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Research Article

Evolution of New Oral Health Care Practices in Response to COVID-19 Pandemic: Lesson Learned From National Survey

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Abstract

Background

The COVID-19 (COrona VIrus Disease-19) outbreak has challenged dental and oral health care workers and their practices and has evoked different speeds of reaction and types of response worldwide. This survey aimed to document the early effect of the pandemic on dental and oral health care workers, their response to combat the COVID-19 outbreak, the evolution of practices, and learn lessons for future health policies in similar situations in the future.

Methods

A descriptive cross-sectional study was designed and conducted via Google form from 24 June 2020 to 13 July 2020 among Nepal's dental and oral healthcare workers after getting ethical approval from Nepal Health Research Council (Reg 445/2020P / Ref No 2710). The study questionnaire was developed in 4 domains: first, general demographics; second, personal impact; third, professional impact and fourth, the academic impact of COVID-19. In addition, Chi-square test was used to show the relationship between variables.

Results

Of 133 respondents, 18.8% exposure risk and 14.3% infection rate were found among dental and oral health care workers of Nepal; a higher exposure rate was unmarried (ER, 21.4%), senior residents (ER, 50%), female (ER, 19.6%), 20-29 years (ER, 16%), the Lumbini province (ER, 50%). Only 50(37.6%) of

them had a provision for testing. The majority of participants exhibited some COVID-19 symptoms. As a result, 48.2% of DOHCWs have entirely closed their all-clinical activities. Rapidly, they gained knowledge, attitude and practice about COVID19.

Conclusion

Pandemic adversely affects personal, practice and academic lives of dental and oral health care workers. The timeliness of COVID-19 affects tightly interconnected processes is a clear lesson that we have learnt, and that shall be maintained even in the future to allow better advancement of science and optimal patient engagement, safety, empowerment and care.

Keywords: COVID-19; Dental Research; Dentist; SARS CoV-2

1. Background

In early 2020, Dr Li Wenliang reported the death of many people in a local hospital in Wuhan, China suffering from severe acute respiratory syndrome (severe pneumonia) of unknown cause [1,2]. The scientists rapidly identified the aetiology of the novel beta-coronavirus, while two evidence of such virus outbreaks have been described as the severe acute respiratory syndrome coronavirus (SARS-CoV-1) and the Middle East respiratory syndrome coronavirus (MERS-CoV). Currently, it has named Severe Acute Respiratory Syndrome CoronaVirus-2 (SARS-CoV-2) [2,3], and the disease is called COVID-19 (COrona VIrus Disease-19) [4,5]. COVID-19 is presented with a wide range of clinical features, mild to severe symptomatic and asymptomatic. The symptomatic COVID-19 present with a dry cough, fever, and dyspnea [6], but also anosmia, ageusia, and, in a few cases, diarrhoea, and oral and cutaneous manifestations have been reported [7,8]. COVID-19 is considered a threat and danger to humans than previous epidemics because of its transmission mode and high spreading potential via all possible modes [9-12]. Invariably, Dental and oral health care workers (DOHCWs) are at a higher risk of exposure to SARS CoV-2 due to close physical contact with the patients. The nature of work, i.e. direct contact with saliva, blood, and longer work duration, makes them presumably high infection rate [14-16].

The health care workers globally were overwhelmed by the COVID-19 pandemic; among them, DOHCWs were forced to halt their professional activities and rightfully take a backseat during a pandemic. Centers for disease control and prevention (CDC) suggested the DOHCWs prepared to reserve the workforce if medical health professionals were infected or scarcity occurred [17]. The simple logic was given to reserve PPEs, maintain social distancing, and protect DOHCW, and patients from potential exposure and illness [17,18]. However, the pandemic impact on them is very much visible [1,18-20]. The various professional organisations proposed working guidelines suggesting maintaining emergency and urgent dental care services with proper personal protective equipment (PPEs) for existing patients and new patients [18,21,22]. Nepalese local health authorities recommended closing oral health care (OHC) services. The reason for such grave action was the unavailability of logistic support [23]. A closer OHC centre followed lockdown; consequently, huge numbers of patients with oral and dental problems were presented in a general hospital's emergency department (ED) [23-25]. Patients had only insight way to get treatment there. Unfortunate, a few hospitals are equipped to maintain urgent OHC services to the patients. Lessons learned from the

previous similar outbreak (SARS CoV-1), past evidence or information to help health care workers for COVID-19 rapid response preparedness, prioritising contagion limitation, developing protocols (rules), training guides for this public health emergency of international concern (PHEIC) [5,]. Therefore, OHC researchers grasped the opportunity of free time from clinical work to research activities during an early COVID-19 outbreak. They were focused on innovation for safe practice to develop evidence on minimising the impact on DOHCWs and dentistry overall [26]. As a result, the evolution of many ideas, technologies, and guidelines has occurred in dental and OHC practice; this would help DOHCWs combat current and ready for future climatises [21,22].

Presently, an increased number of COVID-19 cases have been detected in many parts of the world. Although, there was a significant reduction in cases in any part of the world. A new variant has continued to be detected in part of the globe. There are significant variations in disease severity and exhibited a proportionally higher infection rate than previous variants. Anytime, DOHCWs are at an increased risk of contracting the infection, becoming potential disease carriers and potential for onwards transmission to patients and other clinicians or staff even if they were vaccinated. If SARS CoV-2 circulates among humans, there would be more opportunities for the virus to change and more mutation. Therefore, they must remain vigilant once vaccinated [27]. Thus, DOHCWs should drive transmission down and protect themselves against getting the severe disease in the current situation in low-resource countries like Nepal.

Despite much evidence concerning COVID-19, little work has been done explicit immediate impact on the professional, academic and personal lives of DOHCWs working in the oral health care centre [22,27]. Moreover, a quicker response is needed to reduce the greater transmission and infection to the DOHCWs, which helps to understand the nature of COVID-19 infection and changes in practices. Therefore, the purpose of this paper is to learn the lesson from the early effects of the COVID-19 pandemic on DOHCWs and, make use of elicited a visible response from them, plan for the future practice. The specific aims were to survey DOCHWs; 1) assessment of exposure risk and infection rate among DOHCWs; 2) characterise the availability and use of PPEs; 3) understand the current knowledge, practices; 4) identify the changes made in clinical and academic activities; 5) characterise the subjective experience of DOHCWs during the pandemic. Probably, this would be the first-ever survey conducted in Nepal to find the effect of COVID-19 on the professional, academic and personal lives of all DOHCWs, including faculty, staff and students. Moreover, timeliness would help develop more effective protocols (rules), training guides and priority interventions to support the DOHCWs' response to COVID-19 currently and similar future pandemics.

2. Methods

This study protocol was prepared following the American Association for Public Opinion Research (AAPOR) reporting guideline for ethical approval. In addition, this survey was conducted following the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for observational studies [28].

2.1 Study design and setting

A cross-sectional observational online survey was designed during the early phase (first wave) of the

COVID-19 pandemic. The online survey was conducted via Google form from 24 June 2020 to 13 July 2020 among Nepal's dental and oral health care workers (DOHCWs). During this period, the total confirmed cases of COVID-19 exceeded ten thousand (10,099 to 16945) in Nepal (Figure 1). The OHCS, in particular, has been overwhelmed by the early effect of COVID-19 on complete lockdown. OHCS includes private hospitals/clinics, community/ Public hospitals, and government or private teaching hospitals from all seven provinces of Nepal.

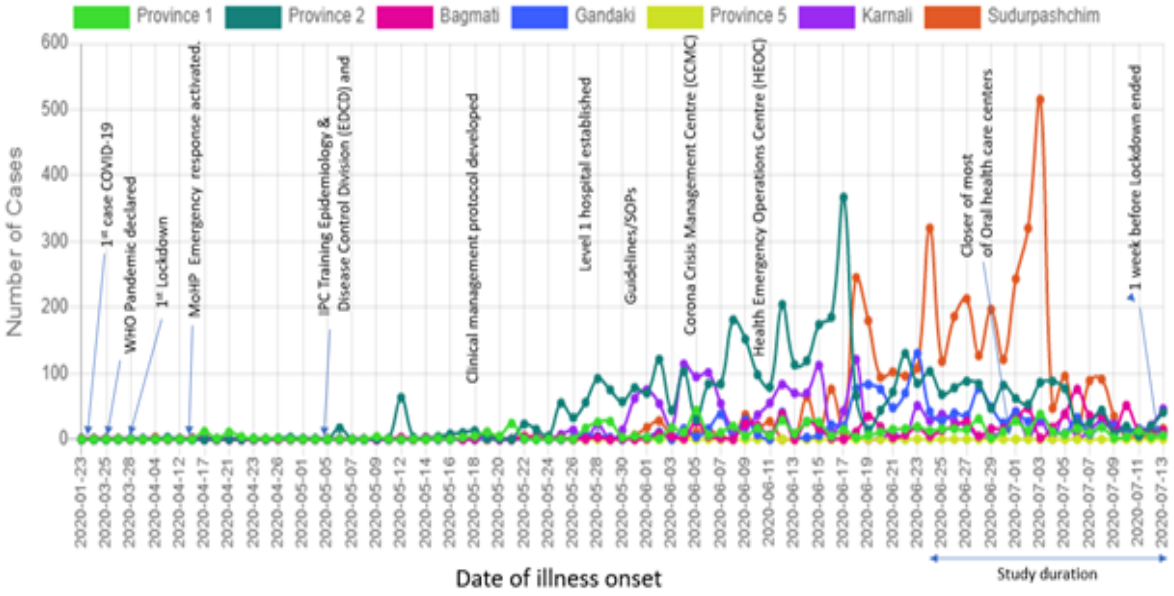

Figure 1: Preparedness for coronavirus disease; change of daily infected numbers of Coronavirus disease 2019 (COVID-19) in Nepal. Timing of study was duration of lockdown and closer of most of oral health care centers.

2.2 Participants

Participants were DOHCWs, including faculties, specialist dental doctors, dental surgeons, dental nurses, security guards, and ambulance drivers. To calculate an adequate sample size for this study, we used a simple proportional sample size formula; n = $(Z^2 \times p \times q) / d^2$.

= $(1.96^2 \times 51x49)/10.2^2$

= 92

Where,

n= minimum required sample size,

Z= the standard normal variate (it is 1.96 at 95% CI),

p= approximately 51% assumed,

q= (100-51)%=49%,

d= precision for prevalence (it is 10.2, 20% of p at 80% statistical power).

Some more factors considered while calculating the final sample size include the expected drop-out rate, an unequal allocation ratio, and the study's objective, design, and setting. Hence, to allow for analyses, we amplified the sample size by 45% with a goal of at least 134 completed questionnaires from participants.

2.2.1. Selection criteria: The inclusion criteria were DOHCWs of any gender above 20 years to read English/Nepali and co-operative and provide informed consent for this study. The exclusion

criteria were repeated entry, incomplete form fill up, or a participant who was not providing informed consent for the study and wanted to drop out of the study within two weeks.

2.2.2. Selection Methods: The method used for this survey was the internet base online survey. The Google form internet link of the questionnaire was sent to the target DOHCWs via both personal email and social media platforms. The list of valid email-id and social media addresses was collected with the help of friends and colleagues. The final lists included the participants working in 7 provinces of Nepal. In addition, the survey link was posted in close groups on Facebook, such as Dentist of Nepal, Nepal dental association. Furthermore, considering nonresponse bias and increased response rate, the convenience sampling technique was used. Email blast reminder messages and links were sent weekly for two weeks if the person did not respond initially. Further, researchers continuously communicated with DOHCWs of different provinces on phone calls to stimulate the participants' responses. (Figure 2).

2.3 Variables

The primary outcome variable was the respondent's perception of COVID-19 coded as yes/ no, level of agreement, and satisfaction. The indirect variables were socio-demographic characteristics. The direct variables for this survey were exposure risk, COVID-19 symptoms experienced, family reaction, availability of resources, attitude and practice during early COVID-19. Demographic data were self-reported by the participants, including age (20-29, 30-39, >40 years), gender (male or female), co-morbidity, type of OHC centre, geographic location (provinces), marital status, work position (occupation), place of residence, and work profile. Participants were categorised into three groups; first, clinically active who responded 'yes' to direct interaction with the patients ie. diagnosis, treatment in ED or ambulatory setting. Second, halt clinical work that did not provide the community's oral care service. Third, an academician who excessively provides teaching-learning activities only. The direct and indirect variables are listed in table 1.

Characteristics	Categories	No of Response (%)
Age (in years)	20 – 29	69(51.9)
	30 – 39	48(36.1)
	≥40	16(12.0)
	Mean age ± SD	31.07 ± 7.42
	Range (Min – Max)	22 – 70
Gender	Male	82(61.7)
	Female	51(38.3)
	Others	0
Co-morbidities	None	123(92.5)
	Yes	10(7.5)
	Hypertension	4(3.0)
	Diabetes mellitus	3(2.3)
	Asthma/COPD	4(3.0)
	Others	2(1.3)
Type of oral health service center	University / Medical / Dental teaching college	59(44.4)

	Private Dental hospital	16(12.0)
	Government hospital	24(18.0)
	Private Dental clinic	34(25.6)
Working place (City/Town)	Rural area	0
	Urban area	133(100)
Work province	Province 1	27(20.3)
	Madhesh	37(27.8)
	Bagmati	53(39.8)
	Gandaki	2(1.5)
	Lumbini	9(6.8)
	Karnali	1(0.8)
	Sudurpashim	4(3.0)
Marital status	Single	70(52.6)
	Married and living with spouse	58(46.6)
	Married and staying away from the spouse	4(3.0)
	Widowed	1(0.8)
Work Position	Junior Resident	22(16.5)
	Senior Resident	2(1.5)
	Faculty Member	27(20.3)
	Dental surgeon	79(59.4)
	Sanitation worker	3(2.3)
Work profile	Clinically Active	80(60.2)
	Halt clinical work	44(33.1)
	Participating in academic activities only	9(6.8)
Change in practice	Closing dental practices /stay home	24(18.0)
	Selective or less procedure than before	98(73.7)
	More work load than before	2(1.5)
	Telemedicine or online consultation	9(6.8)
Provision of quarantine	Only when infected	47(35.4)
	After SARS CoV-2 test positive	19(14.3)
	After 2 weeks of work	NA
Provision of testing	Only when symptomatic	50(37.6)
	After 2 weeks of work	NA
Administrative support	Facility of cleaning area	78(58.7)
	Transports	59(44.3)
	Food	66(49.6)

NA: Not available

Table 1: Demographic characteristics of respondents.

2.4 Data collection tools

The questionnaire was developed as guided by Regmi PR et al. 2016 in Google Forms [29]. This platform was chosen because it is free, easy to use for both the researchers and respondents, and it provides easily extrapolated data for use in Excel (Microsoft). The

questionnaire was produced that how were DOHCWs combat COVID-19 a crisis, in English and Nepali and included multiple-choice questions, likert scale, or matrix questions. This questionnaire was developed in 4 domains. First, the domain collected participants' personal and workplace demographic. Second, the domain included most of the primary outcomes, i.e. exposure risk and prevalence of infection rate to SARS-CoV-2, social and family reaction. It was constructed to determine the effect of COVID-19 on the personal lives DOHCWs. Third, the domain was constructed to determine the effect on the professional lives of DOCHWs. It included changes in patient care, workforce and staffing issues, and logistic support availability. Fourth, the domain evaluated the effect of COVID-19 academic activities, i.e. teaching-learning, under graduate and postgraduate levels.

2.5 Reliability and validity

A 21-item survey instrument (questionnaire) was developed using WHO course materials on COVID-19 and interim guidance 1 for health care workers and guidelines published by professional organisations for COVID-19 [18,30]. The questionnaire covered DOHCWs' demographic characteristics, knowledge and exposure risk assessment, and personal and professional perceptions during the early phase of the COVID-19 pandemic. Face validity was used to evaluate the questionnaire in terms of feasibility, readability, consistency of style and formatting, and the clarity of the language. The initial developing survey questionnaire was provided to the ten experts from different specialities (faculties) for reading and asked to assess clarity and acceptability. In addition, they were requested for their suggestions and correction to the questionnaire. The developed draft survey instrument was made accessible through a google form link and was distributed to 10 experts from 7 provinces of Nepal to assess the content domains of the questionnaire comprehensively and rated the ease of re-adaptability of the questionnaire ranging from 0 to 100 (0-30: confusing; 31-50: difficult; 51-70: standard; 70-90: easy; and 90-100 very easy). The tool's reliability was validated through an intra-class correlation with a strong relation of 0.80 (Cohen alpha). The feasibility and time required to answer the survey were evaluated on another 5 participants. Those participants were not included in the research.

Finally, a valid email and single responses setting of links was done. The majority of the questions were mandatory for the response and sent only when the respondent reached the end of the questionnaire. However, some questions were fixed as not relevant to nonclinical DOHCWs. All participants had received response emails and reply emails.

2.6 Statistical Analyses

The spreadsheet (excel) was generated and downloaded from Google form doc. The spelling error entry (especially in open-ended questions) was corrected, and the Nepali font was erased. All the nominal and ordinal variables' responses were categorised and coded numerically. The string variables of liker type questions were assigned a score ranging from 0 to 4. Data analysis was performed using SPSS statistical software version 11.5 (IBM Corp).

Descriptive analysis was done by calculating frequency and percentages for each question in categorical variables, mean and standard deviation for continuous variables. Chi-square test was used to find the relationship between different types of workplaces and the work profile of DOHCWs. 95% confidence intervals (CIs) were used to quantify the

associations between variables. A 2-sided P < .05 was considered statistically significant.

3. Result

Only 134 (29.77%) complete responses were received in this survey among the 450 dental and oral health care workers asked to participate (Figure 2).

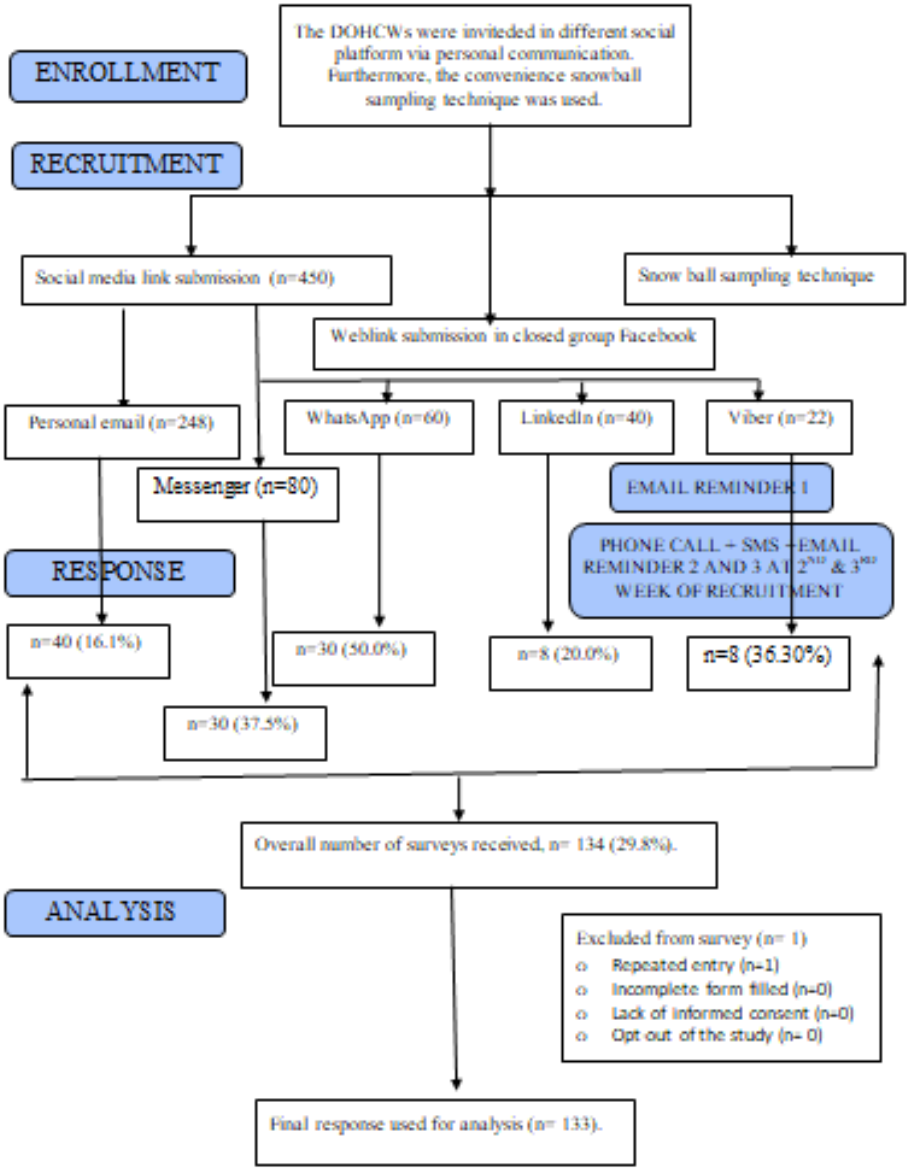

Figure 2: Flow chart detailing respondent's recruitment and response rate in each social platform in this survey.

3.1 Demographic characteristics

In practice demographic of DOHCWs, over 80(60.2%) of them responded that they were actively working on the COVID-19 crisis; 44(33.1%) of them halted their all-clinical activities (Table 1). Furthermore, 98(73.7%) of them started mitigation of procedure by performing a selective or less procedure than before; 24(18.0%) of them completely closed their dental practices and stayed home. Off, 9(6.8%) of them shifted practice to an online platform

(teledentistry), whereas 2(1.5%) worked more work hours than before. Only 50(37.6%) of them had a provision for testing; however, none of the DOHCWs had the provision for testing after two weeks of work. Approximately 50% of respondents received good administrative support for a facility of cleaning areas, transport, and food (Table 1).

3.2 Personnel impact

Of a total 133 of DOHCWs, 19(14.3%) of them were tested positive and quarantined, 5(20.0%) were tested positive among 25(18.8%) of DOHCWs whom at least one episode of exposure to COVID-19 cases, whereas 14(14.89%) were tested positive among 94(70.67%) of them not having a history of exposure. An attributable risk (AR) 7.04%; [OR, 1.678; 95% CI, (0.54 to 5.19)], exposure risk (ER 18.8%) was found. Chi-square test showed the highest exposure risk among unmarried (ER, 21.4%), senior residents (ER, 50%), female (ER, 19.6%), 20-29 years (ER, 16%), the Lumbini province (ER, 50%) (Table 2).

More DOHCWs specially dental surgeon got exposed in private dental hospital (12[33.3%] vs 0) but fewer in private dental clinic (30 [16.7.3%] vs 0) (P < .001). The faculty over 40 years were more likely to be exposed than working clinicians aged 40 years or older (ER, 18.7%; P < .003). Moreover, in terms of work position and work profile, there was a statistically significant difference found in most of the demographic variables; age (P=0.001 and P=0.003), gender (P=0.006 and P=0.04) and marital status (P=0.001 and P=0.06) respectively (Table 2).

A considerable proportion of participants had symptoms of fever (6.0%), dry cough and difficulty breathing (15.0%), tiredness (49.6%), flu-like symptoms (nasals congestion, headache, conjunctivitis) (27.8%), sore throat (27.8%), diarrhoea (18.8%), anosmia (loss of taste or smell) (7.7%), a rash on skin or discolouration of fingers or toes (6.8%). Most respondents responded, never option (≥50%), followed by seldom, occasionally, frequently, always, respectively (Table 3). Dental surgeons, women, and working workers reported experiencing more severe symptoms. The clinically active respondents during the COVID-19 crisis reported a higher percentage of all symptoms.

Similarly, on comparison between different workplaces found that the family reactions were higher in the category of the clinically active group than halt the clinical workgroup; happy for being on duty (45[62.5%] vs 22[30.6%]; P,.79), worried about getting ill myself (74[63.8%] vs 35[30.2%]; P,.08), and worried about getting the infection at home (68[59.1%] vs 38[33.0%]; P, .45) (Table 4).

Characteristics	No of responses (Exposure Rate %)										Overall response No (%)	Exposure risk (ER)%
	Working position (Occupation)						Work profile					
	Junior Resident	Senior Resident	Faculty	Dental surgeon	Sanitation worker		Clinically Active		Halt clinical work	Participating in Academic activities only		
Age (years)												
20 – 29	16(25.0)	0(0.0)	0(0.0)	50(18.0)	3(66.6)	P=0.001*	36 (19.4)	31 (22.5)	2(0.0)	P=.003*	69(51.8)	20.10%
30 – 39	6(16.7)	1(0.0)	18(5.5)	23(17.4)	0(0.0)		29 (13.8)	13 (23.0)	6(16.6)		48(36.0)	16.60%
≥40	0(0.0)	1(0.0)	9(22.2)	6(33.3)	0(0.0)		15 (26.6)	0(0.0)	1(0.0)		16(12.0)	18.70%
Gender												
Male	9(22.2)	2(50.0)	22(9.1)	49(10.2)	0(0.0)	P=0.006*	56 (17.8)	21 (23.8)	4(00)	P=.04*	82(61.6)	18.30%
Female	13(15.3)	0(0.0)	5(20.0)	30(36.6)	3(33.3)		24 (20.8)	23 (21.7)	4(0.0)		51(38.3)	19.60%
Marital status												
Single	15(20.0)	0(0.0)	4(0.0)	48(22.9)	3(33.3)		38 (21.1)	30 (23.3)	2(0.0)		70(52.6)	21.40%
Married and living with spouse	5(20.0)	2(50.0)	23(13.0)	28(14.2)	0(0.0)	P=0.001*	39 (12.8)	12 (25.0)	7(0.0)	P=.06*	58(43.6)	13.80%
Married and staying away from the spouse	2(0.0)	0(0.0)	0(0.0)	2(50.0)	0(0.0)		3 (66.6)	1(0.0)	0(0.0)		4(3.0)	50.00%
Widowed	0(0.0)	0(0.0)	0(0.0)	1(0.0)	0(0.0)		0(0.0)	1(0.0)	0(0.0)		1(0.8)	0.00%
Comorbidity												
No	21(19.0)	1(0.0)	23(13.0)	75(18.7)	3(33.3)	P=0.07	79(16.5)	42(19.0)	8(0.0)	P=.63	123(92.5)	17.00%
Yes	1(0.0)	1(100.0)	4(0.0)	4(50.0)	0(0.0)		7 (28.5)	2 (100.0)	1(0.0)		10(7.5)	40.00%
Province (Location)												
Province 1	11(27.3)	0(0.0)	4(0.0)	12(33.3)	0(0.0)		17 (29.4)	7 (28.5)	3(0.0)		27(20.3)	25.90%
Province 2	2(0.0)	1(0.0)	7(14.3)	26(15.4)	1(0.0)		19 (21.1)	15 (20.0)	3(0.0)		37 (27.8)	18.90%
Bagmati	5(20.0)	1(100.0)	16(12.5)	29(17.2)	2(3.8)	P=0.26	33 (15.1)	17 (11.7)	3(0.0)	P=0.69	53(39.8)	13.20%
Gandaki	0(0.0)	0(0.0)	0(0.0)	2(100.0)	0(0.0)		0 (0.0)	2 (100.0)	0(0.0)		2(1.5)	100%
Lumbani	3(0.0)	0(0.0)	0(0.0)	6(33.3)	0(0.0)		7 (14.2)	2 (50.0)	0(0.0)		9(6.7)	22.20%
Karnali	0(0.0)	0(0.0)	0(0.0)	1(0.0)	0(0.0)		7 (0.0)	2(0.0)	0(0.0)		9(6,7)	0.00%
Sudurpashim	1(0.0)	0(0.0)	0(0.0)	3(0.0)	0(0.0)		1 (0.0)	0(0.0)	0(0.0)		1(0.8)	0.00%

Type of oral health care centre												
University / Medical / Dental teaching college	22(18.2)	2(50.0)	19(10.5)	21(18.2)	3(33.3)		26 (7.7)	24 (1.6)	9(0.0)		59(44.4)	20.30%
Private Dental hospital	0(0.0)	0(0.0)	1(0.0)	12(33.3)	0(0.0)	P=0.001*	11 (18.2)	5 (40.0)	0(0.0)	P=0.001*	16(12.0)	25.00%
Government hospital	0(0.0)	0(0.0)	6(16.8)	16(18.8)	0(0.0)		22 (18.2)	2(0.0)	0(0.0)		24(18.0)	16.60%
Private Dental clinic	0(0.0)	0(0.0)	1(0.0)	30(16.7)	0(0.0)		21 (19.0)	13 (7.7)	0(0.0)		34(26.6)	14.70%
Overall responses No (%)	22(16.5)	2(1.5)	27(20.3)	79(59.4)	3(0.0)		80 (60.2)	44 (33.1)	9(0.0)		133(100)	18.80%
Exposure risk %	18.10%	50.00%	11.10%	20.30%	33.30%		18.80%	22.70%	--	-	18.80%	-

Note: *P ≤ 0.05 is the statistically significant.

Table 2: Exposure risk assessment among DOHCWs.

Symptoms experienced	Response No. (%)					P-value
	Never	Seldom	Occasionally	Frequently	Always	
Fever	125(94.0)	4(3.0)	4(3.0)	0(0.0)	0(0.0)	0.59
Dry cough and difficulty breathing	113(85.0)	11(8.3)	9(6.8)	0(0.0)	0(0.0)	0.46
Tiredness	67(50.4)	23(17.3)	34(25.6)	5(3.8)	4(3.0)	0.13
Flu like symptoms ie nasals congestion, headache, conjunctivitis	104(78.2)	11(8.3)	18(13.5)	0(0.0)	0(0.0)	0.08
Sore throat	96(72.2)	20(15.0)	15(11.3)	2(1.5)	0(0.0)	0.14
Digestive symptoms; Diarrhea	108(81.2)	9(6.8)	16(12.0)	0(0.0)	0(0.0)	0.17
Anosmia ie loss of taste or smell	123(92.5)	2(1.5)	8(6.0)	0(0.0)	0(0.0)	0.09
A rash on skin or discoloration of fingers or toes	124(93.2)	4(3.0)	5(3.8)	0(0.0)	0(0.0)	0.85

Note: *P ≤ 0.05 is the statistically significant.

Table 3: Clinical symptoms of Coronavirus disease 2019 (COVID-19) developed within 2 weeks of period among DOHCWs in work profile.

Characteristics	Response No. (%)				P-value
		Work profile			
	Overall	Clinically Active	Halt clinical work	Academician	
Happy for me being on duty	72(54.1)	45(62.5)	22(30.6)	5(6.9)	0.79
Worried about getting ill myself	114(87.2)	74(63.8)	35(30.2)	7(6.0)	0.08
Worried about getting the infection at home	113(86.5)	68(59.1)	38(33.0)	9(7.8)	0.45

Note: *P ≤ 0.05 is the statistically significant.

Table 4: Family reacting of DOHCWs toward COVID-19 pandemic in work profile.

3.3 Professional impact

The professional life had changed for obvious reasons were psychological disturbance (19.5%), lockdown (34.6%), following the guideline (45.1%), clinician scarcity (5.3%), and lack of PPEs (31.6%) and others (1.5%) (Table 5). In addition, a psychological disturbance (P,.02), fewer/no patients (P,.06), and following guidelines (P,.01) were found to be statistically significant reasons to change in practice among the DOHCWs of various oral healthcare centres of Nepal (Table 5). The level of satisfaction of DOHCWs with the availability of logistics support provided by the administrative authority of OHCS centres is presented in table 6. DOCHWs responded in categories of slightly satisfied to extremely satisfied (approximately 50%), neutral (10-15%), slightly dissatisfied and extremely dissatisfied (approx 40%) on availability of PPEs issues. Notably, the level of satisfaction with logistic support provided by administrative agencies was found to have a statistically significant difference between OHCS centres in the following categories;

availability of masks other than N95 (52.6%; P,.04), availability of PPEs (40.6%; P,.06) and facility of cleaning area (58.7%; P,.01). (Table 6). Surprisingly, tertiary care centres had gotten less support from their authorities to combat with COVID-19 pandemic.

Particulars	Response No (%)					
	Overall	Type of oral health service centers				
		University / Medical / Dental teaching college	Private Dental hospital	Government hospital	Private Dental clinic	P-value
Psychological disturbance	107(80.5)	54(91.5)	10(62.5)	19(79.2)	24(64.7)	**0.02**
Less patients/ lock-down	87(65.4)	44(74.5)	7(43.6)	17(29.2)	19(55.9)	**0.06**
Strict to government order/guideline	73(54.9)	28(47.5)	14(87.5)	10(41.7)	21(61.8)	**0.01**
Clinician scarcity	126(94.7)	56(94.9)	16(100.0)	22(91.7)	32(94.1)	0.71
Lack of PPE	91(68.4)	38 (64.4)	13(81.3)	15(62.5)	25(73.5)	0.48
Others	131(98.5)	58 (98.3)	15(93.8)	24(100.0)	34(100.0)	0.34

Table 5: The reasons of transitional Change in practices among DOHCWs in different oral health service centers.

Particulars	No (%)					
	Extremely satisfied	Slightly satisfied	Neither satisfied, nor dissatisfied	Slightly dissatisfied	Extremely dissatisfied	P-value
Availability of Sanitizers/ hand wash	53(39.8)	45(33.8)	12(9.0)	12(9.0)	11(8.3)	0.19
Availability of N-95 Masks	28(21.1)	39(29.3)	13(9.8)	19(14.3)	34(25.6)	0.08
Availability of Masks other than N95, N99	22(16.5)	48(36.1)	23(17.3)	23(17.3)	17(12.8)	**0.04**
Availability of PPEs	26(19.5)	28(21.1)	23(17.3)	26(19.5)	29(21.8)	**0.06**
Facial mucosa protection (face shield, eye visor, goggles)	28(21.1)	38(28.6)	21(15.8)	16(12.0)	30(22.6)	0.11

Note: P ≤ 0.05 is the statistically significant.

Table 6: The level of satisfaction on protective personal protective equipment's provided by administrative agencies; a comparison between responders from different oral health service centers.

3.4 The academic impact

In response to 13-knowledge questionnaires about the nature and mode of transmission of new SARS CoV-2, response rates were 100%; undecided responses were shallow; correct response rates were found between 18% to 90% (Table 7). The mean knowledge score was 9.726 (SD: 0.216, range: 0-13) (Tables 7,8). an overall correct response rate was 74.82%

(9.73/13*100). On the knowledge test, the correct response rate was much higher in AGPs knowledge questions [79.39% (6.35/8*100)] than in the mode of transmission knowledge questions [69.28% (3.464/5*100)]. On the other hand, only 37.57% (13.15/35*100) of DOHCWs responded correctly to know about the working guideline for the COVID-19 pandemic (Table 8). Unfortunately, they have very poor knowledge about working guidelines but a marginally good knowledge of the nature and mode of transmission of SARS CoV-2.

Questions	Undecided Response Rate (%)	Correct responses Rate (%)
Q. Following clinical activities generates aerosol;		
K1. Use of bone cutting burs/piezoelectric saw with NS spray [**Strongly Agree (SA), Agree (A),** Undecided (U), Disagree (DA), Strongly Disagree (SD)]	4(3.0)	120(90.2)
K2. Use of ultrasonic scaling [**SA, A,** U, DA, SD]	5(3.8)	118(88.7)
K3. Use of air-rotter hand piece. [**SA, A,** U, DA, SD]	6(4.5)	121(90.8)
K4. Use of slow speed micrometer. [**SA, A,** U, DA, SD]	20 (15.0)	105(78.9)
K5. Use of high-pressure suction. [**SA, A,** U, DA, SD]	22(16.5)	81(60.9)
K6. While performing endotracheal intubation. [**SA, A,** U, DA, SD]	20(15.0)	107(80.5)
K7. While doing biomechanical preparation. [**SA, A,** U, DA, SD]	24(18.0)	87(65.4)
K8. While manipulations in oral cavity (impression taking, a traumatic restoration, oral examination, extraction of teeth) [SA, A, U, ***DA, SD***]	18(13.5)	94(70.7)
Total AGPs knowledge score ±SD		6.351±0.11
Q. The SARS-COV-2 human-to-human transmission are occurred via		
K9. Saliva and blood associated respiratory droplets. [***SA, A***, U, DA, SD]	3(2.3)	130(97.7)
K10.Contact transmission (Air born). [***SA, A***, U, DA, SD]	15(11.3)	112(84.2)
K11. Fecal oral transmission. [***SA, A***, U, DA, SD]	38(28.6)	70(52.6)
K12. Vertical transmission. [SA, A, U, ***DA, SD***]	52(39.1)	25(18.8)
K13. Aerosol and fomite transmission. [***SA, A***, U, DA, SD]	7(5.3)	124(93.2)
Total Mode of transmission knowledge score	3.464±0.33	
Overall Mean Knowledge score ±SD	9.726±0.216	

Note: Bold indicate true response. SD, standard deviation, SARS CoV-2. Correct response of 80% and above) was considered as good knowledge.

Table 7: Knowledge score nature and mode of transmission of SARS CoV-2 during clinical activities. Each correct response allotted '1' mark and incorrect and undecided response allotted ' 0' mark.

Categorization of Procedure	Procedure Type	Total Response	Highest response	Correct response
A-Emergency operation/procedure	Q21.4	129	96(74.4)	96(74.4)
	Q21.6	130	89(68.5)	89(68.5)
	Q21.7	130	74(56.9)	74(56.9)
	Q21.11	129	64(49.6)	-
	Q21.15	127	46(36.2)	-
	Q21.18	125	50(40.0)	-
	Q21.19	125	47(37.6)	-

B- Urgent conditions that can be managed with minimally invasive procedures and without aerosol generation	Q21.3	129	-	35(27.1)
	Q21.5	130	84(64.6)	84(64.6)
	Q21.9	128	64(50.0)	64(50.0)
	Q21.10	128	51(39.8)	51(39.8)
	Q21.11	129	-	40(31.0)
	Q21.14	127	-	26(20.5)
	Q21.16	128	57(44.5)	57(44.5)
	Q21.17	126	51(40.5)	51(40.5)
	Q21.23	124	58(46.8)	58(46.8)
	Q21.28	123	44(35.8)	44(35.8)
	Q21.32	125	55(44.0)	55(44.0)
	Q21.27	126	44(34.9)	-
	Q21.33	124	38(30.6)	-
C- Urgent conditions that need to be managed with invasive and/ or aerosol-generating procedures	Q21.15	127	-	37(29.1)
	Q21.18	125	-	40(32.0)
	Q21.19	125	-	39(31.2)
	Q21.33	124	-	29(23.4)
	Q21.14	127	28(22.0)	-
D- Non-urgent – Mitigation	Q21.2	129	52(40.3)	52(40.3)
	Q21.13	127	44(34.6)	44(34.6)
	Q21.20	127	49(38.6)	49(38.6)
	Q21.24	124	40(32.3)	40(32.3)
	Q21.27	126	31(24.6)	31(24.6)
	Q21.29	127	38(30.7)	38(30.7)
	Q21.30	124	48(38.7)	48(38.7)
	Q21.34	122	34(27.9)	34(27.9)
	Q21.1	129	60(46.5)	-
	Q21.3	129	47(36.4)	-
	Q21.8	130	54(41.5)	-
	Q21.25	126	43(34.1)	-
	Q21.26	123	47(38.2)	-
	Q21.31	124	40(40.3)	-
E- Elective – propounded	Q21.1	129	-	31(24.0)
	Q21.8	130	-	33(25.4)
	Q21.12	130	55(41.4)	55(41.4)
	Q21.21	127	60(47.2)	60(47.2)
	Q21.22	124	48(38.7)	48(38.7)
	Q21.25	126	-	42(33.3)
	Q21.31	124	-	44(35.5)
	Q21.35	126	53(42.1)	53(42.1)
Total correct response score (0-35)			13.15±0.127	

Note: The correct response of 35 procedure into five category of treatment options.

Table 8: DOHCWs follow the working guideline for COVID-19 pandemic. A correct answer is assigned 1 point and an incorrect/unknown answer was assigned 0 point.

4. Discussion

The pandemic of COVID-19 has disrupted global health, social welfare and the economy in a proportion unparallel in modern history [21,22,26]. In addition, the effects of the disease on public health, a collateral effect on the healthcare system and its providers, have emerged [31-33]. DOCHCWs are one healthcare speciality with a high exposure risk that contributes to widespread effect on its personal, professional, and academic lives [22,26]. Despite the general public dissatisfaction with the performance of DOHCWs, our participants expressed their

scepticism and concern about the uneven OHC, lack of PPEs, logistic support and inadequate organisational staffing in the early phase; however, it has persisted the context of the COVID-19 outbreak. The present survey aimed to find Nepal's early preparedness, readiness, and response actions for COVID-19. Based on the study findings, this paper highlights the overall impact of COVID19 on OHC and how it would DOHCWs enable to become more adaptive in addressing future practices. This paper helps readers find out the gaps in early and current practices and how would DOHCWs combat the COVID19 pandemic in our country's hospitals.

The present survey described how was COVID-19 pandemic affected personal life, including relationships with family, friends and community. DOHCWs were at higher risk of getting SARS CoV-2 infection (infection rate 14.3%)) at the workplace in the early COVID-19 pandemic. Compared with past evidence, the infection rate was 16 times more than public and HCWs [13,34]. However, in early pandemic studies, a similar infection rate was found in HCWs [26,27]. The reasons for the high infection rate in this study could be due to poor knowledge of working guidelines, insufficient protective measures (PPEs) available, availability of masks, nature of work ie (AGPs), longer duration of work, and work close to airways. In contrast, early pandemic evidences showed that non–frontline HCWs had a significantly higher infection rate than frontline HCWs [13,14]. This could have occurred because the government and local health authorities were only focused on frontline HCWs, and the public was isolated. The majority of participants of this study responded with dissatisfaction with personal protective equipment provided by OHC authorities. We found a significant disproportion in the distribution of masks other than N95, N99 (52.6%; P,.04) and PPEs (40.6%; P,.06) in the different types of OHC centres (Table 6). Pandemic effects were more extensive when clinicians had shortages of personal protective equipment (PPEs) in various OHC centres. The tertiary OHC centre had more dissatisfaction with PPEs and infection rate; probably, that could have occurred due to the tertiary centre's higher educational status and test availability. Higher levels of education are associated with high knowledge, attitude and practices about COVID-19 [34]. Low resource countries like Nepal, a shortage of PPEs had occurred in the local market, and non-front-line HCWs were worked with high exposure risk.

Each exposure pathway to SARS-CoV-2 has a risk of COVID- 19 infection. The greatest challenge of the current COVID-19 pandemic is transmitting the virus to DOHCWs [32,33]. Studies reported that isolation and quarantine measures are the only way to prevent transmission. Nevertheless, human-to-human transmission of the SARS-CoV-2 is widespread even majority of humans have been vaccinated [27]. Therefore, the current practices should have sufficient PPEs and other logistic support, and clinicians should adopt personal hygiene, i.e. hand hygiene and sanitation, to prevent exposure in the workplace. In this study, an exposure rate (18.9%) was found. We found that the exposed DOHCWs had two times more chance of getting an infection than the non-exposed DOHCWs [AR, 7.04%; OR, 1.678; 95% CI, (0.54 to 5.19)]. Exposed DOHCWs pose a serious threat to COVID19 infection. We have learned from this finding that current practice should require rigorous monitoring of adherence to preventive practices during health care interaction and aerosol-generating procedures (AGPs) [36,37].

DOHCWs have a much higher viral load since they operate close physical contact with patients (face to face) and close contact with the patients for a longer period [33]. In an early pandemic, DOHCWs had been used many ways to reduce their exposure to them shelve in OHC centres, such as triage and screening of patients in the waiting room, measuring the body temperature of all patients, mitigation of procedures, i.e. only emergency or urgent procedure, and reduction of AGPs [38-40]. Earlier prevention measures based on less exposure, i.e. reduction of the number of patients in the waiting room, could be done with teledentistry or telephone triage. However, the current practice should not focus on mitigation procedures because most public and almost all HCWs have been vaccinated, and logistic supports are radially available now. However, IPC measures are still mandatory for all clinicians during health care interaction. Currently, DOHCWs should consider every patient as a carrier or infected and follow the standard precaution to prevent their exposure, just like clinicians have been taking care of HIV and Hepatitis B, C viruses [36,37]. In comparing the exposure in the workplace and work profile in this study, a statistically significant exposure was found in age categories and type of OHC centre. The reasons for higher exposure risk in these age groups (20-30) could be because they were actively working forces in OHC centres and, therefore, affected mainly by redundancies and knowledge gaps during outbreaks. Similarly, private dental hospitals had a higher exposure risk in various OHC centres because of the lack of availability of logistic support (Table 6). This could have occurred because the majority of the private clinics have self-owner by DOHCWs, and they did not have sufficient finance to modify their OHC.

Current practices, the owner should update their OHC centre with recent technologies and techniques, i.e. air purifier, air exchange devices, infrastructure, screening and triage area, waiting area, and logistic support, i.e. proper PPEs, hand hygiene sanitisers. However, some ameliorations arose with new standardised preventive procedures, a slow-down in the working schedule, and improved patient communication. OHC environment aeration (fumigation) should be done for two weeks. Moreover, masks, disposable gowns, gloves, face shields and adherence to personal hygiene are the only weapons to give complete protection against variants of SARS CoV-2.

This outbreak brings many challenges to the DOHCWs, including protecting the health of the family, students, faculty, staff and public. Currently, they have social responsibilities to ensure the continuity of quality of OHC to the community and dental education to dental students [20,21]. Earlier evidence has been described that many asymptomatic or undetected COVID-19 cases have been present in the community, posing a threat to transmitting the infection to DOHCWs [37,38,39]. Knowing this risk, the governments of Nepal or local authorities had decided to close OHC. Indeed, the impact of closer had been seen in public and DOHCWs life. Also, a study by Humagai M et al., found that only 10% of patients received dental treatments from the dentist in lockdown [24]. The public had not got OHC on the initial day of oral disease. Moreover, the impact on DOHCWs was much visible: loss of job, financial crisis, and deterioration of the clinical skill. In an early pandemic, the OHC crisis is a major issue in the community. The public can only get OHC in the emergency department (ED) of the general hospital; therefore, many patients were sought there. Unfortunately, they had got only conservative

treatment (mainly antibiotics and analgesics). Consequently, in mid of lockdown, ED had received a considerable number of patients with pain, trismus and swelling of the mouth and face. That could have occurred due to a lack of OHC on time; hence simple oral disease (dental caries, pulpitis or periodontitis) had progressed to severe complications such as dysphagia and partial airway obstruction, requiring immediate intervention and drainage to save the patient's life. In the hospital ED, the oral and maxillofacial surgeons (OMS) had worked as frontline to reduce the burden on the healthcare system. They faced extreme workloads due to the rise in emergency cases. Unfortunately, OMS was not prepared well for these unexpected practice changes; finally, the management of urgent/emergency conditions such as oral and maxillofacial injuries, acute bleeding, incision, and drainage was affected. If the healthcare system or authority could have engaged other DOHCWs, especially endodontists and periodontists, then such an oral health crisis could have been managed efficiently. Therefore, from this study, lesion learned that early preparedness, prioritised resource management, human resources and urgent intervention must be utilised to combat the early phase. Proper planning, decision, support, and practice modification must be needed to establish an OHC centre comfortably.

Preparedness and readiness took one year in Nepal; mid of December 2020, most OHC centres started to provide service to the community with proper PPEs. However, significant public oral health impacts were observed by DOHCWs; approximately 50% of patients were presented with advanced-stage oral diseases, i.e. dental caries and chronic periodontitis. As a result, a significant number of teeth were extracted than conservative treatment in the ambulatory setting of OHC centres. The main reasons for high extraction could be poverty, hopeless treatment prognosis and avoiding the AGPs [18,21]. Looking backwards, this gave us exceptional learning that our decision to close OHC was not the solution to reducing transmission and infection of COVID-19; instead, it affects public health. Therefore, OHC should be recognised early to reduce complications and burden on the OHC system in the future.

In the early phase COVID-19 pandemic, this study found that DOCHWs were psychologically disturbed and stopped working on patients with dry cough, fever, dyspnea, anosmia, ageusia, and diarrhoea. Within two weeks of work, 50% of DOHCWs reported fever, cough, dyspnea, anosmia, ageusia, and diarrhoea. However, these symptoms could have occurred other than COVID19 disease, i.e. the viral flu, common cold, and seasonal flu, but a huge number of untested DOCHWs could not guarantee the free of COVID-19. Moreover, shreds of evidence have described that new disease is hard to recognise the disease early [6,8,11]. Probably, the early phase was the time of constant development of newer and improved methods for detecting SARS CoV-2 diagnostic guidelines, which play a crucial role in monitoring and curbing the spread of the new variants. Similarly, this study found that 50(37.6%) and 47(35.4%) of OHC had provision for COVID-19 tests and quarantine, respectively. Unfortunately, none of the OHC centres had provision testing and quarantine after two weeks of clinical work. As a result, many undetected cases (asymptotic or symptomatic) may be raised; it possesses thread to family, friends and community spread. Nevertheless, early evidence has described equal transmission rates in asymptomatic and symptomatic patients [6]. Surprisingly, in this survey, clinically active DOHCWs had developed less frequency of symptoms than halt the working. Higher-level

anxiety was found to halt the working DOCHWs; it could be the reason for the generation of higher symptoms. Anxiety stimulates the central and autonomic nervous systems, leading to a generation of symptoms like tiredness, headache, and diarrhoea [8]. Moreover, PPE may give a secure sense in working clinicians and less symptoms. Hence, signs and symptoms should not consider as confirmation of SARS CoV-2 infection. The serological test available should be done whenever DOCHWs are in doubt of COVI19 infection. Currently, serological tests are recommended whenever symptomatic rather than routinely after two weeks of work.

Long before the industrial revolution and many years afterwards, several public health emergency of international concern (PHEIC) have driven and continue to drive change in society and the workplace. Health crises are harder to understand as they are typically unpredictable. Similarly, Nepalese DOHCWs had made alterations in their practice, and these changes were influenced by a variety of factors such as personal, institutional, and local government regulations [16,18]. Similarly, our survey found that 18% of DOCHWs had closed their practice and stayed at home safely; 6.8 % had shifted practice online, i.e., teledentistry. 73.7% of them were involved in clinical work, performing fewer procedures (Table 1). However, this early pandemic effect may turn into long term consequences. In early pandemic, DOHCWs had obvious reasons to change practice; these were psychological disturbance (80.5%, P,.02), lock-down effect (65.4%, P,.06), strict to government regulation/guideline (54.9%, P,0.01) (Table 5). They were anxious about an uncertain future or afraid to work on patients. Similarly, Ahmad MA et al. found that more than two-thirds of the general dental practitioners (78%) were anxious and scared [41]. Consolo U et al., found concern (70.2%), anxiety (46.4%) and fear (42.4%) [42]. Finally, mental health workshops should be needed to enhance self-efficacy and broaden mental health education as part of the core dental curriculum to reduce its unfavourable impact on the different systems of the human body. When these symptoms moderate to extreme, it weakens the body's immune system and increases the risk of contracting the virus. While combat outbreaks and scarcity of resources have occurred in the past, in this study, 5.3% of the scarcity of staff occurred at the early stage of the epidemic. The human resource scarcity had occurred due to many reasons, i.e., lack of provision tests and quarantine, PPEs, and emotional and family reactions.

Amid this crisis, the DOHCWs were undoubtedly affected: from de-specialisation and serving on the frontline to upgrading knowledge, attitude and practice about COVID-19 and academic changes. Rigorous prevention measures should limit transmission in an OHC setting [43-45]. Initially, DOCHWs were stressed about the safe clinical practice and academic activities; later in the outbreak, they learned about the disease, mode of transmission, and preventive measures via various sources. This study found that 33.1% of DOHCWs stopped all clinical activities, and 6.8% shifted their online teaching-learning activities. The Nepal medical council postponed dental licensing examinations until further notice in Nepal. Most academicians in dental institutions have modified their education and training practices to ensure the safety of residents, faculty, and staff; was rapidly transformed physical presence classes into online classes. They flipped the virtual classroom method, in which the learners were asked to review the lecture online, with a subsequent virtual meeting focused on active learning and case-based discussions. Other methods include online

practice questions, educational webinars, and telehealth clinics with resident involvement. Many applications such as Webex, Google Classroom, Microsoft Teams, and Zoom offer platforms for remote online conferences. Nevertheless, the educators faced a challenge in ensuring students' teaching, skill and competency. First, they identified many online learning barriers in medical education [46,47]. Later, the educator has implemented social distancing and safety measures (PPEs) in laboratories, exams and clinical areas to teach clinical and practical skills [46,47]. Furthermore, they were under extreme pressure to keep up with guidelines or ensure the continuity and quality of dental education [31,40].

Although they kept themselves updated with developments in practice protocols, the protocols have been changing rapidly as new. As this survey was conducted at the beginning of this epidemic, the overall knowledge score (9.726 ± 0.216) is insufficient about COVID-19. However, they had a good knowledge of the mode of transmission and AGPs (Table 7). Since the SARS-CoV-2 is a novel virus, its invasive properties have not yet been well studied or understood. ACE2 receptors on the mucosa are the primary port of entry. However, some studies have highlighted a new potential threat in identifying the potential neuro-invasive properties of the SARS CoV-2. They had very poor knowledge about working guidelines; only 37.57% (13.15/35*100) of DOHCWs responded correctly to the interim working guideline for the COVID-19 pandemic (Table 8). Guidelines are recommended for quarantine/self-isolation after two weeks of continuous work [13]. Unfortunately, only 35.4% of DOCHWs were extremely satisfied and slightly satisfied with the provision for quarantine in case they were infected. Therefore, they felt insecure about going to the workplace in centres. In addition, 33.1% of DOHCWs in this survey were not currently working on patients. For continued work, many DOHCWs had moved out from their family home to self-isolate, while others followed a strict protocol at home as they lived with elderly family members. Control of transmission in DOHCWs could depend on maintaining a low threshold for suspicion of infection. The signs may indicate that staff should be tested, including working at or attending a healthcare facility in the past 14 days. Today situation has changed; all health professionals from different disciplines (including DOHCWs) were updated about the change and were converted to COVID-19 patient care, and who came in contact with SARS-CoV-2 patients were encouraged to work until they showed symptoms [28].

4.1 Making use of the early COVID19 crisis and planning for the new normal era

Global cooperation and exchange of ideas and experiences are still to be improved. The pandemic is still in various stages in different countries. In April 2022, many countries like China and Italy face a rapidly increasing number of cases, lockdowns and mortalities; these countries are learning from the early phase and recovering from a similar crisis. The future requires better planning, training and reallocation of resources to be prepared for the next phase of COVID-19 or another outbreak. The safety of DOHCWs should be of utmost importance. In adopting safe practices, every clinician should be trained in infection prevention and control (frequent hand sanitising, cough etiquettes, and personal protective equipment). New outbreak and psychological mitigation must need that boost their work morale. Working with the fewest personnel possible should be in favour, with the highest skilled DOHCWs performing the procedure to avoid

prolongation of the procedure and complications and follow-up. The use of the available technologies should be encouraged in dental education and clinical settings. Teledentistry such as remote triaging and examination techniques, feedback through mobile applications, and virtual interdisciplinary meetings should be encouraged. Urgent legislative reforms to adapt to these changes are mandatory. The international scientific societies must support e-learning, virtual conferences, webinars, and simulation training initiatives. Curricula should be revised to adapt to these needs. Non-technical skills should constitute an integral part of learning programs. Plans should be prepared to manage the accumulated long waiting lists of elective surgeries. Prioritisation should be rational without inferring an excessive burden on the recovering health system after the crisis.

The educators should continue all teaching-learning activities (theoretical, clinical and practical skills) by implementing social distancing and safety measures. The venerable practitioner should be identified to secure economic safety, and job security with flexible working hours must be encouraged. If financial support is needed, the concerned authority must focus on incentives, economic aid, or loans. We believe that dental practices will differ after the pandemic is over. Implementing new technologies, restructuring our health care systems with the incorporation of teledentistry, and reorganising our traditional training programs will be crucial for more effective and optimal delivery of care.

4.2 Potential bias and limitations

This survey was an online survey; hence coverage bias, selection bias, size bias, and nonresponse bias could have occurred. A limitation of this online survey is the relatively low response rate (29.77%). Potentially a nonresponse bias of participants could have happened due to willingness and harshness amongst professionals. Moreover, the participants' responses entirely depend on their decision and interest in the survey. Probably, we have received a response only from those participants who take a particular interest in research activities. Finally, potential selection bias may represent a unique makeup of those opting to receive the survey instead of those who did not. However, it is guaranteed that a larger sample size and higher response rate would have been achieved with a more extended survey duration. Although the response rate may appear low in this study, there were respondents from all seven provinces of Nepal; hence, its generalizability in regions may be acceptable. Moreover, a low response rate does not necessarily mean that the study results have low validity but rather a more significant risk [45]. So, response rates can be informative but independently should not be considered a good proxy for study validity.

5. Conclusions

In this survey study of dental and oral health care workers actively working in an oral health care centre for patient care in Nepal, they responding to combat in the COVID-19 reported high exposure risk and infection rate. The COVID-19 crisis has had a significant impact on oral health practice all over Nepal. More extensive and sustained surveillance for SARS CoV-2 in the workplace, monitoring their evolution, transmission and assessment of their exposure risk should be performed to understand the nature of SARS CoV-2 and prepare for the next epidemic. The oral health practice is a sorry and confusing situation shall continue until the development and availability of a point-of-care quick serological Covid-19 testing suitable for dental practice settings, a vaccine for Covid-19, and

personal protection equipment. Gradually, all the dental and oral health care workers are desperately looking forward to combating this pandemic. The timeliness of COVID-19 affects tightly interconnected processes is a clear lesson that we have learnt, and that shall be maintained even in the future to allow better advancement of science and optimal patient engagement, safety, empowerment and care.

List of abbreviations

AGPs- Aerosol-generating procedures; COVID-19- COrona VIrus Disease-19; CDC- Centers for Disease Control and Prevention; DOHCWs- Dental and oral health care workers; HCWs- Health care workers; PHEIC- Public Health Emergency of International Concern; PPEs- Personal protective equipment's; SARS CoV- Severe Acute Respiratory Syndrome Corona Virus; WHO- World health organization

Declaration

Ethics approval and consent to participate: All methods were carried out in accordance with the Declaration of Helsinki. This study was approved by the ethical review board (ERB) of the Nepal health research council (NHRC) (Reg 445/2020P/ Ref No 2710) before the initiation of this study. Informed consent was obtained from all participants. All participants in this survey were volunteer.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that there is no conflict of interest regarding the publication of this article.

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Authors' contributions

SPD involved in designing the study, collection and interpretation of the data and drafting of the manuscript, table. DB did the statistical analysis. All authors read and approved the final manuscript.

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References

1. Coulthard P. Dentistry and coronavirus (COVID-19) - moral decision-making. Br Dent J 228 (2020): 503-505.
2. Lai X, Wang M, Qin C, et al. Coronavirus Disease 2019 (COVID-2019) Infection Among Health Care Workers and Implications for Prevention Measures in a Tertiary Hospital in Wuhan, China. JAMA Netw Open 3 (2020): e209666.
3. World Health Organization. Report of the WHO – China Joint Mission on Coronavirus Disease 2019 (COVID-19) (2020).
4. Purcell LN, Charles AG. An invited commentary on World Health Organization declares global emergency: A review of the 2019 novel Coronavirus (COVID- 19): emergency or new reality? Int J Surg 76 (2020): 111.

5. World Health Organization. WHO announces COVID-19 outbreak a pandemic. World Health Organisation (2020).
6. Shah SGS, Farrow A. A commentary on "World Health Organization declares global emergency: A review of the 2019 novel Coronavirus (COVID-19)". Int J Surg 76 (2020): 128-129.
7. Russell B, Moss C, Rigg A, et al. Anosmia and ageusia are emerging as symptoms in patients with COVID-19: What does the current evidence say? Ecancermedicalscience 14 (2020): ed98.
8. Galván Casas C, Català A, Carretero Hernández G, et al. Classification of the cutaneous manifestations of COVID-19: a rapid prospective nationwide consensus study in Spain with 375 cases. Br J Dermatol 183 (2020): 71-77.
9. Chen N, Zhou M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet 395 (2020): 507-513.
10. Holshue ML, DeBolt C, Lindquist S, et al. Washington State 2019-nCoV Case Investigation Team. First Case of 2019 Novel Coronavirus in the United States. N Engl J Med 382 (2020): 929-936.
11. Li Q, Guan X, Wu P, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. The New England journal of medicine 382 (2020): 1199-1207.
12. Rothe C, Schunk M, Sothmann P, et al. Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. The New England journal of medicine 382 (2020): 970-971.
13. Lai THT, Tang EWH, Chau SKY, et al. Stepping up infection control measures in ophthalmology during the novel coronavirus outbreak: an experience from Hong Kong. Graefes Arch Clin Exp Ophthalmol 258 (2020): 1049-1055.
14. Lu CW, Liu XF, Jia ZF. 2019-nCoV transmission through the ocular surface must not be ignored. Lancet 395 (2020): e39.
15. Li Y, Ren B, Peng X, et al. Saliva is a non-negligible factor in the spread of COVID-19. Mol Oral Microbiol 35 (2020): 141-145.
16. Volgenant CMC, De Soet JJ. Cross-transmission in the Dental Office: Does This Make You Ill? Curr Oral Health Rep 5 (2018): 221-228.
17. Centers for Disease Control and Prevention. CDC Recommendation: Postpone Non-Urgent Dental Procedures, Surgeries, and Visits (2020).
18. American Dental Association. American Dental Association Interim Guidance for Minimizing Risk of COVID-19 Transmission (2020).
19. Dave M, Seoudi N, Coulthard P. Urgent dental care for patients during the COVID-19 pandemic. Lancet 395 (2020): 1257.
20. Meng L, Hua F, Bian Z. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. J Dent Res 99 (2020): 481-487.
21. Nepal dental association. Interim guidance for dental practices during covid 19 global emergency in Nepal (2020).
22. Guo H, Zhou Y, Liu X, et al. The impact of the COVID-19 epidemic on the utilization of emergency dental services. J Dent Sci 15 (2020): 564-567.

23. Responding to COVID-19, Health sector preparedness, response and lessons learnt.pdf (mohp.gov.np)
24. Humagain M et al. Dental Practice during COVID-19 in Nepal: A Descriptive Cross-sectional Study JNMA J Nepal Med Assoc 58 (2020): 764-769.
25. World Health Organization. Critical preparedness, readiness, and response actions for COVID-19 (2020).
26. Iyer P, Aziz K, Ojcius DM. Impact of COVID-19 on dental education in the United States. J Dent Educ 84 (2020): 718-722.
27. Garvey MI, Wilkinson MAC, Holden E, et al. Early observations on the impact of a healthcare worker COVID-19 vaccination programme at a major UK tertiary centre. J Infect 83 (2021): 119-145.
28. Von Elm E, Altman DG, Egger M, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: Guidelines for reporting observational studies. J. Clin. Epidemiol 61 (2008): 344-349.
29. Regmi PR, Waithaka E, Paudyal A, Simkhada P, van Teijlingen E. Guide to the design and application of online questionnaire surveys. Nepal J Epidemiol 6 (2016): 640-644.
30. World Health Organization. Protocol for assessment of potential risk factors for coronavirus disease 2019 (COVID-19) among health workers in a health care setting (2020)
31. Ran L, Chen X, Wang Y, et al. Risk Factors of Healthcare Workers with Corona Virus Disease 2019: A Retrospective Cohort Study in a Designated Hospital of Wuhan in China Clinical infectious diseases: an official publication of the Infectious Diseases Society of America (2020).
32. Izzetti R, Nisi M, Gabriele M, et al. COVID-19 Transmission in Dental Practice: Brief Review of Preventive Measures in Italy. J Dent Res 99 (2020): 1030-1038.
33. Kampf G, Todt D, Pfaender S, et al. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. The Journal of hospital infection 104 (2020): 246-251.
34. Sah MK, Singh A, Sangroula RK. Knowledge of novel coronavirus disease (COVID-19) among dental surgeons of Nepal: a nationwide study. BMC Infect Dis 20 (2020): 871.
35. Seah I, Su X, Lingam G. Revisiting the dangers of the coronavirus in the ophthalmology practice. Eye 34 (2020): 1155-1157.
36. Chan-Yeung M. Severe acute respiratory syndrome (SARS) and healthcare workers. Int J Occup Environ Health 10 (2004): 421-427.
37. Otter JA, Donskey C, Yezli S, et al. Transmission of SARS and MERS coronaviruses and influenza virus in healthcare settings: the possible role of dry surface contamination. J Hosp Infect 92 (2016): 235-250.
38. Chan JF, Yuan S, Kok KH, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: A study of a family cluster. Lancet 395 (2020): 514-523.
39. Tran K, Cimon K, Severn M, et al. Aerosol generating procedures and risk of transmission of acute respiratory infections

to healthcare workers: a systematic review. PLoS One 7 (2021): e35797.

40. Van Doremalen N, Bushmaker T, Morris DH, et al. Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1. N Engl J Med 382 (2020): 1564-1567.
41. Ahmed MA, Jouhar R, Ahmed N, et al. Fear and Practice Modifications among Dentists to Combat Novel Coronavirus Disease (COVID-19) Outbreak. Int J Environ Res Public Health 17 (2020): 2821.
42. Consolo U, Bellini P, Bencivenni D, et al. Epidemiological Aspects and Psychological Reactions to COVID-19 of Dental Practitioners in the Northern Italy Districts of Modena and Reggio Emilia. Int J Environ Res Public Health 17 (2020): 34-59.
43. Kampf G, Brüggemann Y, Kaba HEJ, et al. Potential sources, modes of transmission and effectiveness of prevention measures against SARS-CoV-2. J Hosp Infect 106 (2020): 678-697.
44. Sandhu P, De Wolf M. The impact of COVID-19 on the undergraduate medical curriculum. Med Educ Online 25 (2020): 1764740.
45. Khan S, Khan M, Maqsood K, et al. Is Pakistan prepared for the COVID-19 epidemic? A questionnaire-based survey. J Med Virol. (2020).
46. Holbrook AL, Krosnick JA, Pfent A. The causes and consequences of response rates in surveys by the news media and government contractor survey research firms. In: Lepkowski JM, Tucker C, Brick JM, et al, eds. Advances in Telephone Survey Methodology. Hoboken, NJ: John Wiley & Sons 12 (2008): 499-528
47. O'Doherty D, Dromey M, Lougheed J, et al. Barriers and solutions to online learning in medical education - an integrative review. BMC Med Educ 18 (2018): 130-145.