



Research article

Prevalence and risk factors of COVID-19 suicidal behavior in Bangladeshi population: are healthcare professionals at greater risk?



Mohammed A. Mamun^{a,b,*}, Tahmina Akter^{a,c}, Fatematz Zohra^{a,d}, Najmuj Sakib^{a,e},
A.K.M. Israfil Bhuiyan^a, Palash Chandra Banik^f, Mohammad Muhit^{g,h}

^a Centre for Health Innovation, Networking, Training, Action and Research - Bangladesh, Dhaka, Bangladesh

^b Department of Public Health and Informatics, Jahangirnagar University, Savar, Dhaka, Bangladesh

^c Department of Epidemiology, Bangladesh University of Health Sciences, Dhaka, Bangladesh

^d Department of One Health, Chittagong Veterinary and Animal Sciences University, Chittagong, Bangladesh

^e Department of Microbiology, Jashore University of Science and Technology, Jashore, Bangladesh

^f Department of Noncommunicable Diseases, Bangladesh University of Health Sciences, Dhaka, Bangladesh

^g CSF Global, Dhaka, Bangladesh

^h Asian Institute of Disability and Development, University of South Asia, Dhaka, Bangladesh

ARTICLE INFO

Keywords:

Psychology

Public health

COVID-19 and suicide

Suicidal ideation

Suicidal behavior

Health-care professional' suicide

Frontline worker's suicide

Suicide in Bangladesh

ABSTRACT

Background: Current COVID-19 researches suggest that both general population and health-care providers (HCPs) are at risk of elevated psychological sufferings including suicidality. However, suicidality has not been addressed properly, although mental health problems are studied globally. Besides, the extreme fear of COVID-19 infection is being existed among the Bangladeshi HCPs, that is reported by a recent patients' suicide because of HCPs treatment negligence.

Methods: A web-based cross-sectional study was administered through the social media platforms. A total 3,388 respondents took part in the survey (mean age 30.1 ± 6.4 years) among them 834 were frontline HCPs (30.7 ± 5.6 years). The measures included socio-demographics, PPE-related and patient-care related information and a question concerned with the COVID-19 suicidal behavior.

Results: About 6.1% of the total participants had suicidal behavior, with no detectable differences within the groups (i.e., general population and HCPs). Regression analysis showed that being female, being divorced, and having no child were emerged as independent predictors for suicidality. There was no significant association between the PPE-related or patient-care related variables and suicidal behavior of the HCPs. Majority of the participants sometimes had fear of death although no significant relation of the factor was found with suicidality.

Limitations: The study can be limited because of its nature (i.e., cross-sectional self-reporting online survey) and not considering non-COVID-19 related suicide risk factors etc.

Conclusions: The present findings identified the substantial proportion of the HCPs and general population had COVID 19 related suicidal behavior. It can be used to advocate a large-scale suicide safety plan using a multi-disciplinary approach herein.

1. Introduction

The ongoing COVID-19 disease (also known as novel corona virus disease) outbreak has turned into a public health emergency of international concern, and later it was also declared as a pandemic by the World Health Organization. As of 11 May 2020, a total 4,006,257 confirmed cases and 278,892 deaths were reported globally whereas a total 14,032 cases and 973 deaths were reported in Bangladesh (WHO, 2020). In fact,

lack of sufficient COVID-19 diagnostic kits as well as presence of one test-center only till the last week of March were alleged for lower case reporting in Bangladesh (where the present study was carried out; The Daily Star, 2020a). Besides, an unpublished report claimed that 81% of the total population might be affected in the country whereas 507,442 people might have to die (Mridha et al., 2020). The report was shared throughout the social media platforms by popular celebrities although it was not peer-reviewed or reflected by data-driven computational models.

* Corresponding author.

E-mail addresses: mamunphi46@gmail.com, mamun.abdullah@phiju.edu.bd (M.A. Mamun).

<https://doi.org/10.1016/j.heliyon.2020.e05259>

Received 14 August 2020; Received in revised form 7 September 2020; Accepted 9 October 2020

2405-8440/© 2020 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Hence, the overall situation is arguably leading the mass people to higher fear of COVID-19 infection, panic towards COVID-19 and other associated psychological distresses. Additionally, Dhaka, the capital of the country and the top most populated city across the world, is reported to have the highly polluted environment, which results in greater acute respiratory infection incidence rates now-a-days. Also, the infection rate was claimed to be seven times higher than the previous year; therefore, the incidence may have influence on rising public fear as of flue like symptoms that are represented in the COVID-19 patients as well (Dhaka Tribune, 2020a).

The health-care providers (HCPs) are directly involved in the diagnosis, treatment, and care of patients and previous studies showed that they had higher chance of developing mental illness like depression, fear, anxiety, stress, trauma etc. because of contagion and infection fear of themselves and their family members (Khan et al., 2020; Mamun et al., 2020a; Usman et al., 2020). In Bangladesh, there is no clear estimation on HCPs psychological sufferings during the COVID-19 pandemic although they are anticipated to be most vulnerable to these sufferings mainly because – (i) people rush to all sorts of hospitals with flu-fever like symptoms hiding their travel and contact history despite having specific hospitals for COVID-19 treatments (Anadolu Agency, 2020), (ii) there is huge shortage of PPE (Al Jazeera, 2020) and its' questionable quality (The Financial Express, 2020), (iii) substandard PPE was alleged for many of HCP's infection [e.g., as of 30 April, 500 doctors (within total 7,103 cases) are affected with COVID-19 disease and 600–700 doctors are in home or institutional quarantine (The Daily Star, 2020b)], (iv) two HCPs death cases are reported for not getting enough treatment facilities (e.g., unavailability of ambulance to move to COVID-19 designated hospital) (Dhaka Tribune, 2020b). Moreover, without proper safety measures, the HCPs are also in dilemma whether to continue the job or not owing to personal and family protection. In some cases, their such decision made them fall into the state of partial unemployment which may aggravate mental sufferings during the crisis period (Dhaka Tribune, 2020c; Mamun et al., 2020b; Rafi et al., 2019).

There is a recent report, that claimed patients' suicide occurrence because of treatment negligence by the HCPs in Bangladesh (Mamun et al., 2020a). The HCPs assumed the patients' as infected with the COVID-19, and declined to treat her, even they also forbid other patients to get touch with the victim where the victim was not tested for COVID-9 (Mamun et al., 2020a). Besides, since the mental health sufferings are likely to persist for a long time even after the crisis leading to traumatic disorders (Lee et al., 2018), the HCPs as well as the general population may be considered to be the most vulnerable in the present Bangladeshi context. The aggregated fear of contagion, loneliness, anxiety, phobia, economic crisis, fear of not getting proper treatment during emergency are arguably suicide contributing factor as the 90% of suicide occurred due to mental disorders and traumatic sufferings (Dsouza et al., 2020; Mamun and Griffiths, 2020a, 2020b). Although there are many studies that accessed the psychiatric issues among the general people and HCPs during the current COVID-19 pandemic, none of them assessed the suicidal behaviors to date (Pappa et al., 2020; Rajkumar, 2020). Many HCPs suicide occurrences are reported in press media although (Jahan et al., 2020a), suicidal behaviors (i.e., suicidal thoughts, suicide plan, suicide attempt etc.) are not investigated anywhere (e.g., Bhuiyan et al., 2020; Dsouza et al., 2020; Griffiths and Mamun, 2020; Mamun and Ullah, 2020; Mamun et al., 2020c). Besides, the COVID-19 suicides reports (including HCPs) in the social media can further contribute to copycat suicides (Ruder et al., 2011). Thus, the present study aimed to investigate the suicidality and its associated risk factors of HCPs by comparing with that of general population as it is anticipated that the HCPs may have higher suicidality as of being exposed to critical situation and higher mental health sufferings.

2. Methods

2.1. Participants, procedure and ethics

A web-based cross-sectional study was administered through the social media platforms (i.e., Facebook, WhatsApp, Imo etc.) from 8 to 25 April, 2020. Approximately 3400 participants were contacted whereas, 3,388 respondents took part in the survey (mean age 30.1 ± 6.4 years). Among them 2,554 were general population (29.6 ± 6.7 years) and 834 were frontline HCPs (30.7 ± 5.6 years). After giving the online consent (by mentioning the ethical guidelines and participant's rights provided by the Helsinki Declaration, 1975), the respondents were capable to participate in the survey. The confidentiality of the information of the participants was assured and kept anonymous. Besides, a formal ethical approval was obtained from the Institute of Allergy and Clinical Immunology of Bangladesh (Dhaka, Bangladesh) prior to the inception of this study.

2.2. Measures

2.2.1. Socio-demographics

Data concerning socio-demographic factors including age, gender (male or female), marital status (unmarried, married or divorced) and parenthood status (i.e., having children; yes/no) were asked. A question (i.e., 'do you have any elderly person at home?') was asked through a binary response to inquire about the aged person in the family who are thought to be mostly affected by the COVID-19 disease. Lastly, personal fear of death by COVID-19 infection was also assessed in the present study with three answer choices (i.e., 'all times', 'never', 'sometimes').

2.2.2. PPE-related information

A dichotomous response (i.e., yes/no) was used to assess the personal protective equipment (PPE)-related information among HCPs: (i) whether they purchased PPE by themselves, (ii) whether they received PPE from hospital authority, (iii) whether the purchased or provided PPE was reusable and (iv) whether they were satisfied at the quality of PPE. Besides, three answer choices (i.e., 'less than a week', 'a week', 'more than a week') were given to them to measure the frequency of using a single PPE.

2.2.3. Patient caring-related information

For HCPs, patient-care related questions were asked in binary responses (yes/no) concerning (i) whether they were worried while examining a patient having flu-like symptoms, (ii) whether they washed hands after examining each patient, (iii) whether they felt insecure for both themselves and their family members and (iv) whether they were in fear of spreading COVID-19 to others. Additionally, two more questions were enquired of them as to their precautionary measures at home after returning from workplace and their attitude towards a patient returning from abroad (see Table 4 for the exact answer choices asked).

2.2.4. Suicidal behavior

For assessing the suicidal behavior among the participants, a question was asked (i.e., Yes/No response) like previous studies (Jahan et al., 2020b; Xu et al., 2016). According to the concept of suicidal behavior (i.e., intending to end one's life, making plan for the thought, and attempting to end life; Turecki and Brent, 2016), the question, "do you think about committing suicide, and whether these thoughts were persistent due to the COVID-19 related issues and move forward to plan and attempt?" was included in the present study.

2.3. Statistical analysis

The data were analyzed using Statistical Package for Social Science (SPSS) Version 25.0 for Windows (SPSS Inc, Chicago, IL, USA). Microsoft

Excel 2016 was used for initial data cleaning and preparation for SPSS format. The descriptive statistics (i.e., mean, standard deviation, percentage, frequencies) were used for socio-demographics, PPE-related and patient caring attitude and perception about COVID-19 disease variables. Inferential statistics (e.g., chi-square tests) were performed to identify significant relationships among suicidality and the variables in three groups (i.e., total respondents, general population and healthcare providers). Besides, the binary logistic regression was performed to assess the suicidal behavior risk factors in the variables that were significant in bivariate analysis. In this study, the logistic regression was interpreted with 95% confidence intervals and a p -value of <0.05 was considered significant.

3. Results

Of the total 3388 sample, 51.8% were females; majority of the participants were married (60.8%), without child (57.8%), and with elderly person at their home (66.1%). Moreover, more than half (56.2%) of them sometimes had fear of death due to COVID-19. Besides, 75.4% of the total sample was general people and rest of them was health-care providers (Table 1).

Table 2 represented the suicidal behavior among the total respondents, about 6.1% of the total respondents had a suicidal behavior. There was no significant difference between suicidal behavior of two groups (i.e., general people and HCPs- 6.1% and 6.0%, respectively; $p = 0.906$). Females in the total sample (8.4% vs 3.5%; $p < 0.001$) and in both general people (8.5% vs 3.6%; $p < 0.001$) and HCPs (8.1% vs 3.3%; $p < 0.001$) experienced more suicidal behaviors compared to males. Within the marital status, persons who were divorced had reported more suicidal behavior followed by unmarried and married respondents (16.3%, 7.6%, 4.9% respectively; $p < 0.001$), in general population (14.3%, 8.2%, 4.5% respectively; $p < 0.001$) and in HCPs (20.0%, 5.4%, 5.9% respectively; $p = 0.05$). Respondents with no child were more prone to suicidal behavior in the total participants and general population (7.4% vs 4.3%; $p < 0.001$ and 7.6% vs 3.9%; $p < 0.001$ respectively) although it was not significantly associated in HCPs (Table 2).

Table 3 and Table 4 were solely represented for the HCPs regarding personal protective equipment (PPE) and patient-caring information respectively. About 63.2% of the HCPs purchased their own safety equipment; on the other hand, half of them got PPE from the hospital authorities, and only 16% was satisfied at the provided PPE. There were no significant associations between the PPE-related variables and suicidal behavior of the HCPs (Table 3). Besides, 65.3% of the HCPs were

restless in examining patients with flu-like symptoms; 91.0% felt insecure of probable infection for both themselves and their family members due to caring COVID-19 patients; 88.8% were in fear of transmitting the infection as a host. Furthermore, there were no significant associations between the patient-caring variables and suicidal behavior of the HCPs (Table 4).

Results from the regression analysis showed that being female was a risk factor for suicidal behaviors in total respondents (OR = 2.50; 95% CI = 1.83–3.42), general population (OR = 2.48; 95% CI = 1.74–3.53) and HCPs (OR = 2.62; 95% CI = 1.35–5.09). In the marital status, divorced and unmarried participants belonging to the total sample (OR = 3.77; 95% CI = 1.64–8.68 and OR = 1.60; 95% CI = 1.20–2.13 respectively) and general people group (OR = 3.50; 95% CI = 1.18–10.38 and OR = 1.87; 95% CI = 1.34–2.60 respectively) were at elevated suicidal behavior risk compared to the married persons. Lastly, having no child was the strongest predictor of suicidal behavior in total sample and general population (Table 5).

4. Discussion

The traumatic events such as pandemic, natural disaster etc. have an aggregative role in elevated psychiatric sufferings during and as an aftermath of these events (Cheung et al., 2008; Mamun et al., 2019; Mamun and Griffiths, 2020a). In the prior pandemics, the elevated suicide rates are reported to be high (i.e., the elderly suicide rates subsequently increased after the SARS pandemic [Cheung et al., 2008]). However, during the COVID-19 pandemic, the issue of mental health is lightly addressed in Bangladesh (e.g., Islam et al., 2020a, 2020b; Sakib et al., 2020), but this negligence may accelerate the suicide cases (Mamun and Griffiths, 2020b). Also, only a few studies have attempted to analyze that phenomenon (Bhuiyan et al., 2020; Mamun and Griffiths, 2020c; Mamun et al., 2020a, 2020d). Therefore, the present study aimed at exploring the dynamics of suicide between health-care providers (HCPs) and general population.

Based on the unfavorable features the lockdown provides (i.e., isolation, quarantine, economic recession etc.), it is anticipated that many of the people are prone to suicide due to not combating with the situations – although there is a dearth of knowledge establishing the suicidal behaviors across the world (Dsouza et al., 2020; Hawryluck et al., 2004; Lee et al., 2018). However, this study for the first time reports a suicidal behavior from the Bangladeshi sample (i.e., 6.1%, $n = 206$) during the time of COVID-19. Besides, there was no significant difference on suicidal behavior between the general people and HCPs

Table 1. Distribution of the variables across general population and health-care providers.

Variables	Total sample, N = 3388 (n; %)	General population (2554, 75.4%)	Health-care providers (834, 24.6%)
Gender			
Male	1634, 48.2	1267, 49.6	367, 44
Female	1754, 51.8	1287, 50.4	467, 56
Marital status			
Unmarried	1286, 38	1028, 40.3	258, 30.9
Married	2059, 60.9	1498, 58.7	561, 67.3
Divorce	43, 1.3	28, 1.1	15, 1.8
Having children			
Yes	1429, 42.2	1044, 40.9	385, 46.2
No	1959, 57.8	1510, 59.1	449, 53.8
Having COVID-19 high-risk elderly at home			
Yes	2240, 66.1	1627, 63.7	613, 73.5
No	1148, 33.9	927, 36.3	221, 26.5
Fear of death due to COVID-19			
All times	683, 20.2	526, 20.6	157, 18.8
Never	802, 23.7	595, 23.3	207, 24.8
Sometimes	1903, 56.2	1433, 56.1	470, 56.4

Table 2. Distribution of the suicidal behavior across general population and health-care providers.

Variables	Total sample (206; 6.1%)			General population (156, 6.1%)			Health-care providers (50, 6.0%)		
	Yes (%)	χ^2 test value	p-value	Yes (%)	χ^2 test value	p-value	Yes (%)	χ^2 test value	p-value
Gender									
Male	58 (3.5)	35.4	<0.001	46 (3.6)	26.9	<0.001	12 (3.3)	8.6	<0.001
Female	148 (8.4)			110 (8.5)			38 (8.1)		
Marital status									
Unmarried	98 (7.6)	18.2	<0.001	84 (8.2)	17.3	<0.001	14 (5.4)	5.4	0.050
Married	101 (4.9)			68 (4.5)			33 (5.9)		
Divorce	7 (16.3)			4 (14.3)			3 (20.0)		
Having children									
Yes	61 (4.3)	14.2	<0.001	41 (3.9)	14.6	<0.001	20 (5.2)	0.8	0.367
No	145 (7.4)			115 (7.6)			30 (6.7)		
Having COVID-19 high-risk elderly at home									
Yes	146 (6.5)	2.2	0.137	108 (6.6)	2.2	0.138	38 (6.2)	0.2	0.680
No	60 (5.2)			48 (5.2)			12 (5.4)		
Fear of death due to COVID-19									
All times	51 (7.5)	3.2	0.202	40 (7.6)	3.2	0.198	11 (7.0)	0.5	0.796
Never	49 (6.1)			38 (6.4)			11 (5.3)		
Sometimes	106 (5.6)			78 (5.4)			28 (6.0)		

(i.e., 6.1% and 6.0% respectively), although HCPs are anticipated to have higher suicidality due to the pandemic related exposures and difficulties. However, it can be assumed that the general people are similarly feared and panicked to COVID-19 infection as HCPs are due to misinformation and other circumstances existing in the country (Ahorsu et al., 2020; Khan et al., 2020; Pakpour and Griffiths, 2020). Thus, a nation-wide study concerning public mental health sufferings is warranted.

Although males are more likely to commit suicide, females are alleged to have more suicidal behaviors due to the persistent psychological sufferings they had to experience and their behavioral natures (i.e., attention seeking; Beautrais, 2006; Devries et al., 2011; Mamun et al., 2020e). Females in the present sample are similarly more suicide prone in the total sample and general population. The negative consequences of lockdown (i.e., males staying at home is more likely to vent anger and frustration on the females) may have influences on females' psychological disturbances and higher suicidality. Besides, domestic violence; physical, emotional or sexual torture which are reported from the females during the COVID-19 lockdown can be additional suicidality risk factors (Devries et al., 2011). However, there are several common reasons that

motive suicide completions such as fear of being COVID-19 infected, quarantine related issues, COVID-19 related stress, being isolated or lonely, being infected, economic recession, having no supply of drug-substances during the lockdown time (Dsouza et al., 2020; Mamun and Griffiths, 2020c; Mamun and Ullah, 2020).

The term 'social isolation' can be termed as being isolated from qualitative and quantitative social relationships in terms of individual, community and larger level where human interaction exists (Dsouza et al., 2020; Wang et al., 2017). There is growing evidence on any destructions in social relationships, which can play the influential roles in mental health sufferings such as loneliness, depression, personality disorders, psychoses and suicidal behaviors etc. (Armitage and Nellums, 2020; Dsouza et al., 2020; Wang et al., 2017). In the present COVID-19 pandemic, isolation is being adopted among the suspected and confirmed cases globally to minimize the transmission rate. Besides, its dramatic importance, detrimental effects on mental health is concerned. For instance, suicide occurrences due to being isolated and loneliness are reported during the COVID-19 crisis in India (Dsouza et al., 2020) as well as in global adolescent (Manzar et al., 2020). However, people without

Table 3. Distribution of the PPE-related information with suicidal behavior among health-care providers (n = 834).

Variables	Total (n, %)	Suicidal behavior (n, %)	χ^2 test value	df	p-value
Purchased own safety equipment					
Yes	527, 63.2	32, 6.1	0.015	1	0.902
No	307, 36.8	18, 5.9			
Received PPE from the authorities					
Yes	409, 49.0	27, 6.6	0.523	1	0.469
No	425, 51.0	23, 5.4			
Reusable					
Yes	360, 43.2	19, 5.3	0.924	1	0.336
No	433, 51.9	30, 6.9			
How long do you use your PPE					
Less than a week	316, 37.9	18, 5.7	0.645	2	0.724
A week	136, 16.3	10, 7.4			
More than a week	239, 28.7	17, 7.1			
Satisfaction over PPE quality					
Yes	133, 15.9	8, 6.0	0.003	1	0.958
No	603, 72.3	37, 6.1			

Table 4. Distribution of the patient caring related information with suicidal behavior among health-care providers (n = 834).

Variables	Total (n, %)	Suicidal behavior (n, %)	χ^2 test value	df	p-value
Worried while examining a patient having flu-like symptoms					
Yes	545, 65.3	33, 6.1	0.010	1	0.920
No	289, 34.7	17, 5.9			
Washing hands after examining each patient					
Yes	733, 87.9	40, 5.5	3.111	1	0.078
No	101, 12.1	10, 9.9			
Feeling of insecurity for himself/herself and family members due to COVID-19					
Yes	759, 91.0	48, 6.3	1.620	1	0.203
No	75, 9.0	2, 2.7			
Fear of spreading the COVID-19 disease to others					
Yes	741, 88.8	46, 6.2	0.533	1	0.465
No	93, 11.2	4, 4.3			
Attitude examining a patient returning from abroad					
No difference	136, 16.3	9, 6.6	2.640	3	0.450
Felt restless	273, 32.7	18, 6.6			
Maintain a distance of at least 1 m	375, 45.0	18, 4.8			
Disagree to examine the patient	50, 6.0	5, 10.0			
Precautionary measures at home after returning from workplace					
Put him/herself in complete isolation	186, 22.3	13, 7.0	0.478	3	0.924
Use masks at home	33, 4.0	2, 6.1			
Maintain a distance of one meter	200, 24.0	12, 6.0			
Do not do anything	415, 49.8	23, 5.5			

Table 5. Binary logistic regression analysis of the significant variables with suicidal behavior.

Variables	Total sample		General population		Health-care providers	
	OR; 95% CI	p-value	OR; 95% CI	p-value	OR; 95% CI	p-value
Gender						
Female	2.504; 1.834–3.419	<0.001	2.481; 1.742–3.532	<0.001	2.620; 1.349–5.091	<0.001
Male	Reference		Reference		Reference	
Marital status						
Divorce	3.770; 1.637–8.679	<0.001	3.505; 1.183–10.384	<0.001	4.000; 1.076–14.871	0.100
Unmarried	1.599; 1.200–2.131		1.871; 1.345–2.603		0.918; 0.482–1.747	
Married	Reference		Reference		Reference	
Having children						
No	1.793; 1.318–2.437	<0.001	2.017; 1.399–2.907	<0.001	1.307; 0.729–2.341	0.368
Yes	Reference		Reference		Reference	

suspected or confirmed cases also have to be socially isolated due to the global lockdown. The lockdown time can be unbearable to trifling minors (i.e., unmarried or divorced people) as if they become lonely compared to those who had companion to pass the time. The present study reports that having no or broken marital status is highly associated with suicidality. This may be due to excessive loneliness leading them to technological addiction that directly or indirectly vulnerate them to be suffered from common psychiatric issues (Mamun et al., 2020f). Besides, it is established that the married people have less suicidal tendency compared to the divorced (i.e., due to increased social negligence, financial stress, reduced self-esteem, loneliness etc.) and single people (i.e., due to solitude, failure in love, history of broken family, unwanted pregnancy, unhappy love, disgust with life etc.; Kposowa, 2003). Additionally, after controlling the psychological, socio-demographic, and economic factors, suicide occurrences are reported to have spatial varieties within divorce and short-time separation which are not considered in the present study (Ide et al., 2010). However, the participants with marital status who have no children; hence, a possible lonely period can be arisen.

The present study is not without limitation. Nature of study being cross-sectional, self-reported data and online survey may limit the study methodologically. Besides, the study did not consider other proximal or

distal factors (i.e., family history of suicides, early-life adversity, economic conditions, pre-existing mental or physical health problems etc.) limiting the present findings (Turecki and Brent, 2016). Despite the limitations, the study from countrywide sample provides a novel information between the two groups (i.e., general people and healthcare providers) where there is limited information globally.

5. Conclusions

A developing as well as densely populated country like Bangladesh, having no suicide prevention strategies indicates a higher chances of suicide occurrences in many times to come (Griffiths et al., 2020; Mamun and Griffiths, 2020d). Based on the present findings, a good number of individuals had suicidal behavior, and female, broken relationship, having no child were the associated factors. Hence, it is anticipated that the present findings will be helpful for the development of country level mental health strategies, as well as global prospect where no prior information is available. Besides, online psychiatric services are suggested to be established through hotlines to cope up with the immensely pressurizing lockdown anxiety and panic contagion in both general population and HCPs.

Declarations

Author contribution statement

M. A. Mamun: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

T. Akter, F. Zohra, N. Sakib, A. K. M. I. Bhuiyan, P. C. Banik and M. Muhit: Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Competing interest statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

Acknowledgements

The authors would like to thanks all the participants and research assistants involving to this project. Besides, we would like to acknowledge that the project was run by the Undergraduate Research Organization, presently which will be introduced as the Centre for Health Innovation, Networking, Training, Action and Research - Bangladesh.

References

- Ahorsu, D.K., Lin, C.-Y., Imani, V., Saffari, M., Griffiths, M.D., Pakpour, A.H., 2020. The fear of COVID-19 scale: development and initial validation. *Int. J. Ment. Health Addiction* epub ahead of print.
- Armitage, R., Nellums, L.B., 2020. COVID-19 and the consequences of isolating the elderly. *Lancet Publ. Health* 5 (5), e256.
- Al Jazeera, 2020. Hundreds of Doctors in Bangladesh Infected with Coronavirus. Retrieved. <https://www.aljazeera.com/news/2020/04/hundreds-doctors-bangladesh-infected-coronavirus-200423080515266.html>. (Accessed 25 May 2020).
- Anadolu Agency, 2020. 13 Staffers at Bangladesh Hospital Positive for Virus. Retrieved. <https://www.aa.com.tr/en/asia-pacific/13-staffers-at-bangladesh-hospital-positive-for-virus/1808656>. (Accessed 25 May 2020).
- Bhuiyan, A.K.M.I., Sakib, N., Pakpour, A., Griffiths, M.D., Mamun, M.A., 2020. COVID-19-related suicides in Bangladesh due to lockdown and economic factors: case study evidence. *Int. J. Ment. Health Addiction* epub ahead of print.
- Beautrais, A.L., 2006. Women and suicidal behavior. *Crisis* 27, 153–156.
- Cheung, Y.T., Chau, P.H., Yip, P.S.F., 2008. A revisit on older adults' suicides and Severe Acute Respiratory Syndrome (SARS) epidemic in Hong Kong. *Int. J. Geriatr. Psychiatr.* 23, 1231–1238.
- Devries, K., Watts, C., Yoshihama, M., Kiss, L., Schraiber, L.B., Deyessa, N., et al., 2011. Violence against women is strongly associated with suicide attempts: evidence from the WHO multi-country study on women's health and domestic violence against women. *Soc. Sci. Med.* 73 (1), 79–86.
- Dhaka Tribune, 2020a. Respiratory and Infectious Diseases Soar in Bangladesh. Retrieved. <https://www.dhakatribune.com/bangladesh/2020/04/02/respiratory-and-infectious-diseases-soar-in-the-country>. (Accessed 25 May 2020).
- Dhaka Tribune, 2020b. Coronavirus: Bangladesh Reports First Death of a Physician. Retrieved. <https://www.dhakatribune.com/health/coronavirus/2020/04/15/first-d-ocor-dies-of-coronavirus-in-bangladesh>. (Accessed 25 May 2020).
- Dhaka Tribune, 2020c. Six Doctors of Kuwait Bangladesh Friendship Government Suspended for Absence in Duty. Retrieved. <https://www.dhakatribune.com/bangladesh/dhaka/2020/04/11/six-doctors-of-kuwait-bangladesh-friendship-government-suspended-for-absence-in-duty>. (Accessed 25 May 2020).
- Dsouza, D.D., Quadros, S., Hyderabadwala, Z.J., Mamun, M.A., 2020. Aggregated COVID-19 suicide incidences in India: fear of COVID-19 infection is the prominent causative factor. *Psychiatr. Res.* 290, e113145.
- Griffiths, M.D., Mamun, M.A., 2020. COVID-19 suicidal behavior among couples and suicide pacts: case study evidence from press reports. *Psychiatr. Res.* 289, e113105.
- Griffiths, M.D., Misti, J.M., Mamun, M.A., 2020. Bangladeshi medical students' suicide: a response to Arafat (2020). *Asian J. Psychiatr.* 53, e102201.
- Hawrylyuk, L., Gold, W.L., Robinson, S., Pogorski, S., Galea, S., Styra, R., 2004. SARS control and psychological effects of quarantine, Toronto, Canada. *Emerg. Infect. Dis.* 10, 1206–1212.
- Ide, N., Wyder, M., Kolves, K., De Leo, D., 2010. Separation as an important risk factor for suicide: a systematic review. *J. Fam. Issues* 31 (12), 1689–1716.
- Islam, S.D., Bodrud-Doza, M., Khan, R.M., Haque, M.A., Mamun, M.A., 2020a. Exploring COVID-19 stress and its factors in Bangladesh: a perception-based study. *Heliyon* 6 (7), e04399.
- Islam, M.A., Barna, S.D., Raihan, H., Khan, M.N.A., Hossain, M.T., 2020b. Depression and anxiety among university students during the COVID-19 pandemic in Bangladesh: a web-based cross-sectional survey. *PLoS One* 15 (8), e0238162.
- Jahan, I., Ullah, I., Mamun, M.A., 2020a. COVID-19 Suicide and its Risk Factors Among the Healthcare Professionals: the Way Forward... submitted for publication.
- Jahan, S., Araf, K., Griffiths, M.D., Gozal, D., Mamun, M.A., 2020b. Depression and suicidal behaviors among Bangladeshi mothers of children with Autism Spectrum Disorder: a comparative study. *Asian J. Psychiatr.* 51, e101994.
- Khan, K.S., Mamun, M.A., Griffiths, M.D., Ullah, I., 2020. The mental health impact of the covid-19 pandemic across different cohorts. *Int. J. Ment. Health Addiction* epub ahead of print.
- Kposowa, A.J., 2003. Divorce and suicide risk. *J. Epidemiol. Community Health* 57 (12), 993, 993.
- Lee, S.M., Kang, W.S., Cho, A.R., Kim, T., Park, J.K., 2018. Psychological impact of the 2015 MERS outbreak on hospital workers and quarantined hemodialysis patients. *Compr. Psychiatr.* 87, 123–127.
- Mamun, M.A., Akter, S., Hossain, I., et al., 2020b. Financial threat, hardship and distress predict depression, anxiety and stress among the unemployed youths: a Bangladeshi multi-city study. *J. Affect. Disord.* 276, 1149–1158.
- Mamun, M.A., Bodrud-Doza, M., Griffiths, M.D., 2020a. Hospital suicide due to non-treatment by healthcare staff fearing COVID-19 infection in Bangladesh? *Asian J. Psychiatr.* 54, e102295.
- Mamun, M.A., Bhuiyan, A.K.M.I., Manzar, M.D., 2020c. The first COVID-19 infanticide-suicide case: financial crisis and fear of COVID-19 infection are the causative factors. *Asian J. Psychiatr.* 54, e102365.
- Mamun, M.A., Chandrima, R.M., Griffiths, M.D., 2020d. Mother and son suicide pact due to COVID-19-related online learning issues in Bangladesh: an unusual case report. *Int. J. Ment. Health Addiction* epub ahead of print.
- Mamun, M.A., Griffiths, M.D., 2020a. PTSD-related suicide six years after the Rana Plaza collapse in Bangladesh. *Psychiatr. Res.* 287, e112645.
- Mamun, M.A., Griffiths, M.D., 2020b. A rare case of Bangladeshi student suicide by gunshot due to unusual multiple causalities. *Asian J. Psychiatr.* 49, e101951.
- Mamun, M.A., Griffiths, M.D., 2020c. First COVID-19 suicide case in Bangladesh due to fear of COVID-19 and xenophobia: possible suicide prevention strategies. *Asian J. Psychiatr.* 51, e102073.
- Mamun, M.A., Griffiths, M.D., 2020d. Mandatory Junior School Certificate exams and young teenage suicides in Bangladesh: a response to Arafat (2020). *Int. J. Ment. Health Addiction* epub ahead of print.
- Mamun, M.A., Huq, N., Papia, Z.F., Tasfina, S., Gozal, D., 2019. Prevalence of depression among Bangladeshi village women subsequent to a natural disaster: a pilot study. *Psychiatr. Res.* 276, 124–128.
- Mamun, M.A., Siddique, A.B., Sikder, M.T., Griffiths, M.D., 2020e. Student suicide risk and gender: a retrospective study from Bangladeshi press reports. *Int. J. Ment. Health Addiction* epub ahead of print.
- Mamun, M.A., Hossain, M.S., Moonajilin, M.S., Masud, M.T., Misti, J.M., Griffiths, M.D., 2020f. Does loneliness, self-esteem and psychological distress correlate with problematic internet use? A Bangladeshi survey study. *Asia Pac. Psychiatr.* 12 (2), e12386.
- Mamun, M.A., Ullah, I., 2020. COVID-19 suicides in Pakistan, dying off not COVID-19 fear but poverty?—The forthcoming economic challenges for a developing country. *Brain Behav. Immun.* 87, 163–166.
- Manzar, M.D., Albougami, A., Usman, N., Mamun, M.A., 2020. COVID-19 suicide among adolescents and youths during the lockdown: an exploratory study based on media reports. *Preprints*, epub ahead of print.
- Mridha, M.K., Mitra, D.K., Labrique, A., Zhu, Y., Paul, R.R., 2020. COVID-19: Cases, Hospitalization Need, Critical Care Needs and Mortality Projections for Bangladesh. Retrieved. <https://www.scribd.com/document/452626372/Bangladesh-COVID-19-projections>. (Accessed 25 March 2020).
- Pakpour, A.H., Griffiths, M.D., 2020. The fear of COVID-19 and its role in preventive behaviors. *J. Concurr. Disord.* 2 (1), 58–63.
- Pappa, S., Ntella, V., Giannakas, T., Giannakoulis, V.G., Papoutsis, E., Katsaounou, P., 2020. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain Behav. Immun.* Epub ahead of print.
- Rafi, M., Mamun, M.A., Hsan, K., Hossain, M., Gozal, D., 2019. Psychological implications of unemployment among Bangladesh Civil Service job seekers: a pilot study. *Front. Psychiatr.* 10, e578.
- Rajkumar, R.P., 2020. COVID-19 and mental health: a review of the existing literature. *Asian J. Psychiatr.* 52, e102066.
- Ruder, T.D., Hatch, G.M., Ampanozi, G., Thali, M.J., Fischer, N., 2011. Suicide announcement on Facebook. *Crisis* 32 (5), 280–282.

- Sakib, N., Bhuiyan, A.K.M.I., Hossain, S., et al., 2020. Psychometric validation of the bangla fear of COVID-19 scale: confirmatory factor analysis and rasch analysis. *Int. J. Ment. Health Addiction* epub ahead of print.
- The Daily Star, 2020a. Coronavirus Outbreak: Low Test Rate May Be Belying Reality. Retrieved. <https://www.thedailystar.net/frontpage/news/coronavirus-outbreak-low-test-rate-may-be-belying-reality-1888327>. (Accessed 29 May 2020).
- The Daily Star, 2020b. 500 Doctors Infected with Covid-19: Bangladesh Doctors' Foundation. Retrieved. <https://www.thedailystar.net/500-doctors-infected-with-coronavirus-covid-19-in-bangladesh-1898275>. (Accessed 29 May 2020).
- The Financial Express, 2020. Mugda Hospital Director Made OSD over Mask Scam. Retrieved. <https://thefinancialexpress.com.bd/national/mugda-hospital-director-made-osd-over-mask-scam-1588233211>. (Accessed 12 May 2020).
- Turecki, G., Brent, D.A., 2016. Suicide and suicidal behaviour. *Lancet* 387 (10024), 1227–1239.
- Usman, N., Mamun, M.A., Ullah, I., 2020. COVID-19 infection risk in Pakistani healthcare workers: the cost-effective safety measures for developing countries. *Health Behav.* 3 (3), 75–77.
- Wang, J., Lloyd-Evans, B., Giacco, D., Forsyth, R., Nebo, C., Mann, F., Johnson, S., 2017. Social isolation in mental health: a conceptual and methodological review. *Soc. Psychiatr. Psychiatr. Epidemiol.* 52 (12), 1451–1461.
- World Health Organization, 2020. Coronavirus Disease 2019 (COVID-19): Situation Report – 112. Retrieved. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200511-covid-19-sitrep-112.pdf?sfvrsn=813f2669_2. (Accessed 29 May 2020).
- Xu, H., Qin, L., Wang, J., Zhou, L., Luo, D., Hu, M., et al., 2016. A cross-sectional study on risk factors and their interactions with suicidal ideation among the elderly in rural communities of Hunan, China. *BMJ Open* 6 (4), e010914.