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Exploring the knowledge, awareness and practices of COVID-19 among dentists in Bangladesh: A Cross-sectional Investigation.

Explorando el conocimiento, la conciencia y las prácticas de COVID-19 entre los dentistas en Bangladesh: una investigación transversal.

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Abstract: Background: COVID-19 pandemic has caused an unprecedented strike on humanity around the world . The scenario in Bangladesh is getting worse day by day, and every aspect of the society is observing its impact. Health care professionals are at a greater risk of contracting the disease while caring for patients. **Objective:** The research objective is to explore knowledge, awareness, and practices of registered dentists regarding COVID-19 epidemiology and transmission during the rapid outbreak of this highly contagious virus in Bangladesh. **Material and Methods:** A cross-sectional web-based survey was conducted among the dentists who were enrolled with their valid unique Bangladesh Medical and Dental Council (BMDC) registration number. A structured questionnaire was distributed among the dentists through different social media platforms. A total of 184 dentists participated in the survey between March and April 2020. Both descriptive analysis and multivariable logistic regression analysis was performed. **Results:** The dentists' mean age was 31.75 years, with a standard deviation of 6.5 years. About 29.3% of dentists completed their postgraduate qualification, and 76% of them were engaged in private practice at the time of data collection. Compared to the dentists with undergraduate education, the dentists with a postgraduate education are three times (OR=3.1, 95%CI 1.2-7.9 and over 5 times (OR=5.3, 95% CI: 1.2-23.3) more likely to have) better knowledge and practices toward COVID-19 respectively. Dentists aged 26-30 years are less likely to have good practices than the younger dentists (OR: .1; 95% CI: .01-.5). However, dentists with less than five years experience are 10.3 (1.6-68.9) times more likely to have good practices compared to the dentists with more experience. **Conclusion:** Majority of the dentists from Bangladesh have shown good knowledge, awareness, and practice regarding COVID-19. We recommend that the healthcare authorities, professional organizations, and hospitals coordinate, and conduct mandatory advanced infectious disease training for all the practicing dentists in the country.

Keywords: *COVID-19; Bangladesh; dentists; knowledge; awareness; attitude.*

Resumen: **Antecedentes:** la pandemia de COVID-19 ha desatado un ataque sin precedentes contra la humanidad en todo el mundo. El escenario en Bangladesh empeora día a día, y todos los aspectos de la sociedad están observando su impacto. Los profesionales de la salud corren un mayor riesgo de contraer la enfermedad mientras atienden a los pacientes. **Objetivo:** El objetivo de la investigación es explorar el conocimiento, la conciencia y las prácticas de los dentistas registrados con respecto a la epidemiología y transmisión de COVID-19 durante el rápido brote de este virus altamente contagioso en Bangladesh. **Material y Métodos:** Se realizó una encuesta transversal basada en la web entre los dentistas inscritos con su número de registro único válido del Consejo Médico y Dental de Bangladesh (BMDC). Se distribuyó un cuestionario estructurado entre los dentistas a través de diferentes plataformas de redes sociales. Un total de 184 dentistas participaron en la encuesta entre marzo y abril de 2020. Se realizó tanto análisis descriptivo como análisis de regresión logística multivariable. **Resultados:** La edad media de los odontólogos fue de 31,75 años, con una desviación estándar de 6,5 años. Aproximadamente el 29,3% de los dentistas habían completado su título de posgrado y el 76% de ellos se dedicaba a la práctica privada en el momento de la recopilación de datos. En comparación con los dentistas con educación universitaria, los dentistas con educación de posgrado tienen tres veces (OR = 3,1, IC del 95%: 1,2 - 7,9 y más de 5 veces (OR = 5,3, IC del 95%: 1,2 - 23,3) más probabilidades de tener) mejores conocimientos y prácticas hacia COVID-19 respectivamente. Los dentistas de 26 a 30 años tienen menos probabilidades de tener buenas prácticas que los dentistas más jóvenes (OR: .1; IC del 95%: .01 - .5). Sin embargo, los dentistas con menos de cinco años de experiencia tienen 10,3 (1,6 - 68,9) veces más probabilidades de tener buenas prácticas en comparación con los dentistas con más experiencia. **Conclusión:** La mayoría de los dentistas de Bangladesh han demostrado un buen conocimiento, conciencia y práctica con respecto a COVID-19. Recomendamos que las autoridades sanitarias, las organizaciones profesionales y los hospitales coordinen y lleven a cabo una formación avanzada obligatoria sobre enfermedades infecciosas para todos los dentistas en ejercicio del país.

Palabra Clave: *COVID-19; Bangladesh; odontólogos; conocimiento; concienciación; actitud.*

INTRODUCTION.

In December 2019, the world observed an outbreak of a rapidly spreading and contagious virus in Wuhan, China. Subsequently, it quickly spread out throughout China and worldwide, prompting the World Health Organization (WHO) to officially declare this new type of coronavirus disease as pandemic on March 13, 2020.[1-2] The pandemic has spread overwhelmingly, affecting every part of the globe, directly or indirectly.[3]

COVID-19 is an enveloped RNA virus,[4] which is more contagious than SARS-CoV and MERS-CoV, creating more concern among experts.[5-7] Its common clinical symptoms include fever, dry cough, fatigue, myalgia, headache, haemoptysis and sometimes diarrhoea, loss of taste and smell sensation,[8] which typically last from 4 to 14 days.[9] Though this virus' accepted incubation period range is two weeks, in some cases it may extend even up to 24 days, making the virus unpredictable.[9] In severe cases, COVID-19 may progress to acute respiratory distress syndrome and bleeding and coagulation dysfunction, affecting older people and people with comorbidities.[10] This virus is mostly transmitted from humans to humans through airborne droplets or by contact with an infected person or contaminated surface.[10]

In Bangladesh, the first case of COVID-19 was detected on March 7, 2020, since then the country observed a steep rise in cases.[11] To date, over a quarter-million confirmed COVID-19 cases were reported in Bangladesh by COVID-19,[1] where the capital region, Dhaka has been mostly affected.[11] Health care workers are at higher risk of getting infected as they come in proximal contact with both symptomatic and asymptomatic COVID-19 patients.[5] According to the WHO, in Bangladesh by May 1, 2020, the health care workers, including medical doctors, dentists, nurses & associated healthcare professionals, comprised 11% of the total COVID-19 cases.[12] Till date, at least 92 doctors have died due to this viral infection in Bangladesh.[13] The COVID-19 is also affecting the psychological wellbeing of

healthcare professionals.[14]

Among the health care workers, the risk of cross-infection is high among dentists because they must work with patients with close contact. Furthermore, dental procedures themselves pose a riskier environment because of producing aerosol and droplets out of the patient's oral cavity.[5,15-17] Recent study data suggested that SARS-CoV-2 virus might remain viable and infectious in aerosols and droplets for hours, which poses more significant threats for dentists to be infected and subsequently spread to their colleagues, families and other patients.[7] Using a saliva sample, it is easy to detect the virus in saliva or oral fluids, and this can result in new strategies to prevent and detect COVID-19.[18]

Dentists may also get infected from unrecognized and under surveillance COVID-19 individuals; thus, contamination may occur before the symptoms appear[19] and indirect contact with contaminated surfaces and instruments.[20] As the pandemic continues, strate-gies to manage patients will need to evolve from a palliative to a more standard treatment approach.[21] For this reason, the Centre for Disease Control and Prevention (CDC) and the WHO recommend various precautionary guidelines to prevent COVID-19 cross-infection in the dental setting.[22] A multi-country study finding revealed that dentists around the world are in a state of anxiety and fear due to the COVID-19 pandemic.[23] Despite the rapid spread of COVID-19 in Bangladesh, countrywide lockdown, and social distancing measures to slow down the disease spreading have made it difficult for implementing extensive official professional education or training material to prevent cross-infection in dental settings.

There are some misconceptions concerning the knowledge, prevention and hygiene practices of COVID-19, which are deeply rooted in the mindset of the healthcare professionals.[24]

However, different professional organizations have been using online and social media platforms to spread the scientifically validated protocols, emergency dental treatment outlines to prevent the disease spread through dental practice. It is of paramount importance for Bangladesh's dental health care workers to be equipped with up-to-date knowledge and best practices regarding COVID-19. Therefore, the current study aimed to assess the knowledge, attitude, and practices (KAP) of registered dentists regarding COVID-19 epidemiology and transmission during the rapid outbreak of this highly contagious virus in Bangladesh.

MATERIALS AND METHODS.

Study Design and participants

Building upon the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) a cross-sectional web-based survey was conducted among the dentists who enrolled with their unique Bangladesh Medical and Dental Council (BMDC) registration number between May and June, 2020.[25] The dentists were approached by social media platforms and a link to the web-based survey was shared, where participation in the survey was voluntary. The following inclusion criteria used-

(i) Registered with Bangladesh Medical and Dental Council, and

(ii) Currently in practice in Bangladesh. A total of 184 dentists filled out the survey questionnaire.

Data Collection and Ethical approval

Ethical approval for this research was taken from the Research Ethics Committee of Sapporo Dental College & Hospital, Dhaka, in Bangladesh (Ref. No. SDC/C-7/2020/745). The research team developed the survey questionnaire by reviewing relevant literature and was compiled according to international guidelines.[19,22-23] Initially, the preliminary questionnaire was pretested for face and content validity. Content validity was evaluated by four experts who have a clear idea about COVID-19 guidelines. Then following minor corrections were made according to their suggestions. After that, the revised questionnaire was administered among 30 dentists of Sapporo Dental College and Hospital, Dhaka, through an interview to evaluate face validity. The respondents were asked about the difficulty of understanding and ambiguous nature of the questions, if any. All the participants commented that they had understood every question of the questionnaire appropriately. Following some grammatical correction, the final questionnaire was then sent to all the registered dentists online.

The survey questionnaire was divided into four parts. The first part covered the background infor-

mation about the dentists. The second part included knowledge-related questions, the third part referred to the awareness and attitude towards COVID-19, and the fourth and final part contained questions on attitude and practice. Google docs were used to develop the questionnaire. The questionnaire's link was distributed among the dentists through social media platforms such as Facebook Inc, Viber, and WhatsApp Messenger.

Data analysis and variables

Both descriptive and inferential statistics were performed using IBM SPSS version 26 (SPSS Inc., Chicago, IL USA). Descriptive statistics were performed variables such as gender (male and female), age group (21-25 years, 26-30, 31-35 years and >35 years), educational status such as undergraduate and postgraduate, monthly income was categorized into below Bangladeshi taka (BDT) 20000, BDT 20000-50000, BDT 50000-100000, BDT 100000-150000 and more than BDT 150000, place or work was categorized into government, private, and independent and years of working experience was categorized to less than 5 years and above 5 years.

For inferential statistics, three dependent variables were formulated. This study's dependent variables were knowledge, awareness, and practices of COVID-19 among dental professionals in Bangladesh. We measured knowledge using 24 questions on COVID-19 epidemiology and transmission. To measure awareness, we used 11 questions on COVID-19 awareness, while we measured practices of the dental professionals to prevent the spread of the infection using 13 questions. All questions were dichotomous.

We gave one point for each correct response, good awareness and good practice, while an incorrect response, poor awareness and poor practice received a score of zero. We computed the subscale (knowledge, attitude and practice) total by computing all scores of that subscale.

Finally, we transformed the subscale total on a scale of 0 to 100. Then, we categorized knowledge, awareness and practice as good, moderate and poor.

Table 1. Distribution of dentists by their background characteristics.

Background Characteristics		Frequency	Percentage (%)
Gender	Male	98	53.3
	Female	86	46.7
Age Group	21-25	19	10.3
	26-30	81	44
	31-35	42	22.8
	36+	42	22.8
	Mean±SD	31.75±6.50	
Educational Background	Undergraduate	130	40.7
	Postgraduate	54	29.3
Years of working experience	Less than 5 years	95	51.6
	More than 5 years	89	48.4
Place of work	Government	34	18.5
	Independent	10	5.4
	Private	140	76.1
Average Monthly Income	Below BDT 20000	41	22.3
	BDT 20000-50000	64	34.8
	BDT 50000-100000	41	22.3
	BDT 100000-150000	26	14.1
	More than BDT 150000	12	6.5

***BDT:** Bangladeshi Taka (1 BDT = 0.11 US Dollar; OANDA Currency converter, 8 August 2020)

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Table 2. Descriptive analysis of knowledge related questions.

Knowledge related questions	False (%)	True (%)
The main clinical symptoms of COVID-19 are fever, fatigue, dry cough and myalgia	14 (8)	161 (92)
Unlike the common cold, stuffy nose, runny nose and sneezing are less common in persons infected with the COVID-19 virus	62 (35.4)	113 (64.6)
There currently is no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection	3 (1.7)	172 (98.3)
Not all the persons with COVID-19 will develop severe cases. Only those who are elderly, have chronic illness and are obese are more likely to be severe cases	16 (9.1)	159 (90.9)
Eating or contacting wild animals would result in the infection by the COVID-19 virus.	102 (58.3)	73 (41.7)
Persons with COVID-2019 cannot infect the virus to others when a fever is not present.	158 (90.3)	17 (9.7)
The COVID-19 virus spreads via respiratory droplets of infected individuals	6 (3.4)	169 (96.6)
Community people can wear general medical masks to prevent the infection by the COVID-19 virus.	48 (27.4)	127 (72.6)
Dentists can wear the conventional surgical masks to prevent the infection by the COVID-19 virus.	104 (59.4)	71 (40.6)
It is not necessary for children and young adults to take measures to prevent the infection by the COVID-19 virus.	165 (94.3)	10 (5.7)
To prevent the infection by COVID-19, individuals should avoid going to crowded places such as train stations and avoid taking public transportations.	2 (1.1)	173 (98.9)
People come from virus infected area are not capable of spreading COVID-19 infection	163 (93.1)	12 (6.9)
Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus.	2 (1.1)	173 (98.9)
People who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place. In general, the observation period is 14 days.	1 (0.6)	174 (99.4)
Quarantine or isolation is not essential for the people who had contact with COVID-19 infected person	167 (95.4)	8 (4.6)
70% alcohol-based hand rub and sanitizer can reduce the chance of COVID-19 infection	7 (4)	168(96)
Washing hands with soap and water at least 20 seconds to reduce the chance of COVID-19 infection	1 (0.6)	174(99.4)
Novel coronavirus in an airborne virus	87 (49.7)	88 (50.3)
COVID-19 is not a contagious disease	159 (90.9)	16 (9.1)
COVID-19 is caused by SARS CoV-1 virus	97 (55.4)	78 (44.6)
Use of all personal protection equipment (PPE) such as gloves, mask, face shield or goggles, apron or gown are not essentials for clinical dentists to prevent the contamination of COVID-19 disease	154 (88)	21 (12)
Avoiding touching nose, mouth and eyes with unwashed hand can reduce the chance of COVID-19 transmission	14 (8)	161 (92)
Optimizing the ventilation in the dental clinic is not essential to minimize the exposure	148 (84.6)	27 (15.4)
Coronavirus can live/survive on surfaces for more than 24 hours	47 (26.9)	128 (73.1)
There is already effective vaccine available for COVID-19 (April 2020)	160 (91.4)	15 (8.6)
The incubation period of COVID-19 is 14 days	12 (6.9)	163 (93.1)

On a 0 to 100 scale, a score of 80 or greater was categorized as good; 50 - <80 was categorized as moderate, and <50 was categorized as poor. These categorizations are arbitrary but a common practice in measuring KAP.[26]

Explanatory variables included in this study were:

(i) gender- male and female,

(ii) age group was categorized to 21 to 25 years, 26 to 30 years, 31 to 35 years and 35 years and above,

(iii) educational background (undergraduate or postgraduate),

(iv) years of working experience had two categories: less than 5 years of working experience and more than 5 years of working experience,

Table 3. Descriptive analysis of awareness related questions.

Awareness related questions	No (%)	Yes (%)
Do you have confidence that Bangladesh can win the battle against the COVID-19 virus?	37 (21.1)	138 (78.9)
Do you think dentists can contribute effectively in the battle against COVID-19?	57 (32.6)	118 (67.4)
Do you think that the health education for the community will be effective for COVID-19 prevention?	16 (9.1)	159 (90.9)
Do you feel anxious when giving treatment to the patients after the pandemic outbreak of COVID-19?	12 (6.9)	163 (93.1)
Do you think that you can be contaminated by the virus from your patients during dental treatment?	35 (20)	140 (80)
Do you think that one of your patients can be contaminated by another patient from your dental office?	4 (2.3)	171 (97.7)
Do you think that the number of patients seeking dental treatment is reduced after the COVID-19 outbreak in your Hospital or Private Practice?	14 (8)	161 (92)
Do you think that your professional/occupational income will be reduced due to COVID-19 outbreak?	5 (2.9)	170 (97.1)
Do you think that the patients might hide their proper medical history due to social stigma?	5 (2.9)	170 (97.1)
Do you think that the COVID-19 outbreak will create a negative impact on the health sector of Bangladesh?	17 (9.7)	158 (90.3)
Do you think that quarantining a suspected person for 14 days will help to control COVID-19 outbreak of Bangladesh?	7 (4)	168 (96)
Do you think that the maintenance of social distance among a healthy population will help control COVID-19 outbreak of Bangladesh?	4 (2.3)	171 (97.7)
Do you think all kinds of dental treatment should continue during the COVID-19 Pandemic?	161 (92)	14 (8)

Table 4. Descriptive analysis of practice and behaviour related questions

Practice related questions	No (%)	Yes (%)
In recent days, have you gone to any crowded places?	153 (87.4)	22 (12.6)
In recent days, have you worn a mask when leaving home?	6 (3.4)	169 (96.6)
Do you use surgical face masks during treatment of all patients?	5 (2.9)	170 (97.1)
Do you use Hand Gloves during treatment of all patients?	4 (2.3)	171 (97.7)
Do you use Eye Shield during treatment of all patients?	55 (31.4)	120 (68.6)
Do you use Head Cap during treatment of all patients?	56 (32)	119 (68)
Do you use separate gowns/apron/OT dress for individual patients?	100 (57.1)	75 (42.9)
Do you provide treatment to the patients having fever,sneezing, with a dry cough and fatigue after COVID-19 outbreak situation?	152 (86.9)	23 (13.1)
Do you take the recent travel history (outside the country) of all patients fatigue consultation & treatment?	28 (16)	147 (86)
Do you ask all patients about their chance of exposure to any person traveling abroad recently?	17 (9.7)	158 (90.3)
Have you already reduced the schedule of patients' appointments?	7 (4)	168 (96)
Have you closed down your practice during outbreak of COVID-19	26 (14.9)	149 (85.1)

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Table 5. Multilevel Logistic Regression analysis between background characteristics with knowledge, awareness and practice during COVID-19

Background Characteristics		Knowledge			Awareness			Practice		
		OR	95% CI	*p*-value	OR	95%CI	*p*-value	OR	95%CI	*p*-value
Gender	Male	1			1			1		
	Female	0.7	0.4-1.4	0.361	1.2	0.5-2.9	.689	1.7	.5-5.4	.362
Age Group	21-25	1			1			1		
	26-30	1.2	0.4-3.5	0.707	2.7	0.7-9.7	.130	0.1	0.01-0.5	0.006
	31-35	1.9	0.5-7.6	0.389	5.2	0.8-32.7	.082	0.9	0.1-7.9	0.961
	36+	1.5	0.3-7.3	0.601	0.46	0.6-36.1	.151	1.9	0.2-20.7	0.608
Educational Background	Undergraduate	1			1			1		
	Postgraduate	3.1	1.2-7.9	0.020	0.5	0.1-1.5	.214	5.3	1.2-23.3	0.028
Years of working experience	Less than 5 years	1.8	0.7-4.8	0.234	1.7	0.5-5.6	.396	10.3	1.6-68.9	0.016
	More than 5 years	1			1			1		
Place of work	Government	1			1			1		
	Private/Independent	1.1	0.5-2.7	0.801	1.1	0.4-3.1	.908	4	0.7-24	0.127
Average Monthly Income	Below BDT 20000	1			1			1		
	BDT 20000-50000	2.2	0.9-5.3	0.069	1.2	0.4-3.3	.793	0.2	0.0-1.3	0.093
	BDT 50000-100000	2.3	0.8-6.5	0.121	5.9	1.0-33.3	.044	0.4	0.1-2.2	0.308
	BDT 100000-150000	2.2	0.6-8.1	0.218	1.8	0.4-9.5	4.66	0.5	0.1-3.7	0.469
	More than BDT 150000	1	0.2-4.9	0.994	1.9	0.3-13.6	.545	0.4	0.0-4.1	0.444

(v) place of work: government setting, private clinic and independent practice, and

(vi) average monthly income categories: below BDT 20000, BDT 20000-50000, BDT 50000-100000, BDT 100000-150000 and more than BDT 150000.

RESULTS.

The background characteristics of the respondents are displayed (Table 1). About 46.7% of female dentists and 53.3% of male dentists participated in this research, and most of them (44%) are in the age category of 26 to 30 years. The mean age of the dentists is 31 years, with a standard deviation of 6.50. Only 10.3% of respondents are in the age category of 21 to 25 years. Approximately 40.7% of dentists completed an undergraduate degree, and 29.3% completed postgraduate degrees. About 51.6% of dentists are working less than five years, and 48.4% dentists are working for more than five years. Most of the dentists who participated in this survey are involved in private practice (76.1%). Only 18.5% of dentists are serving the government hospitals, and 5.4% of dentists are doing independent practice during the survey. Most of the dentists (34.8%) are earning between BDT 20000-50000, approximately 22.3% of dentists are making below BDT 20000, and only 6.5% of dentists were earning over BDT 150000. The descriptive analysis of knowledge, awareness and practice related questions. (Table 2, Table 3 and Table 4).

About 92% of respondents provided appropriate replies related to the main clinical symptoms of COVID-19. Approximately 98.3% of dentists know that there is no effective cure for COVID-19. About 58.3% of respondents shared that eating or contacting wild animals would not result in the infection by the COVID-19 virus. Almost 59.4% dentists know that they can wear conventional surgical masks to prevent the infection.

About 95.4% considered people who come from virus-infected areas cannot spread the virus as false. Approximately 88% of respondents shared that using all personal protection equipment is not essential for clinical practice as an incorrect response. A vast majority of the respondents, 93.1% know the incubation period of COVID-19 is 14 days.

Regarding awareness of COVID-19 virus, about 92% of dentists reported that all dental treatment should not continue during the pandemic. About 97.1% of dentists are aware that their professional income will be affected during the pandemic. A similar number of dentists agreed that the patients might hide their medical history due to social stigma. About 92% of dentists revealed that the number of patients seeking dental treatment is reduced due to the outbreak. Approximately 97.7% of respondents shared that another patient in a dental clinic can contaminate patients.

Majority of the dentists (93.1%) feel anxious to provide dental treatment to patients due to the pandemic. Concerning the practice regarding COVID-19 related issues, only 14.9% of dentists did not close down their practice during the outbreak, and 96% dentists already reduced the schedule of patients appointments. Approximately 57.1% dentists shared that they do not use separate gown/apron or operating theatre dress covers for individual patients. Only 3.4% of dentists reported that they do not use a mask when leaving home.

Regression analysis findings between background characteristics and knowledge, awareness and practice during COVID-19 among the Bangladeshi dentists. (Table 5). The dentists who completed postgraduate education are three times more likely to know (OR=3.1, 95%CI 1.2-7.9) about COVID-19 compared to the dentists who completed an undergraduate degree. The dentists who are earning monthly between BDT 20000-50000, BDT 50000-100000 and BDT 100000-150000 are two times more likely to know about COVID-19 related information relative to the dentists who are earning below BDT 20000. The dentists aged between 31-35 years are five times more likely to be aware of COVID-19 associated issues compared to the dentists aged between 21 to 25 years old. Similarly, dentists earning between 50000-100000 are five times more (OR=5.9, 95%CI 1.0-33.3) likely to be aware of COVID-19 situation with the dentists who are earning below BDT 20000.

Regarding practice and awareness on COVID-19 matters, dentists with postgraduate degrees are five times (OR=5.3, 95%CI 1.2-23.3) more likely to follow proper precautions than the dentists who completed undergraduate dental degrees. Dentists working in the dental clinics for less than 5 years are ten times more likely to practice in the safest possible way during COVID-19 than the dentists working for more than five years. It is also observed that the dentists employed in private and independent settings are four times (OR=4, 95%CI 0.7-24) more likely to follow safe practice than the dentists employed in the government hospitals clinics.

DISCUSSION.

The COVID-19 pandemic put the whole world almost into a state of emergency because of its deadliest nature of contagion and mortality. Although COVID-19 was prevalent in the developed countries,[2] now the epicenter of the pandemic is gradually shifting in the South Asian region with its destructive nature.[27] Bangladesh is one of the countries in this region where an increase of COVID-19 cases has increased since the virus outbreak in March, 2020.[11] However, mortality due to this virus is still relatively low here compared to the reported case elsewhere in the world.[28]

Nevertheless, mortality among the health professionals in Bangladesh who were affected by COVID-19 is quite high in Bangladesh.[12] Dentists, who are an essential part of the health professional group, are front liners in this pandemic. Moreover, the areas of professional expertise of dentists are the oral cavity and teeth, which put them in the most vulnerable position for being infected by SARS-CoV-19.[19-20,22-23] Therefore, a dentist should have proper knowledge and practice according to standard guidelines to prevent the infection. For the first time in Bangladesh, we have conducted this study among registered dentists to explore knowledge, awareness and practice regarding COVID-19.

A total of 184 registered dentists responded, the majority were male and between 26-30 years old. Most of the dentists who responded are in private

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practice and earn between BDT 20000-50000 while only 6.5% of respondents earn more than BDT 150000.

The response rate was quite low, perhaps because dentists might feel reluctant to fill up the questionnaire due to COVID related stress or unwillingness to take part in research studies. The study findings revealed that the majority of the dentists who took part in this study, completed an undergraduate degree and only 29.3% dentists completed the postgraduate education; this is lower than reported in a multi-country study (35%), and lower than in Jordan, where 30.4% completed their postgraduate education.[22,29]

This study finds that most dentists have a better knowledge score, which is similar to the findings among the Indian, Jordanian and Saudi dentists.[10,29-30] Although knowledge about symptoms is high among Bangladeshi dentists, most of them gave fewer right answers regarding the chance of getting infected from animals, types of COVID-19 virus, and airborne nature of this novel coronavirus. However, dentists who have postgraduate degrees are three times more likely to be knowledgeable than dentists who have only an undergraduate degree. This finding is also consistent with the results in other countries,[10,30] which emphasizes education and training over knowledge scores. Furthermore, dentists who earn more than BDT 20000 have better knowledge than those who earn a lower amount.

Most dentists have a more positive awareness regarding the battle against COVID-19, and they firmly believe that they can contribute effectively to the health system in this COVID-19 situation. Besides, most dentists think that health education, quarantine, and social distancing could be an effective way to prevent COVID-19, like the Jordanian dentists and primary health care providers in Pakistan.[22,31] On the other hand, similar to the dentists from the other part of the world, most Bangladeshi dentists are afraid of being infected as patients may hide COVID-19 history due to social stigma, income reduction, patient reduction and ultimately negatively impact on the health system.[23] Consequently, most of the dentists in this study reported that they had reduced their patient schedule, and most of them closed their practice. The higher stress level was also reported among Pakistan's health care workers due to the pandemic.[32]

The odds ratio analysis revealed that the dentists aged between 31 to 35 years of age are showing a more positive awareness and this is a contrast to multi-country findings where it was found that there is no association between positive awareness and age of the dentists.[33] This research exhibited that years of clinical experience are associated with a positive awareness related to COVID-19. Still, no significant relationship was observed between years of clinical practice concerning continuing dental practice among dental professionals in Poland.[34]

Regarding safe and hygienic practice, the study found that female dentists are more likely to follow safe practice procedures compared to their male counterparts. This is different from the Polish research, where the male dentists wanted to continue their work.[34] The Bangladeshi dentists who are less experienced are more likely to maintain safety and hygiene in the dental settings due to COVID-19. In contrast, Sarfaraz and colleagues could not find any link between years of experience and maintaining safe practice.[33]

This study had several limitations. The response rate of the survey is relatively low, and it resulted in a smaller sample size. Thus, the findings may not wholly represent the accurate picture of all the dentists in Bangladesh. The survey has only captured the responses from younger and middle age group dentists. Since they are active in social media, they have exhibited good knowledge, awareness, and practice on COVID-19; however, this study has failed to capture senior dentists' views and opinions. This prevents the ability to generalize the findings of this study. The study also presents some strengths, and this is the first study among the dentists in Bangladesh on COVID-19, so the outcomes are relatively novel. Dentists are considered as vulnerable health care professionals in Bangladesh. This COVID-19 pandemic not only places dentists at higher risk of getting infected, but as so many dental practices in the country are currently closed since the lockdown started, and patients are not accessing the dental settings due to fear and anxiety, these other consequences have affected these dental professionals. The dentists in the country are going through financial hardship, and

no government initiative is in place to help the dentists who are struggling to meet their daily needs. It has also been reported that psychological distress increased among the dentists as the level of knowledge of COVID-19 infection increased.[35]

CONCLUSION.

The COVID-19 pandemic has brought multiple challenges in the health sector in a densely populated country like Bangladesh, mostly due to its unpredictable trajectory and delay in integrating public health activities within the health delivery system.

Although the dentists in Bangladesh have shown good knowledge, awareness, and practice regarding COVID-19, we recommend healthcare authorities, administration, professional organizations, and hospitals coordinate and organize mandatory advanced infectious disease training for all the practicing dentists. Easily accessible, scientifically verified online education materials can guide dentists to get more updated infection status and therapeutics.

Different international healthcare and professional authorities' official websites, such as the World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), and American Dental Association (ADA), provide free access to online courses and webinars which can be excellent self-learning platforms for the dentists in Bangladesh. There is an urgent need to assess the psychological, financial, occupational health and safety challenges faced by the dentists in Bangladesh, and proper intervention should be introduced to overcome these unpredicted difficulties.

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