SYSTEMATIC REVIEW

Factors Affecting the Psychological Health of Dental Care Professionals During Pandemic: A Systematic Review

Muhammad Faiz Mohd Hanim[1,4], Nursharhani Shariff[1,4], Intan Elliayana Mohammed[1,4], Mohd Yusmiaidil Putera Mohd Yusof[2,3], Budi Aslinie Md Sabri[1], Norashikin Yusof[1]

[1] Centre of Population Oral Health and Clinical Prevention, Faculty of Dentistry, Universiti Teknologi MARA (UiTM), Sg Buloh Campus, 47000, Sungai Buloh, Selangor, Malaysia.
[2] Centre of Oral & Maxillofacial Diagnostics & Medicine Studies, Faculty of Dentistry, Universiti Teknologi MARA (UiTM), Sg Buloh Campus, 47000, Sungai Buloh, Selangor, Malaysia.
[3] Institute of Pathology, Laboratory and Forensic Medicine (I-PPerForM), Universiti Teknologi MARA (UiTM), Sg Buloh Campus, 47000, Sungai Buloh, Selangor, Malaysia.
[4] Oral Health Programme, Ministry of Health, Level 5, Block E10, Complex E, Federal Government, Administrative Centre, 62590, Putrajaya, Malaysia.

ABSTRACT

Objective: To assess the prevalence of mental health issues among dental care professionals during the COVID-19 pandemic and identify potential factors that influence their mental well-being. **Methods:** A comprehensive search of various online databases was conducted from 2019 to December 2022. All cross-sectional studies in English that evaluated the mental health of dental practitioners during the pandemic were included. The quality of studies was assessed using NHLBI's Study Quality assessment tools. **Results:** 37 studies were included, and most had fair quality scores. The findings revealed that 48.6% of dental care professionals experienced anxiety during the pandemic. **Conclusion:** This review highlights the significant impact of the COVID-19 pandemic on the mental health of dental care professionals. Preventative and psychological support should be provided to ensure the well-being and quality of care during and after pandemics. **Impact:** This review provides essential insights into the mental health of dental care professionals during the pandemic. It can inform the development and implementation of support programs, provide a basis for future research, and serve as a resource for dental care professionals, policymakers, and health-care organisations.
Malaysian Journal of Medicine and Health Sciences (2023) 19(SUPP18) 83-98.doi:10.47836/mjmhs19.s18.12

Keywords: Mental health; Psychological distress; Systematic review, Dental staff; Pandemic

Corresponding Author:
Norashikin Binti Yusof, PhD
Email: dr_norashikin@uitm.edu.my
Tel: +603 61266621

INTRODUCTION

IIn the year 2020, healthcare workers (HCWs) endured a devastating pandemic as a result of a new, little-known, and potentially fatal disease known as Coronavirus 2019 (COVID-19) (1). Based on self-reported surveys of 2441 dental care professional (DCPs) in the United Kingdom, more than sixty per cent of the DCPs felt anxious, agitated, tired, and sad as a result of the work pressure they were under (2). Thus, focusing on the mental health of DCPs during the COVID-19 pandemic is critical for their well-being and the quality of healthcare that they are providing.

A study by Kim et al. (2018) found that mental health issues were among the factors in the high turnover rate of oral healthcare workers (OHCWs) and which in turn affected the costs of management of dental institutions due to increased costs of training and decreased productivity (3). Studies from earlier pandemics, such as SARS, Ebola, and MERS, have demonstrated that the unexpected emergence of an unknown illness with a high fatality rate will impact the mental health of OHCWs (4-7). In addition, lack of personal protection equipment (PPE), reorganisation of units and services

due to the expansion of new teams, fear of getting sick or spreading the disease, being forced to make challenging ethical decisions on patient care priorities, feeling helpless, and without social support could all affect OHCWs' mental well-being (8-10). Also, some OHCWs have been working long hours by wearing PPE and severely limiting family visits to all patients (11, 12). Studies revealed that dentistry had caused more stress than any other medical profession for years. The primary causes of this stress are the nature and the working circumstances in dental surgery (13-15). Thus, it is only reasonable for dentists to feel more and more concerned and afraid than they did in the past in light of the increasing number of people getting infected by COVID–19 around the world. Dentists are particularly vulnerable to the danger of COVID–19 because their line of work requires them to maintain close contact with patients and expose them to the possibility of being splashed by aerosols and droplets that may be released from the oral cavity of a patient (16-18). A study by Ng et al. also showed that DCPs have a high risk of COVID-19 infection and are likely to feel a great deal of anxiety due to the pandemic (19). The anxiety of a mild degree is perfectly normal and serves as a preventive and prophylactic function (20). However, in the given scenario, DCPs who suffer from chronic anxiety are more likely to panic and make mistakes, leading to unreasonable decision-making and behaviour (21). Hence, this systematic review aims to identify the factors that can affect the psychological health of dental care professionals during the COVID-19 pandemic.

Review questions

There are two review questions in this study: (1) What is the prevalence of DCPs who experience psychological effects or mental health symptoms during the COVID-19 pandemic? (2) What mental health symptoms did DCPs experience during the COVID-19 pandemic?

METHODS

This review was conducted following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) statement, and the checklist was strictly followed and conceived according to consensus among researchers. The review was prospectively registered with PROSPERO with registration ID CRD42021268654.

Eligibility criteria

The inclusion criteria were: (i) cross-sectional studies evaluating prevalence rates of psychological effects or mental health symptoms of DCPs in practice during the COVID-19 pandemic. In the context of this systematic review, DCPs include dentists, dental therapists and dental nurses (22, 23). , (ii) using validated scales, (iii) published until December 31st, 2021 (iv) published in the English language. The exclusion criteria were: (i) duplicated publications, (ii) case reports, qualitative studies, literature reviews, and meta-analyses, (iii) full-text non-available, (iv) prevalence of unspecified mental disorders, and (v) dental trainee or postgraduate as a sample.

Information sources and search strategy

Five electronic databases were searched, including PubMed, EBSCO-Medline, Scopus, Web of Science, and Google Scholar. All the authors designed the search strategy (FH, NH, IM, YY, BS, NY). It comprised three concepts about the purpose of the study: (i) the current COVID-19 pandemic, (ii) the mental health impact, and (iii) DCPs. In addition, it is restricted to English studies published between January 1st, 2019, and December 31st, 2021. Table I outlines the processes of constructing a search query in all the database using the keywords and their respective synonyms.

Table I: Database search string

No.	Search string	Number
PubMed		
1.	(((Coronavirus[MeSH Terms]) OR (2019-ncov)) OR (Covid-19)) OR (Sars-cov-2[MeSH Terms])	167,128
2.	((((((((((psychological effect*) OR (mental health)) OR (psychological well-being)) OR (psychological impact)) OR (emotional impact)) OR (psychological distress)) OR (Depression)) OR (Burnout)) OR (Insomnia)) OR (Stress)) OR (anxiety)	2,207,896
3.	((((((dental staff) OR (oral healthcare worker)) OR (Dentist)) OR (dental hygienists)) OR (dental therapist)) OR (dental professional)) OR (Dental practitioner)	85,609
4.	#1 AND #2 AND #3	148
EBSCO - Medline		
1.	Coronavirus OR 2019-ncov OR Covid-19 OR Sars-cov-2	167,128
2.	psychological effect OR mental health OR psychological well-being OR psychological impact OR emotional impact OR psychological distress OR Depression OR Burnout OR Insomnia OR Stress OR anxiety	2,207896
3.	dental staff OR oral healthcare worker OR Dentist OR dental hygienists OR dental therapist OR dental professional OR Dental practitioner	85,609
4.	#1 AND #2 AND #3	1057
Web of Science		
1.	Coronavirus (All Fields) or 2019-ncov (All Fields) or Covid-19 (All Fields) or Sars-cov-2 (All Fields)	330,397
2.	Psychological effect (All Fields) or mental health (All Fields) or psychological well-being (All Fields) or psychological impact (All Fields) or emotional impact (All Fields) or psychological distress (All Fields) or Depression (All Fields) or Burnout (All Fields) or Insomnia (All Fields) or Stress (All Fields) and anxiety (All Fields)	1,516,601
3.	Dental staff (All Fields) or oral healthcare workers (All Fields) or Dentists (All Fields) or dental hygienists (All Fields) or dental therapist (All Fields) or dental professional (All Fields) or Dental practitioner (All Fields)	57,824
4.	#1 AND #2 AND #3	276

CONTINUE

Table I: Database search string (cont.)

No.	Search string	Number
Scopus		
1.	(TITLE-ABS-KEY (coronavirus) OR TITLE-ABS-KEY (2019-ncov) OR TITLE-ABS-KEY (covid-19) OR TITLE-ABS-KEY (sars-cov-2))	352,977
2.	(TITLE-ABS-KEY (psychological AND effect) OR TITLE-ABS-KEY (mental AND health) OR TITLE-ABS-KEY (psychological AND well-being) OR TITLE-ABS-KEY (psychological AND impact) OR TITLE-ABS-KEY (emotional AND impact) OR TITLE-ABS-KEY (psychological AND distress) OR TITLE-ABS-KEY (depression) OR TITLE-ABS-KEY (burnout) OR TITLE-ABS-KEY (insomnia) OR TITLE-ABS-KEY (stress) OR TITLE-ABS-KEY (anxiety))	4037259
3.	(TITLE-ABS-KEY (dental AND staff) OR TITLE-ABS-KEY (oral AND healthcare AND worker) OR TITLE-ABS-KEY (dentist) OR TITLE-ABS-KEY (dental AND hygienists) OR TITLE-ABS-KEY (dental AND therapist) OR TITLE-ABS-KEY (dental AND professional) OR TITLE-ABS-KEY (dental AND practitioner))	83196
4.	#1 AND #2 AND #3	251
Google Scholar		
1.	Coronavirus OR 2019-ncov OR Covid-19 OR Sars-cov-2	4,910,000
2.	psychological effect OR mental health OR psychological well-being OR psychological impact OR emotional impact OR psychological distress OR Depression OR Burnout OR Insomnia OR Stress OR anxiety	3,830,000
3.	dental staff OR oral healthcare worker OR Dentist OR dental hygienists OR dental therapist OR dental professional OR Dental practitioner	127,000
4.	#1 AND #2 AND #3	2565
Filter	English	

Study selection and data extraction

Primary articles evaluating the various aspects of DCPs' psychological status due to the pandemic were included in this review. First, three reviewers (FH, NH, and IM) performed the search and screening of the titles and abstracts following the inclusion and exclusion criteria, and any duplications were excluded. Second, the full text of all included articles was retrieved and evaluated based on the same eligibility criteria. Any conflicts were resolved until all reviewers (FH, NH, IM, YY, BS, NY) reached a consensus. The search process is shown in the PRISMA 2020 flow diagram (Fig. 1). Then, three reviewers (FH, NH, and IM) independently extracted the data from each selected study using an Excel spreadsheet, and it was cross-checked to ensure consistency. Any disputes that arose during this process were discussed with the presence of fourth reviewers (YY) until a consensus was reached. This procedure was repeated to overcome the difference that resulted while extracting every single study. The extracted data were collected using a standard table that comprised of 4297 research. After removing 1078 duplicated studies, followed by another 3147 studies that failed to meet the criteria for inclusion set out by the reviewer, 72 studies were included for full-text screening. However,

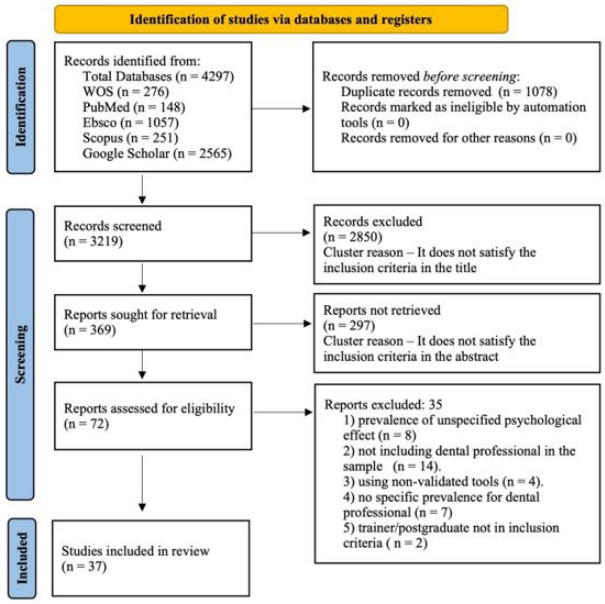

Fig. 1: PRISMA Flowchart

the authors, year, study country, sample size, type of mental health/psychological effects, measurement tools including the range of score, and findings by the severity of mental health status or psychological effects.

Quality assessment

The National Heart, Lung, and Blood Institute's (NHLBI) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies was used to evaluate the quality of the papers (24). Three reviewers independently assessed the studies' quality (FH, BS, NY). This instrument consisted of fourteen items, each of which may be marked as Yes, No, Not Available, or Not Reported. A score of 1 is assigned to Yes and 0 to all other responses. The score was a total of the item with a Yes answer. The grading was done by evaluating the final score; the sum of Yes, more than eight (8) are graded as good, those lower than four (4) are considered poor, and those that fell in the range of 4 to 7 represent fair studies (25). Any conflicts were resolved with the fourth reviewer (YY) until a consensus was reached.

Outcome of interest

The primary outcomes of this systematic review were the impact of mental health or psychological effect on DCPs dealing with the COVID-19 pandemic and the factors that affect them.

RESULTS

Search result

The electronic database search resulted in the discovery

35 studies had to be excluded again, and the final number of studies suitable for inclusion in the review was 37. The reasons for excluding other studies are shown in Fig. 1.

Study characteristics

Table II demonstrates the characteristics of the included studies. The studies conducted were cross-sectional studies in which six (6) studies each were conducted in India (26-31), Saudi Arabia (32-37) and Turkey (38-43), respectively. Others were conducted in Pakistan (n=4) (44-47), Egypt (n=2) (48, 49), and China (n=2) (50, 51). Only one study each was conducted in other countries, that is, Poland (52), Italy (53), Indonesia (54), Israel (55), Hong Kong (56), Russia (57), the United Kingdom (58), Germany (59), Romania (60), and Iran (61), respectively. Last but not least, one study conducted involved 30 countries across several continents (62). The sample size in these studies ranged from 48 to 5170 participants, and studies which included primarily dentists only were 29 studies. Others involved dentists and dental specialists (n=4 studies), dental specialists only (n=1 study), dentists, dental nurses/therapists, and dental specialists (n=2 studies) and dentist and dental nurse/therapist (n=1 study).

Table II: Study characteristics and findings outcome

Study characteristics		Outcome characteristics		Findings				
Study/year **Country**	**Population/ Sample size**	**Type of mental health**	**Measurement tools (range of score)**	**Total**	**By the severity of the outcome**	**By gender**	**By sample population**	**By the year of practice**
(48) China	Frontline dental services T: (269)	Anxiety	Chinese BAI (1-4)	Anxiety (22.3%)	NR	M: 23.3% F: 76.7%	NR	NR
(24) India	Dentist T: 307	Fear	Fear score (0-9)	Fear 6.57 + 2.07	NR	M:(6.58 + 2.20) F:(6.56 + 1.96)	NR	<5 (6.49 + 2.13) 6-10 (6.63 + 1.88) 11-15 (6.64 + 2.13) >16(6.57 + 2.12)
(25) India	Dentist T: 670	Anxiety		Anxiety 62.40%	NR	NR	NR	NR
(36) Turkey	Orthodontist T: 215	Anxiety	GAD-7	Anxiety 16.70%	NR	M: 10.9% F: 19.2%	NR	NR
(46) Egypt	Dentist T: 293	Anxiety Fear		(%) Anxiety:44 Fear:16.4	NR	NR	NR	NR
(37) Turkey	Dentist T: 706 FP: 330 FN: 376	Burnout Stress	MBI	Burnout 26.3%	NR	NR	Burnout FP: 34.4% FN: 17.6% Stress FP:9.10 (2.03) FN:8.19 (2.20)	NR
(52) Indonesia	OHW T:48 MS: 21;DS: 1; D: 7; N: 14; MW: 2	Burnout		Burnout All: 45.8% Dental: 75%	NR	NR	Burnout D: 71.4% DS: 100%	NR
(26) India	Dentist T: 403	Anxiety		Anxiety 35.7%	NR	NR	NR	NR

CONTINUE

Table II: Study characteristics and findings outcome (cont.)

Study characteristics		Outcome characteristics		Findings				
Study/year **Country**	**Population/ Sample size**	**Type of mental health**	**Measure-ment tools (range of score)**	**Total**	**By the severity of the out-come**	**By gender**	**By sample population**	**By the year of practice**
(42) Pakistan	OHCW T: 583 - clinical - non-clinical	Anxiety Fear		Anxiety 84.2% Fear 80.3%	NR	NR	Anxiety C:98.5% NC:55.0% Fear C:94.4% NC:51.3%	NR
(53) Israel	Dental pro-fessional T: 338	Psychologi-cal distress	Kessler's K6 (0 to 30)	Stress 11.5%	NR	NR	NR	NR
(30) Saudi Arabia	HCW T: 389 SW: 7 Admin: 33 Tech: 86 N: 66 D: 14 GP: 183	Depression Anxiety	Arabic PHQ-9 (0-27) GAD-7 (0-15)	Depression 37.3% Anxiety 31.1%	Depression moderate: 18.8% moderately severe: 11.3% severe: 7.2% Anxiety moderately severe:13.6% severe: 17.5%	Depression M: 57.9% F: 79.7% Anxiety M: 55.6% F: 82.1%	NR	Depression (%) <5: 78.2 5-14:60.4 15-24: 54.4 25+: 38.1 Anxiety (%) <5: 76.8 5-14:61.5 15-24:45.6 25+: 47.6
(31) Saudi Arabia	Dental health care provider T: 320 C: 184 NC: 136	Anxiety Fear		Anxiety 92.5% Fear 85.0%	NR	NR	Anxiety C: 90.2% NC: 92.6% Fear C: 90.2% NC: 77.9%	NR
(38) Turkey	HCW T: 508 N&MW: 336 GP&D: 45 Others: 127	Anxiety	BAS (0-63) SF-36 (0-100)	Anxiety BAS 12.26 (11.258) SAF-36 90.53 (11.273)	NR	BAF M: 7.35 + 8.602 F: 14.17 + 11.594 SF-36 M: 90.98 + 9.927 F: 90.98 + 9.927	NR	NR
(32) Saudi Arabia	Dental pro-fessional T: 400	Fear Anxiety		Fear (89%) Anxiety (86%)	NR	NR	NR	NR

CONTINUE

Table II: Study characteristics and findings outcome (cont.)

Study characteristics		Outcome characteristics		Findings				
Study/ year **Country**	**Population/ Sample size**	**Type of mental health**	**Measure-ment tools (range of score)**	**Total**	**By the severity of the outcome**	**By gender**	**By sample population**	**By the year of practice**
(51) Italy	Dental prac-titioner T: 356	Anxiety	GAD-7 (0-21)	Anxiety 6.56 (4.48)	Moderate:15.2% Severe:8.7%	NR	NR	NR
(33) Saudi Arabia	HCW T: 377 GP: 150 D: 62 N: 82	Stress	PSS (0-40)	20(5)	Low:10% Moderate: 82% High: 8%	M: 20.7(4.6) F: 19.1 (4.7)	NR	NR
(60) 30 coun-tries	Dental pro-fessional D: 511 DS: 97 DC: 42	Fear		Fear: 78%	NR	NR	NR	NR
(27) India	Dentist T: 500	Depression Anxiety Stress	DASS 21	Depression 50% Anxiety 21% Stress 32%	Depression Severe: 8% Anxiety Moderate: 9% Stress Moderate: 24% Severe: 8%	NR	NR	NR
(43) Pakistan	Dentist T: 313	Fear Anxious		Fear:75% Anxious: 88%	NR	NR	NR	NR
(47) Egypt	Dentist T: 216	Fear Anxious		Fear 92.6% anxious 90.7%	NR	NR	NR	NR
(39)- Turkey	HCW T: 280 GP: 39.5% D: 32.1% N: 14.3%	Fear		91.8%	NR	M: 91.7% F: 91.9%	NR	NR
(40) Turkey	Dentist T: 1002	Anxiety Disorder	WAQ	Anxiety disor-der 16.2%	NR	NR	NR	NR
(41) Turkey	Dentist T: 1095	Stress		Stress 28.4%	NR	NR	NR	NR
(50) Poland	Dentist T: 347	Fear	FCV-19S	1.66	High: 6.1% Extremely high: 2.1%	NR	NR	NR

CONTINUE

Table II: Study characteristics and findings outcome (cont.)

Study characteristics		Outcome characteristics		Findings				
Study/year **Country**	**Population/Sample size**	**Type of mental health**	**Measurement tools (range of score)**	**Total**	**By the severity of the outcome**	**By gender**	**By sample population**	**By the year of practice**
(54) Hong Kong	HCW T: 747; GP: 172; D: 33; N: 341; PH: 20; AHP: 82;	Stress	PSS-10 (0-40)	21.88 (2.62)	NR	NR	NR	NR
(44) Pakistan	HCW T: 507 GP: 274 N: 52 PH: 42 D: 21	Anxiety Depression	HADS (0-21)	Anxious 54%, 6.07 (3.56) Depressed 54%, 7.97 (3.69)	NR	NR	NR	NR
(34) Saudi Arabia	HCW T: 4920 GP: 734 N: 1913 PH: 580 D: 299	Anxiety	DCWS (1-28)	medium (36.1%) high (32.3%)	NR	NR	Dentist low (33.1%) medium (37.1%) high (29.8%)	NR
(59) Iran	Dental professional T: 320 D: 72.5% DS: 27.5%	Anxiety Sleep disorder Depression	corona-associated anxiety (CAA) (0-54) GHQ-28 (0-84)	Corona-associated anxiety 42.5% GHQ-28 37.5%	CAA Moderate: 10% Anxiety and sleep disorder Moderate:10% Severe: 2.5% Depression symptoms Moderate: 2.5% Severe: 1.3%	Corona-associated anxiety M: 13.93 (9.11) F: 15.75 (8.83) GHQ-28 M: 18.27 (8.44) F: 22.72 (12.92)	NR	NR
(55) Russia	OHCW T: 128 D: 43 DA: 37 Others: 48	Depression Anxiety PTSD	DASS-21 (0-42) PSS-SR (0-51) IES-R (0-88)	DASS-21 (Dep): 2.33% DASS-21 (Anxiety): 6.98% DASS-21 (Stress): 9.30% PSS-SR: 41.86% IES-R: 4.66%	DASS-21 (Dep) Severe: 2.33% DASS-21 (anxiety) Severe: 2.33% Extreme severe: 4.65% DASS-21 (Stress) Severe 9.30% PSS-SR tot. Moderate: 30.23% Severe: 11.63% IES-R tot. Moderate: 2.33% Severe: 2.33%	NR	NR	NR
(56) United Kingdom	Dentist T: 5170	Psychological distress	GP-CORE	Psychological distress 57.8%	NR	NR	NR	NR

CONTINUE

Table II: Study characteristics and findings outcome (cont.)

Study characteristics		Outcome characteristics		Findings				
Study/year **Country**	**Population/ Sample size**	**Type of mental health**	**Measurement tools (range of score)**	**Total**	**By the severity of the outcome**	**By gender**	**By sample population**	**By the year of practice**
(57) Germany	dentist	Anxiety Stress Fear	DASS-21 (0-21) IES-R (0-88)	DASS-21 Total 14.84 + 12.31 Depression 4.88 ± 4.85 Anxiety 2.88 ± 3.57 Stress 7.08 ± 5.04 IES-R Intrusion 9.12 ± 8.44 Avoidance 10.68 ± 8.88 Hyperarousal 10.35 ± 8.68	DASS-21 Depression severe 6.4% extremely severe 8% Anxiety severe 4.5% extremely severe 7.3% Stress severe 11.1% extremely severe 5.2% IES-R Intrusion moderate 0.8% Avoidance moderate 1% severe 0.1% Hyperarousal moderate 1.2%	DASS-21 Total: M: 14.35+12.84 F: 15.05+11.86 Depression M: 5.07 + 5.10 F: 4.71 + 4.63 Anxiety M: 2.67 + 3.65 F: 2.86 + 3.44 Stress M: 6.61 + 5.11 F: 7.35 + 4.95 IES-R Intrusion M: 8.12 ± 8.44 F: 9.74 ± 8.36 Avoidance M: 9.07 ± 8.26 F: 11.74 ± 9.12 Hyperarousal M: 9.48 ± 8.65 F: 10.87 ± 8.64	NR	NR
(28) India	Dentist T: 1253 D (A): 348 Dac (B): 400 D&Dac (C): 400	Stress	PSS-10 (0-40)	Stress 79.24% 20.72 + 1.95	Low: 20.76% Moderate: 61.37% High:17.87%)	M: 20.69 + 6.75 F: 20.41 + 6.42	A: 22.35+6.72 B: 18.56+6.35 C: 21.26+6.09	<10 20.86 ±6.28 >10 19.90 ±6.81
(29) India	HCW T: 294 GP: 37.4% D: 9.5%	Anxiety disorder Depression Insomnia	GAD-2(0-6) PHQ-9 (0-27) ISI (0-28)	GAD-2: 20.7% PHQ-9: 26.5% ISI: 44.2%	NR	NR	Medicine GAD-2: 20% PHQ-9: 28% ISI: 47.3% Dental GAD-2:28.6% PHQ-9:35.7% ISI: 50%	NR

CONTINUE

Table II: Study characteristics and findings outcome (cont.)

Study characteristics		Outcome characteristics		Findings				
Study/year **Country**	**Population/ Sample size**	**Type of mental health**	**Measurement tools (range of score)**	**Total**	**By the severity of the outcome**	**By gender**	**By sample population**	**By the year of practice**
(49) China	Emergency dental care provider T: 969 PubSH: 496 PubGH: 453 PriHosp: 20	Stress Depression Anxiety Posttraumatic stress disorder	PHQ-9 (0-27) GAD-7 (0-21) PSS-10 (0-40) ASDS (0-95)	Perceived stress: 66.2% Depression 13.8% PTSD 8.5% Anxiety 7.1%	NR	PHQ-9 M: 13.2% F: 14.1% GAD-7 M: 6.5% F: 7.4% ASDS M: 9.7% F: 7.9% PSS-10 M: 65.5% F: 66.5%	PHQ-9 (%) PubGH:15.5 PubSH:12.5 PriHosp: 10 GAD-7 (%) PubGH: 8.4 PubSH: 6 PriHosp: 5 ASDS (%) PubGH: 9.9 PubSH: 7.1 PriHosp: 10 PSS-10 (%) PubGH: 70.2 PubSH: 62.1 PriHosp: 75	NR
(45) Pakistan	OHCW T: 392 D: 254 DH: 138	Anxiety Stress	GAD-7 (0-21) IES (0-88)	GAD-7: 24.5% IES-R: 14%	GAD-7: Moderate: 21.4% Severe: 3.1%	NR	NR	NR
(35) Saudi Arabia	HCW T: 577 GP: 16% D: 31% DH: 1% DA: 8% Others: 62%	Depression Anxiety	GAD-7 (0-21) PHQ-9 (0-27)	PHQ-9 36% GAD-7 32%	GAD-7 Moderate:18% Severe: 14% PHQ-9 Moderate: 20% Moderately severe: 9% Severe: 7%	PHQ-9 M: 33% F: 40% GAD-7 M:27% F: 36%	PHQ-9 D: 33% DH: 0% DA: 4% GAD-7 D: 24% DH: 0% DA: 11%	NR
(58) Romania	Dentist: 93	Fear	FCV-19S (7-35) AIS (0-24)	FCV-19S 14.56 + 6.90 AIS 11.37 + 3.45	NR	NR	NR	NR

Abbreviation. No: Number; BAI/BAS: Beck Anxiety Inventory/Beck Anxiety Scale; NR: Not reported; T: Total; M: Male; F: Female; GAD-7: The 7-item Generalized Anxiety Disorder; MBI-22: The Maslach Burnout Inventory; MS: Medical specialist; DS: Dental specialist; D: Dentist; N: Nurse; MW: Midwives; OHW: Oral health worker; HCW: Healthcare worker; SW: Social worker; GP: Physician; PHQ-9: Patient Health Questionnaire-9; SF-36: Short Form 36 Life Quality Scale; PSS: Perceived Stress Scale; DC: Dental consultant; DASS 21: The 21-items Depression, Anxiety, and Stress; WAQ: Worry and Anxiety Questionnaire; FCV-19S: COVID-19 Fear Scale; PH: Pharmacist; AHP: Allied Health Professional; NHCW: Non-healthcare worker; HADS: Hospital Anxiety and Depression Scale; DCWS: dispositional cancer worry scale; GHQ-28: General health questionnaire-28; DA: Dental assistance; PSS-SR: PTSD Symptom Scale-Self-Report; IES-R: Impact of Event Scale-Revised; GP-CORE: General Population-Clinical Outcomes in Routine Evaluation; Dac: Dental academicians; PSS-10: Perceived stress scale; GAD-2: Generalized Anxiety Disorder 2-items; ISI: Insomnia Severity Index; ASDS: Acute Stress Disorder Scale; PubSH: Public stomatological hospital; PubGH: Public general hospital; PriHosp: private hospitals; DH: Dental hygienist; AIS: Athens Insomnia Scale; PTSD: Post-traumatic stress disorder; C: Clinical; NC: Non-clinical

Quality assessment of selected studies

The quality of the included studies was evaluated using the NHLBI quality assessment tools (as detailed in Table III). While all studies reported on the objectives, study population, exposure, and outcomes, none of them specified the power of the study. Upon review, one study was determined to be of good quality, 34 were considered to be of fair quality, and two were classified as poor quality.

Table III. Assessment of quality

Study	Item evaluation according to NIH Quality Assessment Tools														Overall quality assessment
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
(48)	✓	✓	✓	✓	✓	✓	✓	NR	N/A	N/A	✓	N/A	N/A	✓	FAIR
(24)	✓	✓	NR	✓	✗	✗	✗	✓	N/A	N/A	✓	N/A	N/A	✓	FAIR
(25)	✓	✓	✓	✗	✗	✗	✗	✗	N/A	N/A	✓	N/A	N/A	✗	FAIR
(36)	✓	✓	NR	✗	✗	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✓	FAIR
(46)	✓	✓	NR	✓	✓	✗	✗	✗	N/A	N/A	✓	N/A	N/A	✗	FAIR
(37)	✓	✓	NR	✓	✓	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✓	FAIR
(52)	✓	✓	NR	✗	✗	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✓	FAIR
(26)	✓	✓	✗	✓	✗	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✗	FAIR
(42)	✓	✓	NR	✓	✗	✗	✗	✗	N/A	N/A	✓	N/A	N/A	✓	FAIR
(53)	✓	✓	NR	✓	✗	✗	✗	✗	N/A	N/A	✓	N/A	N/A	✓	FAIR
(30)	✓	✓	NR	✗	✗	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✓	FAIR
(31)	✓	✓	✓	✓	✗	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✓	FAIR
(38)	✓	✓	✓	NR	✓	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✓	FAIR
(32)	✓	✓	NR	✗	✗	✗	✗	✗	N/A	N/A	✓	N/A	N/A	✗	POOR
(51)	✓	✓	✗	✓	✓	✗	✗	✓	N/A	N/A	✓	N/A	N/A	✗	FAIR
(33)	✓	✓	✓	✓	✗	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✓	FAIR
(60)	✓	✓	✗	✗	✗	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✗	POOR
(27)	✓	✓	NR	NR	✗	✗	✗	✓	N/A	N/A	✓	N/A	N/A	✗	FAIR
(43)	✓	✓	NR	✓	✗	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✗	FAIR
(47)	✓	✓	✓	✓	✓	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✗	FAIR
(39)	✓	✓	✓	✗	✗	✗	✗	✗	N/A	N/A	✓	N/A	N/A	✗	FAIR
(40)	✓	✓	NR	✗	NR	✗	✗	✗	N/A	N/A	✓	N/A	N/A	✓	FAIR
(41)	✓	✓	NR	✓	✓	✗	✗	✗	N/A	N/A	✓	N/A	N/A	✗	FAIR
(50)	✓	✓	✗	✓	✗	✗	✗	✓	N/A	N/A	✓	N/A	N/A	✗	FAIR
(54)	✓	✓	NR	✓	✗	✗	✗	✓	N/A	N/A	✓	N/A	N/A	✓	FAIR
(44)	✓	✓	NR	✓	✗	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✓	FAIR

CONTINUE

Table III. Assessment of quality (cont.)

Study	Item evaluation according to NIH Quality Assessment Tools														Overall quality assessment
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
(34)	✓	✓	✗	✓	✓	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✓	FAIR
(59)	✓	✓	NR	✓	✗	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✓	FAIR
(55)	✓	✓	✗	✓	✗	✗	✗	✓	N/A	N/A	✓	N/A	N/A	✓	FAIR
(56)	✓	✓	✗	NR	✗	✗	✗	✗	N/A	N/A	✓	N/A	N/A	✓	FAIR
(57)	✓	✓	✓	N/A	✓	✗	✗	✓	N/A	N/A	✓	✗	N/A	✓	FAIR
(28)	✓	✓	✓	✓	✓	✗	✗	✓	N/A	N/A	✓	N/A	N/A	✗	FAIR
(29)	✓	✓	✓	✓	NR	✗	✗	✓	N/A	N/A	✓	✓	N/A	✓	GOOD
(49)	✓	✓	✓	✓	✓	✗	✗	✗	N/A	N/A	✓	N/A	N/A	✓	FAIR
(45)5	✓	✓	✓	✓	✗	✗	✗	NR	N/A	N/A	✓	N/A	N/A	✓	FAIR
(35)	✓	✓	✓	✓	✓	✗	✗	✓	N/A	N/A	✓	N/A	N/A	✗	FAIR
(58	✓	✓	✓	✓	✗	✗	✗	✓	N/A	N/A	✓	N/A	N/A	✓	FAIR

N/A = not applicable; NR = not reported. ✓ : Yes; ✗: No.

DISCUSSION

In the scope of this systematic review, all studies included employed self-reported validated scales and questionnaires, such as the Depression Anxiety Stress Scales (DASS) and etc, to elucidate respondents' self-perceived mental health. These instruments have served as valuable means of assessing the severity of depression, anxiety, stress, and related symptoms, allowing respondents to introspectively evaluate their emotional well-being. However, it is crucial to acknowledge that while these self-reported measures offer valuable insights into perceived mental and emotional states, they do not substitute for formal diagnoses of mental health disorders.

Finding outcome

The impact of the COVID-19 pandemic on the mental health of DCPs is evident in the most prevalent psychological symptoms they experience. Anxiety was the most common outcome that was investigated (47%), followed by fear and stress (27%), depression (19%), burnout, anxious, insomnia, and post-traumatic stress disorder (PTSD) (2.3%), respectively. Furthermore, some studies compared the DCPs involved with the contact tracing and non-contact tracing teams in Turkey (39) and clinical and non-clinical involvement in Saudi Arabia (33).

Anxiety

Anxiety was the most common outcome that was investigated (47%), followed by fear and stress (27%), depression (19%), burnout, anxious, insomnia, and post-traumatic stress disorder (PTSD) (2.3%), respectively. Furthermore, some studies compared the DCPs involved with the contact tracing and non-contact tracing teams in Turkey (39) and clinical and non-clinical involvement in Saudi Arabia (33).

Fear and Stress

Several findings showed that at least 8.4% (52), 16.4% (48), 75% (45), to 91.8% (41) of dental professionals expressed their fear of the impact of COVID-19 on themselves and their families. In addition to fear, the prevalence of stress among DCPs has been well documented. In a recent study by Mishra et al. (2020), 79.24% of dental professionals reported moderate levels of stress (30). The study also revealed that private DCPs had a higher mean stress level than public DCPs (22.27 + 6.12 vs 18.96 + 6.37) (30).

Depression

In terms of depression, most studies reported that the degree of depression was only mild, contributing up to 50% of the sample (29, 31, 32, 46, 51, 57). One of the studies showed that DCPs was more likely to experience depression than their medical professional counterparts (35.7% vs 28%) (31). Moreover, few studies reported that most DCPs who experienced depression were female (37, 51). In another study, Tao et al. (2021) conducted a study that examined the prevalence of depression among DCPs working in different types of hospitals. The results of the study indicated that DCPs working in a public general hospital had a higher prevalence

of depression (15.5%) compared to those working in a public somatological hospital (12.5%) or private hospital (10%). A public somatological hospital is a type of healthcare facility that is owned and operated by the government and specialises in providing dental care to the public (51).

Burnout

Studies have found a high prevalence of burnout among DCPs, with rates ranging from 26.3% to 75% (39, 54). In these studies, DCPs who were involved in contact tracing for patients with COVID-19 reported higher rates of burnout compared to their medical (39). Additionally, dental specialists were found to have higher rates of burnout compared to other DCPs (54).

Anxious

Two (2) studies found that a high percentage of DCPs were anxious due to the impact of COVID-19, with rates of 88% (45) and 90.7% (49).

Insomnia

2.5% of DCPs suffered from insomnia and reduced sleep quality (61). Another study by Sarapultseva et al. (2021) found that the sleep quality of DCPs was associated with their level of anxiety (57).

Post-traumatic stress disorder (PTSD)

Post-traumatic stress disorder (PTSD) has been identified as a significant concern among DCPs in studies by Sarapultseva et al. (2021) and Tao et al. (2021), with a reported prevalence of 7% (57) and 8.5% (51), respectively. One study found that male DCPs had a higher rate of PTSD symptoms compared to female colleagues (9.7% versus 7.9%) (51).

Potential factors that affected the psychological or mental health of dental care professionals

Several potential factors, such as financial concerns, worries about employment opportunities and lack of knowledge regarding the pandemic, influenced their mental health status, which is consistent with Aly et al. findings (63).

Lack of knowledge

The early stages of the COVID-19 pandemic saw many oral healthcare workers struggling with a lack of knowledge about the virus and inconsistent adherence to proper hygiene protocols (38). This lack of information may have contributed to increased anxiety and feelings of vulnerability, and lack of control among DCPs (38, 42). Fear and anxiety caused by the pandemic can have detrimental effects on dentists' behaviours, choices, and decisions (49), such as avoiding necessary procedures or limiting the quality of care provided. This could lead to disruptions in dental services, especially in emergency cases, and a reduction in the overall quality of care (49). Additionally, OHCW also lacked information about prevention and isolation strategies in healthcare institutions, which could increase stress levels among DCPs (49, 61, 62). The early phase of the pandemic saw limited official information from higher authorities on COVID-19 transmission, and reliance on social media led to irrational fear, overestimated risk, and stigma among OHCWs (64).

Financial concern

The COVID-19 pandemic has resulted in dental practices having to limit patient attendance due to safety protocols, and this has led to decreased patient volume and, as a result, reduced revenue for many DCPs (61, 63). In addition, the safety protocols themselves, such as increased disinfection procedures and the need for more PPE, have increased the time and costs associated with each patient visit, further impacting the bottom line for dental practices (61, 62). This financial strain can exacerbate existing mental health concerns among DCPs, who may also feel additional pressure to continue working despite the economic challenges.

Lack of personal protection equipment

The inadequate availability of PPE also contributed to the fear and concern felt by DCPs, particularly during the early stages of COVID-19 disease. This issue arises due to the strict infection control protocol and increasing demand (61, 63). The lack of access to PPE increased their risk of contracting and spreading the virus, causing fear and anxiety and affecting their mental health status. Although healthcare organizations and governments worldwide have acknowledged and addressed the issue of inadequate availability of PPE, DCPs in low-income countries or private practices may still face challenges in accessing adequate PPE (65). This continued lack of access can perpetuate mental health concerns among DCPs.

Risk management of psychological effects

Generally, it is crucial to identify the causes of these adverse psychological effects so that possible and suitable measures can be taken to help eliminate or lessen the impact, hence, improving the mental health of DCPs. When confronted with the unprecedented pandemic situation, it is natural for the DCPs to experience some psychological effects. On a positive note, the pandemic has initiated dental practitioners to practice preventive behaviours and minimise the probability of infection (49). However, extreme levels such as fear and anxiety can lead to detrimental effects on dentists' behaviours, choices, and decisions (49, 62). For instance, significant fear might force them to avoid any procedure, including even emergency dental treatment, and this would lead to patients being left without any appropriate care being provided. Further disruption in delivering dental services can also happen due to reduced procedure time in an attempt to limit the danger of infection and thus reduce the quality of the services offered.

Dentists' mental health and quality of life may be further

harmed if the fear, anxiety, sadness, and concern due to the prolonged pandemic are not addressed, which can contribute to psychiatric problems. In addition, the extreme rage connected with this pandemic can lead to a rise in the level of home violence, further adding to the detrimental health of dentists and their families (61, 62). There is almost no way to alleviate the psychological effects brought on by the proximity of patients and DCPs. However, guidelines issued by the government or dental associations as a standard operating procedure and the proper use of PPE in a well-ventilated surgery will aid DCPs and their workers in managing their clinics and patients well and reduce or minimise the risk of disease transmission between patients and DCPs. These may help alleviate some fear concerns (66, 67). By ensuring that proper care and precautions are taken during patient management and standard operating procedures are closely followed, such as compliance towards health recommendations in the dental environment and the usage of PPE by those working in the dental industry, the prevalence of COVID-19 among DCPs and their assistants can be minimised (68).

The findings of these studies should be effectively disseminated to DCPs through dental associations or higher management in order to mitigate stress, fear, concern, and anxiety among this group. Many studies have shown that providing training materials and guidelines on how to adhere to health requirements related to COVID-19 and how to use proper PPE can reduce DCPs' fear and anxiety in the face of the pandemic (61, 69). It is crucial for dental associations or higher management to implement this recommendation to support DCPs and their assistants in navigating the challenges of the COVID-19 era.

DCPs may benefit from classes and workshops addressing these issues to maintain mental health during and after the COVID-19 pandemic and learn coping strategies for its psychological impact (61). Educational materials such as booklets and multimedia clips can also provide information on mental health concerns related to the pandemic. These materials can be disseminated through mass media, such as television and online forums, and DCPs can be encouraged to seek information from reliable sources (70). Governments and trade unions can also use psychological exams and questionnaires to identify DCPs who are at risk for mental health issues related to the pandemic and prioritise their treatment and psychological training (61).

Limitation

This study has several limitations. All the included studies were cross-sectional, which means that they can only determine the association between dependent and independent variables but not establish a causal relationship. Additionally, the data were collected using self-administered questionnaires, which may introduce recall and reporting bias. Another limitation is that only English-language studies were included in the review, and studies published in other languages were not considered, which means that the findings may not be generalizable to other populations or professions.

CONCLUSION

The results of this systematic review provide a comprehensive understanding of the mental health challenges faced by dental care practitioners globally during the COVID-19 pandemic. It contributes to existing knowledge by providing essential insights into the mental health of DCPs during the pandemic, which can inform the development and implementation of support programs for DCPs. It is, therefore, crucial that tailored preventative and psychological support be provided to this population group both during and after the pandemic. This support is essential for the well-being of DCPs and the quality of care they provide to the public. Future research should investigate the effectiveness of support programs for DCPs and how these support programs can be implemented in practice.

REFERENCES

1. WHO. Weekly Operational Update - 14 December 2020. World Health Organization; 2020.
2. Myers HL, Myers LB. 'It's difficult being a dentist': stress and health in the general dental practitioner. Br Dent J. 2004;197(2):89-93.
3. Kim MS, Kim T, Lee D, Yook JH, Hong YC, Lee SY, et al. Mental disorders among workers in the healthcare industry: 2014 national health insurance data. Ann Occup Environ Med. 2018;30(1):31.
4. Liu X, Kakade M, Fuller CJ, Fan B, Fang Y, Kong J, et al. Depression after exposure to stressful events: lessons learned from the severe acute respiratory syndrome epidemic. Comprehensive Psychiatry. 2012;53(1):15-23.
5. Lung FW, Lu YC, Chang YY, Shu BC. Mental Symptoms in Different Health Professionals During the SARS Attack: A Follow-up Study. Psychiatr Q. 2009;80(2):107-16.
6. Maunder R, Hunter J, Vincent L, Bennett J, Peladeau N, Leszcz M, et al. The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. Cmaj. 2003;168(10):1245-51.
7. Wu P, Fang Y, Guan Z, Fan B, Kong J, Yao Z, et al. The Psychological Impact of the SARS Epidemic on Hospital Employees in China: Exposure, Risk Perception, and Altruistic Acceptance of Risk. The Canadian Journal of Psychiatry. 2009;54(5):302-11.
8. Sun N, Wei L, Shi S, Jiao D, Song R, Ma L, et al. A qualitative study on the psychological experience of caregivers of COVID-19 patients. American Journal of Infection Control. 2020;48(6):592-8.
9. Thomaier L, Teoh D, Jewett P, Beckwith H, Parsons

H, Yuan J, et al. Emotional health concerns of oncology physicians in the United States: Fallout during the COVID-19 pandemic. PLoS One. 2020;15(11):e0242767.
10. Khusid JA, Weinstein CS, Becerra AZ, Kashani M, Robins DJ, Fink LE, et al. Well-being and education of urology residents during the COVID-19 pandemic: Results of an American National Survey. International Journal of Clinical Practice. 2020;74(9):e13559.
11. Guessoum SB, Moro MR, Mallet J. The COVID-19 Pandemic: Do Not Turn the Health Crisis Into a Humanity Crisis. Prim Care Companion CNS Disord. 2020;22(4).
12. Mallet J, Le Strat Y, Colle M, Cardot H, Dubertret C. Sustaining the unsustainable: Rapid implementation of a Support Intervention for Bereavement during the COVID-19 pandemic. Gen Hosp Psych. 2021;68:102-3.
13. Bourassa M, Baylard JF. Stress situations in dental practice. J Can Dent Assoc. 1994;60(1):65-7, 70-1.
14. Cooper CL, Watts J, Kelly M. Job satisfaction, mental health, and job stressors among general dental practitioners in the UK. Br Dent J. 1987;162(2):77-81.
15. Moore R, Brødsgaard I. Dentists' perceived stress and its relation to perceptions about anxious patients. Community Dentistry and Oral Epidemiology. 2001;29(1):73-80.
16. Ather A, Patel B, Ruparel NB, Diogenes A, Hargreaves KM. Coronavirus Disease 19 (COVID-19): Implications for Clinical Dental Care. J Endod. 2020;46(5):584-95.
17. Meng L, Hua F, Bian Z. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. J Dent Res. 2020;99(5):481-7.
18. Ren YF, Rasubala L, Malmstrom H, Eliav E. Dental Care and Oral Health under the Clouds of COVID-19. JDR Clin Transl Res. 2020;5(3):202-10.
19. Ng K, Poon BH, Kiat Puar TH, Shan Quah JL, Loh WJ, Wong YJ, et al. COVID-19 and the Risk to Health Care Workers: A Case Report. Annals of Internal Medicine. 2020;172(11):766-7.
20. Fazel M, Hoagwood K, Stephan S, Ford T. Mental health interventions in schools in high-income countries. The Lancet Psychiatry. 2014;1(5):377-87.
21. Ahmed MA, Jouhar R, Ahmed N, Adnan S, Aftab M, Zafar MS, et al. Fear and Practice Modifications among Dentists to Combat Novel Coronavirus Disease (COVID-19) Outbreak. Int J Environ Res Public Health. 2020;17(8).
22. Care AGDoHaA. About dentists and dental practitioners - Roles of dental care professionals [updated 25 October 2022. Available from: https://www.health.gov.au/topics/dentists/about.
23. Council GD. Types of registrants 2011 [updated 18 Feb 2011. Available from: https://www.gdc-uk.org/about-us/what-we-do/the-registers/types-of-registrants.
24. NIH. Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies: National Heart, Lung, and Blood Institute; 2013 [updated July 2021. Available from: https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools.
25. Bagias C, Sukumar N, Weldeselassie Y, Oyebode O, Saravanan P. Cord Blood Adipocytokines and Body Composition in Early Childhood: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health. 2021;18(4).
26. Suryakumari VBP, Pallavi Reddy Y, Yadav SS, Doshi D, Surekha Reddy V. Assessing Fear and Anxiety of Corona Virus Among Dental Practitioners. Disaster Med Public Health Prep. 2022;16(2):555-60.
27. Dahiya P, Pajnoo A, Malhotra A, Gupta R. Assessment of knowledge and anxiety among dentists in the state of Himachal Pradesh toward the COVID-19 pandemic. International Journal of Community Dentistry. 2020;8(1).
28. Kinariwala N, Samaranayake LP, Perera I, Patel Z. Concerns and fears of Indian dentists on professional practice during the coronavirus disease 2019 (COVID-19) pandemic. Oral Dis. 2021;27 Suppl 3:730-2.
29. Golchha V, Sharma P, Gupta BD, Yadav N. Impact of Covid 19 Pandemic on Dentists: Psychological Evaluation using DASS 21. Indian Journal of Forensic Medicine & Toxicology. 2021;15(2):1233.
30. Mishra S, Singh S, Tiwari V, Vanza B, Khare N, Bharadwaj P. Assessment of Level of Perceived Stress and Sources of Stress Among Dental Professionals Before and During the COVID -19 Outbreak. J Int Soc Prev Community Dent. 2020;10(6):794-802.
31. Ali M, Uddin Z, Ahsan NF, Haque MZ, Bairagee M, Khan SA, et al. Prevalence of mental health symptoms and its effect on insomnia among healthcare workers who attended hospitals during COVID-19 pandemic: A survey in Dhaka city. Heliyon. 2021;7(5):e06985.
32. Alamri HS, Mousa WF, Algarni A, Megahid SF, Al Bshabshe A, Alshehri NN, et al. COVID-19 Psychological Impact on Health Care Workers in Saudi Arabia. Int J Environ Res Public Health. 2021;18(11):6076.
33. Javed MQ, Chaudhary FA, Mohsin SF, AlAttas MH, Edrees HY, Habib SR, et al. Dental health care providers' concerns, perceived impact, and preparedness during the COVID-19 pandemic in Saudi Arabia. PeerJ. 2021;9:e11584.
34. Singh YP. Effect of COVID-19 on Psychological, Socioeconomic Status and Performance of Clinical Practices of Dental Professional in Riyadh, Saudi Arabia. Ann Med Health Sci Res. 2021;11(3):1331.
35. Aldarmasi MA, Alghamdi AH. Factors Influencing Stress Perception among Healthcare Workers during

the Coronavirus Pandemic: A Multi-centric Cross-sectional Study. International Journal of Medical Research & Health Sciences. 2021;10(4):142-9.
36. Alenazi TH, BinDhim NF, Alenazi MH, Tamim H, Almagrabi RS, Aljohani SM, et al. Prevalence and predictors of anxiety among healthcare workers in Saudi Arabia during the COVID-19 pandemic. J Infect Public Health. 2020;13(11):1645-51.
37. Ajwa N, Rafee AA, Rafie HA, Alrafee N, Alduhaimi N, Zainaldeen F, et al. Psychological status assessment of medical and dental staff during the covid-19 outbreak in Saudi Arabia. Med Sci. 2020;24(106):4790-7.
38. Yilmaz HN, Ozbilen EO. The Assessment of Knowledge, Behaviors, and Anxiety Levels of the Orthodontists about COVID-19 Pandemic. Turk J Orthod. 2020;33(4):224-31.
39. Ozarslan M, Caliskan S. Attitudes and predictive factors of psychological distress and occupational burnout among dentists during COVID-19 pandemic in Turkey. Curr Psychol. 2021;40(7):3113-24.
40. Askin Ceran M, Tanrikulu G, Turker E, Tanrikulu Y. Determination of the effect of COVID-19 pandemic on the anxiety levels and life quality of healthcare workers. Marmara Medical Journal. 2021;34(2):189-94.
41. Atas O, Yildirim T, Yildirim K, Tekin S, Oztekin F, ... Investigation of healthcare workers attitudes and practices towards the COVID-19 pandemic. Acta Medica Mediterr. 2020;36(4):2427-32.
42. Uzdemir O, Hazar E, Kozak S, Sağlam BC, Kozak MM. Knowledge and Anxiety Level of Dentists about COVID-19 Pandemic. Journal of Oral Health and Community Dentistry. 2020;14(3):105.
43. Sarialioglu Gungor A, Donmez N, Uslu YS. Knowledge, stress levels, and clinical practice modifications of Turkish dentists due to COVID-19: a survey study. Braz Oral Res. 2021;35:e048.
44. Chaudhary FA, Ahmad B, Ahmad P, Khalid MD, Butt DQ, Khan SQ. Concerns, perceived impact, and preparedness of oral healthcare workers in their working environment during COVID-19 pandemic. J Occup Health. 2020;62(1):e12168.
45. Kamran R, Saba K, Azam S. Impact of COVID-19 on Pakistani dentists: a nationwide cross sectional study. BMC Oral Health. 2021;21(1):59.
46. Abid A, Shahzad H, Khan HA, Piryani S, Khan AR, Rabbani F. Perceived risk and distress related to COVID-19 in healthcare versus non-healthcare workers of Pakistan: a cross-sectional study. Hum Resour Health. 2022;20(1):11.
47. Ahmad Chaudhary F, Ahmad B, Gul M, Rafiq A, Qasim Butt D, Rehman M, et al. The Psychological Impact of the COVID-19 Pandemic on Oral Health Care Workers and its Impact on Their Willingness to Work During this Pandemic. Arch Psychiatry Res. 2021;57(2):179-88.
48. Hanafy R. Assessment of Practical and Emotional Consequences of Novel Coronavirus Emergence on Clinical Dental Practice in Egypt: A Cross Sectional Study. Advanced Dental Journal. 2021;3(1):35-43.
49. Aly MM, Elchaghaby MA. Impact of novel coronavirus disease (COVID-19) on Egyptian dentists' fear and dental practice (a cross-sectional survey). BDJ Open. 2020;6(1):19.
50. Zhao S, Cao J, Sun R, Zhang L, Liu B. Analysis of anxiety-related factors amongst frontline dental staff during the COVID-19 pandemic in Yichang, China. BMC Oral Health. 2020;20(1):342.
51. Tao J, Lin Y, Jiang L, Zhou Z, Zhao J, Qu D, et al. Psychological Impact of the COVID-19 Pandemic on Emergency Dental Care Providers on the Front Lines in China. Int Dent J. 2021;71(3):197-205.
52. Rusyan E, Mielczarek A, Boguslawska-Kapala A, Adamczyk K, Piec R, Szykula-Piec B. Level of Anxiety Caused by the Coronavirus (COVID-19) Pandemic among Dentists in Poland. Medicina (Kaunas). 2022;58(3).
53. Consolo U, Bellini P, Bencivenni D, Iani C, Checchi V. 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. 2020;17(10).
54. Theresa RM, Safira L, Nugrohowati N. Burnout in Health Workers in Pasar Minggu Hospital: Associated Risk Factors During the COVID-19 Pandemic. Annals of the Romanian Society for Cell Biology. 2021:4329-35.
55. Shacham M, Hamama-Raz Y, Kolerman R, Mijiritsky O, Ben-Ezra M, Mijiritsky E. COVID-19 Factors and Psychological Factors Associated with Elevated Psychological Distress among Dentists and Dental Hygienists in Israel. Int J Environ Res Public Health. 2020;17(8).
56. Chua GT, Tung KTS, Kwan MYW, Wong RS, Chui CSL, Li X, et al. Multilevel Factors Affecting Healthcare Workers' Perceived Stress and Risk of Infection During COVID-19 Pandemic. Int J Public Health. 2021;66:599408.
57. Sarapultseva M, Zolotareva A, Kritsky I, Nasretdinova N, Sarapultsev A. Psychological Distress and Post-Traumatic Symptomatology Among Dental Healthcare Workers in Russia: Results of a Pilot Study. Int J Environ Res Public Health. 2021;18(2):708.
58. Collin V, E OS, Whitehead P. Psychological distress and the perceived impact of the COVID-19 pandemic on UK dentists during a national lockdown. Br Dent J. 2021.
59. Mekhemar M, Attia S, Dorfer C, Conrad J. The Psychological Impact of the COVID-19 Pandemic on Dentists in Germany. J Clin Med. 2021;10(5).
60. Iorga M, Iurcov R, Pop LM. The Relationship between Fear of Infection and Insomnia among Dentists from Oradea Metropolitan Area during the Outbreak of Sars-CoV-2 Pandemic. J Clin Med. 2021;10(11).

61. Salehiniya H, Abbaszadeh H. Prevalence of corona-associated anxiety and mental health disorder among dentists during the COVID-19 pandemic. Neuropsychopharmacol Rep. 2021;41(2):223-9.
62. Ahmed MA, Jouhar R, Ahmed N, Adnan S, Aftab M, Zafar MS, et al. Fear and Practice Modifications among Dentists to Combat Novel Coronavirus Disease (COVID-19) Outbreak. Int J Environ Res Public Health. 2020;17(8):11.
63. Aly H, Nemr N, Kishk R, Elsaid Nb. Stress, anxiety and depression among healthcare workers facing COVID-19 pandemic in Egypt: a cross-sectional online-based study: bmjopen.bmj.com; 2021.
64. Zarei N, Joulaei H, Darabi E, Fararouei M. Stigmatized Attitude of Healthcare Providers: A Barrier for Delivering Health Services to HIV Positive Patients. International journal of community based nursing and midwifery. 2015;3(4):292-300.
65. Boro E, Stoll B. Barriers to COVID-19 Health Products in Low-and Middle-Income Countries During the COVID-19 Pandemic: A Rapid Systematic Review and Evidence Synthesis. Front Public Health. 2022;10:928065.
66. Akbari N, Salehiniya H, Abedi F, Abbaszadeh H. Comparison of the use of personal protective equipment and infection control in dentists and their assistants before and after the corona crisis. J Educ Health Promot. 2021;10:206.
67. Baskaran S, Ramasubramanian A, S K. Importance of mental peace for physical well-being among medical and dental personnel during a pandemic - An awareness-based study. Int J Res Pharm Sci. 2020;11:1183-9.
68. Chasib NH, Alshami ML, Gul SS, Abdulbaqi HR, Abdulkareem AA, Al-Khdairy SA. Dentists' Practices and Attitudes Toward Using Personal Protection Equipment and Associated Drawbacks and Cost Implications During the COVID-19 Pandemic. Front Public Health. 2021;9:770164.
69. Abbaszadeh H, Salehiniya H. The Prevalence of COVID-19 in Dentists and Dental Assistants. Journal of Biostatistics and Epidemiology. 2021;7:170-80.
70. Al-Amad SH, Hussein A. Anxiety among dental professionals and its association with their dependency on social media for health information: insights from the COVID-19 pandemic. BMC Psychol. 2021;9(1):9.