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Dentists Perception to Personal Protection Equipment Use during the COVID-19 Pandemic (Analytical Study)

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ABSTRACT

Background: It has been demonstrated that the use of personal protective equipment (PPE) by health care workers, including dentists, reduces the transmission of COVID-19. PPE lowers patient morbidity and death as well as illness and absenteeism**.**

Aim: The purpose of the study was to evaluate the impact of dentists' perceptions of personal infection control and their level of trust in PPE as part of the dental profession's response to the COVID-19 pandemic.

Materials and Method: The sample size was (388) participants distributed as specialist, general dental practitioners, dental branch practitioners, and rotators. Google form prepared with specific questions; demographical and knowledge questions translated to the mother language (Arabic Language). Structured and distributed online by sharing the link through electronic platforms. Two responses were used in a statistical analysis using the SPSS version (SPSS Package version (21). Significant p value of 0.05 or less was used. Descriptive statistics were used in the data analysis to analyze the percentage, and mean values. All questions employ the spearman test to determine correlations. Kruskal-Wallis for comparing differences between groups including qualification and experience period between participants.

Result: Significant results were shown in both rotators and general practitioners for comparison of different qualification levels between dentists. All dentists had good knowledge regarding the PPE.

Conclusions: Overall, dentists in the current study had good knowledge of the PPE used for COVID-19 protection. However, it was discovered that knowledge is important for rotators and general practitioners in the majority of the PPE questions.

Keywords: Dentist Perception, Covid 19, Personal Protection Equipment**,** Analytical Study, Knowledge Questionnaires.

INTRODUCTION

Everywhere in the world, the year 2000 was exceptional. The worst health issue affecting humanity is COVID-19, which has claimed numerous lives. The epidemic attacks presented a variety of difficulties for people at many stages of life (social, economic, health, political). Leaders made every attempt to shield the populace from the epidemic's wide spread. The symptoms of COVID-19 infection had been identified as fever, cough, exhaustion, anorexia, shortness of breath, and myalgia, in addition to odor and test loss [(1,2)], which have a high death rate [(3,4)].

However, some people exhibit symptomless attacks, occurring at a rate of between 1.5 and 2.8% in the initial studies of COVID-19[(5)]. People who are asymptomatic present a special risk to dental professionals since they might unwittingly attend their appointment while carrying the COVID-19 virus. Dental professionals are not exempt from these difficulties because saliva is thought to be a source of the COVID-19 virus[(6)]. The dental team is in a risky position for infection because of their close proximity to their patients[(7)].

The World Health Organization (WHO) first reported and issued cautions about this virus in the weekly updates on January 12 after China provided the virus' genetic sequence [(7)]. The WHO recorded 79 million reported illnesses and almost 1.7 million deaths on December 29, 2020, which was one year later[(8)]. Consequently, at the height of an attack, dental clinics were obliged to close[(9)].

Hospitals, basic care clinics, and even private clinics are getting ready and being urged to try their maximum best to stop the spread of COVID-19. One goal of these initiatives was to increase the preparedness of healthcare workers (HCWs) by educating them about the illness and the steps needed to stop its spread, primarily through the use of personal protective equipment (PPE)[(9)]. In fact, effective PPE use which includes gloves, dressing gowns, masks, and protective eyewear can reduce infection control and transmission. It has been demonstrated that the use of PPE by HCWs, including dentists, reduces the transmission of COVID-19, which lowers patient morbidity and death as well as illness and absenteeism [(10)].

Dental professionals may not be fully aware of PPE's demonstrated effectiveness and relevance of use, and reports of misuse and compliance are common[(11)]. With improved personal protective equipment (PPE), new protection protocols are upheld for the performance of harmless dental treatments[(12)].

The WHO reported in March 2020 that the cost of surgical masks had climbed six-fold, that the price of N95 masks had increased threefold, and that the price of

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gowns had doubled as a result of their efforts. Also, after aerosol generating procedures (AGPs) are used, there needs to be "fallow time" for the aerosols to settle and reduce the risk of transmission. The WHO reports significant mortality rates among medical personnel [13].

Dental personnel are not exempt from similar risks of infection or infection transmission [14]. However, because of the relatively long incubation period of this highly contagious disease (up to 14 days in certain cases) it can be difficult for dental personnel to detect COVID-19 infection throughout the incubation period. Because of this, dental professionals must keep PPE up a high level of knowledge and skill to deal with the condition and be able to manage it and stop it from getting worse [15].

AIM

The purpose of the study is to evaluate the impact of dentists' perceptions of personal infection control and their level of trust in PPE as part of the dental profession's response to the COVID-19 pandemic with cost effect evaluation. The null hypothesis, according to the authors, is that dentists' perceptions and knowledge of the use of PPE against COVID-19 are identical, with no differences.

MATERIALS AND METHODS

Study Design:

A cross sectional study was conducted between Augusts and November 2022 among dentists working in Nineveh Health Directorate in Nineveh Province, Iraq.

The study purpose was explained to the participants with all details of the research. Consequently, willing to share or not were made according to wishes not obligatory. Written consent form was fabricated for this purpose. Dentists were the study sample whether working either in public hospitals or health care centers or clinics in Nineveh.

The sample size was (388) participants distributed as (Specialist, General Dental Practitioners, Dental Branch Practitioners, and Rotators). Google form prepared with specific questions (Demographical and Knowledge questions) translated to the mother language (Arabic Language). Structured and distributed online by sharing the link through electronic platforms (Facebook, Whatsup, Telegram, emails and other social media).

The form spread to only dentists regardless their level of job or specialty. As well as the form cannot be submitted if there are empty answers, all fields should be completed. Rolling the form to the colleagues is ordered to reach maximum participation of dentists. Data collected from Hospitals, Health Specialist Centers, Primary Health Centers and Rural Area Health Centers. The questions were searched and collected from different sites and then modified to serve the Iraqi community.

The questionnaire consisted of two parts:

1- Basic demographic characteristics gender, professional status, type of dental setup, and working experience).

2- Knowledge and cost effect questioners regarding the use of a face mask and shield, gloves, and gowns to limit COVID-19 exposure. The second part of the questionnaire was consisting of 18 questions.

The questionnaire consisted of three parts:

First Section: Basic Demographic Characteristics:

This section include five personal questions these are age, gender, qualification, work-place, professional experience (years). Age divided into 25-30 y, 31–35 y, 36-40 y, 41–45 y, 56–50y, and more than 51 years. Gender include male and female. Qualifications involve specialist, general practitioner, branch practitioner and rotator. Work place also recorded distributed to four places which are hospitals, health specialist centers, primary health centers, and rural area health centers while the period of professional experience in years recommended as 1-10y, 11-20y and more than 21 y.

Second Section: is Knowledge of dentist about PPE Uses and Importance:

In this section authors evaluate the knowledge regarding PPE by fourteenth questions start from the question 1-14 main divisions (the general knowledge of dentists regarding PPE indications and how to use with their importance in protection). Involve these questions, Have you heard of PPE before, Do you know what personal protective equipment is?, Do you know the indications for PPE?, Do you know if the gloves worn protect you against specific types of viral pathogen like Covid Virus?, Is your present level of knowledge of PPE adequate before Covid Attacks?, Will you be willing to put on the highest level of PPE when the need arises, should patients' safety be your first choice?, Do you feel taking your lab coat/ward home is not harmful?, PPE is required by only some special health worker?, Available PPE is effective in preventing infectious disease?, Training on PPE use should be performed for all health workers including dentist?, Is it very important to wear the full PPE?, Using PPE has no impact on the communication with the patient?, Do you feel safe wearing your PPE?, and final question is Do you think that mishandling PPE is a potential source of COVID-19 transmission?. The answers are either (True or False) for each section except the first demographical section.

Third Section: Cost Effect Estimation:

Four questions are focused on cost effect on PPE widely using in this epidemic these question are (15-18). These includes: are you satisfied with the extra cost of the PPE?, did your budget for purchasing PPE increase after the COVID-19 pandemic?, did you increase the fees for treatments to compensate for PPE

cost?, during the pandemic, the PPE was not cost effective?

Google form arranged as 18 questions in total divisions collected and analysed. Two point scales are used to assess answers in all sections except the demographical informations, answers ranged from true or false.

Ethical Approval:

Approval to conduct this study was obtained from the Institutional Review of the Authorised Scientific Committee in Nineveh Health Directorate with the numbered session 235 with research number 2022142 (no. 31446).

Statistical and data analysis:

Using a Pentium IV, information about each participant was transferred into an Excel data sheet forum. Two responses were used in a statistical analysis using the SPSS Package version (21) with a significant p value of 0.05 or less. The information was then shown in pertinent tables

By figuring out the odd ratio, the percentages for the different group comparisons of the sample variables were found. Descriptive statistics were used in the data analysis to analyze the percentage. All questions employ the spearman test to determine correlations. Version 21.0 of IBM SPSS for Windows was used for the analysis. Correlation is significant at the 0.01 level (2-tailed). Kruskal-Wallis H for comparing differences between groups including qualification and experience period between participants.

RESULTS

First Section: Basic demographic characteristics:

The sample size was (388) participants distributed as (Specialist, General Dental Practitioners, Dental Branch Practitioners, and Rotators). General Dental Practitioners show the highest numbers of participant (129, 33%), followed by the specialist (113, 29%), while branch practitioners and rotators form (59 and 87 participants consequently) . Table one is focus on the detailed Demographical Informations of Study Sample. Consider age divided into different groups (25 – 30) show 27% of participant, (31-35) as well as (41-45y) show more than 10%, (46-50) about 0.15% and (more than 51) show the least. On the contrary age group (36-40y) display the highest group (118, 30%) . Male demonstrate more than half of participants (227, 59%).

In regard to Work-place most participants are work in primary health centers (139, 36%). Ten to twenty year's professional experience is the highest group too (165, 43%).

Professional experience distributed into three levels (1-10 years) with 37% , (11-20 years) with 43 % which is the highest percent and more than 20 years show 20 % of the total participants.

Table (1): Demographical Information's of Study Sample

Variables		Dentists No.	
		No.(388)	%
Age	25-30 y	105	27.1
	31-35 y	42	10.8
	36-40 y	118	30.4
	41- 45 y	43	11.1
	46- 50 y	57	0.15
	more than 51 y	23	0.06
Gender	Male	227	0.59
	Female	161	0.41
Qualification	Specialist	113	0.29
	General P.	129	0.33
	branch practitioner	59	0.15
	Rotator	87	0.22
Workplace	Hospital	54	0.14
	Health Specialist Centers	122	0.31
	Primary Health Centers	139	0.36
	Rural Area Health Centers	73	0.19
Professional experience (years)	1-10Y	147	0.37
	10-20Y	165	0.43
	More than 20 Y	76	0.2
Total No. of Sample		388 Dentists	

Questions concerning the dentist knowledge and practicing the PPE are demonstrated in the Table two with details of yes and no numbers and percentages as follow.

Second Section: Knowledge of Dentist:

Fourteenth questions start from the question 1-14; the result of these questions. Question one about previous hearing of PPE before the Covid epidemic 24% only who don't hear previously about the PPE. In question 2; 17% don't know what PPE is specifically. Six % only don't know the indications of use. In question 3 only 25 participant don't know the clear indication of PPE use. All dentists agreed on that glove can give protection against Covid. Twenty nine of participants admit that have limited level of knowledge of PPE before Covid Attacks classified in question 5. As well as in question 6; all dentist subscribed that they enthusiastic to put patients' safety as first choice, and feel taking the lab coat / ward home is not harmful. Forty three only agreed on that PPE is required by only some special health worker (question 8). In question nine, ten and fourteen; all participant shared same answer which is yes that PPE is effective against infectious disease, training on PPE use should be performed for all health workers including dentist and mishandling of PPE can be source of COVID-19. Sixty seven participants from total reply that use of PPE are important which is question 11. Concerning communications of patients 69% reject that PPE can affect communication with patients. In question 13 slightly above half of participant feel safe when wearing PPE.

Third Section: Cost Effective:

Cost estimation effect in clinical practicing of PPE use is focused in four in this epidemic (15-18). Sixty six percent not satisfied with the extra cost of the PPE as well as 90% increase their budget for purchasing PPE after the COVID-19 pandemic. No one recommend increasing the fees for treatments to compensate for PPE cost also 74% consider the pandemic, the PPE was not cost effective more or less.

Table (2): Dentist Knowledge and Practicing about PPE (Questions and Answers)

Questions Lists	Questions answers			
	Yes (I do)		No (I Don't)	
	No.	%	No.	%
Knowledge				
1. Have you heard of PPE before?	323	0.83	95	0.24
2. Do you know what personal protective equipment is?	293	0.76	65	0.17
3. Do you know the indications for PPE?	363	0.94	25	0.06
4. Do you know if the gloves worn protect you against specific types of viral pathogen like Covid Virus?	388	1	0	0
5. Is your present level of knowledge of PPE adequate before Covid Attacks?	277	0.71	111	0.29
6. Will you be willing to put on the highest level of PPE when the need arises, should patients' safety be your first choice?	388	1	0	0
7. Do you feel taking your lab coat/ward home is not harmful?	388	1	0	0
8. PPE is required by only some special health worker?	43	0.11	345	0.89
9. Available PPE is effective in preventing infectious disease?	388	1	0	0
10. Training on PPE use should be performed for all health workers including dentist?	388	1	0	0
11. Is it very important to wear the full PPE?	259	0.67	129	0.33
12. Using PPE has no impact on the communication with the patient?	121	0 31	267	0 69
13. Do you feel safe wearing your PPE?	225	0 58	163	0.42
14. Do you think that mishandling PPE is a potential source of COVID-19 transmission?	388	1	0	0
Cost Estimation				
15. Are you satisfied with the extra cost of the PPE?	131	0.34	257	0.66
16. Did your budget for purchasing PPE increase after the COVID-19 pandemic?	358	0.92	30	0.08
17. Did you increase the fees for treatments to compensate for PPE cost?	0	0	388	1
18. During the pandemic, the PPE was not cost effective?	286	0.74	102	0.2

Statistical Analysis and Correlation:

Spearman test for correlations between the demographical Informations and the questions are highlighted in Table three, questions (4, 6, 7, 9, 10, 14 and 17) are excluded from this test as all the answers are the same. The test show significant correlation between the demographical data and the questions (Correlation is significant at the 0.01 level (2-tailed)).

Table (3): Spearman test correlations between the demographical Informations and the questions.

		Q1	Q2	Q3	Q5	Q8	Q11	Q12	Q13	Q15	Q16	Q18
Age	CC	.645**	.754**	.432**	.795**	.822**	.814**	.804**	.804**	.832**	.466**	.771**
	Sig	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Gender	CC	.533**	.676**	.312**	.752**	.838**	.567**	.989**	.989**	.601**	.350**	.709**
	Sig	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Qualification	CC	.627**	.764**	.367**	.792**	.831**	.810**	.843**	.843**	.802**	.412**	.775**
	Sig	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Workplace	CC	.660**	.707**	.386**	.717**	.735**	.744**	.787**	.787**	.769**	.434**	.710**
	Sig	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Experience	CC	.673**	.723**	.394**	.719**	.723**	.780**	.751**	.751**	.828**	.442**	.720**
	Sig	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Questions (4, 6, 7, 9, 10, 14 and 17) are excluded from this test as all the answers were the same **CC. = Correlation is significant at the 0.01 level (2-tailed).

* Sig P value = 0.01 level (2-tailed).

In order to the differences in knowledge and dentist's opinions; Kruskal-Wallis H Test are used as comparison between the qualifications group and experience as well as. Table Four focus on the difference between question's answers according to qualification (Kruskal-Wallis H Test). The result illustrated the preference related to the rotators as first group followed by the branch certificate group. On the other side specialist and general practitioners show no significant differences.

Table (4): Difference between Question's Answers According to Qualification (Kruskal-Wallis H Test).

Ranks				**Kruskal-Wallis H**	**Asymp. Sig.**
	Qualification	**N**	**Mean Rank**		
Q1	Specialist	113	162.00	269.444	0.001
	General P.	129	162.00		
	branch practitioner	59	162.00		
	Rotator	**87**	**306.94**		
Q2	Specialist	113	147.00	349.696	0.001
	General P.	129	147.00		
	branch practitioner	59	173.31		
	Rotator	**87**	**341.00**		
Q3	Specialist	113	182.00	92.213	0.001
	General P.	129	182.00		
	branch practitioner	59	182.00		
	Rotator	**87**	**237.75**		
Q4	Specialist	113	194.50	0.000	1.000
	General P.	129	194.50		
	branch practitioner	59	194.50		
	Rotator	87	194.50		
Q5	Specialist	113	139.00	317.471	0.001
	General P.	129	139.00		
	branch practitioner	59	217.92		
	Rotator	**87**	**333.00**		
Q6	Specialist	113	194.50	0.000	1.000
	General P.	129	194.50		
	branch practitioner	59	194.50		
	Rotator	87	194.50		
Q7	Specialist	113	194.50	0.000	1.000
	General P.	129	194.50		

	branch practitioner	59	194.50		
	Rotator	87	194.50		
Q8	Specialist	113	173.00	166.881	0.001
	General P.	129	173.00		
	branch practitioner	59	173.00		
	Rotator	**87**	**268.89**		
	Qualification	**N**	**Mean Rank**	**Kruskal-Wallis H**	**Asymp. Sig.**
Q9	Specialist	113	194.50	0.000	1.000
	General P.	129	194.50		
	branch practitioner	59	194.50		
	Rotator	87	194.50		
Q10	Specialist	113	194.50	0.000	1.000
	General P.	129	194.50		
	branch practitioner	59	194.50		
	Rotator	87	194.50		
Q11	Specialist	113	130.00	332.612	0.001
	General P.	129	130.00		
	branch practitioner	59	268.10		
	Rotator	**87**	**324.00**		
Q12	Specialist	113	61.00	352.124	0.001
	General P.	129	242.97		
	branch practitioner	59	255.00		
	Rotator	**87**	**255.00**		
Q13	Specialist	113	113.00	326.570	0.001
	General P.	129	138.57		
	branch practitioner	**59**	**307.00**		
	Rotator	**87**	**307.00**		
Q14	Specialist	113	194.50	0.000	1.000
	General P.	129	194.50		
	branch practitioner	59	194.50		
	Rotator	87	194.50		
	General P.	129	166.67		
	branch practitioner	**59**	**293.00**		
	Rotator	**87**	**293.00**		
Q15	Specialist	113	66.00	317.921	0.001
	General P.	129	232.93		
	branch practitioner	**59**	**260.00**		
	Rotator	**87**	**260.00**		
Q16	Specialist	113	179.00	116.266	0.001
	General P.	129	179.00		
	branch practitioner	59	179.00		
	Rotator	**87**	**248.13**		
Q17	Specialist	113	194.50	0.000	1.000
	General P.	129	194.50		
	branch practitioner	59	194.50		
	Rotator	87	194.50		
Q18	Specialist	113	143.50	329.420	0.001
	General P.	129	143.50		
	branch practitioner	59	192.82		
	Rotator	**87**	**337.50**		

Kruskal-Wallis H Test is used as comparison between the experiences too. Table Five express the difference between question's answers according to experience (number of years work) by Kruskal-Wallis H Test. The result illustrated the preference related to the periods ranged from 1 – 10 years as first group. On the contrary long periods of work (20 years) show no significant differences.

Table (5): Difference between Question's Answers According to Periods of Work (Experience) (Kruskal-Wallis H Test)

Ranks				Kruskal-Wallis H	Asymp. Sig.
	Experience	**N**	**Mean Rank**		
Q1	More than 20 Y	147	162.00	319.715	0.001
	10-20Y	165	162.00		
	1-10Y	**76**	**327.92**		
Q2	More than 20 Y	147	147.00	296.307	0.001
	10-20Y	165	169.34		
	1-10Y	**76**	**341.00**		
Q3	More than 20 Y	147	182.00	109.417	0.001
	10-20Y	165	182.00		
	1-10Y	**76**	**245.82**		
Q4	More than 20 Y	147	194.50	0.000	1.000
	10-20Y	165	194.50		
	1-10Y	76	194.50		
Q5	More than 20 Y	147	139.00	252.331	0.001
	10-20Y	165	180.15		
	1-10Y	**76**	**333.00**		
Q6	More than 20 Y	147	194.50	0.000	1.000
	10-20Y	165	194.50		
	1-10Y	76	194.50		
Q7	More than 20 Y	147	194.50	0.000	1.000
	10-20Y	165	194.50		
	1-10Y	76	194.50		
Q8	More than 20 Y	147	173.00	198.016	0.001
	10-20Y	165	173.00		
	1-10Y	**76**	**282.76**		
Q9	More than 20 Y	147	194.50	0.000	1.000
	10-20Y	165	194.50		
	1-10Y	76	194.50		
Q10	More than 20 Y	147	194.50	0.000	1.000
	10-20Y	165	194.50		
	1-10Y	76	194.50		
Q11	More than 20 Y	147	130.00	225.317	0.001
	10-20Y	165	192.32		
	1-10Y	**76**	**324.00**		
Q12	More than 20 Y	147	95.31	287.531	0.001
	10-20Y	**165**	**255.00**		
	1-10Y	**76**	**255.00**		
Q13	More than 20 Y	147	113.00	218.615	0.001
	10-20Y	165	215.29		
	1-10Y	**76**	**307.00**		
Q14	More than 20 Y	147	194.50	0.000	1.000
	10-20Y	165	194.50		
	1-10Y	76	194.50		
	10-20Y	165	234.21		
	1-10Y	**76**	**293.00**		
Q15	More than 20 Y	147	87.12	323.407	0.001
	10-20Y	**165**	**260.00**		
	1-10Y	**76**	**260.00**		
Q16	More than 20 Y	147	179.00	137.958	0.001
	10-20Y	165	179.00		
	1-10Y	**76**	**258.13**		
Q17	More than 20 Y	147	194.50	0.000	1.000
	10-20Y	165	194.50		
	1-10Y	76	194.50		
Q18	More than 20 Y	147	143.50	274.259	0.001
	10-20Y	165	174.07		
	1-10Y	**76**	**337.50**		

DISCUSSION

There is no doubt all over the world that PPE is essential for shielding healthcare personnel from transmitted pathogens like the pandemic (COVID-19), high levels of skill and expertise are therefore crucial in relation to this subject. Infection control recommendations will be impacted by misleading safety perceptions, which will increase risk.

In a study published by **Verbeek *et al.*** [16] in Cochrane Library stated that global workforce in the healthcare industry totals more than 59 million individuals as reported in the WHO report 2006. Because of their jobs, some of these health care workers (HCWs) could get deadly infectious diseases. Patient blood or other secretions such as mucus or vomit or droplets are expelled. The possibility of infection and its effects varies, but it is widely acknowledged as a work-related danger. These dangers are heightened during the epidemics. The implications of this become clearer as the rate of HCW infection raises compared to the average population. HCW infection also carries the possibility that Infected HCWs will spread the infection to patients or serve as a vector for the spread of illness among patients. Additionally, while infected HCW, outbreaks, and other factors will further reduce healthcare system that is already overburdened.

The author's goal in writing this article was to examine and appraise the knowledge and skills of dentists using various reviews of their training and work history, including the effects of cost estimates and the challenges. The list of questioners is set up to help the dentists of the Nineveh Health Directorate, who all have different qualifications. Three sections, totally involve 18 questions. Qualifications, work experience, and places of employment are included in the first area for assessing demographic information.

In the authors' opinion, other than rotators, all of the participants had good knowledge in relation to long periods of work facing various situations according to their health. They also kept up with attending and listening to lectures throughout their work periods, which significantly change their knowledge. The study results showed significant differences according to various qualifications, with a high result specifically for rotators. According to the **Nibras *et al*.** [17] study, general dentists are familiar with and aware of the significance of PPE use and its purpose.

Recently new recommendations for the use of PPE have been made according to the last epidemic which comes with death shadow. Dentists have great role in COVID-19 disseminations [16].

In particular, the respondent's knowledge demonstrates a high level of information or education for all dentists, regardless of their levels, even though they use PPE in both public and private institutions, based on the idea that patients' safety comes first and that they comprehend the pandemic disaster's catastrophic spread. Additionally, the dentist is fully entitled to play their part in these unique circumstances [2,18]. All participants agree on that mishandling PPE is a potential source of COVID-19 transmission [17].

In China "Chinese critical care professionals' knowledge and self-reported compliance with the advised PPE use is subpar. In order to reduce the substantial gap between perception and knowledge or behavior, the perceived impediments should be addressed ". Dentists think about the challenges to using PPE as a normal protocol in the pandemic [19]. PPE used for some special health worker only and other extra equipment to make dental work safer. This can be related to the fact that all dentists at risk of infection and disease transmission.

Overall, the dentists demonstrated satisfactory levels of knowledge with the application and use of various PPE. Despite the fact that only 34% of dentists were pleased with the rise in PPE costs during the pandemic, 92% of them were aware of the necessity of PPE and increasing their budget after the COVID-19 pandemic. This demonstrated the participants' overall favorable attitude towards the use of PPE [17].

Long-term PPE use by healthcare professionals has been associated with a variety of problems, including exhaustion, dehydration, and headaches. Fear from infection added additional stress to these negative effects, which had a considerable negative impact on their decision-making and level of care [20]. These characteristics were seen in our study, despite utilizing the recommended PPE, about 35% of the participants indicated fear of infection. The people who took part also said that wearing PPE made it harder for them to talk to patients and make decisions.

The majority of participants stated that the pandemic raised their budget for PPE purchases. However, 20% of the dentists actually increased the treatment cost to make up for the shift in PPE cost, whereas over 60% of them believed that PPE was cost-effective. Because people were getting more worried, there were not enough PPEs to go around, especially in the first few months after the COVID-19 crisis started. The prices then rose significantly as a result of the decrease in PPE supplies. Later, alternative sources were found and production was increased in order to solve the supply issue, but PPE prices remained comparatively high. The financial burden on health authorities and health workers has increased globally as a result of the requirement to purchase additional PPE items [21]. Additionally, compared to pre-pandemic, the cost of surgical masks jumped up to 10 times after COVID-19[17].

The data revealed that newly graduated dentists have good knowledge about PPE more frequently. This can suggest that they are curious more and they work under supervision by specialist and general practitioners giving skilled instructions predict PPE behaviors and a favorable knowledge toward PPE [22].

There is no doubt about that PPE has a crucial role in reducing the spread of infection and protecting

lives. Also, the quality of the procedure and the dentist's comfort while doing their job will both improve with the use of PPE that is breathable and meets strict safety standards. In Kruskal-Wallis H Test comparison of experience show the 1 – 10 years period's significant result from authors opinion think that the well experienced dentists with long period of work's time familiar with a different multiple attacks of infection's pandemic in the last 20 years and well authorised with the infections control guidelines too with no fatigues or time consuming or difficulties. Beside Nineveh Health directorate focus on newly graduated (1-10 years) with heavy training and education courses also needed for professional promotion [23,24].

CONCLUSIONS

Overall, dentists in the current study have good knowledge of the PPE used for COVID-19 protection. However, it was discovered that knowledge is important for rotators and general practitioners in the majority of the PPE questions. It follows that increasing dentists' awareness of PPE might increase their trust in it, increase their use of it, and adherence to rules, as well as have a beneficial impact on their willingness to treat infected patients, lower absenteeism, and lower infection and disease transmission by them.

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