Knowledge, attitude and practice of infection control measures among dentists of Peshawar Pakistan: A Cross sectional study

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Abstract

Objective: To assess the knowledge, attitude and practice of infection control measures in dentists in Peshawar Pakistan.

Methodology: This was a cross sectional study. The data was collected from three hospitals and private clinics of Peshawar from The sample size were calculated as 218. Dentists of any age or any race of both genders were included in the study if they were with at least qualification of bachelor of dental surgery, practicing in Peshawar and having at least one year of clinical experience. The questionnaire used for data collection was adopted from a similar studies conducted in Karachi Pakistan and Saudi Arabia. Data was analyzed through SPSS.

Results: Total 218 (148 male and 70 female) dentists were included in the study. The mean age of the participants of was 32.66 ± 7.88 years. 99.1% were sterilizing instruments by autoclave. 94% believed that ineffective sterilization results in cross infections. 98% believed that isolation is necessary to prevent cross infection. 72% dentists thought that wearing gloves didn't replace the need of hand wash. 98% were taking medical history of their patients before treatment. 88.1% and 96.8% were washing their hands before and after dealing with patients. 96.8% were using gloves and 88.1% were wearing face mask during treating their patients. 95% were using sterilized instruments.

Conclusion: Dentists in Peshawar have good knowledge regarding infection control. Majority of them showed positive attitude and were involved in good practice regarding infection control in their clinical setups.

Keywords: Infection Control, personal protective equipment, pathogens

Introduction

Healthcare professionals including general physicians, dentists, nurses and medical laboratory professionals are among the groups at the hazard of blood-borne pathogen transmission.[1] The mouth is a natural habitat for a huge number of microorganisms. Therefore, dentists are exposed and very prone to many hazards during different dental procedures including cross-infection of blood-borne pathogens.[2] Cross infection is a term used for the transmission of pathogens between staff and patients within a clinical setup. Various microorganisms can be spread very easily in a dental clinical setup, such as Hepatitis BVirus (HBV), Hepatitis CVirus (HCV), Human Immunodeficiency virus(HIV) as well as other viruses and bacteria.[3] These infections can be spread via several ways; either via direct contact with blood or saliva contaminated by blood, indirectly via touching infected instruments or through hair-borne contaminants in either aerosol or splatter.[4]

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A study conducted in Brazil concluded that the cleaning and sterilization of instruments, pliers, and bands, besides the use of Personal Protective Equipment (PPE), received positive and unvarying responses. Only orthodontists trained for more than 13 years choose using glutaraldehyde for sterilization or disinfection of pliers.[5] Indian and Iranian dentists showed satisfactory level of knowledge and attitude regarding HIV, HBV and HCV infections, but little gaps were noticed which suggested that advanced level of knowledge of dental professionals plays a very vital role in constructing the practices and attitudes about patients diagnosed with HBV, HCV and HIV.[1,6] A study reported that almost 80% of Nepalese dentists and medical practitioners have poor knowledge regarding infection control and majority of them showed a positive attitude towards infection control in current COVID-19 pandemic.[7] According to a study on Lebanese dentists reported that 96% dentists were positively engaged in infection control while 90% of them had received vaccination for HBV. The similar study revealed that only 43% dentists worked with protective eyewear and a significant association was present between PPE and gender of dentists.[8] Another study conducted in South Korea revealed that the nasal carriage rate of Methicillin-Resistant Staphylococcus Aureus (MRSA) in dental health care professionals was 2.9% which was too high as compared to the rate in general population but was also less than the rate in the other health care providers.

They suggested that additional education and knowledge of dental health care workers regarding MRSA may help in its infection control in dental clinical setups.[9] Among South Korean dentists there was positive significant correlation between practice and attitude towards infection control.[9]

Another survey from turkey regarding infection reported that Turkish dentist have moderate knowledge regarding various procedures of infection control. Enhanced knowledge and observance with the recommended procedures of infection control is necessary for the control of infections. They also suggested that continuation of such education and short courses regarding infection control will help in the enhancement of knowledge of dentists.[10] Similarly another study reported that Brazilian dentists have good knowledge regarding care on AIDS/HIV comprising of various biosafety measurements as well regarding the oral manifestations correlated associated with AIDS. They revealed that necrotizing ulcerative gingivitis, oral candidacies and hairy leucoplakia were among the manifestations which more associated with HIV without any difference between the both genders.[11]

Among dentists practicing in Mumbai the preventive measures and awareness regarding biological risks and occupational hazards were consistent with guidelines regarding infection control published in the literature.[12] Practices of dental technicians from Jordon were not satisfactory in impressions disinfection and therefore there is ultimate need of creating awareness through educational programs regarding impression disinfections.[13] Dentists from Sweden and Norway were very aware of control measures of endodontic infections as they were taking necessary measures to construct and maintain aseptic environment during endodontic treatment.[14] Researchers in Saudi Arabia recruited dentists from 23 different countries to assess knowledge and attitude towards disinfection in COVID-19 pandemic. They revealed that the mean score of knowledge out of 12 was 4.19 which mean participants have poor knowledge while there was positive attitude regarding disinfection.[15]

About 94 % dentists in Germany were vaccinated against Hepatitis B virus and 33 % German dentist think there is high risk of blood borne diseases transmission.[16] Among German dentist 94% were practicing the wearing of gloves while 87% were practicing use of surgical mask and protective goggles were only using by 67%.[16]

A study from Pakistan reported that dentists should encourage their patients to questions their dentists when they visit them for dental treatment regarding cross infection control measures in order to decrease the risk of being infected for them.[17] A study reported that Pakistani dentists from Karachi have satisfactory knowledge, attitudes and practice regarding infection control.[18,19]

Knowledge and practices of dentists regarding measures for infection control is very important not only for themselves but for their patients as well. Further, to the authors best knowledge there is lacking of literature in private dental practitioners in Pakistan particularly in Peshawar regarding knowledge attitude and practice regarding infection control in clinical practice so this study was designed to assess the knowledge, attitude and practice of dentists regarding infection in Peshawar. The findings of this study will also help the authorities to arrange seminars and workshops for dentists regarding infection control in practice.

Material and Methods

The current study was a cross sectional study and data was collected from the dentist, working in various hospitals of Peshawar like, Khyber collage of dentistry (KCD), Sardar Begum Dental Hospital and Northwest General Hospital and Research Center. Data was also collected from dentists practicing in private clinics as well. Convenience sampling technique was used for data collection. Sample size was calculated online via Rae soft software. Margin of error was taken as 5%. The investigators choose Confidence level as 95%. Estimated population of dentist in Peshawar was taken as 500 while the response rate was selected as 50%. After these parameters the sample size calculated was 218. The duration of the study was 4 months i.e. from April 2021 to July 2021.

Inclusion Criteria was all the dentists of both gender of any race, Willing to participate in the study, At least have Bachelor of Dental surgery, Practicing in Peshawar in hospital or private setup, Clinical experience of at least one year And the Exclusion Criteria was participants were excluded in the study was. Non practicing dentists

Data collection procedure

After approval of the study proposal and ethical consideration from the internal graduate committee of IPMS, Khyber medical university Peshawar permission from Director was obtained for data collection. Permission for data collection was taken from the superior authorities of the hospitals and owners of private clinics. Participants who are willing to participate were screened for eligibility criteria. Informed consent was signed from all the eligible participants. Data was collected from the participants meeting the eligibility criteria through a questionnaire which was adopted from two similar studies published in Saudi Arabia and Pakistan (2,18). Initially the data was collected for a pilot study. The questionnaire was checked for the reliability (internal consistency) via Cronbach's alpha. The questionnaire was adopted for the further study as the Cranach's alpha value was 0.8 which was in the acceptable range (α=0.7-1). The questionnaire includes separate sections for demographic data, knowledge (9 Qs), attitude (5 Qs) and practice (14 Qs) of dentists regarding infection control measures.

Data analysis procedure

Data was analysed through SPSS version 25.0. Descriptive statistics was applied. Frequency and percentages of the categorical variables (e.g. gender, dichotomous questions etc.) was calculated and was graphically presented through bar charts. Mean and standard deviation along with minimum and maximum values was calculated for quantitative variables (e.g. Age) and was graphically presented through histogram.

Results

Age of participants

The mean age of the participants was 32.66 ±7.88 years. The minimum age was 23 years and the maximum age was 61 years.

Table 1: Age of participants

Total participants	218
Mean Age	32.66 years
Std. Deviation	7.888
Minimum Age	23 years
Maximum Age	61 years

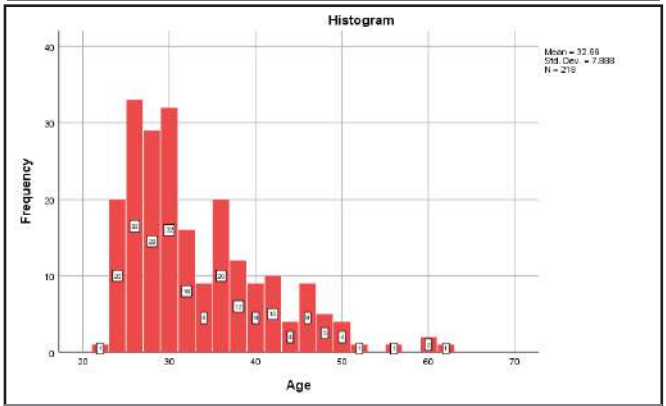

Figure 1: Age of the respondents

Gender

Among total 218 participants 148 (67.9%) were male while 70 (32.1%) were female.

Table 2: Gender of the participants

	Frequency	Percent
Male	148	67.9
Female	70	32.1
Total	218	100.0

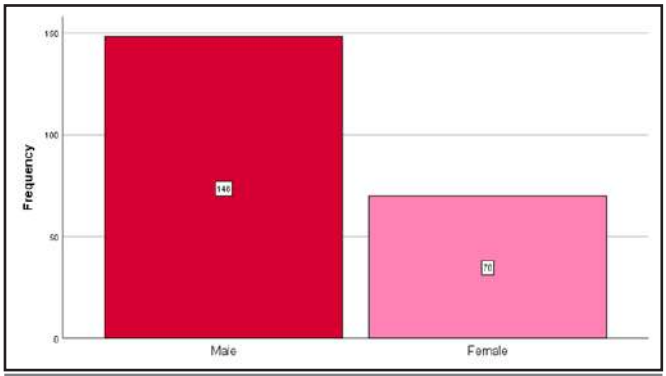

Figure 2: Gender of the respondents

Experience of respondents

Among 218 dentists 105 (48.2%) had experience of less than five years while 66 (30.35%) have clinical experience of five to ten years and 47 (21.6%) had experience of more than 10 years.

Table 3: Experience of respondents

	Frequency	Percent
Less than five years	105	48.2
5-10 years	66	30.3
more than 10 years	47	21.6
Total	218	100.0

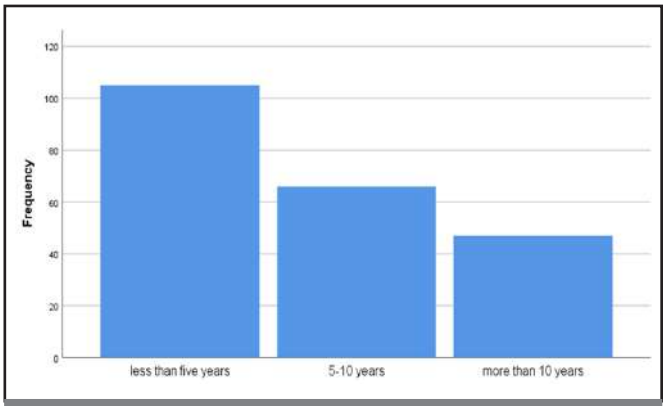

Figure 3: Experience of respondents

Vaccination against disease

Among 218 dentists only 108(49.5%) were vaccinated against Hepatitis B, only 2(0.9%) were vaccinated against Tuberculosis only, 28(12.8%) were vaccinated against Tetanus and BCG, 2411.0%)(had not done any vaccination while 56 (25.7%) have got all vaccines i.e. Hepatitis B only Tuberculosis only Tetanus and BCG.

Table4: Vaccination against disease

		Frequency	Percent
	Hepatitis B only	108	49.5
	Tuberculosis only	2	.9
	Tetanus and BCG	28	12.8
	None of the above	24	11.0
	All of the above	56	25.7
	Total	218	100.0

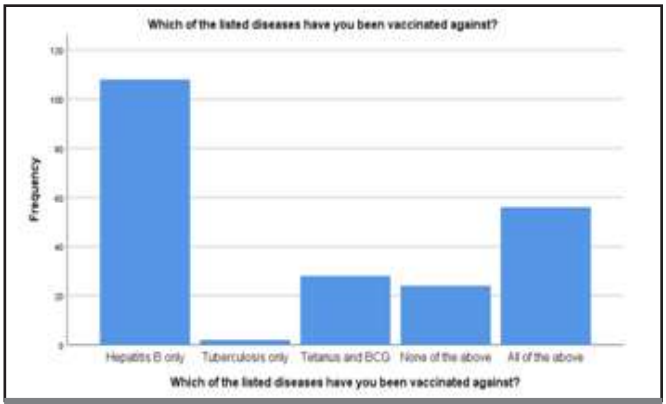

Figure 4: Vaccination against disease

Sterilization of instruments

Among 218 dentists 216(99.1%) were sterilizing instruments only2 (0.9%) were not sterilizing instruments.

Table 5: Sterilization of instruments

		Frequency	Percent
	No	2	.9
	Yes	216	99.1
	Total	218	100.0

Out of 218, 217(99.5%) were using autoclave for sterilizing instruments while only 1(0.5%) was sterilizing instruments by washing and disinfecting.

Table 6: How do you sterilize?

		Frequency	Percent
	Autoclave	217	99.5
	Washing and Disinfecting	1	.5
	Total	218	100.0

Among 218, 8(3.7%) agreed that the minimum time required for autoclaving is 5 minutes, 53 (24.3%) agreed on 10 minutes and 157(72.0%) agreed that minimum time is 15 minutes

Table 7: Minimum time required for autoclaving is?

		Frequency	Percent
	5 minutes	8	3.7
	10 minutes	53	24.3
	15 minutes	157	72.0
	Total	218	100.0

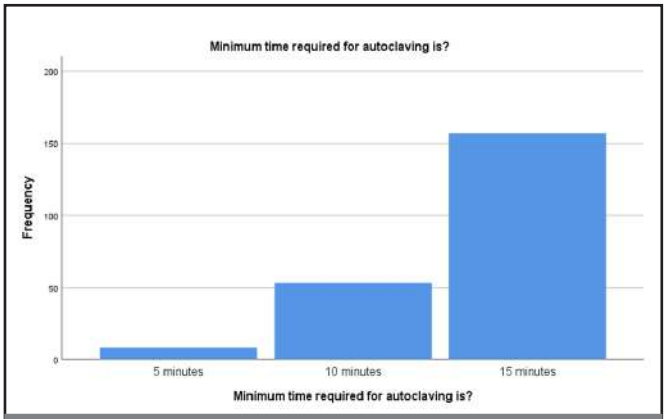

Figure 5: Minimum time required for autoclaving is?

Among 218 28(12.8%) agreed on that the optimal temperature for autoclaving is 100 centigrade at 15 lbs, 183(83.9%) agreed on temperature of 121 centigrade at 15 lbs, only 7 (3.2%) said that the optimal temperature is 150 centigrade at 150lbs

Table 8: Optimal temperature

		Frequency	Percent
	100 centigrade at 15 lbs.	28	12.8
	121 centigrade at 15lbs	183	83.9
	150 centigrade at 15lbs	7	3.2
	Total	218	100.0

206(94.5%) dentists revealed that ineffective sterilization results in cross infection, 9(4.1%) revealed that ineffective sterilization does not cause cross infection while 3(1.4%) were unaware of effects of ineffective sterilization.

Table 9: Effects of ineffective sterilization

		Frequency	Percent
	Yes	206	94.5
	No	9	4.1
	Don't know	3	1.4
	Total	218	100.0

Regarding the disease which has the highest rate of transmission via saliva 99(45.4%) said that it is hepatitis B, 11(5.0%) said it is AIDS, 88(40.4%) said it is Tuberculosis while 20 (9.2%) were did not have any knowledge regarding this

Table 10: Transmission of disease via saliva

		Frequency	Percent
	Hepatitis B	99	45.4
	AIDS	11	5.0
	Tuberculosis	88	40.4
	Don't know	20	9.2
	Total	218	100.0

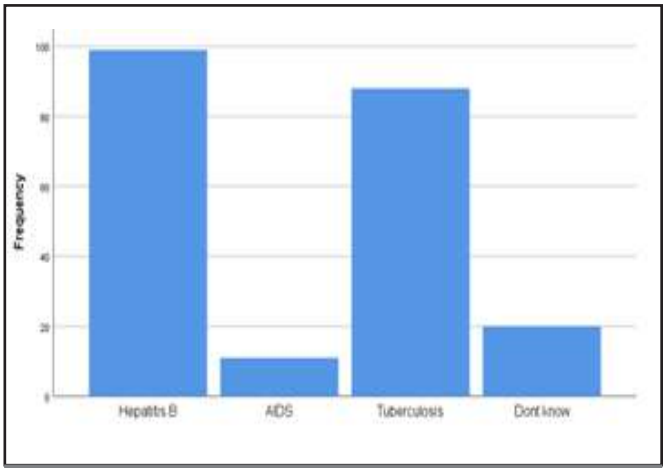

Figure 6: Transmission of disease via saliva

Immediate actions taken after contact with blood of HIV patient

In case of contact with the blood of HIV patient among 218 138(51.8%) revealed that immediate action is administration of Anti HIV Igs, 44(20.2%) said that Anti HIV drugs should be administered, 46(21.1%) said that blood tests should be done immediately while 15(6.9%) were unaware of which action should be taken.

Table 11: Immediate actions taken after contact with blood of HIV patient

		Frequency	Percent
	Anti HIV Igs	113	51.8
	Anti HIV drugs	44	20.2
	Blood tests	46	21.1
	Don't know	15	6.9
	Total	218	100.0

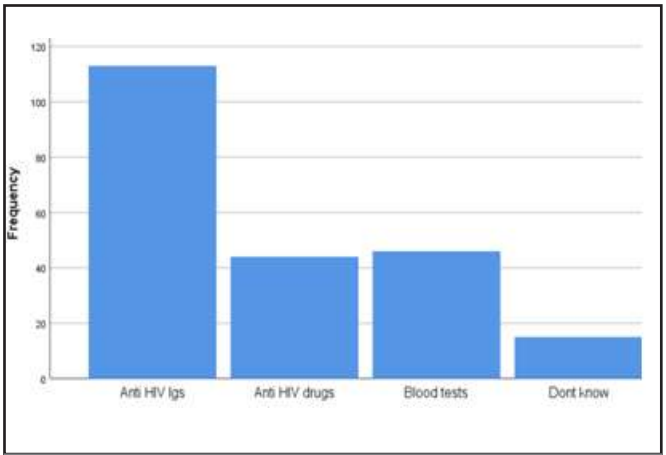

Figure 7: Immediate actions taken after contact with blood of HIV patient

Infections with highest risk of infection

Among 218 119(54.6%) said that HBV has the highest risk of transmission in dental practice, 5(2.3%) said that HIV has the highest rate of transmission in dental practice, 63(28.9%) agreed on HCV while 31(14.2%) did not have any knowledge regarding this.

Table 12: Infections with highest risk of infection

		Frequency	Percent
	HBV	119	54.6
	HIV	5	2.3
	HCV	63	28.9
	I don't know	31	14.2
	Total	218	100.0

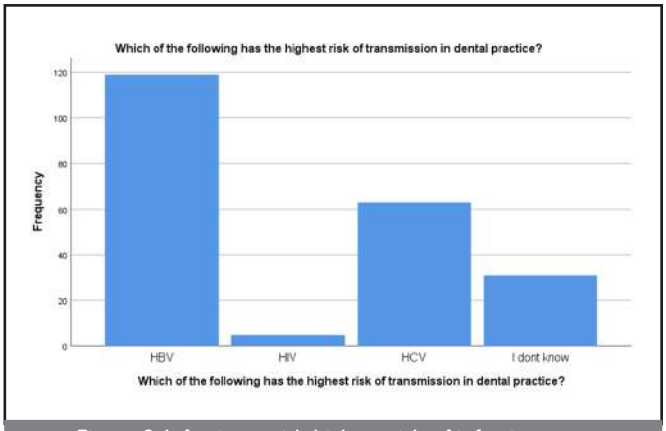

Figure 8: Infections with highest risk of infection

Among 218 (98.2%) reported that isolation is necessary to prevent cross infection while 4(1.8%) reported that isolation is not necessary.

Table 13: Role of isolation

		Frequency	Percent
	No	4	1.8
	Yes	214	98.2
	Total	218	100.0

Among 218 213(97.7%) said that besides sterilizing instruments, disinfection of dental chair is essential while 5(2.3%) said that it is not essential.

Table 14: Disinfection of dental chair and clinic

		Frequency	Percent
	No	5	2.3
	Yes	213	97.7
	Total	218	100.0

Among 218 188(86.2%) agreed that disinfection of the dental unit and chair is required after each patient while 30(13.8%) were not agreed on this.

Table 15: Disinfection of dental unit

		Frequency	Percent
	No	30	13.8
	Yes	188	86.2
	Total	218	100.0

Among 218 157(72%) agreed that wearing gloves did not replace the need of hand wash while 61(28%) agreed that wearing gloves replace the need of hand wash.

Among 218 166(76.1%) were disposing sharp waste in sharp container while 52(23.9 %) were not disposing sharp waste in sharp containers.

Among 218, 115(52.8%) were using eyewear only while working in clinics other than gloves and facemask, 53(24.3%) were using protective clothing only while 50(22.9%) were not using any other.

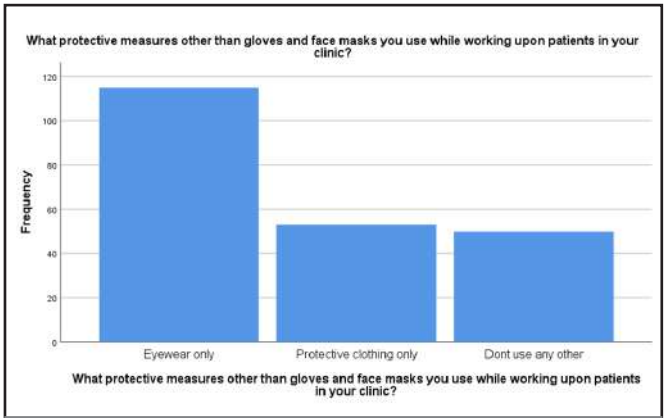

Figure 10 Protective measures other than glove and face masks

Discussion

Healthcare professionals including general physicians, dentists, nurses and medical laboratory professionals are among the groups at the hazard of blood-borne pathogen transmission.[1] The mouth is a natural habitat for a huge number of microorganisms. Therefore, dentists are exposed and very prone to many hazards during different dental procedures including cross-infection of blood-borne pathogens.[2] Cross infection is a term used for the transmission of pathogens between staff and patients within a clinical setup. Various microorganisms can be spread very easily in a dental clinical setup, such as Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Human Immunodeficiency virus (HIV) as well as other viruses and bacteria.[3] These infections can be spread via several ways; either via direct contact with blood or saliva contaminated by blood, indirectly via touching infected instruments or through hair-borne contaminants in either aerosol or splatter.[4]

The aim of the current study was to assess knowledge, attitude and practice of Pakistani dentists. Knowledge and practice regarding infection control measures is very important as Infection control practices in a clinical setup have role in the avoiding the risk of infection not only among the clinicians but also among the patients. Most of the participants were with experience less than 5 years. More than two thirds of the dentists in this study were male. In a study conducted in Saudi Arabia most of the dentists were female.[2] Similarly in another identical study almost two third of the participants were female.[11] The reason behind this contradiction may be because most of the female dentists in Pakistan do not practice or pursue dentistry as a career after graduation.[20] One fourth of the participants were vaccinated against TB, HBV, tetanus and BCG and 75.2% of the participants were vaccinated against HBV. These numbers are very less than those reported in Saudi Arabian study which reported that 90% were vaccinated against HBV which indicates less awareness regarding vaccination against HBV in Pakistani dentists.[2] Another Pakistani study reported that 84.8%bdentists were vaccinated against HBV.[18] Similarly another Saudi study reported that 88% were vaccinated against HBV which are very high numbers as compared to our study. The findings in our study are then satisfactory as compared to vaccination of dentists in Jordon where only 36% were only vaccinated against HBV. 11% were unvaccinated which was almost similar findings as among Saudi dentists where 7 % were unvaccinated. 73.5% of dentists from Chennai India thought vaccination against HBV is an efficient protection against infection. In current study 45.4% dentists think HBV has highest rate of transmission via saliva while only 5% reported that AIDS has highest rate of transmission via saliva. According to a study 75% Iranian dentists reported that HIV can be transmitted via saliva'.

In the current study overall knowledge about infection control measure was good. It was very good in some areas especially in use of sterilized instruments for dental procedures. 99.1% participants agreed with the use sterilized instruments. 99.5% participants of current study were using autoclave for sterilization of instruments which are similar to another Pakistani study where 93.2% were using autoclave for sterilization of instruments . 72% participants of current study reported that 15 minutes are the minimum time for autoclaving and another Pakistani study also reported similar findings where 70.1% reported similar findings. In the current study 88.1% of dentists were using mask during treating patients. In contrast to this a study reported that in Brazil almost every dentist was wearing mask during treating their patients. They also reported that almost all dentists were changing gloves between patients which was almost similar to our study where it was 96.8% . Our results regarding changing gloves were more satisfactory as compared to a study conducted on Iranian dentists which reported that 84.9% were changing gloves between patients '.

Conclusion

Dentists in Peshawar have good knowledge regarding infection control. Majority of them showed positive attitude and were involved in good practice regarding infection control in their clinical setups.

Recommendations

Other researchers are recommended that such studies should be conducted in other areas of province and country.
The study should be conducted on large sample size of dentists in future.
It is also recommended that inferential statistics should be used in future researches to assess the association of different demographic variables and other factors with the knowledge attitude and practice of infection control among dentists.
Such studies should also be conducted on dental technologists as well in future.

Table 16: Replacement of hand wash by wearing gloves

		Frequency	Percent
	Yes	61	28.0
	No	157	72.0
	Total	218	100.0

Regarding recapping the needle after injecting local anesthesia 184(84.4%) agreed that it should be done by the dentist, 31(14.2%) agreed that it should be done by the assistant while 3(1.4%) said that it can be left uncovered.

Table 17: Recapping the needle

		Frequency	Percent
	The dentist	184	84.4
	Dental assistant	31	14.2
	it can be left uncovered	3	1.4
	Total	218	100.0

Among 218 214(98.2%) reported that they check medical history of patient before treatment while 4(1.8%) said that they don't check.

Table 18: Checking medical history of patients

		Frequency	Percent
	No	4	1.8
	Yes	214	98.2
	Total	218	100.0

Among 218 192(88.1%) reported that they washed their hands before examining patients, whereas 26(11.9%) reported that they did not washed their hands.

Table 19: Washing hands before examination

		Frequency	Percent
	No	26	11.9
	Yes	192	88.1
	Total	218	100.0

Among 218 211(96.8%) reported that they washed their hands after examining patients, whereas 7(3.2%) reported that they did not washed their hands.

Table20: Washing hands after examination of patients

		Frequency	Percent
	No	7	3.2
	Yes	211	96.8
	Total	218	100.0

Out of total 34 (15.6%) were using water only for washing hands while 69 (31.7%), 46 (21.1%) and 69 (31.7%) were using soap bar, liquid soap and anti-septic solution respectively.

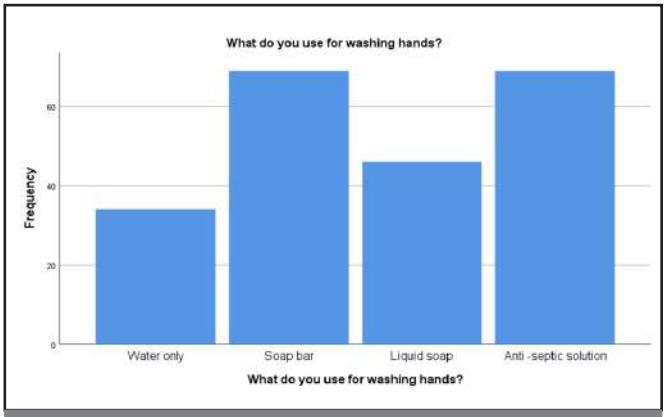

Figure 9 : Washing hands material

Most of the participants 164 (75.2%) reported that the order of putting PPE was gown-mask-goggles-face shield.

Table21: Order of putting PPE

		Frequency	Percent
	Gown- mask- gogglesface gloves-shield	164	75.2
	Gloves -gown - gogglesmask-face shield	35	16.1
	Mask -gogglesface shield gown-gloves -	19	8.7
	Total	218	100.0

Most of the participants 163 (74.8%) reported that the order of putting PPE was gloves-gown-eye protection-mask-face shield.

Among 218 participants 211(96.8%) said that they wear gloves while treating patients whereas 7(3.2%) did not wear gloves while treating patients.

Among 218 214(98.2%) said that they change their gloves between patients, or when they are being torn while 4(1.8%) said that they did not change their gloves.

Among 218 192(88.1%) said that they wear face mask while treating patients while 26(11.9%) said that they did not wear face mask.

Among 218 192(88.1%) dentists said that they clean and rub dental chair before starting their daily work while 26(11.9%) said that they did not clean and rub dental chairs.

Among 218, 207(95%) were keeping sterile instruments in sterile pouches while 11(5.0%) were not keeping instruments in pouches until usage.

Among 218, 153(70.2%) were using class B autoclave for sterilization, 7(3.2%) were not using class B autoclave while 58(26.6%) were unaware of using class B autoclave.

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Author Contributions

1. Sumbal Anwar- Conceptualization and Manuscript writing
2. Ibrar Ahmad- Literature review and data interpretation
3. Talha Falak Khalil- Methodology of study, Manuscript review and Data Analysis