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Original Research Paper

Infection Control Knowledge and Attitudes Among Dental Technicians In Benghazi City–Libya

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ABSTRACT:
Background: Potential disease transmission in the dental environments well documented. As well as dental technicians are exposed to a potential risk for infection transmission during work activity. Therefore, Infection control is an essential part in dental practices and dental technicians should strictly adhere to the standard precautions in order to prevent potential risks of cross contamination, thereby producing a safe environment for patients and staff. : The aim of this study was to evaluate the level of knowledge and attitude among dental technicians toward infection control protocols at the dental laboratories, Benghazi – Libya. **Materials and Methods**: A descriptive cross-sectional study was conducted among dental technicians. Selected from dental laboratories (public and private) at Benghazi, Libya. Using a pre-tested, self-administered questionnaire. The data was collected and analyzed by using SPSS software. **Results:** About 43.3% of sample who worked in public dental laboratories, 37.8% of them were in private dental laboratories and just 18.9% of them work in both. While about 62% of them had sharp injures during work. About 65.5% of participants who work in public were aware that wearing a personal protective equipment is mandatory during work. Where overall mean of participants who work in both (public and private laboratories) had the significant highest level of attitude and good practice. **Conclusion and recommendation**: Educational programs aimed at improve dental technicians' knowledge of infection control by adopting the most effective prevention measures are essential for reducing the incidence of technicians, dentists, and patients exposure.

Key words: dental technicians, dental laboratories, knowledge, attitude and practice, infection control.

INTRODUCTION:

Infection control in dentistry represents a main concern in relation to the perceived risk to which the professionals and patients are exposed [(1)] .Before 1970s, infection control was not performed in dental laboratories though there was a major concern on handling of items from “high-risk patients”. It was later realised that microorganisms could survive on saliva and blood and that any patient could be a source of infection. [(2)] A dental laboratory is an area where dental technicians/technologists can get infected mainly from the dental clinics.[(3,4)] Where ,the prosthodontics procedures still offer many opportunities for cross-contamination during the manipulation of specific items between the dental office and the dental laboratory .In addition, infection can be transferred from cast to the dental technician by surface contact, hand-pieces, burs, aerosols, unwashed hands or handled without gloves and masks wearing etc. [(5,6)] As a result, infection control became apparent and has now resulted in impressive protocols to prevention of disease spread in the dental office and laboratories [(7)] . Infection control in dental laboratories was first recommended by American Dental Association (ADA) through its recommendations and guidelines of the Centres for Disease Control (CDC). It was published first in 1986 and revised in 1993 [(8)].

Furthermore, the centers for disease control define standard precautions as "any standard of care designed to protect health care personnel and patients from pathogens that can be spread by blood or any other bodily fluid, excretion, or secretion. [9] Standard precautions include hand washing, sharp safety, safe injection practices, sterile instruments and devices, clean and disinfected environmental surfaces, and the use of personal protective equipment (PPE).[10] Many of studies evidence that ,first step to improve an infection control measures in dental laboratories by changing their behavior. [11] In addition, these studies report that better practice was associated with better knowledge and better attitudes. [12] Besides that, we need to evaluate the awareness and attitude level of dental technicians toward infection control. Because if they had a lack in awareness and attitude. Should be initiated education programs to improve their practices and policy of infection control measures in dental laboratories.

MATERIAL AND METHODS:

Nonprobability convenience sampling was utilized to take the sample from an accessible population, it was carried on100 technicians working at dental laboratories (private and public) in Benghazi, Libya during 2021-2022. The purpose of this research was explained to the participations, to protect the privacy and confidentiality of participants, the survey was kept anonymous with no identifiable information. A self-administered close ended questionnaire adapted from references to assess the dental technician's knowledge and attitude regarding infection control procedures. [1,5,6,13,14,15] The survey instrument had been pilot studied through questionnaire with twenty dental technicians working in dental laboratories (public and private). Responses from the pilot test were analyzed to assess the clarity and relevance of the questions, and some modifications were made. Demographic statue such as gender, age, years of professional activity and workplace was recorded. The respondents asked about their knowledge and attitude of infection control measures: hand washing, use of gloves, protective eyeglasses, receiving of impression in laboratory, disinfection of impression, etc. The data was entered and tabulated into a computer using the Statistical Package for Social Science (SPSS Version 20 for Windows, SPSS Inc. Chicago, IL). Data analysis included descriptive statistics and knowledge, attitude scores were calculated to obtain the level of awareness and attitude of dental technicians toward infection control measures.

RESULTS:

Ninety dental technicians had participated in the study. About 37.8% of sample were from governmental sector, 43.3% from private sector and 18.9% of them were worked in both sectors. 61.1% of the participated were males and 38.9% were females. Majority of the participants 71.1% had at least 10 years of experience in practice (Table 1) Regarding the general protection, the technicians claimed that they are vaccinated against hepatitis B virus at a rate of 68.0% (Figure 1).With more than half of the participants with a history of an exposure to sharp injuries 62.0% during work (Figure 2) In knowledge's evaluation found that the private group had the significant highest correct answers (94.9% and 84.6%) regarding washing hands before work and personal protective equipment is mandatory for all laboratory tasks respectively (Table 2).

The percentage of dental technicians (82.4%) who work in both of public and private lab had the insignificant highest awareness regarding that the disinfection can be prevent the cross infection from clinic to lab. However, just 26.5% of them were aware to that disinfected acrylic items store in sealed plastic bag containing (Table 2).

About the knowledge regarding disinfection of the impressions received in the laboratory, most of dental technicians 86.2% and 87.2% from public and private labs respectively responded that they disinfect all the impressions they receive from clinics. (Table 2)

Regardless the technicians attitude, the most of the technicians adhered to changing torn gloves during work (76.5%),(87.2%) for public and private laboratories respectively, and use facial masks 70.6%,79.5% public and private respectively. On the other hand, the use of goggles was lower among technicians working at public labs (52.9 %) in comparison with those working at private labs (74.4%) with statically significant difference. (Table 3)

There was a significant relation between work places. Participants who work in public laboratories had the significant lowest level of knowledge and attitude regarding infection control measures. (Table 4)

Figure (1) : Distribution of hepatitis B vaccination:

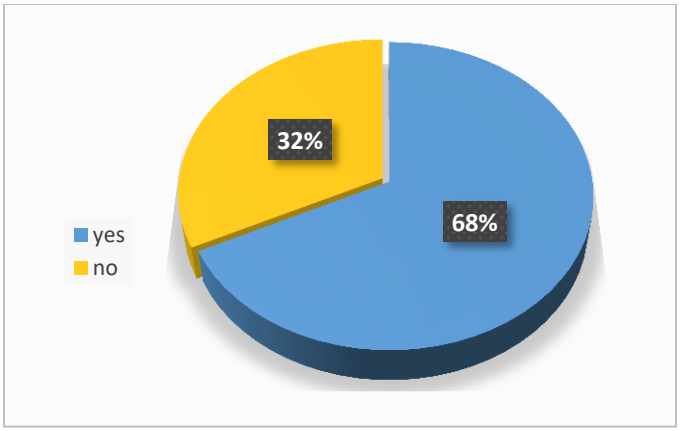

Figure (2): Show percentages of sharp injuries during work.

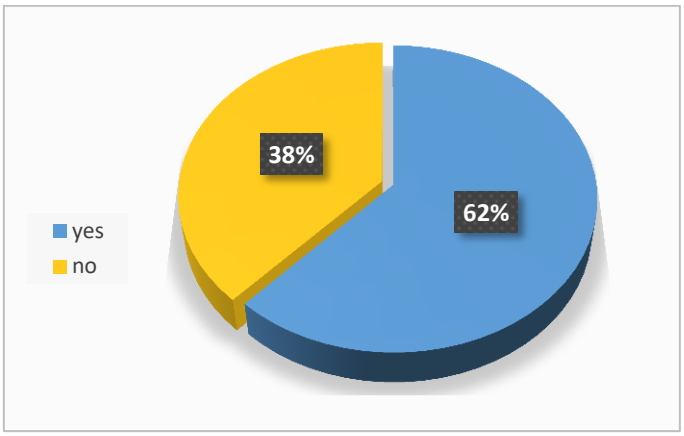

Table (1): The socio-demographic characteristics of participants.

Variables		Number (N)	Percentage (%)
Gender	Male	55	61.1%
	Female	35	38.9%
Age (years)	20 - 30	37	41.1%
	31 – 40	38	42.2%
	41 – 50	11	12.2%
	more than 50	4	4.4%
Years of work	<= 10 years	64	71.1%
	11 - 20 years	20	22.2%
	> 20 year	6	6.7%
Work place	Public	34	37.8%
	Private	39	43.3%
	Both	17	18.9%

Table (2): Infection control knowledge among dental technicians

Knowledge questions	Public		Private		Both		Chi – square	P - value
	Correct	incorrect	Correct	Incorrect	Correct	Incorrect		
Washing hands before work	76.5%	23.5%	94.9%	5.1%	100%	0%	8.847	0.01**
Personal protective equipment is mandatory for all laboratory tasks	65.6%	34.4%	84.6%	15.4%	100%	0%	6.977	0.031**
Wearing of gloves before work	67.6%	32.4%	74.4%	25.6%	76.5%	23.5%	0.596	0.742
Wearing of protective clothes during work is necessary	88.2%	11.8%	81.6%	18.4%	100%	0%	3.697	0.157
Disinfection can be prevent the cross infection from clinic to lab	70.6%	29.4%	79.5%	20.5%	82.4%	17.6%	1.183	0.554
Disinfecting the impression is necessary	86.2%	13.8%	87.2%	12.8%	88.2%	11.8%	0.023	0.989
Disinfected acrylic items store in sealed plastic bag containing	26.5%	73.5%	38.5%	61.5%	29.4%	70.6%	1.272	0.529
The best method of instruments sterilization	88.2%	11.8%	92.3%	7.7%	94.1%	5.9%	0.606	0.739
Use of the chemical sterilization	41.2%	58.8%	41.0%	59.0%	41.2%	58.8%	0.000	1.000

Table (3): Infection control attitude among dental technicians.

Attitude questions	Public		Privat		Both		Chi - square	P - value
	Positive	Negative	Positive	Negative	Positive	Negative		
Changing torn gloves	76.5%	23.5%	87.2%	12.8%	100%	0.0%	5.224	0.073
Wearing goggles (eyes glass) during procedures	52.9%	47.1%	74.4%	25.6%	100%	0.0%	12.571	0.002**
Wearing a surgical mask during procedures	70.6%	29.4%	79.5%	20.5%	94.1%	5.9%	3.782	0.151
Laboratory should have a separate receiving area	85.3%	14.7%	94.9%	5.1%	94.1%	5.9%	2.291	0.318
The dental cast and the fabricated items should be transferred in very close package	73.5%	26.5%	76.9%	23.1%	82.4%	17.6%	0.496	0.780
a proper disposal system for waste in the laboratory is important	73.5%	26.5%	84.6%	15.4%	100%	0.0%	5.799	0.055
Dental personals should discard the protective gears after every shift of working hours	82.4%	17.6%	74.4%	25.6%	94.1%	5.9%	3.072	0.215

Table (4): The mean value of overall scores of good knowledge , high attitude and good practice among dental technicians

	Gender		Mann - Whitney	P - value	Age				Kruskal Wallis Chi-Square	P – value
	Male	female			20 - 30	31 - 40	41 –50	More than 50		
	Mean Rank				Mean Rank					
Knowledge	**45.82**	**45.00**	**945**	**0.881**	**47.68**	**44.09**	**34.82**	**68.13**	**5.567**	**.135**
Attitude	**47.08**	**43.01**	**875.5**	**0.448**	**47.80**	**43.61**	**35.05**	**71.00**	**6.713**	**.082**

	Years of work			Kruskal Wallis Chi-Square	P - value	Work place			Kruskal Wallis Chi-Square	P – value
	<= 10 years	11 - 20 year	> 20 year			Public	private	both		
	Mean Rank					Mean Rank				
Knowledge	**45.08**	**44.70**	**52.67**	**.521**	**.771**	**39.84**	**44.13**	**59.97**	**7.309**	**.026****
Attitude	**45.50**	**42.68**	**54.92**	**1.123**	**.570**	**37.69**	**45.03**	**62.2**	**11.082**	**.004****

DISCUSSION:

The use of effective infection control procedures in the dental office and the dental laboratory will prevent risk of cross-contamination.[16] As well as ,dental technicians should strictly adhere to the standard precautions in order to produce a safe environment for patients and staff. [13] Successful practice of infection control depends on the ability to understand the need for this dynamic concept with the proper implication of method and knowledge.[17] Understanding the level of the knowledge and attitude of dental technicians regarding infection control measures is important ,as it can help gathering as base line data to assess existing situation ,also to control infection and promote healthy system in dental laboratories. Out of 100 questionnaires distributed among dental technician, 90 returned to the researcher, giving a response rate of 90 %, which was greater than North India and Nigeria. [5,15] However , this rate was less than Jordan and Saudi Arabia . [11-12]This high rate is presumably due to the importance of the issue of infection in dental laboratories and because technicians recognize that dental laboratories are important as dental clinics in following infection control programs to create a safe environment. Globally, sharps injuries are the most widely recognized occupational hazards for blood exposure which result in transmission of blood-borne infections .[18-19] .Dental technicians are exposed to a high risk of injuries, about 62% of respondents had answers with YES, when they were asked about exposure to sharp injuries in this study. This rate is lesser than percentage reported in Saudi Arabia (72.7%) . [13] This can be due to their limited orientations or limited experience during work.

Dental laboratory technicians are at risk of cross-contamination from the clinical items they receive and handle from dental offices. [19]The use of protective measures is important to prevent this infection. [21] Therefore, while working in the dental laboratory, a dental technician/ technologist should always use personal protective equipment such as gloves, masks, goggles and lab coats. [21-22] Results of this study, report that almost of the technicians (84.6%) who work in private laboratories are aware of wearing PPE being mandatory for all laboratory tasks. This rate is greater than percentage reported in a study of Riyadh (42%) .[13] This can be due to lack of their knowledge regarding important of wearing protective equipment in controlling the infection during dental practices.

Disinfection of prosthetic items is an important step in preventing the transmission of the diseases in the conditions of an efficient collaboration between the dental laboratory and the dental practice [14,15,22,23,24]. In this study , less than half of technicians who work in public group (26.5%) aware that disinfected acrylic items stored and carried in sealed plastic bag .This rate is lesser than percentage reported in Riyadh Where 44 % of technicians used a plastic bag to carry impressions. .[13] However, 81.3% of dental laboratory personnel in Iasi practiced that regularly disinfect prosthetic items and store before sending them to the dental office ,[1] where just 20% was in Jordan laboratories .[14] This can be due to inadequate knowledge concerning disinfection of prosthetic items how it is an important step in preventing the transmission of pathogenic microbes. .Also some of technicians lack of aware about packaging and transferring of prosthetic items. The waste produced in dental laboratories has been the subject of investigations for many years, and these wastes have important health effects and are dangerous to humans and the environment . [25-26) More than half of public group(73.5%) have positive attitude about a proper disposal system for waste in the laboratory is important ,this is higher than percentage of the Saudi study (57%). [13] On the other hand, the rate reported in North India was 94.0%.[5] This can be due to deficiency in their information regarding the important of waste management and how it effects in occupation hazards and leads to risk. However this study faced some limitations as absence of accurate records for the actual number of dental technicians in either public and private clinics .Therefore , we could not calculate the sample size exactly and selected a convenience sample during period of research .

Conclusion and recommendation:

The present study concluded that dental technicians who had less experience and work in public laboratories had poor awareness and negative attitude in compare to other groups. Therefore ,educational programs aimed at improve dental technicians' knowledge of infection control by adopting the most effective prevention measures are essential for reducing the incidence of technicians, dentists, and patients exposure.

REFERENCES:

1.Carina B, Barlean M, Bobu L and Popescu E. Evaluation of infection control knowledge and attitudes among dental technicians in Iasi. Romanian. Journal of oral rehabilitation.2018; 10:1-2

2. Miller CH. Infection control. Dent Clin North Am. 1996; 40: 437-456. Ref.: https://goo.gl/cFmEUm .

3. Verran J, Kossar S, McCord JF. Microbiological study of selected risk areas in dental technology laboratories. J Dent. 1996; 24: 77-80. Ref.: https://goo.gl/oOZBkZ 4.

4. Dental Laboratory Relationship Working Group of the Organization for Safety and Asepsis Procedures (OSAP). OSAP Position Paper: Laboratory Asepsis. 1998. Ref.: https://goo.gl/HolAzn

5 .Gupta S, Rani S and Garg S. Infection control knowledge and practice: A cross-sectional survey on dental laboratories in dental institutes of North India. The Journal of the Indian prosthodontic society.2017; 17:348-350.

6. Noor M, Aceil K, Karem H and Omar F. "Disinfection of dental impressions: knowledge and practice among dental technicians." Clinical, cosmetic and investigational dentistry. 2019; 11: 103-105

7.Kilimo C and Simiyu N. "Infection control mechanisms employed by denal laboratories to prevent infection of their dental technicians\technologists." Journal of oral health and craniofacial science .2016; 11:3-12.

8. Cottone JA, Terezhalmy GT, Molinari JA. Practical Infection Control in Dentistry. 2nd edition. USA. 1996; Williams &Wilkins. Ref: https://goo.gl/nexrVc.

9. CDC guidelines for infection control in dental health-care settings-2003.; 52: 11-17.

10 .Ajantha H, Kumar B. Infection control in the dental office-A review. Indian Journal of Dental Advancements 2011;3(03):577-82.

11. Kretzer E and Larson E. Behavioral interventions to improve infection control practices .Am infect control .1998; 26: 245-253.

12. Aboelela S, Stone P and Larson E. Effectiveness of bundled behavioral interventions to control healthcare-associated infections: a systematic review of the literature. J Hosp Infect 2007; 66: 101-108.

13. .Khulud A, Sulten B, Aljwharah A , Ebtihal S and MashealH. Infection control awareness level among dental laboratory technicians, Riyadh, Saudi Arabia." Journal of family medicine and primary care.2021; 10:1540-1544.

14 .AL Dwairi Z. "Infection control procedures in commercial dental laboratories in Jordan." Journal of dental education. 2007; 71:1223-1227.

15. Keredolu P, Sofola O and Jokomba O. Assessment of knowledge and practice of cross infection control among Nigerian dental technologists. Niger Postgrad Med J 2006; 13:167-71.

16 .Moh.gov.sa. 2018. Manual of Infection Prevention & Control in Dental Settings.

17.Nimonkar S, Belkhode V, Godbole S, Nimonkar P, Dahane T and Sathe S. Comparative evaluation of the effect of chemical disinfectants and ultraviolet disinfection on dimensional stability of the polyvinyl siloxane impressions. J IntSocPrev Community Dent. 2019; 9:152-8.

18 .Beayou H, EL-Refadi R , Darrat A. The Prevalence of Needle Stick Injuries among Dental Students .The scientific Journal of University of Benghazi, 2020 :33(1);16-19.

19 . Wilburn S and Eijkemans G. Preventing Needle Stick Injuries among Health care Workers: A WHO– ICN Collaboration. Int J Occup environ health.2004; 10:451-6.

20. Junevicius J, Alvydas P and Algimantas S. "Transmission of microorganisms from dentists to dental laboratory technicians through contaminated dental impressions." Stomatolbaltic dent maxillofac J.2004; 6:20-23.

21.Kimondollo P. Developing a workable infection control policy for the dental laboratory. J Prosthet Dent. 1992; 68: 8-974.

22.USA Guidelines for Infection Control in Dentistry Septembe.2004.Available:http://www.brooks.af.mil /dis/infcontrol.htm.

23 .Afsharzand Z, Rashedi B and Petropoulos V. Dentist communication with the dental laboratory for prosthodontic treatment using implants.JProsthodont. 2006; 15:202-207.

24 .Muhammad W. "An overview of dental impression disinfection techniques-a literature review." 2018; 27:207-208

25..Nabizadeh R, Faraji H and Mohammadi A. Solid waste production and its management in dental clinics in Gorgan, Northern Iran. The international journal of occupational and environmental medicine. 2014; 54: 216-218.

26. Satheesh B, Ali S, Maiie M, Rami M, Ayyob E and Sujatha S. "The dental solid waste management in different categories of dental laboratories in Abha city, Saudi Arabia." The open dentistry journal .2015; 9:449-501.