaire-based study composed of senior undergraduate and postgraduate dental students. Information was collected by using a questionnaire similar to that used in previous studies [16, 17]. Although the validity and reliability of the questionnaire used in previous studies had already been confirmed, its reliability was assessed again by the Cronbach test and its validity was evaluated by three specialists (two epidemiologists and one dentist). The reliability scores for the knowledge, attitude, and practice were 0.762, 0.935, and 0.830, respectively. This questionnaire was consistent with the "Center for Disease Control and Prevention" guidelines. The knowledge, attitude, and practice of the respondents regarding the standard, droplet, airborne, and contact precautions were

evaluated by 9, 5, 6, and 8 items, respectively (Table 1). Knowledge was assessed based on three probable responses (yes, no, I do not know) and if a respondent's answer was consistent with the Center for Disease Control and Prevention guidelines, a score of 1 would be allocated to it. A score of 0 was given to any other response. Hence, the final score ranged from 0 to 28. Practice was assessed using a Likert scale consisting of five answers (always, often, sometimes, seldom, never). An "always" answer choice received a score of 1 and all other answers were assigned a score of 0. The final scores ranged from 0 to 28. Attitude was assessed on the basis of five probable answers (very strong, strong, considerable, weak, or null). A value of 5 was assigned to a 'very strong' answer choice and a score of 1 was assigned to a 'null' answer. Therefore, the final score could range from 28 to 140. This study was approved by the Ethical Committee of Shiraz University of Medical Sciences (ethical code: IR.SUMS.DENTAL.REC.1399.100).

The questionnaire was completed by the participants after they gave their written informed consent. Then, the participants were given a Pamphlet about infection control isolation precautions. After 4 weeks, the respondents were asked to fill out the questionnaire again to assess the efficacy of the intervention. The participants who answered the questionnaire incompletely, did not receive the pamphlet, or did not fill out the questionnaire for the second time were excluded from the study.

Statistical analysis:

The Kolmogorov-Smirnov test was applied to assess the normality of data distribution. To evaluate the effect of intervention on the mean scores of knowledge, attitude, and practice, paired t-test was used. Paired t-test was applied to compare the mean scores of the aforementioned parameters before and after the intervention. To evaluate the correlation between the variables (knowledge, attitude, and practice), the Pearson's correlation test was used. All statistical analyses were performed using SPSS version 24. $P \leq 0.05$ was considered statistically significant.

Table 1. Questions assessing the knowledge, attitude and practice of standard, droplet, airborne, and contact precautions

Standard precautions	
Q1	Handwashing before and after patient care
Q2	Handwashing before and after glove use
Q3	Handwashing after contact with blood, body fluids, excretions and contaminated objects
Q4	Wearing gloves before touching the mucous membranes and non-intact skin
Q5	Wearing goggles during the procedures in which generation of splashes or blood and body fluid aerosols is probable
Q6	Handwashing with betadine following contact with each patient
Q7	Wearing a surgical mask for protection of nose and mouth during procedures with the possibility of generation of splashes or blood and body fluid aerosols
Q8	Bending needles before disposal
Q9	Wearing a gown during the procedures in which generation of splashes or blood and body fluid aerosols is possible
Droplet precautions	
Q10	Patients under droplet precautions should be isolated in a private room
Q11	Patients under droplet precautions should be kept apart at a distance of at least 1.5 m
Q12	Patients under droplet precautions should wear a mask while transferring.
Q13	Wearing masks if or when a subject is in 90 cm distance from a patient under droplet precautions
Q14	Wards should be informed before receiving a patient under droplet precautions
Airborne precautions	
Q15	Patients under airborne precautions should be isolated in a single negative-pressure room
Q16	Door of patient room under airborne precautions should be closed at all times
Q17	Wearing a face mask to enter the patient room when the patient has chickenpox or measles
Q18	Healthcare workers should receive a BCG vaccine
Q19	Wards should be informed before receiving a patient under airborne precautions
Q20	Patients demanding airborne precaution care should wear a surgical mask while being transferred
Contact precautions	
Q21	Patients under contact precautions should be kept in a single room
Q22	Gloves are necessary on entry and exit of patient room under contact precautions
Q23	Hand hygiene after removing gloves for patients under contact precautions
Q24	Wearing gowns on entry to room of patient under contact precautions
Q25	Wards should be notified when receiving patient under contact precautions
Q26	Dedicated noncritical patient care equipment for patients under contact precautions
Q27	Clean and disinfect all common equipment between patients under contact precautions
Q28	Double gloving with plastic kitchen gloves will give the same protection as latex gloves

Table 2. Mean, standard deviation, and P value of knowledge, attitude, and practice before and after the intervention

Undergraduate dental students			P-value
Knowledge (Mean± SD)	Before	21.30±7.16	0.032
	After	24.42±5.16	
Attitude (Mean± SD)	Before	114.97±15.91	0.429
	After	117.20±14.11	
Practice (Mean± SD)	Before	10.72±7.04	0.147
	After	12.40±8.35	
Postgraduate dental students			
Knowledge (Mean± SD)	Before	23.87±1.78	0.001
	After	27.20±2.13	
Attitude (Mean± SD)	Before	109.81±10.52	0.016
	After	116.43±13.43	
Practice (Mean± SD)	Before	10.75±5.82	0.255
	After	12.02±7.78	

SD: Standard deviation

Results

Eight postgraduate and undergraduate dental students participated in this study. The mean age of undergraduate and postgraduate dental students was 24 and 28 years, respectively. No statistically significant correlation was found between the scores of knowledge, attitude, and practice following the intervention with age ($P>0.05$) or gender of the participants ($P>0.05$). The results indicated that more than half of the undergraduate and postgraduate dental students had participated in infection control isolation precaution educational programs earlier (52.5% and 62.5%, respectively). The mean total score of knowledge for undergraduate and postgraduate dental students was 21.30 ± 7.16 and 23.87 ± 1.78 , respectively. The mean total score of knowledge for postgraduate dental students was significantly higher than that of undergraduate dental students before the intervention ($P=0.030$). However, the difference in the mean scores of attitude and practice ($P=0.638$ and $P=0.986$, respectively) between undergraduate and postgraduate dental students was not significant before the intervention. The mean scores of knowledge and practice before and after the intervention were not significantly different in undergraduate and postgraduate dental students ($P=0.891$, and $P=0.801$, respectively); however, a significant improvement was found after the intervention regarding the attitude in both undergraduate and postgraduate dental students ($P=0.024$).

The effect of infection control isolation precaution training was statistically significant on the knowledge of undergraduate and postgraduate dental students ($P=0.032$, and $P=0.001$, respectively). Besides, the mean scores of attitude significantly increased after the intervention in postgraduate dental students ($P=0.016$). However, the mean scores of attitude before and after the intervention were not significantly different in postgraduate dental students ($P=0.429$). Also, isolation precaution

training did not cause a statistically significant change in practice scores of undergraduate and postgraduate dental students ($P=0.147$, and $P=0.255$, respectively) (Table 2).

In total, a linear positive correlation was observed between practice and attitude ($r=0.244$ and $P<0.001$, respectively). However, there was no significant correlation between practice and knowledge or between knowledge and attitude ($P=0.100$ and $P=0.072$, respectively).

Discussion

Dental healthcare professionals are at high risk of airborne infections [17]. The COVID-19 outbreak had a considerable impact on people all over the world [17, 18]. Infection control guidelines, which recommend standard isolation supplemented with airborne, droplet, and contact precautions, were developed to prevent COVID-19 [11]. These guidelines were mainly developed with the aim of preventing the transmission of pathogens to dental healthcare workers [16]. Moreover, it is important to well train the healthcare workers regarding the principles of infection control isolation precautions to develop an effective infection control program [19].

The present study showed relatively good knowledge level of dental students. This finding was in agreement with some previous studies [19-23]. In contrast, El-saaidi et al. reported low knowledge scores of Egyptian dental students, while the level of their attitude and practice was good [24]. Also, Silva et al. reported a poor level of knowledge and attitude among the studied students [25]. Higher final score of knowledge in the current and some previous studies may be due to participation in more infection control training courses.

Askarian and Assadian identified linear correlations between the knowledge and attitude and also between the attitude and practice. However, they observed no linear correlation between knowledge and practice

[26]. In contrast, in the current study, a linear correlation was found only between attitude and practice and no linear correlations were discovered between knowledge and attitude or between knowledge and practice. It may be stated that improving attitude would lead to a better performance. As a result, it would be beneficial to alter the educational protocols and to institutionalize proper behaviors towards infection control precautions.

In the current study, it was observed that the mean total score of knowledge in postgraduate dental students was significantly higher than that in undergraduate dental students. In addition, Al Jasser et al. discovered that postgraduate students had a higher level of knowledge than undergraduate dental students [27]. Similarly, Pai et al. demonstrated higher knowledge and practice levels of dental professionals with higher academic levels. They observed that postgraduate dental students had an appropriate level of knowledge about infection control and airborne isolation precautions, while undergraduate students (particularly those who had recently entered the clinic) had the lowest level of knowledge [23]. This finding can be attributed to greater experience of postgraduate students as they are better in searching information, critical reading, and problem-focused observations [27].

The present study showed that 57.5% of the study groups had participated in infection control courses which was higher than the rate reported in a previous study [26]. This shows the improvement of educational programs. The mean scores of knowledge, attitude, and practice in the current study were 76%, 82%, and 38.2%, respectively. In a study by Askarian and Assadian, these scores were 74.5%, 77.5%, and 55.2%, respectively [26]. Participation in more infection control courses may be a probable reason for improvement of knowledge and attitude; whereas lower percentage of practice may be related to the difference in study design between the current study and that of Askarian

and Assadian. In the current study, airborne, droplet, and contact precautions were evaluated in addition to standard precautions. In other words, the field of investigation in the present study was larger.

Furthermore, no significant correlations were found in the current study between the mean scores of knowledge, attitude, and practice with gender, which was consistent with the study by Askarian and Assadian [26].

Similar to the study of Askarian et al., the mean scores of attitude and knowledge regarding aerosol and droplet precautions were good. However, the score of practice was poor [19]. Likewise, Pai et al. reported a positive attitude among the participants towards infection control precautions, although bringing them into practice was weak [23]. Inconsistent with the aforementioned studies, Jain et al. [28], Baseer et al. [13], and Khasawneh et al. [29] observed better infection control in practice and performance of dentists. The probable reason for this higher infection control performance in the study by Baseer et al. may be the design of their study in which their participants had at least 10 years of experience after graduation [13]. Khasawneh et al. assessed the knowledge, attitude, and practice of medical students towards COVID-19. The mean score of practice in their study was more than that in our study. This may probably be due to better conditions and superior monitoring in hospitals [29].

Abalkhail et al. recommended that isolation precaution training of healthcare workers might be beneficial for improvement of their knowledge about standard infection control precautions [30]. Similarly, in the current study, it was observed that the mean score of knowledge before and after the intervention had a significant difference and the intervention improved the mean knowledge score of the participants. However, the intervention had no significant effect on the attitude. Rezai et al. observed a significant difference between the pre-test and post-test scores of a questionnaire

regarding knowledge. In addition, similar to the results of the present study, they detected no significant difference in attitude before and after the educational programs among undergraduate dental students. However, in contrast to the current study, Rezaee et al. found a significant difference regarding performance before and after the educational interventions. Therefore, to achieve an effective educational program, it is necessary to offer constant training programs and to monitor and examine the knowledge, attitude, and practice constantly. Attitude improvement requires novel and more effective training strategies [31].

One limitation of the present study was that the authors were unable to provide an online setting for the participants to complete the questionnaire due to high number of items. Another limitation was that our study was restricted to Dental School of Shiraz. Consequently, it is not possible to generalize the findings to other settings. Moreover, the interventional training was theoretical through PowerPoint presentations. Practical training courses should be used in future studies.

Conclusion

The mean scores of knowledge and attitude of undergraduate and postgraduate dental students were good. However, the mean score of practice was low. In addition, the interventional training program significantly increased the mean scores of knowledge and attitude.

References

- Moodley R, Naidoo S, Wyk JV. The prevalence of occupational health-related problems in dentistry: A review of the literature. *J Occup Health*. 2018 Mar 27;60(2):111-25.
- Harrel SK, Molinari J. Aerosols and splatter in dentistry: a brief review of the literature and infection control implications. *J Am Dent Assoc*. 2004 Apr;135(4):429-37.
- McCarthy GM. Risk of transmission of viruses in the dental office. *J Can Dent Assoc*. 2000 Nov;66(10):554-5, 7.
- Younai FS. Health care-associated transmission of hepatitis B & C viruses in dental care (dentistry). *Clin Liver Dis*. 2010 Feb;14(1):93-104; ix.
- Akbulut Y, Onder M, Kutlu G, Durur F, Orhan K. Determining the COVID-19 Knowledge, Awareness and Anxiety Levels of Intern Dentists. *The International journal of occupational health and safety*. 2023;13(1):108-18.
- Amato A, Caggiano M, Amato M, Moccia G, Capunzo M, De Caro F. Infection Control in Dental Practice During the COVID-19 Pandemic. *Int J Environ Res Public Health*. 2020 Jul 2;17(13):4769.
- Patel M. Infection control in dentistry during COVID - 19 pandemic: what has changed? *Heliyon*. 2020 Oct 30;6(10):e05402.
- Ali K, Raja M. Coronavirus disease 2019 (COVID-19): challenges and management of aerosol-generating procedures in dentistry. *Evid Based Dent*. 2020 Jun;21(2):44-5.
- Aghili SS, Pourzal A, Mosaddad SA, Amookhteh S. COVID-19 Risk Management in Dental Offices: A Review Article. *Open Access Maced J Med Sci*. 2022;10(F):763-72.
- Allison JR, Currie CC, Edwards DC, Bowes C, Coulter J, Pickering K, Kozhevnikova E, Durham J, Nile CJ, Jakobovics N, Rostami N, Holliday R. Evaluating aerosol and splatter following dental procedures: Addressing new challenges for oral health care and rehabilitation. *J Oral Rehabil*. 2021 Jan;48(1):61-72.
- Aldahlawi S, Afifi I. COVID-19 in Dental Practice: Transmission Risk, Infection Control Challenge, and Clinical Implications. *The Open Dentistry Journal*. 2020;14(1):348-54.
- Ataş O, Talo Yildirim T. Evaluation of knowledge, attitudes, and clinical education of dental students about COVID-19 pandemic. *PeerJ*. 2020 Jul 29;8:e9575.
- Baseer MA, Ansari SH, AlShamrani SS, Alakras AR, Mahrous R, Alenazi AM. Awareness of droplet and airborne isolation precautions among dental health professionals during the outbreak of corona virus infection in Riyadh city, Saudi Arabia. *J Clin Exp Dent*. 2016 Oct 1;8(4):e379-e87.
- Bhanushali P, Katge F, Deshpande S, Chimata VK, Shetty S, Pradhan D. COVID-19: Changing Trends and Its Impact on Future of Dentistry. *Int J Dent*. 2020 May 29;2020:8817424.
- Modi PD, Nair G, Uppe A, Modi J, Tuppekar B, Gharpure AS, Langade D. COVID-19 Awareness Among Healthcare Students and Professionals in Mumbai Metropolitan Region: A Questionnaire-Based Survey. *Cureus*. 2020 Apr 2;12(4):e7514.
- Askarian M, Honarvar B, Tabatabaee HR, Assadian O. Knowledge, practice and attitude towards standard isolation precautions in Iranian medical students. *J Hosp Infect*. 2004 Dec;58(4):292-6.

17. Ge ZY, Yang LM, Xia JJ, Fu XH, Zhang YZ. Possible aerosol transmission of COVID-19 and special precautions in dentistry. *J Zhejiang Univ Sci B*. 2020 May;21(5):361-8.
18. Kumar KNL, Reddy GKJB. Effects of COVID-19 on Consumer Behavior in the Tourism Industry. In: Hassan A, Sharma A, Kennell J, Mohanty P, editors. *Tourism and Hospitality in Asia: Crisis, Resilience and Recovery*. Singapore: Springer Nature Singapore; 2022. p. 49-61.
19. Askarian M, Mirzaei K, Honarvar B, Etmiman M, Araujo MW. Knowledge, attitude and practice towards droplet and airborne isolation precautions among dental health care professionals in Shiraz, Iran. *J Public Health Dent*. 2005 Winter;65(1):43-7.
20. Araujo MW, Andreana S. Risk and prevention of transmission of infectious diseases in dentistry. *Quintessence Int*. 2002 May;33(5):376-82.
21. Boukhobza S, Ritschl V, Stamm T, Bekes K. The COVID-19 Pandemic and Its Impact on Knowledge, Perception and Attitudes of Dentistry Students in Austria: A Cross-Sectional Survey. *J Multidiscip Healthc*. 2021 Jun 14;14:1413-22.
22. Elagib MFA, Baldo SMH, Tawfig A, Alqarni MA, Ghandour IA, Idris AM. Knowledge, attitude, and practice regarding infection control measures among dental students during COVID-19 pandemic. *Arch Environ Occup Health*. 2022;77(6):455-67.
23. Pai B, Prashant G M, Shenoy R, Chandu G N. Knowledge, attitude, and practice of oral health care personnel regarding airborne spread of infection in Davangere, India. *J Indian Assoc Public Health Dent* 2014;12(1):38-42.
24. El-Saaidi C, Dadras O, Musumari PM, Ono-Kihara M, Kihara M. Infection Control Knowledge, Attitudes, and Practices among Students of Public Dental Schools in Egypt. *Int J Environ Res Public Health*. 2021 Jun 9;18(12):6248.
25. Silva O, Palomino S, Robles A, Ríos J, Mayta-Tovalino F. Knowledge, Attitudes, and Practices on Infection Control Measures in Stomatology Students in Lima, Peru. *J Environ Public Health*. 2018 Sep 12;2018:8027130.
26. Askarian M, Assadian O. Infection control practices among dental professionals in Shiraz Dentistry School, Iran. *Arch Iran Med*. 2009 Jan;12(1):48-51.
27. Al Jasser R, Al Sarhan M, Al Otaibi D, Al Oraini S. Awareness Toward COVID-19 Precautions Among Different Levels of Dental Students in King Saud University, Riyadh, Saudi Arabia. *J Multidiscip Healthc*. 2020 Oct 29;13:1317-24.
28. Jain M, Sawla L, Mathur A, Nihlani T, Ayair U, Prabu D, Kulkarni S. Knowledge, attitude and practice towards droplet and airborne isolation precautions among dental health care professionals in India. *Med Oral Patol Oral Cir Bucal*. 2010 Nov 1;15(6):e957-61.
29. Khasawneh AI, Humeidan AA, Alsulaiman JW, Bloukh S, Ramadan M, Al-Shatanawi TN, Awad HH, Hijazi WY, Al-Kammash KR, Obeidat N, Saleh T, Kheirallah KA. Medical Students and COVID-19: Knowledge, Attitudes, and Precautionary Measures. A Descriptive Study From Jordan. *Front Public Health*. 2020 May 29;8:253.
30. Abalkhail A, Al Imam MH, Elmosaad YM, Jaber MF, Hosis KA, Alhumaydhi FA, Alslamah T, Alamer A, Mahmud I. Knowledge, Attitude and Practice of Standard Infection Control Precautions among Health-Care Workers in a University Hospital in Qassim, Saudi Arabia: A Cross-Sectional Survey. *Int J Environ Res Public Health*. 2021 Nov 11;18(22):11831.
31. Rezaee R, Danaei M, Askarian M. The efficacy of teaching hand hygiene to medical students: an interventional study. *International Journal of Academic Research in Business and Social Sciences*. 2014;4(9):151-9.