ORIGINAL ARTICLE

Effects of Lockdown on Sleep Pattern in the General Population during COVID-19 Pandemic

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Abstract

Background and aim: COVID-19 pandemic hit India in January 2020. To curb the spread of the virus, a nationwide lockdown was instated on March 24. The lockdown has had an adverse psychological impact on the general population. Sleep is essential because of its many benefits for mental and physical health. Lack of sleep can impair both mental and physical functioning like decision-making, mood changes, anxiety symptoms, jeopardize immune response, increase accidents and increase medical expenditures. The current study was aimed at assessing sleep patterns during the pandemic in the general public.

Materials and methods: This was a cross-sectional, observational descriptive survey study conducted through social media platforms. Sociodemographic data such as age, gender, marital status, etc. along with sleep schedules, and working routine was assessed using a semi-structured pro forma. Insomnia severity index (ISI) and patient health questionnaire-4 (PHQ-4) were tools used to assess insomnia; depression and anxiety respectively.

Results: A total of 124 subjects were included in the study. Sleep patterns revealed a delay in routine bedtimes, with a reduction in sleep quality and an increase in total sleep duration. Moderate to severe insomnia was seen in 9% of patients and 29% had subthreshold insomnia. Anxiety was found in 19 and 22% had depressive symptoms.

Conclusion: Lockdown due to the COVID-19 pandemic was associated with changes in sleep patterns, quantity, and quality of night-time sleep and had also led to the manifestation of emotional symptoms in the general population.

Keywords: COVID-19, Lockdown, Sleep.

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Introduction

COVID-19 pandemic hit India in January 2020. In order to curb the spread of the virus, a nationwide lockdown was instated on March 24th, 2020, limiting movement of the entire population of India.[1] With the complete suspension of all means of transport for people and the closing down of educational institutes, industries, and other services, the lockdown had a significant economic and psychosocial impact.[2] During the period of lockdown, people were confined to their homes. Confinement in the home environment can increase stress and anxiety during the pandemic.[3] A ranges of psychosocial issues like the dread of infection, lockdown consequences, an overflow of misinformation, rumors, multiple conspiracy theories, inadequate supplies, financial damage, and stigma about the infection during this pandemic have had a negative impact on mental health.[4] Considering these issues, sleep is essential because of its many benefits for mental and physical health. Lack of sleep can impair mental functioning like impaired decision-making, mood changes, anxiety, and also physical functioning such as, jeopardizing immune response, and increased accidents all of which lead to increased medical expenditures.[5] Home confinement has led to changes in the pace of the flow of time and also disrupt night-time sleep.[3,6] Sleep architecture is altered and the duration of sleep is reduced during solitary confinement. Sleep disturbances can lead to cognitive and mood.[7]

During holidays children follow irregular sleep schedules and spend more time on screen and less time in physical activity. Students who show a low level of physical activity have shown higher stress levels. During the COVID-19 lockdown, people have associated stress, apprehension, and uncertainty regarding the involvement of themselves and family members. Many have lost their earnings due to the pandemic as companies have let them off.[3] The chronobiological rhythms have been influenced by the lack of social interaction, physical activity, and extensive use of social media devices that interact with daily activities, including sleep.[8]

With this view, the current study has been taken up in order to assess the impact of this pandemic on the sleep pattern of the population, the presence of insomnia, and to assess the associated presence of depression and anxiety amongst the general population.

Materials and Methods

The present study was a cross-sectional, observational, and descriptive study in the form of an online survey conducted using google forms software. Approval to carry out the study was

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obtained from the institutional ethics committee. A survey form was available in two languages, i.e., English and Hindi. The online survey was started in the 2nd month of lockdown and entries were taken in a 15-day period. Participants included were above the age of 18 and of either gender or the survey form was sent through E-mail, SMS, or other social media platforms like WhatsApp. Snowballing type of sampling method was followed where participants were asked to forward the survey form to other potential participants. Participants actively suffering from COVID-19, or on any kind of sedating medications were excluded from the study. Sociodemographic data included age, sex, marital status, residence, religion, education, occupation, income, comorbidities, and substance use history. Participants were also asked whether they are working from home or not and whether they were following a structured schedule.

Sleep Pattern

Individuals were inquired about their time of going to bed and waking, time taken to fall asleep, quality of sleep, the method used for awakening, total nighttime sleep, how they felt on waking up, and time spent on daytime naps. Participants were asked about these variables before and after the lockdown using the recall method.

Insomnia Severity Index

Insomnia was evaluated and severity was measured using the ISI which has seven items enquiring about night-time sleep, sleep quality, and functioning during the daytime, measured on a 5-point Likert scale. A Score ≥14 indicates clinical insomnia. The internal consistency of the scale is good with a Cronhbach alpha of 0.74.[9]

Patient Health Questionnaire – 4 (PHQ – 4)

The PHQ-4 is a four-questionnaire answered on a four-point Likert-type scale. Its purpose is to allow for ultra-brief and accurate measurement of core symptoms/signs of depression and anxiety. A score of 3 or more for depression questions or anxiety questions indicates the presence of the disorders and requires further evaluation.[10]

Statistical Analysis

Statistical analysis of this study was performed using Statistical Package for Social Sciences (SPSS) v. 21.0. Before the beginning of the analysis, duplicate entries and incomplete entries were removed. Categorical responses to multiplechoice questions were summarized with frequency tables, and numerical responses (concerning age, as well as total sleep time, and screen time) were summarized using their mean and standard deviation. Paired continuous variables were compared using the Wilcoxon sign rank test. Comparison of data between groups was done using the Chi-square test for categorical variables and the Mann–Whitney *U* test for continuous variables. A p-value < 0.05 was considered significant.

Results

We received a total of 130 responses during the time period of the survey, of which 6 responses had to be excluded for reasons such as, incomplete responses (n = 3), age below 18 (n = 2), and COVID positive cases (n = 1). The final sample that was analyzed consisted of 124 individuals. All of the participants belonged to India, hailing from 8 different states of the country. While a majority of them participants from the state of Maharashtra (82.5%) with others were from Kerala, Haryana, Orissa, Rajasthan, Andhra Pradesh, Delhi, Chhattisgarh, and Madhya Pradesh.

Table 1: Sociodemographic variables frequency (N = 124)

Variable	*Frequency (%)*
Age	
18–25	37 (30)
26–35	69 (56)
36–45	11 (9)
45–55	4 (3)
>55	3 (2)
Sex	
Male	76 (61)
Female	48 (39)
Marital status	
Single	80 (65)
Married	43 (34)
Divorced	1 (1)
Residence	
Urban	63 (51)
Rural	61 (49)
Religion	
Hindu	89 (72)
Buddhist	23 (19)
Christian	6 (5)
Muslim	5 (4)
Occupation	
Student	44 (35)
Government sector	27 (22)
Private sector	28 (23)
Housewife	2 (2)
Farmer	3 (2)
Business	11 (9)
Other	9 (7)
Routine	
Same	43 (35)
Changed	81 (65)
Work-from-home (WFH)	51 (41)
Comorbidities	
Present	15 (12)
None	109 (88)

The mean age of the participants was 29.53 ± 8.20 years. More than half of the sample consisted of men (61%), almost two-thirds (65%) of the individuals were unmarried, and half of them (51%) resided in an urban setting. The majority of the population were students (n = 44, 35%) followed by people working in government and private sector at 22% and 23% respectively. Only 2% of the population consisted of housewives. Almost two-thirds (65%) reported a change in their daily routine activities and about 60% of the study subjects had been working on a work-from-home (WFH) basis. Vast majority of the sample reported having no physical comorbidities (88%). The remaining sociodemographic details about the sample have been mentioned in Table 1.

On assessing the Insomnia severity, 29% of the study subjects had subthreshold insomnia, whereas, only 9% had moderate

Table 2: Changes in sleep pattern before and after lockdown ($N = 124$)

Variables	Before lockdown Total (%)	After lockdown Total (%)	χ^2 value	p-value
Routine bed time				
Before 10 p.m.	8 (6)	5 (4)	0.42	0.64
10–11 p.m.	49 (40)	29 (23)	6.69	0.009**
11–12 p.m.	43 (35)	44 (36)	0.00	1.00
after 12	24 (19)	46 (37)	8.03	0.004**
Sleep latency				
<30 min	98 (79)	71 (57)	11.12	0.0009**
30–60 min	21 (17)	38 (31)	4.70	0.03*
>60 min	5 (4)	15 (12)	4.34	0.03*
Wakeup time				
4–5 a.m.	5 (4)	7 (6)	0.42	0.51
5–6 a.m.	22 (18)	14 (11)	1.97	0.15
6–7 a.m.	51 (41)	38 (31)	2.17	0.14
7–8 a.m.	31 (25)	35 (28)	0.23	0.63
after 8	15 (12)	30 (24)	3.11	0.07
Mode of waking up				
Myself	70 (56)	74 (60)	0.32	0.56
Alarm	47 (38)	32 (26)	3.30	0.06
Somebody else	7 (6)	18 (14)	4.31	0.03*
Feeling in the morning				
Refreshed	86 (69)	67 (54)	4.75	0.02*
Groggy	9 (7)	9 (7)	0.00	1.00
Tired	12 (10)	22 (18)	2.65	0.10
Sleepy	17 (14)	26 (21)	1.69	0.19
Total sleep hours				
<6 hours	3 (2)	3 (2)	0.00	1.00
6–<8 hours	54 (44)	40 (33)	3.05	0.08
>8–10 hours	51 (41)	50 (40)	0.02	0.88
>10 hours	16 (13)	31 (25)	4.67	0.03*
Mean (hours)	7.74 ± 1.15	8.27 ± 1.74	4.22*	<0.0001**
Screen time (Mean in hours)	3.49 ± 2.85	5.95 ± 3.84	7.67*	<0.0001**

*Wilcoxon signed ranked test; Rest Chi-square test; *p-value < 0.05; **p-value < 0.01

Table 3: Comparison of presence of insomnia according to ISI scale with different groups

Variable	No insomnia N = 76 (%)	Present N = 48 (%)	Test value	p-value
Age (Mean)	30.67 ± 8.27	27.72 ± 8.32	1483.5#	0.07
Gender				
Male	45 (59)	31 (65)	0.35	0.54
Female	31 (41)	17 (35)		
Marital status				
Married	29 (38)	14 (29)	0.89	0.34
Unmarried	47 (62)	33 (69)		
Occupation				
Student	23 (30)	21 (44)	11.35	0.07
Housewife	1 (1)	1 (2)		
Farmer	2 (3)	1 (2)		
Government sector	24 (32)	3 (6)		
Private sector	15 (20)	13 (27)		
Business	6 (8)	5 (11)		
Other	5 (7)	4 (10)		
Screen time (Mean hours) after lockdown	4.94 ± 3.80	7.56 ± 3.83	987.5#	<0.001**
Daytime napping (Mean hours)	2.61 ± 1.29	3.14 ± 1.30	1426.5#	0.03*
Change of routine	45 (59)	36 (75)	3.23	0.07
Work from home	34 (45)	21 (44)	0.22	0.63
Depression	6 (8)	21 (44)	22.20	<0.001**
Anxiety	7 (9)	17 (35)	12.94	<0.001**
PHQ-4				
Normal	60 (79)	15 (31)	33.12	<0.001**
Mild	12 (16)	13 (27)		
Moderate	2 (3)	15 (31)		
Severe	2 (3)	5 (11)		

ISI, insomnia severity index; #Mann Whitney U test; Rest Chi-square test; *p-value < 0.05; **p-value < 0.01.

to severe insomnia according to the ISI scale. The rest of the participants (62%) reported having no clinical insomnia. About 60% of the individuals had normal scores on the PHQ-4 scale, 21% had mild severity, 14% had moderate and only 5% had severe symptoms. On assessing the sub-scales for depression and anxiety, 22% of the participants were positive for depression and 19% positive for anxiety.

Table 2 depicts the changes in sleep patterns before and after lockdown, where we found significant changes in the routine bedtime with the majority showing a delay in bedtime after 12 a.m. ($p < 0.004$). The group also showed significantly higher sleep latency after the onset of the lockdown. Individuals reporting a refreshing sleep before lockdown had significantly reduced ($p = 0.029$), though the mean sleep time had significantly increased post-lockdown ($p < 0.0001$). Also, a greater number of people had to be woken up by someone else ($p = 0.037$). Significant differences were also seen in the use of screens such as mobile phones, TVs, and laptops, etc., before and after the lockdown ($p < 0.0001$).

For the purpose of simplification, the severity groups on the ISI scale were divided on the basis of the presence and absence of insomnia and then comparisons between groups were made. As shown in Table 3, we found significant differences in the use of screens between both groups ($p < 0.00001$), with an increase in screen time correlating with an increased severity. ($r = 0.45$; $p < 0.01$). The significant difference was also seen in the amount of time spent in daytime naps between both groups ($p < 0.03$). Both groups also significantly differed in the presence of depression ($p < 0.0002$) and anxiety ($p < 0.0003$) according to the PHQ-4 subscales. The ISI scores were significantly correlated to depression ($r = 0.566$; $p < 0.01$) and anxiety ($r = 0.517$; $p < 0.01$) sub-scales of the PHQ-4 scale as well.

As depicted below, on comparing the presence and absence of depression (Table 4) and anxiety (Table 5) based on the PHQ-4 scale between different variables, the use of screens differed significantly in both groups ($p < 0.05$). The rest of the variables showed no significant differences.

Comparison of presence and absence of anxiety based on the PHQ-4 scale between different variables, use of screens differed significantly in both groups ($p = 0.0018$ for depression and $p = 0.009$ for anxiety). The rest of the variables such as mean age, gender,

Table 4: Comparison of presence or absence of depression between different variables

Variable	*Absent N = 97*	*Present N = 27*	*Test value*	*p-value*
Age (Mean)	30.16 ± 8.20	27.25 ± 8.58	1086[#]	0.17
Gender				
Male	57 (59)	19 (70)	1.19	0.27
Female	40 (41)	8 (30)		
Occupation				
Student	30 (31)	14 (52)	9.75	0.13
Housewife	1 (1)	1 (4)		
Farmer	2 (2)	1 (4)		
Government sector	25 (26)	2 (7)		
Private sector service	22 (23)	6 (22)		
Self-employed/ Business	8 (8)	3 (11)		
Other	9 (9)	0		
Marital status				
Married	36 (37)	7 (26)	0.5	0.44
Unmarried	60 (62)	20 (74)		
Divorced	1 (1)	0		
Screentime (Mean hours) after lockdown	5.55 ± 3.82	7.40 ± 3.81	921.5[#]	0.01*
Changed routine	60 (61)	21 (77)	2.36	0.12
Work from home	41 (42)	10 (37)	0.23	0.62

[#]Mann Whitney *U* test; Rest Chi-square test; **p*-value < 0.05

Table 5: Comparison of presence or absence of anxiety between different variables

Variable	*Absent N = 100*	*Present N = 24*	*Test value*	*p-value*
Mean age (in years)	29.91 ± 8.23	27.95 ± 8.50	1120[#]	0.61
Gender				
Male	60 (60)	16 (67)	0.36	0.54
Female	40 (40)	8 (33)		
Marital status				
Married	33 (33)	10 (42)	0.58	0.44
Unmarried	66 (66)	14 (58)		
Divorced	1 (1)	0		
Occupation				
Student	35 (35)	9 (38)	7.06	0.31
Housewife	1 (1)	1 (4)		
Farmer	2 (2)	1 (4)		
Government sector	24 (24)	3 (12)		
Private sector service	22 (22)	6 (25)		
Self-employed/ Business	7 (7)	4 (17)		
Other	9 (9)	0		
Screentime after lockdown (Mean hours)	5.58 ± 3.80	7.54 ± 3.81	789.5[#]	0.009**
Changed routine	62 (62)	19 (79)	2.36	0.12
Work from home	41 (41)	10 (42)	0.00	0.95

[#]Mann Whitney *U* test; Rest Chi-square test; **p*-value < 0.05; ***p*-value < 0.01

occupation, working location, or a change in routine showed no significant differences between both groups.

Discussion

Adequate and refreshing sleep is a determinant of good physical and mental health. A significant change in sleep patterns such as the increase in sleep latency and postponement of routine bedtime was observed in the subjects after the lockdown. In this research, in spite of the increased mean sleep duration, there was a diminution in a feeling of refreshment as well as in the ability to wake up by self, when compared to pre-lockdown figures.

The magnitude of insomnia after lockdown (38%) found in the present study was twice the population prevalence of insomnia in pre-lockdown times in the healthy population of India.[11] Our estimations of insomnia were closer to those of the Greek and the Italian studies where nearly 38 and 42% of the participants experienced insomnia after the imposition of lockdown restrictions.[12,13] Indian research during the lockdown done by Gupta et al. found a lower number of people (10%) suffering from Insomnia.[12–14] Such a difference could be explained by the lower mean age of the participants in our study. A large proportion of the sample in the present work included single, young adults who were either receiving education or doing a job in the public or private sector. The young age population is vulnerable to mental health disturbances owing to the uncertainties and negative appraisals in jobs, income, and examinations due to the pandemic.[15] These facts are supported by present research where the ages of individuals with clinical insomnia, anxiety as well as depression are lower than the ones who do not have these mental health problems. Additionally, resilience, coping strategies, and problem-solving ability is known to enhance with age which might explain the lower numbers of older individuals contracting managed healthcare professional (MHPs) in lockdown as has also been found in a South Indian study on medical doctors.[16,17]

The finding of disturbed sleeping pattern post lockdown such as increased sleep latency and postponement of bedtime has been echoed in other similar national and international studies.[14,18] The delayed sleep induction can be explained by alteration in exposure to photic stimuli through reduced exposure to sunlight and continuous exposure to similar bright light throughout the morning and evening in home confinement which leads to disturbed entrainment to the 24-hour day.[19] Postponement of sleep and wake-up timings, especially in the younger adults shows that their evening chronotype is further intensified in the lockdown, which can be attributed to changes in work pattern and work environment as well as reduced physical activity and increased screen time.[20] In the present study, the mean duration of nighttime sleep increased in the individuals after the lockdown. However, a far lower number of individuals felt adequately rested and the duration of daytime napping also underwent a significant increase. These findings coincide with the observations in European and American studies which show that working-class individuals are sleeping longer than the recommended duration (>7 hours)

during lockdown but demonstrate a disturbed sleep-wake rhythm and delayed sleep phase.[21,22]

Increased use of mobile phones, computers, or televisions often ensues with movement restrictions during lockdown. Such an increase in screen time leads to increased sleep latency, excessive daytime sleepiness, and sleep quality disturbances.[23] Melatonin suppression and increased arousal caused by the exposure to blue light emitted from these devices are proven to underlie these sleep disturbances.[24] These findings were echoed in the present study where average screen time which soared in restrictions, had a significant association with the presence of insomnia. Additionally, the individuals in the present study having depression and anxiety were more likely to have a higher screen time. Similar observations have been noted in Canadian youth where increased screen time was considered a risk factor for depression and anxiety.[25] The increased use of mobile phone and the internet have had a similar mental health impact on Indian university students in a study done in pre-lockdown times.[26]

In our study, gender and marital status did not show a significant association with the presence of insomnia, depression, or anxiety. It is a well-known fact that marriage, through enhanced social and emotional support, plays a protective role against neurotic mental health problems.[27] However, the mobility restriction in the lockdown introduces a fresh set of factors such as changes in roles and responsibilities at home as well as increased challenges in taking care of dependent family members, which challenge marital harmony.[28] Additionally, the inability to use temporary distancing during the conflict, fear of spreading the virus to the partner through physical or sexual contact and the psychological distress caused by a confinement in a small space neutralize the protective effect of the institution of marriage and increase marital conflict.[28] Women are known to have a higher propensity to contract depression and anxiety which may further contribute to sleep disturbances as compared to men. However, during lockdown, the socio-occupational challenges faced by men who usually play the role of bread-winners in Indian families increase their vulnerability to developing these mental health issues. Hence, no significant difference in depression, anxiety, or sleep problems was found between the two sexes in the present work. Our findings are in contrast with the study in the Netherlands during lockdown where men had a higher likelihood to develop, and anxiety while females scored higher in depression.[29] The difference in study timings, methodology and instruments used to measure the psychopathology might have led to the distinction.

Limitations

This study consisted of a relatively small sample with only 124 participants. The sampling was done by a snowballing technique hence, generalizing the study findings to the general public is not possible. All the assessment tools used were self-report scales and the data may have been inaccurate due to recall bias.

Conclusion

The pandemic has had unprecedented effects on the mental health of the population, of which sleep is one of the major factors affected. Drastic changes in sleep patterns as well as the total sleep duration and quality of sleep have been found before and after the lockdown. Screen time use has increased significantly post-lockdown and is found to be higher in those showing symptoms of insomnia, depression, and anxiety.

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