

COVID-19 Mental Health Challenges: A Systematic Review, Logistic Regression and Principal Component Analysis



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Abstract

Background: World Health Organization (WHO) declared COVID-19 (SARS-COV2) viral infection as Pandemic on January 31, 2020. The virus is a highly transmittable and pathogenic, displaying primary symptoms of elevated temperature, cough, headache and to some extent loss of taste or smell. However, there are imperceptible psychological effects that are difficult to assess and cure than relevant physical indicators. COVID-19 Positive patients and Medical staff are at high risk to get affected psychologically. Therefore, the mental health status is required to be monitored on priority basis. This study aims to review, synthesize, and analyze published evidence on the prevalence of, anxiety, depression, and insomnia among patients, medical staff, and others (general population) during the COVID-19 outbreak.

Method: Based on PRISM Statement systematic search and review of published data till May 2020 on SARS-COV2 related psychological factor analysis was carried out. Logistic regression and PCA was performed to assess the prevalence of specific psychological aspects related to the prevailing COVID-19 pandemic.

Findings: The studies included in the review, assessed anxiety, depression, distress, insomnia, and suicidal cases in relation to COVID-19. Participants reported psychological burden and high prevalence rates of depression, anxiety, and insomnia. The multiple linear regression analysis showed significance for anxiety ($p < 0.05$). PCA reduced for critical Psych parameters into two components, PC1 with eigen value ($\lambda = 2.67$) and PC2 having eigen value ($\lambda = 1.11$).

Interpretation: COVID-19 patients, frontline medical staff, are at higher risk of mental health challenges.

Recommendation: The study recommends psychological prescription to COVID-19 patients, medical staff, and general population.

Introduction

COVID-19 or SARS-COV2 is an infectious virus newly discovered in the coronavirus family. World Health Organization (WHO) declared COVID-19 (SARS-COV2) viral infection as Pandemic on January 31, 2020 [1]. The COVID-19 virus is mainly transmitted by coming in close proximity of a person who is COVID-19 positive. The virus spreads through droplets generated when a person coughs, sneezes, or exhales. To control the spread of viral infection around 4 billion i.e. half of the world population have been ordered by respective Governments to follow home confinement that is apparently the largest psychological experiment ever. Till date, Globally, there have been 4, 904, 413 confirmed cases of COVID-19, including 323,412 deaths, reported to WHO [1]. According to reported research during epidemic and/or deadly illnesses there are enormous mental pressure on affected population. Social distancing, isolation, and fear of COVID-19, inadequate PPEs are making people vulnerable to mental health problems specifically on patients and frontline medical staff [2,3]. During

quarantine, home confinement and while carrying out essential health care duties it's likely that one feels anxious, depressed and concurrently loses sleep [4]. Increased workload, physical exhaustion, inadequate and nosocomial transmission, fear of corona virus is supposed to elevate the most common emotion that is anxiety. Also, persons who had mental health history may face novel psychological challenges or their condition may worsen during Corona Quarantine. A dramatic decline in physical and mental well-being has also triggered some suicide cases related to COVID-19. Therefore, the Psychological support during COVID-19 Pandemic is vital towards enhancing resilience and good mental health. The aim this study is to carry out Review of COVID-19 related mental health issues among the affected population. We have compiled and evaluated data that gives evidence of psychological issues due to COVID in order to analyse the prevalence of Anxiety, Depression and Insomnia among the affected population. The data analysis will help in crafting precautionary measures to mitigate the toxic mental health effects of COVID-19.

Material and Methods

Study design

The study design was Systematic Review of published re-searched articles, extraction of data based on inclusion and exclu-

sion criterion set and result interpretation after statistical analysis. The methodical literature review and selection criteria to extract COVID-19 data was in accordance with the PRISMA statement depicted in Figure 1.

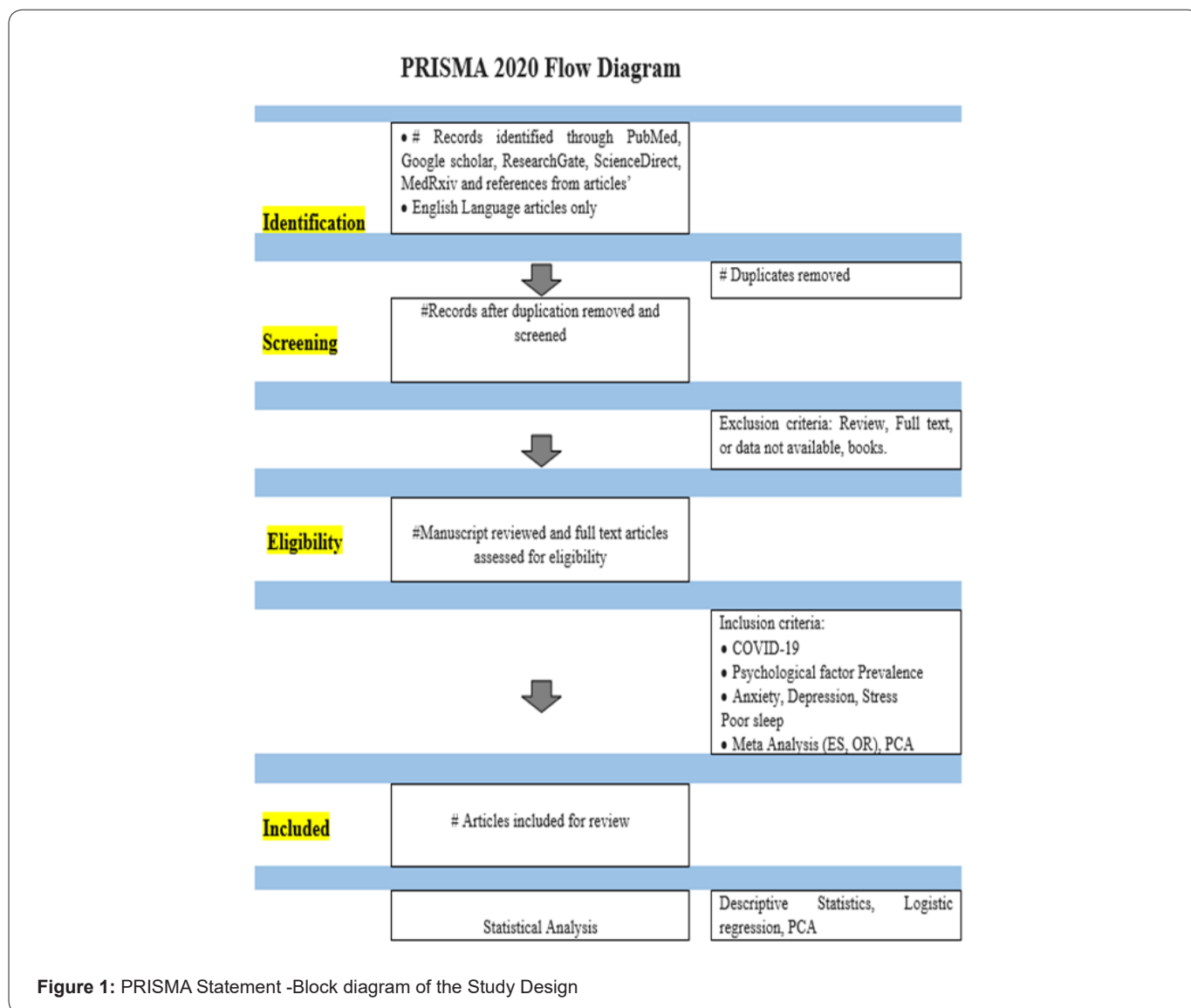


Figure 1: PRISMA Statement -Block diagram of the Study Design

Data extraction

The psychological data of anxiety, depression, poor sleep, suicidal cases linked to the COVID-19 positive patients, Quarantine population, medical professionals and general population were extracted from published articles on PubMed, Google scholar, Research gate, ScienceDirect, MedRxiv sites [5-13]. Further the references from articles were used to increase data base. Only English Language articles were searched and retrieved. The few of the total reviewed journals are listed in Table 1.

Data synthesis and analysis

Microsoft Excel for Windows was utilized in the current study to synthesize and organise data. The data was arranged as Author, publication and year, sample population, evaluation test methods applied, sample size and sample characteristics, age and gender, statistical method applied for assessment, psychological parameters determined and result outcomes. Details are presented in Table 1. The primary psychological parameters retrieved were Anxiety, Depression, Insomnia, Distress (Figure 1).

Table 1: Review of literature on psychological distress related to Co-vid-19 pandemic.

Year	Publication	Author	Study Design	Subjects	Parameters	Evaluation Method	Statistics	Outcome
24 Mar 2020	Online	Xiangyu Kong et al. [5]	Questionnaire Survey	N=144 Hospitalized COVID-19 patients	<ul style="list-style-type: none"> Depression and anxiety symptoms Social support 	<ul style="list-style-type: none"> Hospital Anxiety and Depression Scale (HADS) Perceived Social Support Scale (PSSS) 	<ul style="list-style-type: none"> Multivariate linear regression analyses Bivariate correlation 	<ul style="list-style-type: none"> 34.7% Anxiety, 28.4% Depression Less social support was correlated with more anxious ($r=-0.196$, $p<0.05$) and depressive ($r=-0.360$, $p<0.05$) symptoms
31 Mar 2020	General Hospital Psychiatry	Jiang Du et al. [6]	Smart-phone-based survey	N = 134 Medical Staff	<ul style="list-style-type: none"> Psychological distress, Psychological preparedness Sleep quality, Stress, Depression, Anxiety 	<ul style="list-style-type: none"> Perceived Stress Scale (PSS), Beck Depression Inventory-II (BDI-II), Beck Anxiety Inventory (BAI). 	Logistic regression	Prevalence of moderate stress and elevated depressive (BDI-II scores ≥ 14) and anxiety symptoms (BAI scores ≥ 8):
26 Mar 2020	Psychiatry Research	Yeen Huang et al. [7]	Web-based cross-sectional	N = 7,236 Medical Staff, Teachers and Others	<ul style="list-style-type: none"> Generalized anxiety disorder (GAD), Depressive symptoms Sleep quality. 	<ul style="list-style-type: none"> National Internet Survey on Emotional and Mental Health (NISEMH) Generalized Anxiety Disorder-7 (GAD-7) Center for Epidemiology Scale for Depression (CES-D) PSQI (Pittsburgh Sleep Quality Index) 	<ul style="list-style-type: none"> Chi-square test Uni and multi logistic regression 	<ul style="list-style-type: none"> High prevalence of GAD and poor sleep quality during COVID-19 outbreak

06 May 2020	Brain, Behavior, and Immunity	Sofia Pappa et al. [8]	Review	N=33062 Medical Staff	<ul style="list-style-type: none"> Anxiety Depression Insomnia Pooled Prevalence 	<ul style="list-style-type: none"> Zung Self-Rating Anxiety Scale (SAS) GAD-7 Zung Self-Rating Depression Scale (SDS) Patient Health Questionnaire 9-item depression module (PHQ-9) 	<ul style="list-style-type: none"> Metaanalysis Random effects model Der Simonian & Laird) 	<ul style="list-style-type: none"> High prevalence rates of depression, anxiety and insomnia
23 Mar 2020	JAMA Network Open	Jianbo Lai et al. [9]	cross-sectional hospital-based survey	N=1257 Medical Staff	<ul style="list-style-type: none"> Depression, Anxiety, Insomnia, And Distress [factors associated with mental health outcomes] 	<ul style="list-style-type: none"> PHQ-9, GAD-7 7-item Insomnia Severity Index (ISI) 22-item Impact of Event Scale-Revised (IES-R) 	<ul style="list-style-type: none"> Multivariable logistic regression 	<ul style="list-style-type: none"> Participants reported experiencing psychological burden Frontline medical staff at higher risk of mental health symptoms
14 Apr 2020	Frontiers in Psychiatry	Chenxi Zhang et al. [10]	WeChat program Questionnaire	N=1,563 Medical Staff + others	<ul style="list-style-type: none"> Insomnia, depressive, anxiety and stress-related symptoms 	<ul style="list-style-type: none"> PHQ-9, GAD-7, ISI-7, IES-R-22 	<ul style="list-style-type: none"> Multiple Binary Logistic Regression 	<ul style="list-style-type: none"> Insomnia symptoms during the COVID-19 outbreak
09 Apr 2020	PsychotherPsychosom	Wen-rui Zhang et al. [11]	Online survey	N= 2,182	<ul style="list-style-type: none"> insomnia, anxiety, depression, somatization obsessive-compulsive symptoms, phobic anxiety 	<ul style="list-style-type: none"> ISI-7 PHQ-4 GAD-2 Symptom Check List-90-revised (SCL-90-R) 	<ul style="list-style-type: none"> Chi square and Mann-Whitney tests 	<ul style="list-style-type: none"> During COVID-19 medical health workers had psychosocial problems and risk factors for developing them.
16 Mar 2020	Online	Zhou Zhu et al. [12]	Online questionnaire survey	N= 5062	<ul style="list-style-type: none"> Depressive, anxiety and stress-related symptoms 	<ul style="list-style-type: none"> PHQ-9, GAD-7, ISI-7, IESR-22 	<ul style="list-style-type: none"> Multivariate logistic regression 	<ul style="list-style-type: none"> Medical staff facing a serious psychological challenge
07 Apr 2020	Annals of Internal Medicine	Benjamin YQ Tan et al. [13]	questionnaire survey	N= 470 Medical Staff + others	<ul style="list-style-type: none"> Psychological distress, depression, anxiety, and stress 	<ul style="list-style-type: none"> Depression, Anxiety, and Stress Scales (DASS-21) Impact of Events Scale-Revised (IES-R) PTSD 	<ul style="list-style-type: none"> Pearson chi²test and Student t test Multivariable regression 	<ul style="list-style-type: none"> Risk for psychological distress during the COVID-19 outbreak.

Results and Discussion

The statistics of the included sample in the study is shown in the descriptive statistics in Table 2. A total of n= 18,048 samples from the 8 studies where included in the analysis. All the studies reported the psychological factors like anxiety, depression, stress

and insomnia in medical staff and general population during the COVID-19 pandemic. Some studies that were reviewed had also reported cases of PTSD, Suicide, fear and social connect factor related to lockdown. Out of 8 studies 6 was in mainland china and one was in Wuhan city and one was in Singapore (Figure 2).

Table 2: Descriptive statistics of sample population.

Item	Sample n	Age	Male	Female	Anxiety	Depression	Stress/ Distress	Insomnia / Poor Sleep
Mean	2256	36.6	807.8	1273.1	670.8	483.9	449.9	381.339
SD	2572.1	6.8	1070.3	1791.1	861.4	505.6	630.4	480.728
Skewness	1.339	0.95	2.16	1.333	1.744	0.955	0.902	1.116
SE of Skewness	0.752	0.75	0.75	0.752	0.752	0.752	0.752	0.752
Minimum	134	28	53	1.401	4.96	5.76	0.001	0.001
Maximum	7236	49.98	3284	4304	2540	1454	1509	1317

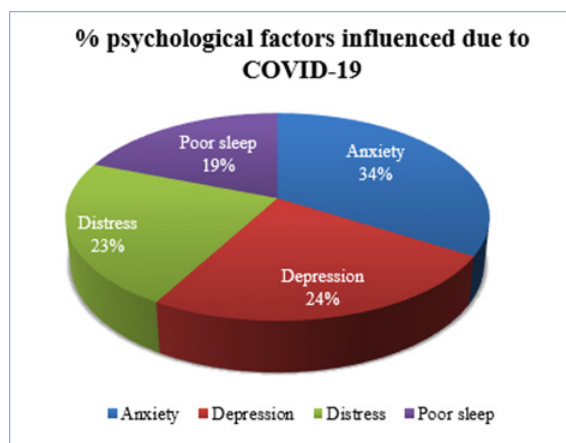


Figure 2: Pie Chart showing % of Anxiety, Depression, Distress and Poor sleep impacting sample population due to COVID-19.

The multiple linear regression analysis (Table 3) showed that sample type ($\beta=-0.41, p<0.05$), Sample number ($\beta 0.61, p<0.01$), age ($\beta=-0.30, p<0.05$), and gender/male ($\beta =0.58, p<0.01$) were

associated with anxiety for COVID-19. As compared to anxiety, depression and stress affected people due to COVID-19 to a lesser degree.

Table 3: Multivariate regression analysis of factors associated with anxiety, depression and distress.

Anxiety	Beta	Std.Err.	B	Std.Err.	t(2)	p-level
Sample Type	-0.41	0.05	-487.91	63.29	-7.71	0.02
Sample n	0.61	0.06	0.20	0.02	10.30	0.01
Age	-0.30	0.04	-39.15	5.68	-6.89	0.02
Male	0.58	0.07	0.46	0.05	8.67	0.01
Anxiety R= .99919257 R ² = .99838579 Adjusted R ² = .99515737 F(4,2)=309.25 p						
Depression	Beta	Std.Err.	B	Std.Err.	t(2)	p-level
Sample Type	-0.42	0.31	-286.18	209.12	-1.37	0.30
Sample n	0.47	0.34	0.09	0.07	1.38	0.30
Age	-0.56	0.25	-41.31	18.77	-2.20	0.16
Male	0.59	0.38	0.27	0.17	1.53	0.27
Depression R= .97274700 R ² = .94623672 Adjusted R ² = .83871016 F(4,2)=8.8000 p						

Distress	Beta	Std.Err.	B	Std.Err.	t(2)	p-level
Sample Type	-0.38	0.74	-326.48	645.68	-0.51	0.66
Sample n	1.43	0.82	0.35	0.20	1.74	0.22
Age	-0.87	0.61	-82.05	57.97	-1.42	0.29
Male	-1.39	0.92	-0.81	0.54	-1.51	0.27

Distress R= .83004987 R²= .68898279 Adjusted R²= .06694838 F(4,2)=1.1076 p

As can be seen from the present analysis that Anxiety, Depression, Stress and Insomnia, amongst other are critical psychological parameters that are affected during painful physical or mental conditions of COVID-19 Pandemic. These four primary parameters of current study that were critically affected during pandemic, were subjected to principal component analysis (PCA). The analysis method of PCA is a dimension reduction procedure by combining a large number of parameters into a smaller set of

components based on their correlation or covariance. The PCA analysis was carried out using JASpV0.12.2 and its Scree plot is depicted in Figure 3. The Scree plot shows “elbow” at 2 components. Two principal components PC1 with eigenvalue ($\epsilon=2.67$) and PC2 having eigenvalue ($\epsilon=1.11$) were derived. The Path –Analysis plot of is presented in Figure 4. The loadings on the first component PC1 are all positive and loaded across three variables Anxiety, Depression and Insomnia. PC2 have positive and negative loading.

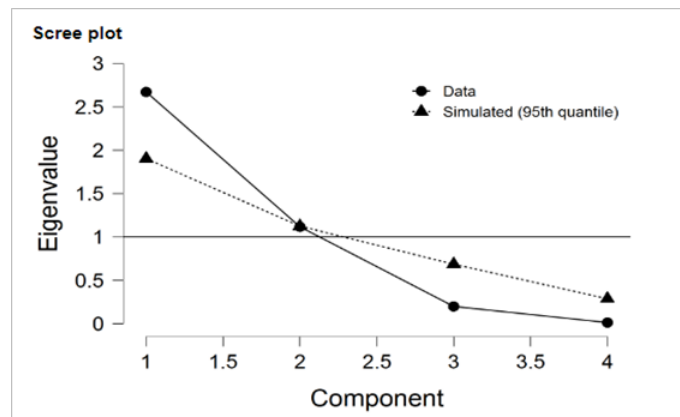


Figure 3: Scree plot of psychological factor analysis of the Anxiety, Depression, Distress and Insomnia.

Path Diagram

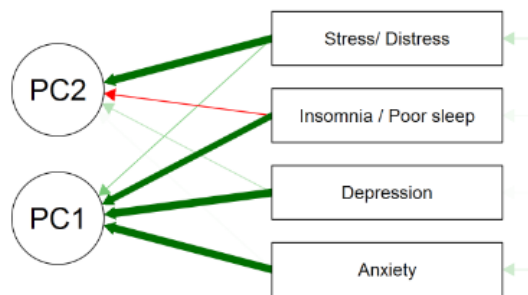


Figure 4: Principal Component Path Analysis identified a two-component structure PC1 and PC2

Conclusion

This review indicates that there are many psychological aspects that are affected during the prevailing pandemic which have been evaluated in recent studies. Data analysis reveals

that there is considerable evidence to conclude that patients of COVID-19 and general population experienced anxiety and felt unsafe during corona virus pandemic peak period. The Principal Component Analysis allowed, critical Psychological parameters

Anxiety, Depression, Stress and Insomnia to be condensed to two factors PC1 and PC2, for assessing COVID-19 mental health. Besides mental health parameters shooting up, there were confirmed cases of suicide under distress of Corona virus which presents an alarming situation. The present study recommends paying added attention towards the mental health of patients, frontline health care workers, in terms of providing good quality protection gears, psychological support and psychological prescription module as well as strong family support during and post the COVID-19 epidemic. It also warrants appropriate professional counselling wherever necessary.

References

1. Coronavirus. (2020) World Health Organization.
2. Sritharan, Jeavana, Sritharan Ashvinie (2020) Emerging Mental Health Issues from the Novel Coronavirus (COVID-19) Pandemic. In: Journal of Health and Medical Sciences 3(2): 157-162.
3. Lai J, Ma S, Wang Y, Wang Y, Cai Z, et al. (2020) Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA Network Open 3(3): e203976.
4. Fardin MA (2020) COVID-19 and Anxiety: A Review of Psychological Impacts of Infectious Disease Outbreaks. Arch Clin Infect Dis.
5. Kong X, Zheng K, Tang M, Kong F, Zhou J, et al. (2020) Prevalence and Factors Associated with Depression and Anxiety of Hospitalized Patients with COVID-19.
6. Du J, Dong L, Wang T, Chenxin Yuan, Rao Fu, et al. (2020) Psychological symptoms among frontline healthcare workers during COVID-19 outbreak in Wuhan. Gen Hosp Psychiatry.
7. Huang Y, Zhao N (2020) Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional Survey. PII: S0165-1781(20): 30607-7.
8. Pappaet S, Ntella V, Gianna T, Giannakoulis VG, Papouts E, et al. (2020) Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. Brain, Behavior, and Immunity.
9. Laiet J, Simeng Ma, Wang Y, Cai Z, Hu J (2020) Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. JAMA Network Open. 2020;3(3): e203976.
10. Zhang C (2020) Survey of Insomnia and Related Social Psychological Factors Among Medical Staff Involved in the 2019 Novel Coronavirus Disease Outbreak. Frontiers in Psychiatry. 11: 306.
11. Wen-rui Zhang, Wang K, Yin L, Zhao W, et al. (2020) Mental Health and Psychosocial Problems of Medical Health Workers during the COVID-19 Epidemic in China. Psychother Psychosom.
12. Zhu Z, Xu S, Wang H, Liu Z, Wu J, et al. (2020) COVID-19 in Wuhan: Immediate Psychological Impact on 5062 Health Workers. Med Rxiv preprint.
13. Benjamin YQ, Tan, Nicholas WS, Chew, Grace KH Lee, MD et al. (2020) Psychological Impact of the COVID-19 Pandemic on Health Care Workers in Singapore. Annals of Internal Medicine.
14. Shacham M, Raz YM, Kolerman R, Mijiritsky O, Ben-Ezra M, et al. (2020) COVID-19 Factors and Psychological Factors Associated with Elevated Psychological Distress among Dentists and Dental Hygienists in Israel. Int. J. Environ. Res. Public Health 17: 2900.
15. Wei-jie Guan, Wen-hua Liang, Yi Zhao, Heng-rui Liang, Zi-sheng Chen, et al. (2020) Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis. Eur Respir J 55: 2000547.
16. Zhang Y, Ma ZF (2020) Impact of the COVID-19 Pandemic on Mental Health and Quality of Life among Local Residents in Liaoning Province, China: A Cross-Sectional Study. Int J Environ Res. Public Health 17: 2381.
17. Griffiths MD, Mamun MA (2020) COVID-19 suicidal behavior among couples and suicide pacts: Case study evidence from press reports. Psychiatry Research 289:113105.



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