Review Article

Depression Among Healthcare Workers During the COVID-19 Pandemic in Low and Middle-Income Countries: A Systematic Review

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Abstract

Background: COVID-19 illness has the ability to remarkably influence the mental well-being of healthcare workers (HCWs), who are facing this situation standing on frontline. Hence it is of foremost importance to observe mood changes, pattern of sleep and other symptoms of deterioration of mental health for forecasting aggravating factors and to suggest interventions. The purpose of the review is to combine and examine current available material on prevalence of depression in HCWs in current epidemic of COVID-19.

Methods: A systematic search of exploration of literature records was carried out till May 30th; 2020.Two reviewers autonomously evaluated complete articles on the basis of already set criteria. For assessment of occurrence of particular mental health issues, the data was pooled by means of random-effects meta-analyses and risk of bias for each study was evaluated.

Findings: Eleven research studies were made part of analysis and 25,413 participants were included in the study having estimated prevalence of 30.2% (95% CI 21.55-39·78, I2=99·53%).An assessment of a sub-group of above mentioned group of participants showed that belonging to female gender and being non-doctor were found susceptible to increased risk of depression.

Conclusion: Evidence indicates that a high percentage of HCWs suffer from changes in mood and patterns of sleep during this epidemic, focusing the requirement to establish methods for alleviating factors deteriorating mental health during this critical situation

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Introduction

After the emergence of the coronavirus disease of 2019 (COVID-19) in Wuhan, it took approximately 212 countries/territories into its spread and became a reason of more than 230000 deaths across the whole world. This occurrence of the diseases became responsible for adding to a huge burden on health-care facilities and health professionals.[1] This in turn resulted into increased demand for both health-care facilities and health professionals. More-over the requirement for psychological care has also increased undoubtedly.[2]

In this epidemic, Health care workers (HCWs) are the most highly stressed professionals. The current outpouring of COVID-19 affected patients has made them susceptible to a large number of mental stressors. Increased duty timings and scarcity of personal protection equipment (PPE) has made them more susceptible to deterioration of mental well-being.[3] HCWs' present condition exposes them to

irritability and depression-linked mental health issues that can become a reason of poor performance and decreased ability of making decisions.[4]

The mental as well as physical well-being of health professionals should be the foremost consideration as they are fighting on the forefront for combating COVID-19. So it is the need of the hour to identify HCWs prone to or suffering from any mental illness and to provide them with prompt diagnosis, treatment and psychological support.[5] It is recommended to diagnose these mental ailments as early as possible to improve outcome and to decrease risk of saturation of health-care capability.[6] Clear statement, reducing hours of duty, availability of space to spend leisure time, free accessibility of PPE along with guideline for using it and focused training on management of COVID-19 patients can lessen irritability associated with unusualness and lethalness of the virus. Provision of suitable and in time custom-made mental health-care measures by means of specially designed teams, mass-media or multidisciplinary teams having mental health professionals as their part and parcel is necessary too.[2,6]

Many studies and reviews done in past on communicable disease outbreaks revealed the frequency and causes related to emergence of psychological issues in health-care professionals.[7] Though the importance of health-care workers and high quality services provided by them in such crisis or critical situation has been identified, but there is no detailed or complete analysis of their mental health in low and middle-income countries (LMICs). To address this gap, we conducted a systematic review in order to describe the prevalence and factors associated with health care provider depression in LMICs in the COVID-19 outbreak. Revealing or exploring these facts will help administrators and policymakers to develop and apply efficient measures to avoid exhaustion and increase work efficacy, output, excellence and main-tenance.

Methods

The systematic review protocol was developed keeping in view the PRISMA statement[8] and the MOOSE (Meta-analyses Of Observational Studies in Epidemiology) Checklist using as guideline. By systematic study of MEDLINE, Pubmed, Embase, and Google Scholar databases, two of writers auto-nomously recognized records published until May 30, 2020 describing frequency of depression in health-care professionals in coronavirus pandemic. The search terms included combinations of: Following search terms were used: "novel coronavirus", "COVID-19", depression", "mental health, "health-care workers" "medical staff", and "healthcare professionals, LMIC".

Our study group included health-care professionals (medical and non-medical) serving geographical regions hit by COVID-19. We only made those researches as part of our study that calculated prevalence of depression by means of valid and reliable evaluation methods. Eligible studies were observational studies (cross-sectional, case - control, and cohort studies). Due to expected difficulties of quantification, case reports/series, duplicate reports, letters to the editor, commentaries, authors' replies, and broad terms such as 'psychological distress' were not included in review. Similarly due to anticipated delay in onset, PTSD was also exempted from review. Our study was confined to documents published in English language till 30 May, 2020. The Studies that showed distinct features established and/or authenticated in an upper-middle, lower-middle and low-income inhabitants as described by the World Bank were included or made part of our study.[9]

Moreover, by means of a modified version of the Newcastle-Ottawa scale, the risk of bias in cross-sectional studies was assessed by two writers. Third author solved probable discrepancies. Quality evaluation measures used were as mentioned below: descriptive statistics appropriateness, sample representativeness of sample, comparison among responders and non- responders and identification of depression. Total score for quality ranged between 0-5. Researches with score $\geqslant 3$ were considered as having low risk of confounding, in contrast the studies scoring <3 points were thought to be at higher risk of having bias. For extraction of equivalent quantity of evidence from each article, a data extraction form was used. Components of extracted Evidence consisted of sample of population, assessment of prevalence, and evaluation of occurrence stratified by gender and profession. This form comprised fields for extraction of data in relation to the evaluation of chance of bias too.

MedCalc Statistical Software version 19.3 (MedCalc

Software bvba, Ostend, Belgium; http://www.medcalc.org; 2020) were employed for analysis of present research. Estimates were pooled and the resultant 95% confidence intervals (95% CI) and p-values were determined.[12] statistic and Cochran's Q test were used for evaluation of heterogeneity in different collective studies. Because of variation in populations of patient, areas, and methods of evaluation of different researches, single effect size can never be exactly determined; hence an random effects model (DerSimonian & Laird) was employed for extraction of pooled prevalence and significant heterogeneity was considered as I2>75%.[10] Assessment of sub-groups was conducted in classes given below: occurrence of depression across different genders and different professions and the main outcome were prevalence (p), confidence intervals (CI) and percentage prevalence (p × 100%).

Results

After removing duplication and screening, eleven studies11, 21 and 25,413 individuals were made part of our research. All researches belonged to cross-sectional design and described the occurrence of depression in HCW while Covid-19 outbreak. Regarding area of conduction of research nine of these were done in China[11,12,13,14,15,16,17,18,20] while two of them were carried out in region of West Bengal, and one was conducted in Singapore and India.[19,21] Table 3 showed the brief details of the main features of every research such as participants of study, area or geographical region, distribution or spread of health-care professionals and frequency of depression. Table 4 reveals outcomes of The Newcastle-Ottawa score of individual research. The pooled prevalence of depression and the subgroup evaluation is shown below and remarkably, I2 was found to be above 75% in large number of the results (Table 2).

Depression was evaluated in eleven studies,[11-21] with a measured pooled prevalence of 30.2% (95% CI 21.55-39•78, I2=99•53%), as evident in figure 2 and Table 1.Table.2 comprises of an analysis of a subgroup for determination of frequency of depression regarding gender and profession. Data for gender regarding depression was present in two researches and a pooled prevalence of 44.1% was found for males while females were having pooled prevalence of 46.5% for depression.[18,21] Considering difference in

frequency of depression in medical and non-medical professionals, data were abstracted from and the pooled prevalence was found to be 30.4% among non-doctors and 37.0% for doctors .[18,21,11,16]
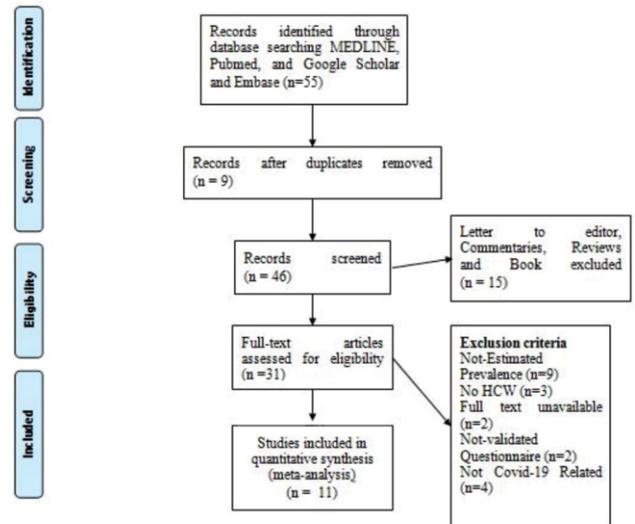
Figure 1: *A PRISMA Diagram Detailing the Study Retrieval Process*
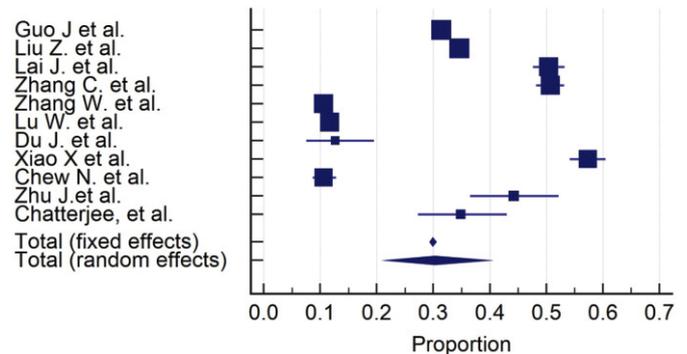
Figure 2: *Pooled Prevalence of Depression*

Table 1: *Pooled Prevalence of Depression*

Study	Sample size	Preva-lence %	95% CI	Weight % Fixed	Weight % Random
Guo J et al.	11118	31.4	30.59-32.32	43.73	9.26
Liu Z. et al.	4679	34.6	33.23-35.98	18.41	9.25
Lai J. et al.	1257	50.4	47.63-53.23	4.95	9.20
Zhang C. et al.	1563	50.6	48.16-53.17	6.15	9.22
Zhang W. etal.	2182	10.6	9.37-12.00	8.59	9.23
Lu W. et al.	2299	11.6	10.37-13.04	9.05	9.23
Du J. et al.	134	12.68	7.56-19.53	0.53	8.69
Xiao X et al.	958	57.3	54.10-60.46	3.77	9.18
Chew N. et al.	906	10.5	8.66-12.78	3.57	9.18
Zhu J.et al.	165	44.2	36.52-52.16	0.65	8.80
Chatterjeeet al	152	34.8	27.32-43.01	0.60	8.76
Total (Fixed effects)	25413	29.92	29.36-30.49	100.0	100.0
Total (Random effects)	25413	30.27	21.55-39.78	100.0	100.0

Table 2: *Sub-Group Analysis of Depression Prevalence*

Characteristic	Depression
Gender	
Male	**44.1%** 95% CI 51.60-96·80 I^2=87.5%
Female	**46.5%** 95% CI 69.56-97.55 I^2=91.3%
HCW group	
Doctors	**37.0%** 95% CI 99.06-99.54 I^2=99.3%
Non-doctors	**30.4%** 95% CI 98.29-99.26 I^2=98.8

Table 3: *Summary of Characteristics of Included Studies*

Author	Study population	Region	Physicians	Nurses	Others	Assessment	Cutt-off	Depression N (%)
Guo J et al.	11118	China	30·28%	53·07%	16·65%	SDS	--	31·45%(3497)
Liu Z. et al.	4679	China	39·6%	60·4%	0·0%	SDS	≥50	34·6%(1619)
Lai J. et al.	1257	Wuhan	39·2%	60·8%	0·0%	PHQ-9	≥5	50·4%(634)
Zhang C. et al.	1563	China	29·0%	62·9%	7·9%	PHQ-9	≥5	50·7%(792)
Zhang W. et al.	2182	China	31·2%	11·3%	57·5%	PHQ-2	≥3	10·6%(232)
Lu W. et al.	2299	Fujian	88·8%	88·8%	11·2%	HAMD	≥7	11·7%(268)
Du J. et al.	134	China	35·1%	41·0%	23·9%	BDI-II	≥14	12·7%(17)
Xiao X et al.	958	China	39.5%	37.5%	23%	(HAD)	≥8	58%(556)
Chew N. et al.	906	India and Singapore	29.6%	39.2%	31.2%	DASS-21	≥9	5.3%(48)
Zhu J.et al.	165	Gansu	47.9%	52.1%	73.9%	SDS	≥50	45.6%(75)
Chatterjee, et al.	152	West Bengal	88.8%	NA	11.1%	DASS-21	NA	35%(54)

Table 4: *Modified Newcastle-Ottawa Quality Assessment Scale and Total Score of Each Study*

Studies	Year	Modified Newcastle-Ottawa quality assessment scale 1 Representativeness of sample (no HCWs' subgroup ≥ 65% of total sample)	2 Sample size (>600 HCWs)	3 Response rate >80%	4 The study employed validate measurement tools with appropriate cut-offs	5 Adequate statistics and no need for further calculations	Score
Guo J et al.					-	-	2
Liu Z. et al.	2020	*	*	-	-	*	3
Lai J. et al.	2020	*	*	-	*	*	4
Zhang C. et al.	2020	*	*	-	*	*	4
Zhang W. et al.	2020	-	*	-	*	*	3
Lu W. et al.	2020	-	*	*	*	-	3
Du J. et al.	2020	-	-	-	*	*	2
Xiao X et al.	2020	*	*	-	*	*	4
Chew N. et al.	2020	*	*	*	*	-	4
Zhu J.et al.	2020	-	-	*	*	-	2
Chatterjee, et. al.	2020	*	-	*	-	-	2

Discussion

The recent review advocates that HCW are coming across a significant grade of stress, apprehension, depression and loss of sleep because of COVID-19 outbreak. This appropriate, fast systematic review and meta-analyses comprises of 11 cross-sectional studies consisting of 25,413 individuals, provides important information that a high percentage of HCWs are suffering from remarkable degrees of depression during COVID-19 outbreak. We are aware of the fact that carrying out study on mental health during such critical time, like COVID-19 pandemic , is a delicate issue as well as we consider that all the researches which were included in our review were given due ethical consideration.[22] During COVID-19 in China ,in the same period, the prevalence of depression was reported to be 30.2% in HCWs which is more or less same to the prevalence found in general public i.e 16•5%-48•3%. This reveals that the crisis has badly affected all the population. 23-25 Possible differences, though, involving these outbreaks and the COVID19 pandemic may possibly be elucidated on the account of the particularly elevated contagious potential and death rate of the former.

Though various measures and cutt-off values were employed by every survey and this probably added to heterogeneity between different studies, it is concluded that most of HCWs suffered from mild signs of depression whereas moderate and severe indications were not usual in HCWs. This accentuates the necessity of identification of psychological ailments at an initial stage and hence starting treatment as early as possible to improve prognosis and to reduce morbidity associated with these ailments. As we know that curing a disease at early stage is not only easier but also has good prognosis and risk of changing disease into severe ailment is reduced. Moreover evaluation of the sub-group's revealed significant variations regarding gender and profession. The frequency of depression was noted to be more in females, and this shows the correspondence with already known fact that ladies are more prone to irritability and signs of depression.[26]

The occurrence of depressive symptoms was found to be higher in doctor's staff (30.4%) as compared to non- medical professionals (37.0%). Similar already done researches also provide clue that the mental health situation of health-care professionals was deteriorated when compared to general public.[27,28] According to a research done by Kerrien M et al,[29] approximately 27% of doctors who were at initial stage of their career were having symptoms of depression. Similarly, Paiva CE et al.30 also revealed that 12.3% doctors were suffering from depression (HADS-D ⩾ 11). Hence our inferences were not constant and these variations may be due to different investigation tools employed.

COVID-19 is extremely affecting the psychological well-being of the health-care providers. A studies conducted in Hong Kong and Germany showed the elevated levels of stress and depression in medical and nursing staff.[31,32] Besides, this critical situation not only had bad psychological effects on staff working in pulmonology and ICU departments but also had morbid effects on health-care professionals working in surgery and anaesthesia departments.[33] Because of intense psychological pressure and extreme fear of death, suicides have been reported in HCWs and this situation is distressing because of the fact that doctors are already more prone to suicide than general public.[33,34] The conclusions of a research done for exploration of causes of psychological problems of HCWs' revealed that suffering of mates with COVID-19, suffering of members of family, lack of or difficulty in use of PPE and violence of attendants against health-care professionals were the main reasons of psychological morbidity HCWs in COVID-19 affected areas.[35,36]

For this reason rapid, fast and to the targeted measures should be undertaken. A number of researches done in China, for detection of mental health status of HCWs, revealed that majority of health-care professionals were facing mental stress and required in time treatment even for mild disease.[15,16] Certainly, a lot of approaches can be utilized, like virtual clinics, psychological treatment offered by a physician on Skype or WhatsApp, mental health education, live discussion through telephone, estimation of individual level phenotype data via digital phenotyping and technologies monitoring risk. Moreover in addition to HCWs and patients suffering from COVID-19, suspected patients suffering from COVID-19 who were isolated at homes, and families and friends of above mentioned also require psychological support.[34,36]

Strengths and Limitations

Undoubtedly, there are a number of strengths and similarly limitations of our review. As far as we know, it is first ever systematic review and meta-analysis that assess the frequency of depression among health-care professionals in this corona virus outbreak in low and middle-income countries.

As we all know this is a new disease and hence available literature on it is scanty so the number of researches included in our review and meta-analysis is small too. However, most of research studies consisted of a good number of study participants. Moreover, our evaluation of depression in sub-group gave important information regarding probable specific vulnerability.

One of the main disadvantages requiring attention is the characteristic heterogeneity among studies. A number of evaluation scales were employed for screening of population and different cut off values were employed although many studies utilized similar tests.

One more limitation of the review is that many of studies may have involved the same population due to their conduction in same geographical region. Because of the reason that most of the studies were done in China the results cannot be generalized.

As we know that healthcare systems vary considerably from country to country, an effort to generalize these results can introduce severe affect. Anyhow admitting the fact that disease was hitting China severely COVID-19 outbreak had potential to put morbid effects on the mental well-being of health-care professionals. Moreover, to understand the long-standing consequences of Corona Virus disease pandemic on HCWs mental well-being requires advance research because all of the researches included within our meta-analysis were of cross-sectional design.

Conclusion

To conclude, the present systematic review and meta-analysis offer an appropriate and complete combination of the prevailing increased frequency of depressive symptoms among HCWs. The present result will assist in estimating the requirement of psychological support and treatment by HCWs and notify tiered and adaptive strategies under outbreak situations that improve resilience and diminish susceptibility.

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