EGYPTIAN DENTAL JOURNAL
www.eda-egypt.org
VOL. 68, 1259:1267, APRIL, 2022
PRINT ISSN 0070-9484 • ONLINE ISSN 2090-2360
ORTHODONTICS, PEDIATRIC AND PREVENTIVE DENTISTRY
Submit Date : 20-01-2022 • Accept Date : 17-03-2022 • Available online: 30-03-2022 • DOI : 10.21608/edj.2022.117397.1954

KNOWLEDGE, ATTITUDE, AND PRACTICE OF USING PERSONAL PROTECTIVE EQUIPMENT AMONG A SAMPLE OF EGYPTIAN DENTAL STUDENTS

Ghada Ezzat El-Hindawy*, Salwa Adel Hegazy**
and Nasr Mohamed Attia***

ABSTRACT

Background: In dental education, dental students are exposed to several oral microorganisms radiating from the patient mouth toward them. Hence, using personal protective equipment (PPE) is considered a must to protect them from radiating aerosols.

Aim: This study was carried out to evaluate the knowledge, attitude, and practice of using (PPE) among 4th and 5th-grade dental students in both Mansoura and Delta Universities.

Methods: A self-administered closed-ended questionnaire was designed to collect information about demographics, knowledge, attitude, and practice of using (PPE) among 4th and 5th-grade dental students. A total of 497 and 301 dental students were selected randomly from Mansoura and Delta Universities, respectively. Data were analyzed using (SPSS) program after collection.

Results: Mansoura University students had significantly higher correct knowledge and attitude about changing gloves than those of Delta University students. As well, a significantly higher percentage of Mansoura University students agreed to wear a surgical mask during procedures (92%), remove gloves while walking around (70.2%), and wear long white coats (80.3%) compared to Delta University students respectively. However, Delta University students showed higher compliance to the use of most of PPE.

Conclusion: Although Mansoura university students had higher correct knowledge and a higher positive attitude toward using and changing PPE, the compliance of Delta University students to the use of PPE was higher.

KEYWORDS: personal protective equipment (PPE), Dental students, Knowledge, Attitude, Practice.

* Assistant Lecturer of Dental Public Health and Preventive Dentistry, Faculty of Dentistry, Mansoura University.
** Professor of Dental Public Health and Preventive Dentistry, Faculty of Dentistry, Mansoura University.
*** Lecturer of Dental Public Health and Preventive Dentistry, Faculty of Dentistry, Mansoura University

INTRODUCTION

Dental students are at great risk of cross-infection, as they are exposed to patients without having comprehensive training during their clinical courses.[1] Also, they didn't apply infection control principles properly in their clinical practices. In addition, they do not have sufficient knowledge and experience like professionals.[2]

A safe working environment and infection control practice among those students have to be applied.[3] This issue requires an advanced level of knowledge, medical training, and clinical skills in dental education globally.[4] Dental colleges have to ensure sufficient infection control measures and how to deal with risky situations.[3]

Dental education helps dental students in gaining sufficient knowledge and attitudes about infection control. It also teaches them the recommended World Health Organization (WHO) approaches. These approaches include the application of universal precautions, vaccination against particular infectious diseases, and the use of personal protective equipment (PPE).[5]

The first line of defence against cross-infection is using personal protective equipment such as gloves, face masks, safety eyewear, and protective outer clothing.[6, 7] The terminology "personal protective equipment "(PPE) is used to describe all protecting barriers that dental staff may use in their clinical practice. It is used for protecting the mucous membranes and skin of the nose, mouth, and eyes of dental personnel from being exposed to saliva, blood, or other possibly contagious material.[8, 9]

In the light of COVID-19 outbreak, growing numbers of confirmed cases throughout the world, and the high risk of its infection among dentists owing to exposure to salivary droplets and aerosols (the main source of transmission); some superior precautions are recommended besides the "standard precautions". These recommendations are founded based on the WHO guidance and should be implemented in dental clinics during this outbreak.[6,10,11]

In case of a working distance less than 1 meter away from the patient, the surgical mask could be used as a standard precaution. But, in the case of using aerosol-generating techniques, a certified N95, European Standard Filtering Face Piece 2 (EU FFP2), must be worn. Moreover, in case of dental emergency treatment for suspected patients of COVID-19, advanced respiratory protection must be used, such as EU FFP3 respirators. Besides, using of rubber dam and preoperative antiseptic mouth wash to decrease the number of pathogens in the oral splatters and aerosols.[6]

In Egypt, there are insufficient studies about knowledge, attitude, and practice related to using personal protective equipment (PPE) among dental students. Therefore, the objective of this study was to obtain information for evaluating the awareness, attitude, and compliance with the use of (PPE) as a recommended principle of infection control among the 4th and 5th-grade dental students in both Mansoura and Delta Universities using a self-administered questionnaire.

SUBJECTS AND METHODS

Study Setting and sample

A cross-sectional study by using a self-administered close-ended questionnaire was carried out in the Faculty of Dentistry in both Mansoura and Delta Universities. It included the undergraduate dental students registered in the 4th and 5th grades in each Faculty. The study sample included half the numbers of dental students registered in each the 4th and the 5th grades in both Universities. The dental students were randomly chosen by computer-generated random numbers from the lists at different dental clinics in the college.

As a result of the great variability in similar studies, the estimated sample size was based on a 5% margin of error, 95% confidence level, and

50% response rate. It was 278 for Mansoura dental students (taking into account that the total population size is 1000), and 235 for Delta dental students (drawn from 600) [according to calculated sample size using Raosoft Sample Size Calculator (http://www.raosoft.com/samplesize.html)]. The total sample size was 513 (this is the minimum required sample size), and since the estimated response rate was anticipated to be 50%, the number of individuals of whom we drew this sample had nearly doubled. The response rate was high, reaching nearly to 80% (798) in this study.

Approvals and ethical considerations:

The approval from the ethical committee in the Faculty of Dentistry, Mansoura University was first obtained under the code (A 01091019). The questionnaire was anonymous to encourage participants to share information and to gain their trust and confidence. There was no need for signing a written consent just returning the filled questionnaire reflected the student's implied consent. After returning the filled questionnaire, data was securely preserved.

The validity and reliability of the study questionnaire were firstly evaluated by randomly distributing the questionnaire among 50 dental students in both Universities to check the clarity and simplicity of the questions. Then, the necessary adjustment was performed depending on the feedback before the beginning of the study. Internal consistency, as measured by Cronbach's alpha test, was 0.81, indicating good scale reliability. [12]

The study was carried out at the beginning of the second term of the 2019/ 2020 academic year and has been finished on 5th March 2020 just before the crisis of COVID-19. The questionnaires were distributed by the researcher. The participants were asked to fill in the questionnaire in the clinics and lecture halls within 10 to 15 minutes. Students showed their acceptance by filling in the questionnaire and returning it. Intern dentists and dental students in the 1st, 2nd, and 3rd grades were excluded from the study.

Questionnaire:

A self-administered questionnaire based on a literature review [4,5, 7] was designed to collect information about knowledge, attitude, and practice of using personal protective equipment (PPE) among 4th and 5th-grade dental students in the Faculty of Dentistry, Mansoura, and Delta Universities. The questionnaires were written and distributed among dental students in the 4th and the 5th grades in the English language. The uncompleted questionnaires were excluded.

It was formed of 22 close-ended questions distributed into 4 parts (as shown in table I); the first part: Demographic data questions about the student (gender, Academic year, and university). The second part contained four questions regarding the knowledge of using and changing (PPE) among students. The third part consisted of seven questions about the attitude towards using (PPE). While the fourth part measured the actual practice of using and changing (PPE). It included eight questions. The exact answers for each part were previously determined, based on previous research studies and the experts' opinions in the field. So, each correct knowledge, agreed attitude, and proper practice was previously mentioned.

Statistical analysis:

After data collection, A one-sample Kolmogorov-Smirnov test was used first to check the normality of data. Then, data were analyzed and tabulated using the Statistical Package of Social Science (SPSS) program for Windows (Standard version 24). Numbers and percentages were used to express qualitative data. A Chi-square test of significance was used to investigate the association between categorical variables. When ($p \leq 0.05$), the results were considered significant. The lesser the p-value obtained; the higher significance were the results. Each correct knowledge, practice answer, or positive attitude, was scored as one while the incorrect was scored zero. The total scores were summed, and then the overall percentage was calculated.

Table (I): Questionnaire of using and changing personal protective equipment

Demographic Data	knowledge questions	Attitude questions (Agree- Uncertain- Disagree)	Practice questions (Always- Sometimes- Never)
Gender: -Male -Female **Academic Year:** -4th year -5th year **University:** -Mansoura -Delta	**1. What do you use for your medical uniform? (More than one choice)** -Examination gloves. -Facemask -Protective glasses -Medical scrubs -Medical gowns -Long white coat -Short white coat **2. Gloves should be used:** -For any consultation -For all non-bloody care -Only for bloody care **3. Gloves should be (more than one choice)** -Changed after single use -changed in case of torn -Reused after sterilization -Reused after washing with soap and water **4. The mask should be changed (more than one choice)** -After each patient -Once a day -When become soiled	**1. Do you think wearing gloves before dental practice is necessary?** **2. Do you think changing gloves after each patient is necessary?** **3. Do you think wearing protective eye wear is necessary?** **4. Do you think disinfecting protective eye wear between patients is necessary?** **5. Do you think removing gloves /mask while walking around in clinic is necessary?** **6. Do you think wearing a surgical mask to protect nose and mouth during procedures is necessary?** **7. Do you think wearing long white coat during work is necessary?**	**1. Do you wear gloves before dental practice?** **2. Do you change gloves after each patient?** **3. Does your instructor changes gloves from patient to patient?** **4. Do you wear protective eye wear?** **5. Do you disinfect your protective eye wear between patients?** **6. Do you wear a surgical mask to protect nose and mouth during procedures?** **7. Do you remove gloves/ mask while walking around in clinic?** **8. Do you wear long white coat during work?**

RESULTS

Roughly one thousand questionnaires were distributed among the students (600 for Mansoura and 400 for Delta). After collecting them and excluding the incomplete ones, about 798 of them met the required criteria, as shown in table 1. The response rate was 79.8%. Gender and academic year distribution of the study groups showed higher numbers of females 478(59.9%) and 4th-grade students 402(50.4%) in all the study participants.

TABLE (1): Gender and academic year distribution of the studied groups

Demographic data	**MU** (N=497) n (%)	**DU** (N=301) n (%)
Gender		
Male	188 (37.8%)	132 (43.9%)
Female	309 (62.2%)	169 (56.1%)
Academic Year		
4th grade	252 (50.7%)	150 (49.8%)
5th grade	245 (49.3%)	151 (50.2%)

MU: Mansoura University, DU: Delta University, N: total number of students, n: number of students, %: the percentage.

The correct knowledge, attitude, and practice about using PPE among Mansoura and Delta dental students were demonstrated in table (2). Mansoura University students had higher correct knowledge about the indication of gloves' use and when to change gloves & face masks than those of Delta University students with a significant difference related only to changing gloves (P=0.020). A significantly higher percentage of Mansoura University students agreed to change gloves after each patient, wear surgical masks during procedures, remove gloves while walking around in the clinic, and wear long white coats compared to Delta University students. Delta University students showed higher compliance to most universal precautions. They significantly used protective eyewear, disinfected their eyewear, removed gloves while walking around in the clinic, and wore long white coats more than those of Mansoura University students. In addition, most all Delta University students reported that their instructor changed gloves from patient to patient which is significantly higher than Mansoura University students.

TABLE (2) Knowledge, attitude, and practice of using PPE among Mansoura and Delta dental students.

Variables	**MU** **n (%)**	**DU** **n (%)**	P-value
Correct knowledge			
Indication of gloves	457 (92.0%)	270 (89.7%)	0.279
Changing of gloves	468 (94.2%)	270 (89.7%)	0.020*
Changing of face mask	442 (88.9%)	261 (86.7%)	0.347
Agreed attitude			
Wearing gloves before dental practice	467 (94.0%)	277 (92.0%)	0.055
Changing gloves after each patient	488 (98.2%)	287 (95.3%)	0.008*
Wearing protective eyewear	408 (82.1%)	226 (75.1%)	0.059
Disinfecting eyewear between patients	369 (74.2%)	218 (72.4%)	0.842
Wearing face mask	457 (92.0%)	251 (83.4%)	0.001*
Removing gloves while walking around	349 (70.2%)	207 (68.8%)	0.030*
Wearing a long white coat	399 (80.3%)	209 (69.4%)	0.001*
Always practice			
Wearing gloves before dental practice	444 (89.3%)	268 (89.0%)	0.923
Changing gloves after each patient	485 (97.6%)	288 (95.7%)	0.265
instructor Change gloves from one patient to another	413 (83.1%)	274 (91.0%)	0.001*
Wearing protective eyewear	116 (23.3%)	97 (32.2%)	≤0.001*
Disinfect eyewear between patients	158 (31.8%)	152 (50.5%)	≤0.001*
Wearing face mask	345 (69.4%)	224 (74.4%)	0.267
Removing gloves while walking around	178 (35.8%)	148 (49.2%)	≤0.001*
Wearing a long white coat	233 (46.9%)	187 (62.1%)	≤0.001*

MU: Mansoura University, DU: Delta University, n: number of dental students, %: percentage, *significant p ≤0.05, Data was analyzed by using Chi-Square test of significance.

DISCUSSION

The first line of defense against cross-infection is using personal protective barriers such as gloves, face masks, safety eyewear, and protective outer clothing. [7] In the present study, the majority of dental students in both Universities were wearing gloves before dental practice (89.2%).

This result is encouraging and reveals their increased awareness about the importance of using gloves in their dental practice. It also reflects their knowledge that hands are the main carrier of infectious materials and wearing gloves is a necessary measure of infection control in the dental clinic. [7]

The results of this study are near to (87.5%) that reported by Utomi (2006)[13] in a study among Nigerian dental students. However, many studies conducted among dental students in Brazil, India, and Saudi Arabia found a more elevated percentage (99.5%, 99.3%, and 98.8%) of dental students respectively were wearing gloves during procedures as an essential infection control measure. [14-16]

Most participants in Mansoura and Delta Universities (96.6%) were changing gloves after each patient. The high percentage of wearing and changing gloves among dental students in the current study is reflected from their high attention to the significance of this measure.

These outcomes are compatible with a study carried out by Ahmad et al (2013)[17] in Saudi Arabia, Halboub et al (2015) [18]in Yemen, and Tahir et al (2018)[19] in Pakistan were (98.5%, 96.5%, and 98.5%) of dental students, respectively were changing gloves after every patient.

Conversely, only (69.8%) of dental students disposed of their gloves after a single use in a study performed by Singh et al (2011)[7] among dental students in Central India, which is much lower than the current study.

Using protective eyewear is necessary for protecting the eyes from infectious splatters and aerosols.[20] Unfortunately, only (23.3%) of Mansoura University students and (32.2%) of Delta University students were using protective eyewear during their dental procedures in this study. The lower usage of protective eyewear among dental students might be attributed to their underestimation of the number of splashes and aerosols that their eyes may be exposed to. [14] This may be also due to the lack of knowledge about the hazards of airborne infection transmission. [16]

Inadequate usage of protective eyewear has been found in many studies which are concurrent with the present study. A previous study was performed among dental undergraduate students in a UK dental school by Porter et al (1995)[21] revealed that only (29%) of the respondents used protective eyewear. Also, a study conducted by Wicker and Rabenau (2010)[22] among Greman dental students and professionals showed that (45.3%) of dental students were wearing protective goggles. Another study in Yemen reported that (53.8%) of dental students wore eye protection during their dental work. [18]

In contrast, a survey was done by McCarthy and Britton (2000)[23] among final year dental, medical, and nursing students in Canada found a higher ratio (93.5%) of dental students were always wearing protective eyewear. Furthermore, De Souza et al (2006) [14] reported that 84.2% of dental students were using protective eyewear in their study in Brazil.

Using a protective face mask is necessary for dental students, as it protects their nose and mouth from infectious splatters and aerosols. [24] The present study showed that (69.4%) of Mansoura University students and (74.4%) of Delta University students wore masks during dental procedures. This inadequate rate of wearing masks by dental students may be due to the lack of knowledge about diseases that could be transmitted through the nose and mouth via salivary droplets and aerosols. [18]

These results are similar to that reported in Germany by Wicker and Rabenau (2010)[22] and Central India by Singh et al (2011)[7] were (64%) and (69.8%) of dental students, correspondingly wore face masks for self-protection.

However, A survey carried out by McCarthy and Britton (2000)[23] and De Souza et al (2006)[14] in Canada and Brazil revealed that (90.9%) and (100%) of dental students respectively were wearing a mask while treating their patients which is incompatible with the current findings.

Wearing protective clothing during dental work decreases the hazards of exposure to infectious procedural splashes of saliva and blood. [25] In the present study, approximately half (46.9%) of dental students in Mansoura University and (62.1%) of dental students in Delta University wore the long white coat as protective clothing.

The lower compliance with wearing protective clothing during dental procedures is owing to students' belief that it is not a must which reflects their underestimation of the hazards of cross-contamination.[26] Additionally, it indicates their deficient knowledge about the concentration of splashes and aerosols on the area of their forearms and chest during dental procedures. [18]

This is slightly lower than studies performed by Rahman et al (2013) [27] in UAE and Ahmad et al (2013) [17] in Saudi Arabia who stated that only (68.9%) and (59%) of dental students, correspondingly were wearing protective clothing during dental treatment.

However, a lower ratio (27.8%) of Indian dental students wore protective clothing while treating their patients as reported by Singh et al (2011)[7] On the contrary, two studies conducted in Saudi Arabia by Al–Maweri et al (2015)[16] and Alharbi et al (2019) [5] mentioned that most dental students (91.6% and 92.1%), respectively wore protective clothing while treating their patients which is higher than the current finding.

Gloves have to be changed instantly after being contaminated or upon completion of dental treatment to avoid cross-contamination. [27] Removing gloves while walking around was reported by (35.8%) of Mansoura University students in comparison to (49.2%) of Delta University students.

This low practice may be attributed to a lack of instructor supervision and the students' concern about the extra cost. It also reflects Delta University students' caution about the cross-contamination caused by infected gloves and availability of the protective materials in the Delta University clinics. The current results were almost similar to a study conducted in Yemen where (53.1%) of dental students removed gloves when leaving the area of patient treatment. [18]

However, These findings are conflicting with a study performed among dental students in UAE by Rahman et al (2013) [27] which reported that (79.8%) of them removed their gloves upon leaving the patient care area.

Dental instructors are considered role models for dental students in complying with infection control principles. Subsequently, dental students are motivated to follow the standard precautions. [14] According to the present study, (83.1%) of Mansoura University students mentioned that their instructors changed gloves from one patient to another compared to (91.0%) of Delta University students.

This finding is hopeful but needs more infection control programs for dental instructors to refresh their knowledge about infection control principles. This outcome is higher than that found in a study performed by De Souza et al (2006)[14] in Brazil where (56.6%) of the instructors changed gloves between patients. Moreover, only (39.8%) of the instructor used gloves during dental procedures.

Mansoura University students had significantly lower practice despite their good knowledge and positive attitude in comparison to Delta University

students. This lower practice among Mansoura University students may be due to lack of (PPE), and cost concerns. Therefore, the use of (PPE) should be obligatory in this educational institution and be necessary for the student's assessment.[17]

This difference between attitude and practice in the two Universities might be owing to the insufficient resources and facilities, the absence of episodic learning programs to remind students about the importance of infection control in the dental clinic, the improper training for practical measures of infection control, and the carelessness of the students. It highlights the students 'need for thorough infection control training during their undergraduate courses.[7]

The present study gathered valuable informations regarding the knowledge, attitude, and practice of using (PPE) among Egyptian dental students as a supplement to infection control practices among the same sample.[28] These informations could be used for the provision of additional future facilities and interventions to improve the awareness and practice of using (PPE) among dental students.

CONCLUSION

Mansoura University students had higher correct knowledge, positive attitude toward using (PPE) over Delta University students. However, Delta University students showed greater compliance.

REFERENCES

1. Binaural S, Al-Drees A, Al-Wehaibi M, Al-Asmary M, Al-Shammery A, Al-Hidri E, et al. Awareness and compliance of dental students and interns toward infection control at Riyadh Elm University. GMC Hygiene and Infection control. 2019; 14:10:1-6. http://doi.org/10.3205/dgkh000326.
2. Arif S, Janjua O, Qureshi S. Knowledge, attitude, and practice of dental students against infection control in allied hospital Faisalabad. Pakistan Armed Forces Medical J. 2019; 69(1): 130-135.
3. Silva O, Palomino S, Robles A, Rios J, Mayta-Tovalino F. Knowledge, Attitude, and Practices of infection control measures in stomatology students in Lima, Peru. J of Environmental and Public Health. 2018: 1-7.
4. Deogade S, Suresan V, Galav A, Rathod J, Mantri S, Patil S. Awareness, knowledge, and attitude of dental students toward infection control in the prosthodontic clinic of a dental school in India. Nigerian J of Clinical Practice. 2018; 21(5):553-559.
5. Alharbi G, Shono N, Alballaa L, ALoufi A. Knowledge, attitude and compliance of infection control guidelines among dental faculty members and students in KSU. J BMC Oral Health. 2019;19 (1):7.
6. Ge Z, Yang L, Xia J, Fu X, Zhang Y. Possible aerosol transmission of COVID-19 and special precautions in dentistry. J of Zhejiang University-Science B. 2020: 361-368.
7. Singh A, Purohit B, Bhambal A, Saxena S, Singh A, Gupta A. Knowledge, attitudes, and practice regarding infection control measures among dental students in central India. J of Dental Education. 2011; 75(3): 421-427.
8. Pandit A, Bhagatkar N, Ramachandran M. Personal Protective Equipment used for Infection Control in Dental Practices. The International J of Hospital Healthcare Administration. 2015; 3(1): 10-12.
9. Javaid M, Kumar R, Abbasi M, Kiyani S, Basharat S. Knowledge, Attitude & Practice regarding use of Personal Protective Equipment (PPE) among Dental Assistants Working at Tertiary Care Hospitals of Multan, Pakistan. J of Liaquat University of Medical & Health Sciences. 2019; 18 (3): 225-230.
10. Meng L, Hua F, Bian Z. Coronavirus disease 2019 (COVID-19): emerging and future challenges for dental and oral medicine. J of Dental Research. 2020; 99(5): 481-487.
11. Izzitti R, Nisi M, Gabriele M, Grzaiani F. COVID-19 transmission in dental practice: a brief review of preventive measures in Italy. J of Dental Research. 2020; 99(9): 1030-1038.
12. Keith S. The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. Research in Science Education J. 2018; 48:1273–1296.
13. Utomi I. Occupational exposures and infection control among students in Nigerian dental schools. Odontostomatolology Tropical dental J. 2006; 29(116): 35-40.
14. De Souza R, Namen F, Joao G, Vieira C, Sedano H. Infection control measures among senior dental students in Rio

de Janeiro State, Brazil. J of Public Health Dentistry. 2006; 66(4); 282-284.

15. Kumar S, Sharma J, Duraiswamy P, Kulkarni S. Infection control practices among undergraduate students from a private dental school in India. Revista Odonto Ciencia. 2009; 24(2): 124-128.

16. Al-Maweri S, Tarakji B, Shugaa-Addin B, Al-Shamiri H, Alaizari N, AlMasri O, et al. Infection control: Knowledge and compliance among Saudi undergraduate dental students. GMS Hygiene and Infection Control. 2015;10: https://doi.org/10.3205/dgkh000253: 1-8.

17. Ahmad I, Rehan E, Pani S. Compliance of Saudi dental students with infection control guidelines. International Dental J. 2013; 63(4):196-201.

18. Halboub E, AL-Maweri S, AL-Jamaei A, Tarakji B, AL-Soneidar W. Knowledge, attitudes, and practice of infection control among dental students at Sana'a University, Yemen. J of Intra Oral Health. 2015. 7(5):15-19.

19. Tahir M, Mahmood A, Abid A, Ullah M, Sajid M. Knowledge, attitude and practice of cross-infection among dental students of Punjab Pakistan. Public J of Medical Studies. 2018; 12(1): 238 – 242.

20. Ozturk M, Ozec I, Kilic E. Utilization of personal protective equipment in dental practice. International Dental J. 2003; 53(4); 216-219.

21. Porter S, El- Maaytah M, Afonso W, Scully C, Leung T. Cross-infection compliance of UK dental staff and students. Oral Diseases. 1995; 1(4): 198-200.

22. Wicker S, Rabenau H. Occupational exposures to bloodborne viruses among German dental professionals and students in a clinical setting. International Archives of Occupational Environmental Health. 2010; 83(1):77-83.

23. McCarthy G, Britton J. A survey of final-year dental, medical, and nursing students: occupational injuries and infection control. J Canadian Dental Association. 2000; 66(10): 561-565.

24. Esen E. Personal protective measures for infection control in a dental health care setting. Tuurk J of Hospital Infection. 2007; 11: 143-146.

25. Centers for disease control and prevention by William G. Kohn, Amy S. Collins, Jennifer L. Jennifer A. Kathy J. Dolores M. Guidelines for Infection Control in Dental Health-Care Settings. https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5217a1.htm. 2003.

26. El-refadi R, Hegazy S, Yakot G. Knowledge, attitude, and practicing of dentists regarding infection control measures in Benghazi city dental clinics- Libya. Master thesis in Dental Public Health and Preventive Dentistry, Faculty of Dentistry, Mansoura University. 2015: 55-67.

27. Rahman B, Abraham S, AL Salami A, ALKhaja F, Najem S. Attitudes and practices among senior dental students at the college of dentistry, the University of Sharjah in the United Arab Emirates. European J of Dentistry. 2013; 7(1):15-19.

28. Ghada Ezzat Al-Hindawy, Nasr Mohamed Attia, Salwa Adel Hegazy. Evaluation of Knowledge, Attitude, and Practice of Infection Control principles Among A Sample of Egyptian Dental Students. Mansoura J of Dentistry 2021;8(29):10-16