ORIGINAL ARTICLE

Insomnia: An Under-recognized Mental Health Catastrophe during the COVID-19 Era

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Abstract

Introduction: The coronavirus pandemic (COVID-19) has affected individuals globally in varied manners. It has also affected the psychosocial well-being, particularly of persons residing in the countries that were worst affected. In India, complete lockdown, social distancing, working from home, and fear of getting infected have caused a vast majority to develop problems related to sleep. We studied the prevalence of insomnia and also identified the potential modifiable risk factors that can address the coronavirus-related sleep pandemic.

Materials and methods: We conducted a survey using a questionnaire delivered through the internet. A total of 645 individuals were enrolled in the study. Insomnia severity index was used to calculate the prevalence of clinically significant insomnia. Data were coded and recorded in MS Excel spreadsheet program. SPSS v23 was used for data analysis.

Results: We found that 51.3% ($n = 331$) of our study population had clinically significant insomnia out of which 137 (21.2%) reported new onset symptoms during the lockdown. Statistically significant association were found between insomnia and female gender, age, anxiety, caffeine consumption, alcohol consumption, and sleep–wake patterns.

Conclusions: In conclusion, the burden of insomnia is more than those that seek treatment. It has tremendous negative consequences on patient's well-being. During the pandemic, given the current social and economic doldrums, insomnia may very well be the last nail in the coffin for those with pre-existing mental illnesses just trying to stay afloat.

Keywords: Cognition, Coronavirus pandemic, Insomnia, Sleep.

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Introduction

The word insomnia is derived from the Latin word "insomnium," which means lack of sleep.[1] In the Indian subcontinent, the prevalence of insomnia has been reported to range from 18% in young adults to as much as 59% in the elderly.[2] Psychosocial, physical, and mental health have been found to be associated with insomnia, as has been the socioeconomic status.[3–5] The 2019 novel coronavirus pandemic (COVID-19) posing as an immediate threat to lives of millions of people globally along with social distancing norms and lockdowns is just the classical setting for the emergence of another pandemic, i.e., acute insomnia. Short-term insomnia, also referred to as adjustment insomnia or acute insomnia, usually lasts a few days or weeks and occurs in response to an identifiable stressor. By definition, symptoms are present for <3 months. It is a clinical diagnosis established by a detailed history.[6]

The insomnia severity index (ISI) is a reliable and valid instrument to detect cases of insomnia in the population and is sensitive to treatment response in clinical patients.[7] A score of 10 or higher on the ISI identified insomnia with a sensitivity of 86% and a specificity of 88% in a community sample.[8] A lot of research has been published on the psychosocial impact of the severe acute respiratory syndrome (SARS) pandemic on healthcare workers.[9] A recent study from China during the COVID-19 pandemic enrolled 1563 healthcare workers and reported that more than one-third of the medical staff suffered insomnia symptoms. The related factors included education level, an isolation environment, psychological worries about the COVID-19 outbreak, and being a healthcare worker.[10] However, to our knowledge, no study has evaluated the impact of COVID-19 pandemic and lockdown on the sleep pattern of the general population, which has seen a massive shift in their lifestyle coupled with anxiety related to the disease spread and its outcomes.

In our study, we aim to identify the incidence of acute insomnia in the general population, along with the risk factors associated and how it impacts the day-to-day activities of individuals.

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Materials and Methods

Study Design

We conducted a survey using a questionnaire delivered through the internet using Google forms. Data were collected in India from May 11 (more than a month into lockdown) to May 15, 2020.

Inclusion Criteria

- Indian nationals residing in India during the lockdown
- Age >18 years

- Able to easily read the questionnaire
- Consenting to its use for research purpose

Exclusion Criteria

- Unable to understand the questionnaire
- Age <18 years
- Already on treatment for insomnia by psychiatrist prior to lockdown

Methods

A questionnaire was administered through electronic media to participants. We obtained a total of 635 participants, out of which 25 were excluded as they did not give consent for their data to be used for the study. To protect the participants' identity, code was assigned to each participant.

Using the questionnaire, we collected the demographic details, work profile, sleep patterns (current and prior to the lockdown), impact on day-to-day activities, daytime naps, alcohol and caffeine consumption, sleep–wake schedule, and requirement of sleeping pills.

The ISI was used to measure the severity of insomnia. Each question was rated on a 0–4 scale. It consisted of seven items, viz., the severity of (1) sleep-onset (initial), (2) sleep maintenance (middle), (3) early morning awakening (terminal) problems, (4) satisfaction with current sleep pattern, (5) interference with daily activities, (6) noticeability of impairment attributed to the sleep problem, and (7) the level of distress caused by the sleep problem. Each of these items is rated on a five-point Likert scale ("0" not at all, and "4" extremely) and the time interval is "in the last 2 weeks." Total scores range from 0 to 28, with high scores indicating greater insomnia severity.

Statistical Methods

Data were coded and recorded in MS Excel spreadsheet program. SPSS v23 (IBM Corporation) was used for data analysis. Descriptive statistics were elaborated in the form of means/standard deviations and medians/Interquartile ranges (IQRs) for continuous variables, and frequencies and percentages for categorical variables. Data were presented in a graphical manner wherever appropriate for data visualization using histograms/box-and-whisker plots/column charts for continuous data, and bar charts/pie charts for categorical data. Group comparisons for continuously distributed data were made using independent sample "*t*" test when comparing two groups. If data were found to be non-normally distributed, appropriate nonparametric tests in the form of Wilcoxon test were used for these comparisons. The Chi-squared test was used for group comparisons for categorical data. In case, the expected frequency in the contingency tables was found to be <5 for >25% of the cells, and Fisher's exact test was used instead. Statistical significance was kept at $p < 0.05$.

Results

Six hundred and seventy participants responded to the questionnaire, out of which 25 were excluded from the study for not meeting the inclusion criteria. So, our sample size was $n = 645$.

Out of 645 participants, 331 (51.3%) were found to have clinically significant insomnia and out of these 137 had new onset insomnia during the lockdown. The overall prevalence of new onset insomnia in the study population was found to be 21.2%. The demographic and other parameters studied are summarized in Table 1.

There was a statistically significant difference between the two groups in terms of distribution of age ($\chi^2 = 14.005$, $p = 0.03$). In the

Table 1: Demographic and other sleep variables studied

Study parameters	*Mean ± SD || Median (IQR) || Min–Max || Frequency (%)*
Age	
18–30 years	139 (21.6%)
30–45 years	198 (30.7%)
45–65 years	270 (41.9%)
>65 years	38 (5.9%)
Gender	
Male	322 (49.9%)
Female	319 (49.5%)
Prefer not to say	4 (0.6%)
Activity during lockdown	
Working from home	269 (41.7%)
Working (essential services)	141 (21.9%)
Homemaker	99 (15.3%)
Studying	53 (8.2%)
Others	83 (12.9%)
COVID-19-related thoughts before sleep	
Yes	98 (15.2%)
No	405 (62.8%)
May be	142 (22.0%)
Worst affected due to insomnia	
Activeness during the daytime	169 (26.2%)
Concentration	60 (9.3%)
Memory	10 (1.6%)
Mood	102 (15.8%)
None	304 (47.1%)
Afternoon nap	
None	323 (50.1%)
Half hour	130 (20.2%)
1 hr	115 (17.8%)
>1 hr	77 (11.9%)
Average night sleep	
<4 hr	31 (4.8%)
4–6 hr	175 (27.1%)
6–8 hr	386 (59.8%)
>8 hr	53 (8.2%)
Sleep hours during lockdown	
Less than before	155 (24.0%)
Same as before	320 (49.6%)
More than before	170 (26.4%)
Evening caffeine consumption (yes)	154 (23.9%)
Alcohol consumption (>60 mL)	
Never	450 (69.8%)
Once in 2 weeks	63 (9.8%)
Once a week	45 (7.0%)
Twice a week	49 (7.6%)
More or less daily	38 (5.9%)
Sleeping pills in last 6 weeks (yes)	58 (9.0%)
Fixed sleep–wake pattern (yes)	353 (54.7%)

IQR, Interquartile range

18–30 years, a larger proportion had insomnia (27.7% vs 14%). Similar results were also seen in the 30–45 years group (32.1% vs 31.2%). In the 45–65 and >65 years groups, larger proportion had no insomnia (insomnia vs no insomnia: 35% vs 48.4%, 5.1% vs 6.4%, respectively).

There was a significant difference between the various groups in terms of distribution of gender ($\chi^2 = 9.81$, $p = 0.003$). In the male group, larger proportion did not report any insomnia (insomnia vs no insomnia: 40.1% vs 56.1%) whereas in the female population, a larger proportion had insomnia (59.1% vs 43.6%).

About 45.3% ($n = 62$) of persons in the insomnia group were working from home, 21.9% ($n = 30$) were in the essential services, 13.1% ($n = 18$) were homemakers, 9.5% ($n = 13$) were students, and 10.2% ($n = 14$) were engaged in other activities.

We studied whether the work profiles of the participants had any significant impact on their sleep. There was no significant difference in the sleep quality between the various groups ($\chi^2 = 3.134$, $p = 0.534$).

There was a significant difference between the two groups in terms of COVID-19-related thoughts before sleep ($\chi^2 = 52.196$, $p \leq 0.001$). The group with COVID-19-related thoughts before going to sleep had larger proportion of insomnia patients whereas the group with no such thoughts was found to have lesser insomnia (insomnia vs no insomnia: 29.2% vs 7.3% and 44.5% vs 76.4%, respectively). Even in the respondents who reported that they "may be" having anxiety, a larger proportion had insomnia (26.3% vs 16.2%). In persons with clinically significant new onset insomnia, the worst affected parameter of daily living was activeness during daytime (41.6%, $n = 57$) followed by mood (29.2%, $n = 40$), followed by concentration (19%, $n = 26$).

There was a significant difference between the insomnia and no insomnia groups in terms of distribution of afternoon nap ($\chi^2 = 15.615$, $p = 0.001$), larger proportion of persons with clinically significant insomnia did not take any afternoon nap (66.4%, $n = 91$), whereas majority of persons tending to nap in the afternoon did not report insomnia (Table 2).

In the group with clinically significant insomnia, 35% ($n = 48$) participants reported an average night sleep of 6–8 hours, 51.8% ($n = 71$) participants reported an average sleep of 4–6 hours, and 13.1% ($n = 18$) reported sleep of less than 4 hours.

There was a significant difference between the two groups in terms of distribution of evening caffeine consumption ($p = 0.041$). A larger number of participants in the insomnia group reported evening caffeine consumption whereas in the no insomnia group, a larger proportion did not consume caffeine after 7 p.m.

Alcohol consumption was not found to be significantly associated with insomnia ($\chi^2 = 6.913$, $p = 0.141$). The requirement of sleeping pills in the last 6 weeks was found to be higher in the group with insomnia (19.7%, $n = 27$) vs the no insomnia group (1.9%, $n = 6$).

There was a significant difference between the two groups in terms of distribution of fixed sleep–wake pattern ($\chi^2 = 28.800$, $p \leq 0.001$). Participants in the no insomnia group had the larger proportion of fixed sleep–wake pattern. Participants in the insomnia group had a larger proportion who did not follow a fixed sleep–wake pattern.

Table 2 summarizes the association between clinically significant insomnia and various parameters.

Discussion

The coronavirus pandemic has affected everyone globally in varied manners. Although patients with the virus and frontline medical workers face the brunt of the devastating impacts of the disease, the consequences have spread far and wide and pose a significant challenge to a healthy lifestyle including adequate sleep. Social distancing, school closures, quarantines, working from home, and fear of getting infected have all brought profound changes to normal routines for people of all ages and walks of life.

In our study, the persons in the "new onset insomnia" group reported that their hours of sleep were less than what they were before the lockdown commenced. Circadian rhythm changes, lack of sunlight exposure, and anxiety have all been implicated on the pathophysiology of insomnia, and these changes may be the reason why a large fraction of the population is developing insomnia in this pandemic related lockdown.[6–8] A recent study from China which enrolled 1,563 healthcare workers showed that 564 (36.1%) participants had insomnia according to ISI.[11] In the study, a multiple binary logistic regression model revealed that insomnia symptoms were associated with an education level of high school or below, being a doctor, currently working in an isolation unit, worried about being infected, perceived helplessness in due to constant bombardment from news or social media with regard to COVID-19, and uncertainty regarding an effective cure.[12] While this study was conducted exclusively on healthcare workers who have greater psychological impact of the pandemic on their well-being, our study was conducted on the general population and reports an overall prevalence of insomnia in 51.3% and new onset insomnia in 21.2% ($n = 137$) of the study population.

In the above-mentioned study by Zhang et al.,[11] females reported more insomnia, which is consistent with our study and various other studies.[13–15] The insomnia group in this study was found to have greater anxiety and depressive symptoms, which is also a finding of our study where the group with anxiety related to COVID-19 reported more prevalence of insomnia. Literature also supports the fact that insomnia is more than twice as prevalent in depressed than in non-depressed individuals.[16]

Although older age is conventionally associated with higher prevalence of insomnia,[17–19] in our study, the 18–30 years age group had the largest proportion of individuals with insomnia. Other studies have also reported insomnia in adolescents. A systematic review of seven studies by Jiang et al.[20] shows that the prevalence of insomnia among university students is ranging from 9.4% to 38.2%. A cross-sectional study conducted over students across nine colleges showed a prevalence of insomnia 61.6%.[21]

There have been earlier studies on insomnia during the SARS epidemic. A study in Hong Kong among residents of Amoy Gardens (the first officially recognized site of community outbreak of SARS in Hong Kong) enrolled total of 903 residents. It was found that 34.2% were suffering from insomnia, apart from various other psychosomatic disorders.[22] About 73.1% participants of this study reported low mood. In our study, the worst affected parameter was activeness during daytime (41.6%) followed by mood disorder (29.2%). Another study from Taiwan reported insomnia in 37% and depression in 38.5% of nurses working in SARS unit.[23]

Multiple studies have shown that napping has little impact on subsequent night sleep quality or duration.[24–26] Our study showed that larger proportion of persons with clinically significant insomnia did not take any afternoon nap.

Caffeine consumption has been linked with poor sleep quality[27,28] and insomnia, and our study also find statistically significant association between the two. Various subjective insomnia symptoms demonstrated after caffeine consumption in healthy

Table 2: The association between clinically significant insomnia and various parameters

	Clinically significant insomnia		
Parameters	*Present (n = 137)*	*Absent (n = 314)*	*p-value*
Age***			0.003[1]
18–30 years	38 (27.7%)	44 (14.0%)	
30–45 years	44 (32.1%)	98 (31.2%)	
45–65 years	48 (35.0%)	152 (48.4%)	
>65 years	7 (5.1%)	20 (6.4%)	
Gender***			0.003[2]
Male	55 (40.1%)	176 (56.1%)	
Female	81 (59.1%)	137 (43.6%)	
Prefer not to say	1 (0.7%)	1 (0.3%)	
Activity during lockdown			0.534[1]
Working from home	62 (45.3%)	128 (40.8%)	
Working (essential services)	30 (21.9%)	74 (23.6%)	
Homemaker	18 (13.1%)	49 (15.6%)	
Studying	13 (9.5%)	20 (6.4%)	
Others	14 (10.2%)	43 (13.7%)	
COVID-19-related thoughts before sleep***			<0.001[1]
Yes	40 (29.2%)	23 (7.3%)	
No	61 (44.5%)	240 (76.4%)	
May be	36 (26.3%)	51 (16.2%)	
Worst affected due to insomnia***			<0.001[1]
Activeness during the daytime	57 (41.6%)	34 (10.8%)	
Concentration	26 (19.0%)	12 (3.8%)	
Memory	2 (1.5%)	2 (0.6%)	
Mood	40 (29.2%)	23 (7.3%)	
None	12 (8.8%)	243 (77.4%)	
Afternoon nap***			0.001[1]
None	91 (66.4%)	146 (46.5%)	
Half hour	22 (16.1%)	73 (23.2%)	
1 hr	17 (12.4%)	62 (19.7%)	
>1 hr	7 (5.1%)	33 (10.5%)	
Average night sleep***			<0.001[1]
<4 hr	18 (13.1%)	3 (1.0%)	
4–6 hr	71 (51.8%)	44 (14.0%)	
6–8 hr	48 (35.0%)	244 (77.7%)	
>8 hr	0 (0.0%)	23 (7.3%)	
Sleep hours during lockdown***			<0.001[1]
Less than before	137 (100.0%)	18 (5.7%)	
Same as before	0 (0.0%)	219 (69.7%)	
More than before	0 (0.0%)	77 (24.5%)	
Evening caffeine consumption (yes)***	40 (29.2%)	64 (20.4%)	0.041[1]
Alcohol consumption (>60 mL)			0.141[1]
Never	96 (70.1%)	209 (66.6%)	
Once in 2 weeks	18 (13.1%)	28 (8.9%)	
Once a week	5 (3.6%)	31 (9.9%)	
Twice a week	10 (7.3%)	29 (9.2%)	
More or less daily	8 (5.8%)	17 (5.4%)	
Sleeping pills in last 6 weeks (yes)***	27 (19.7%)	6 (1.9%)	<0.001[1]
Fixed sleep–wake pattern (yes)***	56 (40.9%)	213 (67.8%)	<0.001[1]

***Significant at $p < 0.05$, 1: Chi-squared Test, 2: Fisher's exact test

individuals have included decreased total sleep time, difficulty falling asleep, increased nocturnal awakenings, and daytime sleepiness.[29–31] A study by Stabenow et al. showed association between alcohol consumption and poor sleep quality.[32] Another Japanese study showed that persistent insomnia in alcoholics is not only related to excessive alcohol intake but also persists even when drinking levels have fallen.[33] However, our study did not find any significant association between alcohol consumption and insomnia, which is consistent with few studies.[34,35]

Our study has established a link between fixed sleep–wake pattern and low insomnia prevalence. The group that did not follow a fixed schedule had a greater proportion of individuals with significant insomnia. A large study[36] (548 subjects) conducted at the Columbia University showed that improper sleep schedule, behaviors that promote arousal near bedtime, and uncomfortable sleeping environments were positively associated with cross-sectional insomnia severity. After controlling for other well-established risk factors in this study, only improper sleep scheduling remained significant. Other literature has also reported similar association between sleep hygiene and insomnia.[37,38] As maintaining a proper sleep hygiene in general and a fixed sleep–wake schedule in particular during the lockdown is in itself a challenge, this variable is probably one of the most important causes of insomnia in our study and may be a useful intervention strategy to improve sleep quality.

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