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Evaluation of sleep quality, psychological states and subsequent self-medication practice among the Bangladeshi population during Covid-19 pandemic

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ABSTRACT

Introduction: Due to the extended lockdown imposed for SARS-CoV-2 pandemic, many people have experienced problematic sleep patterns and associated health issues worldwide. This study was conducted to assess the sleep quality and psychological states of the Bangladeshi population during the COVID-19 pandemic, respondent's behavioral traits as well as psychological or sleep-related problems induced self-medication practice among the respondents, along with the probability of development of drug dependency.

Methods: The survey was conducted among 2941 respondents from 25th November 2020 to 4th December 2020 where the responses were analyzed by SPSS V22.

Results: 10–29.5% experienced a significant degree of sleep problems whereas some experienced severe anxiety and depression. The associations between the behavioral traits and parameters concerning sleep quality, anxiety and depression showed 5% level of significance in all cases. Self-medication practice of sleep aids during this pandemic was reported by 7.14% of the respondents, with a greater percentage belonging to the female or senior age group. Tendency to repeatedly self-medication was observed in 18.86% of this self-medicating populace, and a greater number of male (10.26%) respondents displayed such tendency as opposed to their female (8.6%) equivalents. However, 48.10% of the respondents reported perceptions of improved physical and/or psychological health following self-medication, and this trait was predominant in men (52.14%).

Conclusion: Results showed a significant number of Bangladeshi populaces were suffering from psychological issues during this COVID-19 which also influenced a certain number of people towards self-medication practice where signs of drug dependency were observed in a significant number of respondents.

1. Introduction

The novel SARS-CoV-2 coronavirus outbreak that epi-centered in the Hubei Province of the People's Republic of China has spread to 220 countries in the world till 1st May 2021.¹ The first reported incidence of restricted social interactions due to this outbreak was observed in Wuhan on January 23, 2020²; and even after seventeen months (till May 2021) of the first detection of the virus, many countries are still following protocols of restrictions or limited social interactions. The first reported case of SARS-CoV-2 in Bangladesh, a developing country in South-East Asia, was observed on 7 March 2020.³ The country went into

lockdown protocols on 26 March.³ There are 760,584 total confirmed cases and 11,510 total deaths in Bangladesh as of May 01, 2021.⁴

SARS-CoV-2 has affected almost every aspect of life. The extended lockdown period, restricted social interactions and intensive preventive measures along with multi-factor induced stress have adversely affected the physio-psychological health of a large percentage of the general populace.^{5–10} Sleep is an important parameter for physical and psychological soundness and a change in sleep pattern and habits can be an indicator of adverse physio-psychological changes.¹¹ Region-specific studies regarding Covid-19 and its impact on sleep in the Bangladeshi populace have already been conducted,¹² and an analysis of the data

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Table 1
Socio-demographic characteristics of the respondents (n = 2941).

Socio-demographic characteristics	Frequency	Percent (%)		
Age	≤15	21	0.7	
	16–25	2009	68.3	
	26–35	730	24.8	
	36–45	122	4.1	
	46–55	35	1.2	
	56–65	22	0.7	
	≥66	2	0.1	
Gender	Male	1861	63.28	
	Female	1078	36.65	
	Prefer not to say	2	0.07	
Current Residence	Urban	2262	76.9	
	Rural	679	23.1	
Profession	Government Employee	138	4.7	
	Non-government employee	371	12.6	
	Teaching	94	3.2	
	Banker	46	1.6	
	Student	1953	66.4	
	Business person	123	4.2	
	Others	216	7.3	
	Educational Qualification	Secondary	205	7
		Higher secondary	453	15.4
		Undergraduate	1203	40.9
Graduate		473	16.1	
Post-graduate		528	18	
	M.Phil/PhD	16	0.5	
	Others	63	2.1	

suggests an association between sleep quality degradation and several Covid-19 induced lifestyle changes; such as economic instability, changes in the work environment, fear and anxiety regarding infection, changes in sleep schedule etc.¹² Electronic device and social media usage are factors that are associated with sleep quality which were revealed in several pre-Covid studies.^{16–20} However, though there have been possible changes in said factors due to Covid 19, the associations and impact are yet to be explored. Another key point to be noted that the Bangladeshi pharmaceutical retail market is not adequately regulated. As it is observed with similar inadequately regulated markets,^{13–15} the sale of non-OTC (over the counter) medication without proper prescriptions is persistent. With the recent increase in adverse sleep changes, a possible increase in unprescribed sleep medication sales might be observed.

Therefore, the present study aims to explore the significance of the associations between changes in sleep quality or psychosocial states (i.e. sleep disturbance, anxiety and depression) and the socio-demographic characteristics, caffeine intake, nicotine intake, electronic device usage and social media usage of an individual in lights of the ongoing pandemic. Though the influences of these factors on sleep quality, anxiety and depression have already been established,^{16–20} the pandemic has possibly brought about significant changes in said factors to justify a region-specific revisit of the associations. The secondary aim is to find out if any changes have influenced unprescribed psychotropics usage in the Bangladeshi populace and if persisting, explore the possible development of drug dependency.

2. Methods

Design, measure and population of the study: This study was a cross-sectional questionnaire-based survey which was conducted among the mass population of Bangladesh. During the first wave of COVID-19, all the educational institutions were closed and a large number of offices were conducting their works from home. As peoples were staying at home, there had some chances of developing sleep disturbance and other psychological distresses among the populace. To find out these problems, the study was conducted from November 25, 2020 to

Table 2
Psychological parameters and behavioral patterns of the respondents (n = 2941).

Psychological parameters and behavioral patterns			Frequency	Percentage
Sleep Quality	Degree of satisfaction with sleep pattern	Very satisfied	451	15.33%
		Satisfied	865	29.41%
		Moderately satisfied	1044	35.50%
		Dissatisfied	428	14.55%
		Very dissatisfied	153	5.20%
	Noticeability of sleep problems	Not at all	1096	37.27%
		A little	1224	41.62%
		Somewhat much	382	12.99%
		Very much	239	8.13%
		Not at all	1185	40.29%
Worry about sleep problems	A little	1249	42.47%	
	Somewhat much	366	12.44%	
	Very much	141	4.79%	
	Not at all	777	26.42%	
	A little	1296	44.07%	
Sleep problem interfering with daily functioning	Somewhat much	551	18.74%	
	Very much	317	10.78%	
	None	1081	36.76%	
	Mild	881	29.96%	
	Moderate	623	21.18%	
Difficulty in falling asleep	Severe	270	9.18%	
	Very severe	86	2.92%	
	None	1357	46.14%	
	Mild	764	25.98%	
	Moderate	522	17.75%	
Difficulty staying asleep	Severe	219	7.45%	
	Very severe	79	2.69%	
	Problems waking up too early	None	1469	49.95%
	Mild	610	20.74%	
	Moderate	455	15.47%	
Anxiety	Feeling nervous, anxious or on edge	Severe	257	8.74%
		Very severe	150	5.10%
		Not at all	700	23.80%
	Inability to stop or control worrying	Several days	1282	43.59%
		More than half the days	285	9.69%
Depression	Little interest or pleasure in doing things	Nearly everyday	674	22.92%
		Not at all	825	28.05%
		Several days	1150	39.10%
	Feeling down, depressed or hopeless	More than half the days	312	10.61%
		Nearly everyday	654	22.24%
Behavioral Traits	Caffeine intake	Not at all	774	26.32%
		Several days	1076	36.59%
		More than half the days	389	13.23%
		Nearly everyday	702	23.87%
	Nicotine intake	Not at all	888	30.19%
Several days		870	29.58%	
More than half the days		322	10.95%	
Nearly everyday		861	29.28%	
Social media usage	Not used	493	16.76%	
	Use increased	1019	34.65%	
	Use decreased	369	12.55%	
	Remaining same	1016	34.55%	
Social media usage	Not used	2242	76.23%	
	Use increased	212	7.21%	
	Use decreased	231	7.85%	
	Remaining same	256	8.70%	
Social media usage	less than 2 h	304	10.34%	
	2–4 h	884	30.06%	

(continued on next page)

Table 2 (continued)

Psychological parameters and behavioral patterns		Frequency	Percentage
	4–6 h	750	25.50%
	6–8 h	483	16.42%
	more than 8 h	520	17.68%
Using electronic devices	less than 1 h	288	9.79%
	1–2 h	633	21.52%
	2–3 h	565	19.21%
	3–4 h	391	13.29%
	4–5 h	337	11.46%
	5–6 h	246	8.36%
	More than 6 h	481	16.35%

December 4, 2020. This survey was conducted through online social media like Facebook, WhatsApp, Viber, IMO etc. because face-to-face survey was difficult to maintain social distancing during the pandemic. The questionnaire was designed both in Bengali and English. Total 2941 respondents were participated in this survey. The respondent's socio-demographic characteristics were divided into age, gender, current residence, profession and educational qualification. The questionnaire was consisted of 28 questions where 11 questions were asked to identify sleep disturbance and different psychological states like anxiety and depression of the respondents. Several questions were asked to identify respondent's caffeine and nicotine intake characteristics and self-medication practice to overcome their sleep disturbance and other psychological stresses during the COVID-19 pandemic. Rest of the questions were related to their socio-demographic characteristics.

Data validation: Before starting the survey, the participant's response data were validated by finding internal consistency reliability using Cronbach's alpha (α) and intra-class correlation coefficient. Three weeks before starting the original survey, a pilot survey was conducted among 63 respondents which were excluded from the final survey. The Cronbach's alpha and intra-class correlation coefficient were found 0.78 and 0.92 respectively. Both results had indicated acceptability and excellent internal consistency reliability of data.²¹

Determination of sample size: This study was conducted among the general populace of Bangladesh. The current total population of Bangladesh is more than 160 million.²² The sample size was of the study was calculated by Rasoft®. The minimum estimated sample size would be 385 where the confidence level was 95%. As the total number of respondents was 2941, the sample size was more than the minimum estimated value which fulfilled the study requirement.²³

Statistical analysis: Microsoft Excel 2019 and Statistical Package for Social Sciences (IBM SPSS version 22) were used for statistical analysis. Firstly, responses were converted from Google Form to Google Sheet. Then the data were imported to Microsoft Excel. Microsoft Excel was used for data sorting, coding and editing. The excel file was imported to the SPSS software and revealed in frequencies, means and percentage. Moreover, Pearson's chi-square (χ^2) statistic was performed among the categorical coded variables to identify the association between dependent and independent variables as well as Spearman's rank correlation coefficient was calculated for checking the strength of the correlated variables.

Ethical statement: The research was conducted by following the declaration of Helsinki though it was only a questionnaire-based survey which was not doing any harm to any human or animal or not related to any clinical trial. Moreover, consent was taken from each respondent before participating in the survey. However, a permission was taken from the Chairman, Department of Pharmacy, Faculty of Pharmacy, University of Dhaka before starting the survey.

3. Results

Five socio-demographic characteristics, i.e., age, gender, current residence, profession and educational qualification of the respondents were taken into consideration in this study. All of the variables were

categorically coded. The survey had a total of 2941 respondents where 63.28% of them were male and 36.65% were female. The respondents were categorized into several groups on the basis of their age, with the majority (68.3%) belonging to the age group 16–25 years. Most of the respondents (76.9%) reported themselves to be urbanites and the rest (23.1%) were from rural areas. The data analysis revealed that 66.4% of the respondents were students, most belonging to the undergraduate level (40.9%). As the survey was conducted online through social media, the results portrayed that the engagement of the urban youth in online social media during the COVID-19 pandemic was greater than that of other socio-demographic classes. These results are illustrated in Table 1.

In this study, sleep quality and psychosocial state of Bangladeshi population during the COVID-19 pandemic were evaluated. The participants filled out a self-reported questionnaire comprised of structured questions regarding several psychosocial parameters like sleep disturbance, anxiety and depression. The responses are illustrated in Table 2.

Initially, the association of different socio-demographic characteristics with sleep quality and psychosocial states during the COVID-19 pandemic were analyzed. Since all of the variables were categorical and coded, the chi-square (χ^2) statistic was used for checking association and spearman rank correlation coefficient was calculated for checking the strength of the correlated variables. The sections on sleep disturbance (comprised of 7 questions), anxiety (comprised of 2 questions) and depression (comprised of 2 questions) were considered for primary analysis.

Analysis revealed that the age variable was significant ($p < 0.05$) with noticeability of sleep problems, worry about sleep problems, sleep problems interfering with daily functions, difficulty in falling asleep, difficulty staying asleep, problems waking up too early at 5% level of significance. However, the association between the age variable and the degree of satisfaction with sleep pattern was found to be statistically insignificant at 5% level of significance as the p-value was 0.055 (>0.05), but it was significant at 10% level of significance. To simplify, all parameters of sleep disturbance were found to be associated with the age variable at 5% level of significance except the degree of satisfaction with sleep pattern. After that, the associations between the gender variable and the parameters of sleep disturbance were found to be significant at 5% level of significance, with the results indicating a high level of association. On the other hand, the current residence variable was found to be insignificant ($p = 0.117$) with the problem of waking up too early and significant with the rest of the variables of sleep disturbance at 5% level of significance (Table 3).

The variables (profession, educational qualification and current residency) were found to be insignificantly associated to the problem of waking up too early, with respective p values of 0.066, 0.189 and 0.117 respectively. Lack of association between the profession variable and difficulty staying asleep was also observed to a considerable degree, with a p value of 0.554. The three variables were found to be significantly associated with the rest of the parameters of sleep disturbance (Table 3).

The two variables regarding anxiety i.e. feeling nervous, anxious or on edge and inability to stop or control worrying, were significantly associated with all of the predefined socio-demographic characteristics at 5% level of significance, each having p values smaller than 0.05. Significant association was also found between the two variables for estimating depression (namely little interest or pleasure in doing things and feeling down, depressed or hopeless) and all of the socio-demographic characteristics.

Each and every variable concerning sleep disturbance, anxiety and depression was found to be positively correlated with gender and profession but negatively correlated with current residence (Table 3). Variables, age and educational qualification, displayed positive correlations with the sleep parameter difficulty staying asleep but negative correlations with the rest. Table 3 also illustrated that variables age, gender, profession and educational qualification were highly correlated with the parameters of depression as Spearman rank correlation

Table 3
Association and strength between socio-demographic characteristics and the sleep quality, psychosocial states during COVID-19 pandemic.

Socio-demographic characteristic	Statistical tools and results	Sleep quality and psychosocial states										
		Sleep Disturbance							Anxiety		Depression	
		Satisfied or dissatisfied with sleep pattern during the pandemic	Noticeability to others about your sleep problem during the pandemic in terms of impairing the quality of your life	Worry about sleep problems during the pandemic	Extent of sleep problem interfering daily functioning during the pandemic (e.g. daytime fatigue, mood, ability to function at work/daily chores, concentration, memory, mood, etc.)	Difficulty in falling asleep	Difficulty staying asleep	Problems waking up too early	Feeling nervous, anxious or on edge	Not being able to stop or control worrying	Little interest or pleasure in doing things	Feeling down, depressed or hopeless
Age	Spearman Rank	-0.062	-0.106	-0.102	-0.143	-0.092	0.003	-0.021	-0.101	-0.08	-0.199	-0.206
	Correlation coefficient(r)											
	χ^2 - Statistic	36.004	48.818	40.552	70.279	43.437	54.383	38.308	50.983	34.045	134.74	146.679
Gender	df	24	18	18	18	24	24	24	18	18	18	18
	p-value	0.055 ^b	0.000 ^a	0.002 ^a	0.000 ^a	0.009 ^a	0.000 ^a	0.032 ^a	0 ^a	0.012 ^a	0.000 ^a	0.000 ^a
	Spearman Rank	0.177	0.149	0.176	0.203	0.171	0.139	0.085	0.192	0.163	0.24	0.215
Current residence	Correlation coefficient(r)											
	χ^2 - Statistic	102.64	70.256	93.243	127.935	96.548	78.98	35.875	112.834	84.363	176.766	161.416
	df	8	6	6	6	8	8	8	6	6	6	6
Profession	p-value	0.000 ^a	0.000 ^a	0.000 ^a	0.000 ^a	0.000 ^a	0.000 ^a	0.000 ^a	0.000 ^a	0.000 ^a	0.000 ^a	0.000 ^a
	Spearman Rank	-0.77	-0.55	-0.09	-0.1	-0.104	-0.057	-0.043	-0.045	-0.055	-0.069	-0.05
	Correlation coefficient(r)											
Educational Qualification	χ^2 - Statistic	25.04	11.831	24.313	40.278	33.121	16.18	7.389	13.815	10.312	15.945	11.652
	df	4	3	3	3	4	4	4	3	3	3	3
	p-value	0.000 ^a	0.008 ^a	0.000 ^a	0.000 ^a	0.000 ^a	0.003 ^a	0.117	0.003 ^a	0.016 ^a	0.001 ^a	0.009 ^a
Educational Qualification	Spearman Rank	0.035	0.055	0.051	0.04	0.062	0.025	0.022	0.056	0.027	0.082	0.091
	Correlation coefficient(r)											
	χ^2 - Statistic	50.611	68.255	50.184	90.797	63.189	22.423	35.135	69.649	48.733	170.165	154.14
Educational Qualification	df	24	18	18	18	24	24	24	18	18	18	18
	p-value	0.001 ^a	0.000 ^a	0.000 ^a	0.000 ^a	0.000 ^a	0.554	0.066 ^b	0.000 ^a	0.000 ^a	0.000 ^a	0.000 ^a
	Spearman Rank	-0.073	-0.121	-0.093	-0.115	-0.069	0.021	-0.027	-0.038	-0.021	-0.132	-0.153
Educational Qualification	Correlation coefficient(r)											
	χ^2 - Statistic	50.871	71.21	58.172	70.123	58.328	53.377	38.842	33.201	43.324	93.643	120.22
	df	32	24	24	24	32	32	32	24	24	24	24
Educational Qualification	p-value	0.018 ^a	0.000 ^a	0.000 ^a	0.000 ^a	0.005 ^a	0.01 ^a	0.189	0.1	0.009 ^a	0.000 ^a	0.000 ^a

^a Significant at 5% level of significance (p < 0.05).

^b Significant at 10% level of significance.

Table 4
Association between sleep quality, psychosocial states and caffeine/nicotine intake during COVID-19 pandemic.

Sleep quality and psychosocial states	Topics	Caffeine intake		Nicotine intake	
		χ^2 - Statistic	P-value	χ^2 - Statistic	p-value
Sleep disturbance	Satisfied or dissatisfied with sleep pattern during the pandemic	42.282	0.000 ^a	34.042	0.001 ^a
	Noticeability to others about your sleep problem during the pandemic in terms of impairing the quality of your life	30.746	0.000 ^a	24.388	0.004 ^a
	Worry about sleep problem during the pandemic	47.088	0.000 ^a	45.293	0.000 ^a
	Extent of sleep problem interfering daily functioning during the pandemic (e.g. daytime fatigue, mood, ability to function at work/daily chores, concentration, memory, mood, etc.)	54.134	0.000 ^a	39.179	0.000 ^a
	Difficulty in falling asleep	61.761	0.000 ^a	31.082	0.002 ^a
	Difficulty staying asleep	41.217	0.000 ^a	20.200	0.063**
	Problems waking up too early	34.181	0.001 ^a	12.493	0.407
Anxiety	Feeling nervous, anxious or on edge	57.390	0.000 ^a	39.325	0.000 ^a
	Not being able to stop or control worrying	48.884	0.000 ^a	34.424	0.000 ^a
Depression	Little interest or pleasure in doing things	23.561	0.001 ^a	46.111	0.000 ^a
	Feeling down, depressed or hopeless	19.766	0.003 ^a	21.973	0.009

^a Significant at 5% level of significance (p < 0.05).

Table 5
Association between sleep quality, psychosocial states and recreational activity factors during COVID-19 pandemic.

Sleep quality and psychosocial states		Electronic device usage		Social media usage	
		χ^2 - Statistic	P-value	χ^2 - Statistic	P-value
Sleep disturbance	Satisfied or dissatisfied with sleep pattern during the pandemic	154.046	0.000 ^a	80.506	0.000 ^a
	Noticeability to others about your sleep problem during the pandemic in terms of impairing the quality of your life	129.657	0.000 ^a	118.276	0.000 ^a
	Worry about sleep problem during the pandemic	97.971	0.000 ^a	98.236	0.000 ^a
	Extent of sleep problem interfering daily functioning during the pandemic (e.g. daytime fatigue, mood, ability to function at work/daily chores, concentration, memory, mood, etc.)	194.444	0.000 ^a	163.213	0.000 ^a
	Difficulty in falling asleep	223.377	0.000 ^a	143.149	0.000 ^a
	Difficulty staying asleep	79.044	0.000 ^a	74.991	0.000 ^a
	Problems waking up too early	67.472	0.000 ^a	61.092	0.000 ^a
Anxiety	Feeling nervous, anxious or on edge	104.235	0.000 ^a	145.324	0.000 ^a
	Not being able to stop or control worrying	102.693	0.000 ^a	141.095	0.000 ^a
Depression	Little interest or pleasure in doing things	243.298	0.000 ^a	194.116	0.000 ^a
	Feeling down, depressed or hopeless	205.904	0.000 ^a	254.929	0.000 ^a

^a Significant at 5% level of significance (p < 0.05).

coefficient values were -0.199 & -0.206; 0.24 & 0.215; 0.082 & 0.091; and -0.132 & -0.153 respectively, whereas current residence was slightly correlated with anxiety and depression parameters but highly correlated (r = -0.77) with level of satisfaction with sleep pattern of respondents during the pandemic.

The association between sleep quality, psychosocial states and caffeine/nicotine intake during the COVID-19 pandemic was analyzed using chi-square (χ^2) statistic. Seven variables were considered as parameters for sleep quality, and two variables were considered for anxiety and depression each. According to the analysis, the variable caffeine intake during the pandemic was found to significantly associated to all parameters of sleep quality, anxiety and depression, yielding p values lower than 0.005 in all cases. The associations between the variables, nicotine intake and the parameters of sleep quality were found significant at 5% level of significance in all cases except for the variables, difficulty staying asleep and problems waking up too early, in case of which 0.063 and 0.407 were obtained as p values respectively. It was evident from the analysis that caffeine intake had an effect of every parameter of sleep quality, anxiety and depression considered in this study; and that the aforementioned parameters, except difficulty staying asleep and problems waking up too early, were also affected by nicotine intake (Table 4).

Chi-square (χ^2) statistic was also used to analyze the associations between the parameters of sleep quality, anxiety and depression and the variables of electronic device usage and social media usage during the Covid-19 pandemic. Sleep quality, anxiety and depression were parameterized using 7, 2 and 2 variables respectively. In every case, the associations between the two groups of variables (the parameters of sleep quality, anxiety and depression; electronic device usage and social media usage) were found to be statistically significant, with every analysis yielding a p value lower than 0.005, as is illustrated on Table 5. Electronic device usage and social media usage during the pandemic should therefore be considered as contributing factors for sleep quality, anxiety and depression.

Among the total respondents (n = 2941), 210 (7.14%) respondents reported that they had taken medicine without any doctor's prescription to overcome the sleep disturbances, anxiety or depression during the pandemic. On the basis of different socio-demographic characteristics, age groups above 35 years displayed a greater tendency to self-medicate whereas female (8.63%) respondents were more frequent to take self-medication than their male (6.29%) equivalents. All the analysis results are illustrated in Table 6.

Administration (self or otherwise) of sedatives, anxiolytics and anti-depressant drugs without a doctor's prescription is legally prohibited. Prolonged use of these drugs without proper prescription and supervision can induce drug dependency. As a considerable number of

Table 6
Self-medication practice of sleep aids among the respondents to overcome sleep disturbance, anxiety and depression during the pandemic (n = 2941).

Socio-demographic characteristics		Have you taken any medicine without doctor's prescription to overcome sleep disturbance, anxiety and depression? (%)		
		Number of responses	Yes	No
Age	≤15	21 (100%)	1 (4.76%)	20 (95.24%)
	16–25	2009 (100%)	125 (6.22%)	1884 (93.78%)
	26–35	730 (100%)	56 (7.67%)	674 (92.33%)
	36–45	122 (100%)	17 (13.93%)	105 (86.07%)
	46–55	35 (100%)	6 (17.14%)	29 (82.86%)
	56–65	22 (100%)	5 (22.73%)	17 (77.27%)
	≥66	2 (100%)	0 (0.00%)	2 (100%)
Gender	Male	1861 (100%)	117 (6.29%)	1744 (93.71%)
	Female	1078 (100%)	93 (8.63%)	985 (91.37%)
	Prefer not to say	2 (100%)	0 (0.00)	2 (100%)
Current Residence	Urban	2262 (100%)	174 (7.69%)	2088 (92.31%)
	Rural	679 (100%)	36 (5.30%)	643 (94.70%)
Profession	Government Employee	138 (100%)	14 (10.14%)	124 (89.86%)
	Non-government employee	371 (100%)	27 (7.28%)	344 (92.72%)
	Teaching	94 (100%)	13 (13.83%)	81 (86.17%)
	Banker	46 (100%)	3 (6.52%)	43 (93.48%)
	Student	1953 (100%)	123 (6.30%)	1830 (93.70%)
	Business person	123 (100%)	3 (2.44%)	120 (97.56%)
	Others	216 (100%)	27 (12.50%)	189 (87.50%)
	Secondary	205 (100%)	17 (8.29%)	188 (91.71%)
	Higher secondary	453 (100%)	22 (4.86%)	431 (95.14%)
Educational Qualification	Undergraduate	1203 (100%)	75 (6.23%)	1128 (93.77%)
	Graduate	473 (100%)	32 (6.77%)	441 (93.23%)
	Post-graduate	528 (100%)	49 (9.28%)	479 (90.72%)
	M.Phil/PhD	16 (100%)	5 (31.25%)	11 (68.75%)
	Others	63 (100%)	10 (15.87%)	53 (84.13%)

respondents of this survey were found to be taking these kinds of medications to overcome their sleep disturbance, anxiety and depression during the pandemic, several questions were included in the questionnaire to identify if any drug dependency had developed among the self-medicated respondents. On the basis of socio-demographic characteristics, 4%, 3.57% and 5.88% respondents of the respective age groups 16–25, 26–35 and 36–45 had felt an extreme urge to take the self-medicated drug again within last 30 days. 10.26% of all self-medicated male respondents expressed a considerable or extreme urge to readminister their choice of psychotropics, while the percentage was only 8.6% among the female respondents. All these analyses are showed in Table 7.

However, 48.10% of self-medicating respondents claimed that they felt better physically and/or psychologically after self-medication, while the rest felt indifferent or worse. 43.20%, 57.14% and 47.06%

respondents of age groups 16–25, 26–35 and 36–45 respectively had perceived desirable physical or psychological changes after self-medication. A greater percentage of male (52.14%) participants felt better after self-medication than the female (43.01%) participants. These analyses are tabulated in Table 8 along with other socio-demographic characteristics.

4. Discussion

The study illustrated the prevalence of various physio-psychological problems of the participants. 10–29.5% reported experiencing sleep-associated problems to at least a considerable degree. Summing up the two least desirable ranges of data in Table 2, we saw that an almost equal portion of the participants expressed their dissatisfaction with sleep pattern during the pandemic (19.75%) and stated that their sleep problems were considerably noticeable to others (21.12%). However, only 17.23% were found to be substantially worried about their sleep problems, while a staggering 29.52% claimed that their sleep problems had a notable effect on their daily activities. On the other hand, smaller percentages of people reported having difficulties in falling asleep (12.1%), staying asleep (10.14%) or waking up too early (13.84%). The variance in the data shows that while different sorts of sleep-associated problems have been persistent during the pandemic, the degree and extent to which they are experienced differ noticeably.

Moreover, 22.92% of the respondents reported feelings of nervousness or anxiety nearly every day, while 22.24% reported that they were unable to stop worrying. Both factors were considered signs of anxiety. The findings are consistent with Gualano et al. (2020), who reported that signs of anxiety were prominent in 23.2% of the respondents in an Italian regional study.²⁴ In addition, 23.87% and 29.28% of respondents of our study expressed little interest or pleasure in doing things and felt depressed, down or hopeless nearly every day respectively. These results are pretty similar to Mazza et al. (2020) and Gualano et al. (2020) where the percentage of people suffering from depression were 32.4% and 24.7% respectively.^{24,33}

The first five parameters of sleep quality were found to be associated with the socio-demographic variables gender, current residence, occupation, and educational qualification; with only the last two sleep quality parameters not being associated with some of the aforementioned socio-demographic variables. The variable age was found to be associated with all of the sleep quality parameters except for the first.

The associations between the five socio-demographic variables and factors concerning anxiety and depression reached significance in each case. Changes in all parameters of physio-psychological health (e.g. sleep quality, anxiety and depression) were found to be strongly associated with caffeine and nicotine intake during the pandemic. Our findings regarding nicotine intake are quite similar to those of Stanton et al. (2020) who found a clear connection between smoking and anxiety-depression during the pandemic.²⁵ Similar strong associations were found with the aforementioned parameters and the variables electronic device usage and social media usage. Several recent studies have already addressed the increasing trends in electronic and social media usage and their association with health consequences during COVID-19.^{6,26–28} A survey conducted in China reported the association of increased screen time with changes in health behavior.²⁶ Again, in a Polish study, 49% of participants found to have a prolonged screen time during the pandemic which is interpreted as a factor affecting the changes in dietary, lifestyle & sedentary behavior of participants during the pandemic.²⁷

The persistence of self-medication of sleep aids was a key focus in the current study. Using self-medicated sleep aids during the pandemic was reported by 7.14% of the population. Our data analysis showed that the elderly was more likely to self-medicate with psychotropic medications to handle pandemic related physio-psychological problems. These findings are similar to Simoni-Wastila et al. (2004) who reported that US citizens aged 35 years or older were more likely to non-medically use

Table 7
Chance of drug dependency among the respondents (n = 210) after self-medication.

Socio-demographic characteristics		Have you ever felt the urge to take the self-medicated drugs again in the last 30 days? (%)					
		Number of Responses	Not at all	Slightly	Moderately	Considerably	Extremely
Age	≤15	1 (100%)	1 (100%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
	16–25	125 (100%)	62 (49.6%)	40 (32%)	14 (11.2%)	4 (3.2)	5 (4%)
	26–35	56 (100%)	26 (46.43%)	19 (33.93%)	4 (7.14%)	5 (8.93%)	2 (3.57%)
	36–45	17 (100%)	11 (64.71%)	3 (17.65%)	0 (0.00%)	2 (11.76%)	1 (5.88%)
	46–55	6 (100%)	4 (66.67%)	2 (33.33%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
	56–65	5 (100%)	0 (0.00%)	3 (60%)	1 (20%)	1 (20%)	0 (0.00%)
	≥66	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Gender	Male	117 (100%)	56 (47.86%)	38 (32.48%)	11 (9.40%)	8 (6.84%)	4 (3.42%)
	Female	93 (100%)	48 (51.61%)	29 (31.18%)	8 (8.60%)	4 (4.30%)	4 (4.30%)
	Prefer not to say	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Current Residence	Urban	174 (100%)	91 (52.30%)	49 (28.16%)	16 (9.2%)	11 (6.32%)	7 (4.02%)
	Rural	36 (100%)	13 (36.11%)	18 (50%)	3 (8.33%)	1 (2.78%)	1 (2.78%)
Profession	Government Employee	14 (100%)	5 (35.71%)	7 (50%)	1 (7.14%)	0 (0.00%)	1 (7.14%)
	Non-government employee	27 (100%)	16 (59.26%)	7 (25.93%)	0 (0.00%)	3 (11.11%)	1 (3.70%)
	Teaching	13 (100%)	6 (46.15%)	4 (30.77%)	0 (0.00%)	3 (23.08%)	0 (0.00%)
	Banker	3 (100%)	1 (33.33%)	1 (33.33%)	1 (33.33%)	0 (0.00%)	0 (0.00%)
	Student	123 (100%)	62 (50.41%)	37 (30.08%)	14 (11.38%)	6 (4.88%)	4 (3.25%)
	Business person	3 (100%)	3 (100%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
	Others	27 (100%)	11 (40.74%)	11 (40.74%)	3 (11.11%)	0 (0.00%)	2 (7.41%)
Educational Qualification	Secondary	17 (100%)	12 (70.59%)	3 (17.65%)	2 (11.76%)	0 (0.00%)	0 (0.00%)
	Higher secondary	22 (100%)	13 (59.09%)	7 (31.82%)	1 (4.55%)	1 (4.55%)	0 (0.30%)
	Undergraduate	75 (100%)	33 (44%)	23 (30.67%)	9 (12%)	5 (6.67%)	5 (6.67%)
	Graduate	32 (100%)	16 (50%)	12 (37.5%)	2 (6.25%)	1 (3.125%)	1 (3.125%)
	Post-graduate	49 (100%)	24 (48.98%)	17 (34.69%)	2 (4.08%)	4 (8.16%)	2 (4.08%)
	M.Phil/PhD	5 (100%)	1 (20%)	2 (40%)	1 (20%)	1 (20%)	0 (0.00%)
	Others	10 (100%)	5 (50%)	3 (30%)	2 (20%)	0 (0.00%)	0 (0.00%)

psychotropic.³⁰ However, since this survey was conducted virtually, weighted data distribution was observed in terms of age, owing to the lack of elderly data. Hence, these results may not be a true representative of the actual population. Farther investigations regarding this issue can help clarify this.

Female respondents showed a slightly higher tendency to self-medicate sleep aids compared to their male counterparts (8.63% vs 6.29%). This deduction is consistent with that of Beck et al. (2021), which found that the rate of hypnotic uptake was more prevalent in women relative to men.²⁹ Simoni-Wastila et al. (2004) also declared gender as a risk factor for non-medical use of psychotropic and stated that non-medical use was more persistent among the female populaces.³⁰ These authors found statistical significance between overall non-medical use of psychotropic and gender (female) and age (35 years or older), but statistical significance was not found concerning sedative-hypnotic use specifically. The socio-economic differences between the USA and Bangladesh may contribute to this inconsistency, as may the difference in levels of difficulty in obtaining controlled medication in the two countries.^{13,31} Self-medication of sleep aids was marginally more persistent in the urban participants as opposed to the rural participants.

The data analysis hinted at the possible development of drug dependency, as 18.57% of the self-medicating respondents reported moderate to extreme urges to self-medicate repeatedly, while 31.90% reported a slight urge. The male participants displayed a greater urge as opposed to their female counterparts, as did the urban respondents in contrast to the rural ones. Previous studies had demonstrated that the adult male populace was more likely to abuse illicit substances recurrently than adult females.³² A greater percentage of the male respondents also reported feeling better physically and/or psychologically after self-medication of psychotropic as contrasted with their female counterparts.

5. Conclusion

This survey study showed that a significant number of Bangladeshi populaces were suffering from psychological and sedentary issues during this COVID-19 crisis as for many other countries. These issues

influenced a certain number of people towards the self-medication practice of sleep aids. Consequent signs of drug dependency were observed in a significant number of respondents which may result in further physical and psychological complications.

Since this survey was conducted online and lasted for only ten days, the data distribution was not consistent in all cases. Besides, a large portion of respondents were young population and they lived in urban areas. Therefore, some inferences may not be accurate representations of the whole pandemic period. Keep in mind the limitations, future studies will be designed for extended period so that the representativeness can be more accurate in terms of socio-demographic characteristics.

Author statement

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Table 8
Perception of physio-psychological changes among the respondents (n = 210) after self-medication.

Socio-demographic characteristics		Have you felt better physically and/or psychologically after taking self-medication? (%)		
		Number of responses	Yes	No
Age	≤15	1 (100%)	1 (100%)	0 (0.00%)
	16–25	125 (100%)	54	71
			(43.20%)	(56.80%)
	26–35	56 (100%)	32	24
			(57.14%)	(42.86%)
	36–45	17 (100%)	8	9
			(47.06%)	(52.94%)
46–55	6 (100%)	4	2	
		(66.67%)	(33.33%)	
56–65	5 (100%)	2	3	
	≥66	0 (0.00%)	0 (0.00%)	0 (0.00%)
Gender	Male	117 (100%)	61	56
			(52.14%)	(47.86%)
	Female	93 (100%)	40	53
			(43.01%)	(56.99%)
	Prefer not to say	0 (0.00%)	0 (0.00%)	0 (0.00%)
Current Residence	Urban	174 (100%)	81	93
			(46.55%)	(53.45%)
	Rural	36 (100%)	20	16
			(55.56%)	(44.44%)
Profession	Government Employee	14 (100%)	8	6
			(57.14%)	(42.86%)
	Non-government employee	27 (100%)	15	12
			(55.56%)	(44.44%)
	Teaching	13 (100%)	10	3
			(76.92%)	(23.08%)
	Banker	3 (100%)	3 (100%)	0 (0.00%)
Student	123 (100%)	53	70	
		(43.09%)	(56.91%)	
	Business person	3 (100%)	2	1
			(66.67%)	(33.33%)
Educational Qualification	Others	27 (100%)	13	14
			(48.15%)	(51.85%)
	Secondary	17 (100%)	8	9
			(47.06%)	(52.92%)
	Higher secondary	22 (100%)	7	15
			(31.82%)	(68.18%)
	Undergraduate	75 (100%)	33	42
		(44.00%)	(56.00%)	
Graduate	32 (100%)	18	14	
		(56.25%)	(43.75%)	
	Post-graduate	49 (100%)	25	24
		(51.02%)	(48.98%)	
M.Phil./PhD	5 (100%)	3	2	
		(60.00%)	(40.00%)	
	Others	10 (100%)	7	3
		(70.00%)	(30.00%)	

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