Asian Journal of Medicine and Health

19(4): 1-9, 2021; Article no.AJMAH.68253
ISSN: 2456-8414

Early Impact of Lockdown on Daily Activity Behaviors and Sleep Pattern in Small Indian Population

Anshu Dwivedi[1], Saurabh Jaiswal[1], Shalie Malik[1] and Sangeeta Rani[1*]

[1]Department of Zoology, Biological Rhythm Research Unit, University of Lucknow, Lucknow 226 007, U. P., India.

Authors' contributions

This work was carried out in collaboration among all authors. Authors AD, SM and SR designed the study. Authors AD and SR performed the statistical analysis. Authors AD SJ and SR wrote the protocol and wrote the first draft of the manuscript. Authors AD and SR managed the analyses of the study. Authors AD and SR managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJMAH/2021/v19i430316
Editor(s):
(1) Dr. Engbang Ndamba Jean Paul, University of Douala, Cameroon.
(2) Dr. P. Veera Muthumari, V. V. Vanniaperumal College for Women, India.
(3) Dr. Ashish Anand, GV Montgomery Veteran Affairs Medical Center, USA.
Reviewers:
(1) Zeinab Kasemy, Menoufia University, Egypt.
(2) Yelizarova Olena, Ukraine.
Complete Peer review History: http://www.sdiarticle4.com/review-history/68253

Original Research Article

Received 24 February 2021
Accepted 03 May 2021
Published 05 May 2021

ABSTRACT

Objectives: Lockdown has resulted in unprecedented changes in daily behaviors including depression. We hypothesized that the lockdown would impact our daily behavior such as sleep-wake cycle, eating time, physical activities, work hours, sleep quality, etc. We also observed the depression among the population during the lockdown.
Methods: This is a cross-sectional study was conducted after one month of the imposition of the lockdown (between April 26 – May 05, 2020) by an online questionnaire designed using a google form filled by individuals from different professions (N=251). The analysis was performed using one-way RM ANOVA followed by Bonferroni's multiple analysis post hoc test. Significance was taken at $P< 0.0001$.
Results: The sleep-wake cycle, breakfast time was significantly delayed during the lockdown compared to weekdays before lockdown days. Total 60% of volunteers reported good sleep, 32%

**Corresponding author: E-mail: sangeetarani7@yahoo.com;*

had increased daytime nap, maximum time spent in the usage of social media 29%, and 79% showed increased usage of electronic gadgets. The physical activity and work hours were reduced to 57% and 58% respectively. It seems that lockdown forced people to undergo depression as 54% were depressed.

Conclusion: This is the first study to conclude the changes in daily behaviors including depression. Overall, delay in the sleep-wake cycle, breakfast timings, increased sedentary lifestyle, reduction in their work hours, addiction of electronic gadgets, spending maximum time on social media with increased depression. This study is helpful for the public health systems to create awareness regarding the sleep and health improvements during as well as after lockdown.

Keywords: Lockdown; sleep; daily behaviors; depression; and perception regarding the lockdown.

1. INTRODUCTION

Our daily rhythms such as sleep-wake cycle, eating behavior, hormonal profile are under rhythmic control [1]. Any alteration in the rhythmic environment (natural day and night cycle) may affect the physiological function such as sleep-wake cycle, feeding-fasting cycles, etc. According to [2,3] human sleep is dependent on a biological clock which is entertained daily by natural light and dark cycle in the environment. Literature has shown that sleep plays an important role in the consolidation of learning/memory, growth, and various other functions. Therefore, deprivation of sleep can lead to various psychological and neurocognitive disorders [4]. It has been stated by American Heart Association that irregularity in feeding time and inconsistency in the frequency of having a meal can affect the weight and cardiometabolic of an individual. These kinds of internal misalignments can be due to various external factors. We considered lockdown as one of these factors because it has forced people to reset their work schedule, family time along with the balance in sleep time. Our motive behind this study is to check how people have adapted to this social restriction, what are the changes brought in daily behaviors such as sleep, feeding time, physical activities, work hours, eating frequency, sleep quality, usage of electronic gadgets, etc. during the lockdown?

India is one of the densely populated countries with a total number of 1.3 billion people living across different states and cultures. It is a great challenge for the Indian government to control the prevention of COVID-19 in Indian. To overcome this the Indian Prime Minister has announced Lockdown on 25th March 2020. It was the only measure to reduce the rapid spread of this virus among the Indian population. Lockdown implication restricted all the non-essential activities, only permission was given to essential services. Recently, a study reported that the use of digital gadgets and high use of social media near to sleep time has a negative impact on sleep among young adults [5]. A study mentioned the change in the sleep-wake pattern [6], eating habits [7], reduction in physical activities and energy levels [8]. Hence, this pandemic resulted in a great challenge to continue with work, remain mentally as well as physically fit, taking proper safety while maintaining social distance. Records on studies done during pandemic show that there were significant changes in individuals eating habits along with the increased binge eating, more snacks intake as a result of the change in their body weight [7].

Lockdown has restricted the movements and forced people to live in their homes. The people were completely cut off from social activities and interactions. Therefore, it has caused fear and anxiety among the population. According to a study, the lockdown has led to social isolation, people living far from their family, having low economic status, poor psychological state are at a high risk of having depression, stress, and anxiety [9]. A study reported that 16.5% were having severe depressive symptoms, 28.8% were having moderate to severe anxiety symptoms [10]. It has been reported that there was a high prevalence of mental health problems which was having a positive association between social media exposure and COVID-19 during lockdown [11].

We planned our study in such a way that together we can observe the impact of lockdown on our daily behaviors (Sleep-wake cycle, eating habits, physical activities, working hours, sleep bouts frequency, sleep quality, maximum time spent in, and usage of electronic gadgets), mental health and their perception regarding lockdown) in Indian population. We hypothesized that (i) lockdown has delayed the sleep-wake cycle, eating time as well as a reduction in work hours and physical activities. (ii) A high percentage of the population would be suffering from depression. (iii) Psychological perception of the

population regarding the lockdown in the Indian population.

2. MATERIALS AND METHODS

2.1 Study Design and Study Population

To collect the data from the population a web-based general survey was designed in Google form and was given along with the consent form. It was designed in both English and Hindi languages. The link of this survey was distributed through the WhatsApp contact of the authors. This web-based survey was completely voluntary and non-commercial. The survey was distributed to the general population online from April 26 to May 05, 2020.

Out of 500, a total of 251 participants completed the form successfully and the rest 249 participants were excluded from the study due to incomplete/inappropriate responses. All the participants were of Indian origin. This general self-reported questionnaire entitled "Altered daily behavior: before lockdown vs during lockdown was developed by the author (AD), University of Lucknow, Lucknow. The core idea for questions was taken by the study conducted by [12] and was reframed for our study. This validates our survey data used in this study. The survey was completed by asking the following questions: Section (1) - General information includes name, gender, age, State, City/town/village. Section (2) - It includes basic questions about sleep and eating timings before the lockdown period. Section (3) - This section contains the questions about sleep, eating, daytime nap, eating frequency, work hours, physical activities, time spent in various activities, and depression levels during the lockdown.

2.2 Statistical Analysis

The data is analyzed by using one-way RM ANOVA followed by Bonferroni's multiple analysis post hoc test. Significance was taken at $P< 0.0001$. The graph preparation and statistics were applied by using GraphPad Prism Software version 8.0, San Diego, USA.

2.3 Assessment of Sleep Behavior: Sleep Onset, Offset, Duration, Sleep Quality, and Daytime Nap

The sleep onset, offset timings of each individual, their sleep duration, daytime nap, and sleep quality were asked to study the change in the sleep characteristics. The volunteers reported their sleep onset, offset during weekdays, weekends, and during the lockdown. Sleep duration was derived by calculating the time between time to sleep and time to wake up. The sleep quality was assessed as 'good, bad or no change' and the daytime nap as 'increased, decreased or no change' to the questionnaire.

2.4 Evaluation of Eating Behavior: Breakfast Time

The time to breakfast and time gap between time to wake up and first breakfast was studied during three different conditions (weekdays, weekends, and during lockdown).

2.5 Assessment of Temporal Allocation of Various Other Activities

Besides sleep-wake and eating times, the time spent on various daily activities such as work hours, physical activities, and use of electronic gadgets was calculated based on participant's response as increased, decreased, or no change. The questionnaire also asked about the time spent on activities such as cleaning/washing room, exercise, taking care of plants/pets present at home, cooking, reading books/novel/magazines, playing games, watching T.V, online studies, spending time with family members and social media.

2.6 Evaluation of Psychological Behavior: Depression and Perception of the Lockdown

Depression can be defined as the most common mental illness which can occur due to complex interaction of social, psychological, and biological factors [13]. During the COVID-19 pandemic, many people were suffering from the worst conditions including unemployment, psychological trauma, etc. So, we decided to measure the level of depression by using a Likert scale from 0 to 10. Where 0 means no depression and 10 means severe depression. As the number increase, the level of depression also gets increases. Participants were asked to report their depression level only during the lockdown phase. The change in psychological behavior regarding imposition and continuation of lockdown was assessed and calculated as per their response.

3. RESULTS

A total of 251 participants volunteered in the study, of which 52.5% were females and 47.4%

were males. About 78% were from urban, 6.7% from rural and 15.1% were from semi-urban. The mean age of the participants was 26.18±8.97 years. The differences are explained below in the following sections:

3.1 Sleep Behavior: Onset, Offset, Duration, Sleep Quality, and Daytime Nap

The statistical analysis showed in (Table 1) summarizes that sleep onset on weekdays was significantly advanced from both weekends and lockdown ($F_{2,500}$=9.354, P<0.0001; one-way RM-ANOVA). However, there was no significant difference between weekends and lockdown. Overall, there was a significant difference in the sleep offset on all three conditions (weekdays, weekends, and during the lockdown) ($F_{2,500}$=299.3, P<0.0001; one-way RM-ANOVA). The sleep offset was significantly delayed during the lockdown in comparison with weekends and weekdays. The sleep duration was significantly higher during the lockdown than that of weekends and weekdays ($F_{2,500}$=144.5, P<0.0001; one-way RM- ANOVA).

Fig. 1 shows that on further categorization in sleep onset on weekdays the maximum no. of individuals are being represented in the bracket of midnight (2400-0100 hours), on weekends (2300 to 0100 hours), and was 2300-2400 hours during the lockdown. The majority of the participants were having their sleep offset time from (0500-0600 hours) on weekdays, (0800-0900 hours) on weekends and during the lockdown respectively. About 60% of the population reported 'Good' sleep quality, 25% found 'No change, and 15% mentioned 'Bad' sleep quality. More than half of the population reported 'No change' in the daytime nap, 32% found 'Increased' and 13% reported 'Decrease' in daytime nap frequency during the lockdown.

3.2 Eating Behavior: Breakfast Time and the Time Gap between Wakeup and Breakfast

As shown in Table 1 the breakfast timing on weekdays was significantly earlier than that of weekends and lockdown ($F_{2,500}$=40.99, P<0.0001; one-way RM-ANOVA). There was no significant difference in the breakfast time between weekends and lockdown. Fig. 2. shows that the maximum number of individuals on weekdays had their breakfast at (0500-0600 hours), on weekends, and during the lockdown, it was (0800-0900 hours). Graph (B) shows a significant difference in the time gap from wake-up to breakfast compared between weekdays and lockdown ($F_{2,500}$=36.59, P<0.0001; one-way RM-ANOVA).

3.3 Temporal Allocation of Various Other Activities

Fig. 3 represents the physical activity, work hours, and time spent in various activities during the lockdown. About 57% found a decrease in their physical activities, 22% found no change and only 21% noticed an increase in their physical activities during the lockdown. About half of the population reported a decrease in their work hours, 22% no change, and 20% found an increase in their work hours during the lockdown. Almost 29% mentioned that their maximum time spent was on social media followed by 18% spent their time with their family members, 15% in online studies, 12% watching T.V and the rest of the 26% of the population invested their maximum time in various other activities mentioned in the graph.

Table 1. Sleep and eating behavior for three different conditions weekdays, weekends, and during the lockdown

Variables	Weekdays	Weekends	Lockdown	F value	P-value	Significance
Time to sleep	23.78±8.13	24.33±9.45	24.21±10.43	9.353	<0.0002	***
Time to wakeup	05.19±4.66	07.72±11.05	08.19±11.71	299.3	<0.0001	***
Sleep duration	5.54±0.09	7.50±0.13	7.97±0.14	144.5	<0.0001	***
Time to breakfast	08.67±9.27	0970±8.46	09.82±11.02	40.99	<0.0001	***
Time gap	3.41±0.10	2.40±0.10	2.53±0.11	36.59	<0.0001	***

Significance reported from the Repeated-Measure One-way ANOVA at P<0.0001, Bonferroni post hoc test. Asterisks show significance, Ns shows the non-significance

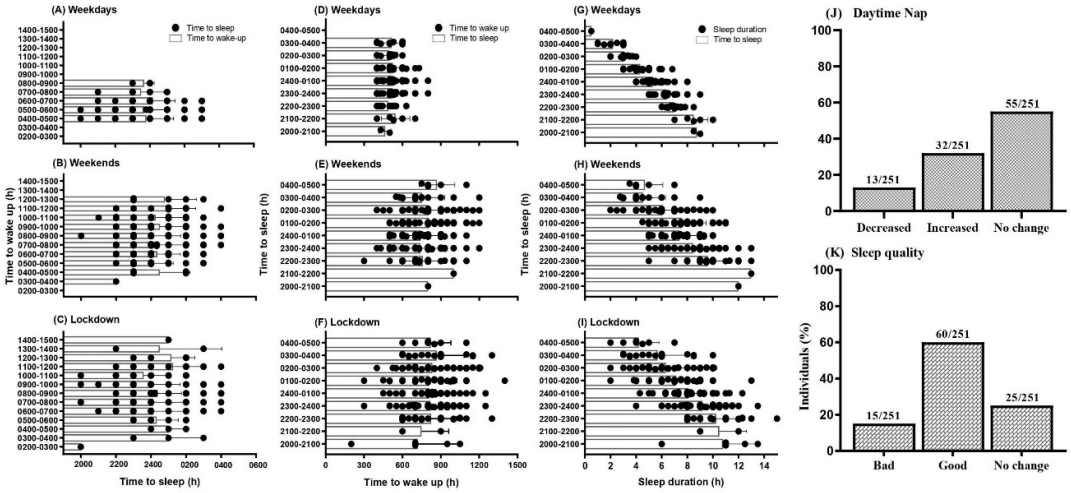

Fig. 1. Sleep behavior of population (n=251). Sleep onset (A, B, and C), sleep offset (D, E, and F), sleep duration (G, H, and I) on weekdays, weekends, and during lockdown respectively. The x-axis indicates time to sleep (graph C), time to wake up (graph F), and sleep duration in hours (graph I). The x-axis on the graph (J) indicates a decrease, increase or no change in a daytime nap and bad, good, or no change in their sleep quality during the lockdown respectively. Whereas the y-axis in the graph (A to C) shows the wake-up, the graph (D to I) shows the time to sleep and the graph (J and K) shows the number of individuals (%)

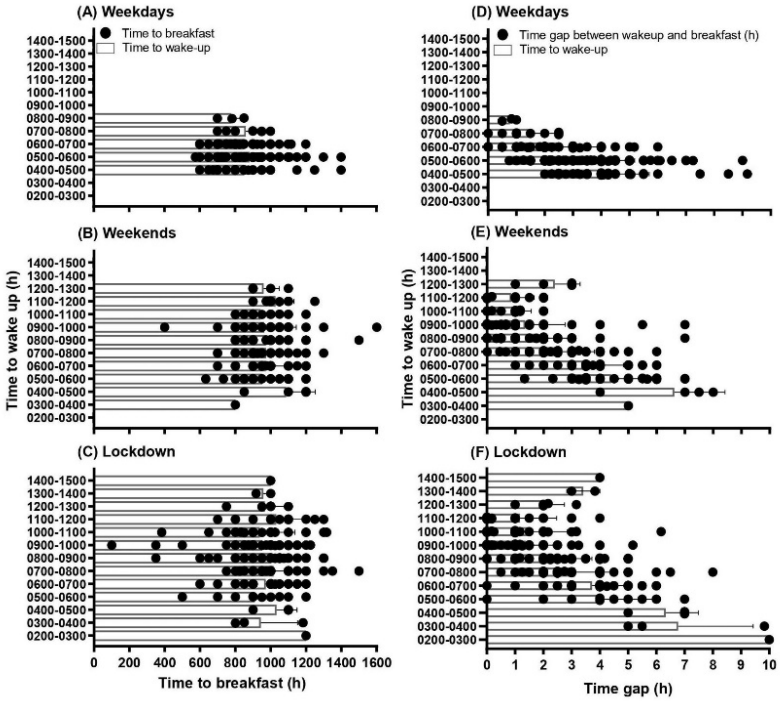

Fig. 2. Eating behavior of the population

Breakfast time (A, B, and C), the time difference (D, E, and F). The x-axis indicates time to breakfast in hours and the y-axis shows time to wake up in hours (graph A, B, and C) on weekdays, weekends, and during lockdown respectively. The x-axis on the graph (D) indicates the time difference between wake-up to breakfast time in hours. The y-axis indicates the time to wakeup

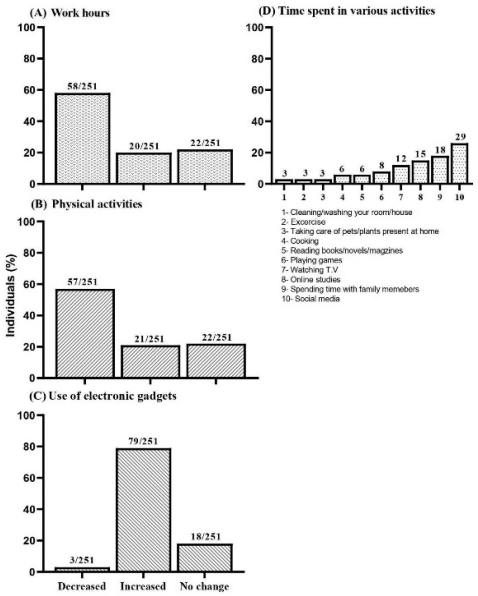

Fig. 3. Temporal allocation of various other activities in population

The frequency distribution of work hours (A), physical activities (B), use of electronic gadgets (C), and time spent in various activities (D) during the lockdown. The x-axis indicates the decrease, increase, or no change (A, B, and C respectively) during the lockdown. The y-axis shows the number of individuals (%). The x-axis on the graph (D) shows the name of different activities performed by the population during lockdown

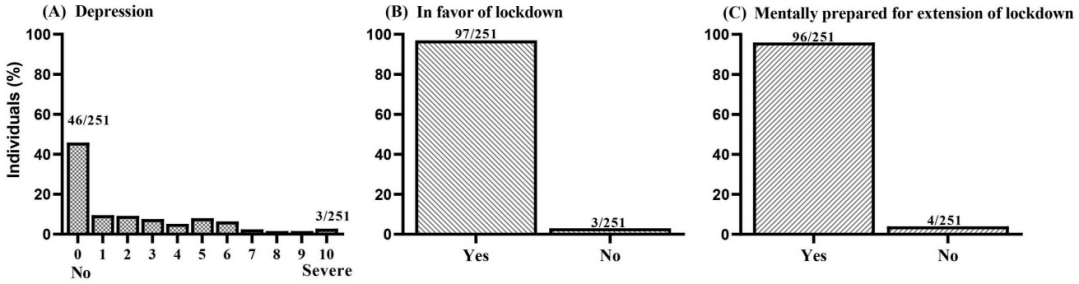

Fig. 4. Psychological behaviors of the population during the lockdown

Depression (A), number of the population in favor of the lockdown (B), and mentally prepared for the extension of the lockdown (C). The x-axis on graph (A) shows the scale of depression ranging from 0 (No depression) to 10 (Severe depression). The x-axis on the graph (B and C) shows the response of individuals in form of Yes/No. While y-axis in all the graphs shows the number of individuals (%)

3.4 Psychological Behavior: Depression and Perception Regarding the Lockdown

The data represented in (Fig. 4) shows that more than half of the population was depressed ranging on a scale of 1 to 10. About 46% of the participants reported no depression while 3% reported severe depression. The perception regarding the lockdown was showing that about 97% of the participants were in the favor of lockdown. While almost 96% of the participants were mentally prepared for the extension of the lockdown.

4. DISCUSSION

The present study highlights the impact of lockdown on daily behavior in humans. Our result

shows that it affected: (i) The sleep onset and offset (ii) its duration and (iii) its relationship with the first meal of the day (breakfast). Before lockdown, during weekdays the time of sleep onset/offset in all the individuals was quite 'in-sync with each other. However, on weekends and during lockdown days sleep onset and offset showed a huge difference (Table 1). The difference in the timing of sleep onset-offset before the lockdown was possibly due to the schedule of work for the next day which compels the individuals to sleep and wake- up early on weekdays. However, during the lockdown, the only possible reason could be late-night screen time, use of electronic gadgets, social media, etc. A recent study has shown an increase in sleep duration during lockdown [6,14]. Similarly, we also found an increase in sleep duration during lockdown (Table 1). The Daytime naps can also be a reason behind the delay in sleep onset and sleep offset [15]. Along with the delay in sleep onset/offset, increase in sleep duration, people also reported their sleep quality as 'good' during lockdown when compared with before lockdown days [16]. A reason behind this can be that they were able to overcome their sleep debt resulting in good sleep quality.

The delay in wake-up times altered the time to breakfast. The study showed a delay in breakfast timings during lockdown when compared to breakfast timings before lockdown (weekdays). We also observed there was an increase in the time gap between wake-up and breakfast before lockdown (Table 1). Such alteration of having meals at the wrong time of the day may disrupt our natural physiological rhythm causing serious health problems. The earlier studies have shown that delaying breakfast time leads to a higher body mass index [17]. Physical activities are very important for the fitness of the body. It utilizes the excess calories and keeps the body fit. Studies reported a decline in physical activity during lockdown [18,19]. A similar decline was also observed in our study where more than half of the individuals showed a decline in their physiological activities and almost 58% of the respondents in their work hours during the lockdown. A reason behind the decline in work hours is the closure of workplaces such as offices, schools, colleges, universities, etc. While, laziness in doing physical activities was due to the closure of fitness gyms, centers, parks, social distancing, and complete lockdown.

The results reveal that more than half of the population were depressed. Among the population, 3% were severely depressed. The reason behind the depression can be various social factors such as prolonged closure of schools, colleges and offices lead to uncertainty about exams, competitive exams for which students were preparing and waiting for a long time, fear of losing jobs among the workers. Similarly [20,21,22] found that the Chinese population (including students) was suffering from severe psychological distress such as stress, anxiety, and depression. This pandemic lockdown was a challenging situation for everyone in the world. It enforced people to remain quarantined in their homes. Also, many were those who were away from their home and their beloved ones. This isolating condition may have resulted in high anxiety, stress, and depression in the Indian population [23,24]. According to [25] during pandemic conditions, people experience fear of getting infected by a disease or virus which results in stress, anxiety, and depression. Apart from this due to COVID-19 countries are facing financial crises which were directly affecting the people of poor economic status, daily wagers, etc. which is a big factor for depression [9,26].

The psychological perception about the lockdown shows that around 97% of the population were in the favor of lockdown. This reveals that the population was aware of the severity of COVID-19. So, they understood the importance of lockdown. About, (96%) of participants were mentally prepared for the extension of lockdown. This shows that people were up to date about COVID-19 and accepted that "prevention is better than cure." So, they were mentally prepared for the extension of lockdown which was the only possible way to control the spread of this pandemic disease.

5. CONCLUSION

This study shows that home isolation has resulted in a change in the sleep-wake cycle, breakfast timings, sedentary lifestyle, addiction to electronic gadgets, spending their maximum time on social media, and also reduction in their work hours. The weekdays were significantly different from weekends and lockdown. The lockdown days were similar to that on weekends and they acted as a 'clock disruptor' by changing the behavior and daily rhythm of our body during the lockdown. This lifestyle change has increased depression levels which are needed for the cure to live a healthy lifestyle. The perception of the Indian population regarding the lockdown shows that

people were aware of the severity of the COVID-19 and the precautions to be taken.

6. FUNDING

The present study proceeded with the help of funds provided by ICMR (Grant no. 45/4/2020-PHY/BMS).

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

This study received ethical approval from the Institutional Ethics Committee at the author's institution (Ref. No.: LU/IEC/ZOOL/2020/11/06).

ACKNOWLEDGEMENT

The authors would like to convey their sincere gratitude to all the participants. We also want to thanks late Dr. Sudhi Singh who always supported us and gave her valuable ideas. We also want to thanks Aman Dwivedi, Anuj Trivedi, Shubhojit Das, and Jyoti Tiwari for sharing this survey in various states.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Aschoff J. Circadian rhythms in the endocrine system (author's transl). Klinische Wochenschrift. 1978;56:425-435.
Available:https://doi.org/10.1007/BF01477056
2. Golombek D, Rosenstein R. Physiol circadian entrain 2. 2010;1063–102.
3. Sidor A, Rzymski P. Dietary choices and habits during COVID-19 lockdown: Experience from Poland. Nutrients. 2020;12:1657.
Available:https://doi.org/10.3390/nu12061657
4. Curcio G, Ferraraa M, Luigi De Gennaroa. Sleep loss, learning capacity and academic performance. Sleep Medicine Reviews. 2006;10:323–337.
5. Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: Implications and policy recommendations. Gen Psychiatry. 2020;33:e100213.
Available:https://doi.org/10.1136/gpsych-2020-100213
6. Blume C, Schmidt MH, Cajochen C. Effects of the COVID-19 lockdown on human sleep and rest-activity rhythms. Curr Biol. 2020;30:R795–R797.
Available:https://doi.org/10.1016/j.cub.2020.06.021
7. Srivastava AK, Dwivedi N, Dhand C, Khan R, Sathish N. Can graphene-based materials play a role in the fight against COVID-19? Science reporter. 2020;00:32-35.
Available:http://nopr.niscair.res.in/handle/123456789/54274
8. Varshney M, Parel JT, Raizada N, Sarin SK. Initial psychological impact of COVID-19 and its correlates in Indian Community : An online. PLoS One. 2020;15(5):e0233874.
Available:https://doi.org/10.1371/journal.pone.0233874
9. Gautam R, Sharma M. 2019-nCoV pandemic: A disruptive and stressful atmosphere for Indian academic fraternity. Brain Behav Immun; 2020.
Available:https://doi.org/10.1016/j.bbi.2020.04.025
10. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, Ho RC. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. Int J Environ Res Public Health. 2020;17(5):1729.
doi: 10.3390/ijerph17051729.
11. Gao J, Zheng P, Jia Y, Cjen H, Mao Y, Chen S, et al. Mental health problems and social media exposure during COVID-19 outbreak. PLoS One. 2020;15(4):e0231924.
Available:https://doi.org/10.1371/journal.pone.0231924
12. Majumdar P, Biswas A, Sahu S. COVID-19 pandemic and lockdown: cause of sleep disruption, depression, somatic pain, and increased screen exposure of office workers and students of India. Chronobiol Int. 2020;00:1–10.
Available:https://doi.org/10.1080/07420528.2020.1786107

13. Jr KPW, Linton SK, Withrow D, Casiraghi L, Lanza SM, Iglesia HDe, et al. Sleep in university students prior to and during COVID-19 Stay-at-Hom orders. Curr Biol. 2020;30:R783–R801.
Available:https://doi.org/10.1016/j.cub.2020.06.022
14. Korman M, Tkachev V, Reis C. et al. COVID-19-mandated social restrictions unveil the impact of social time pressure on sleep and body clock. Sci Rep. 2020;10:22225.
Available:https://doi.org/10.1038/s41598-020-79299-7
15. Borbély AA, Daan S, Wirz-Justice A, Deboer T. The two-process model of sleep regulation: A reappraisal. J Sleep Res. 2016;25:131–143.
Available:https://doi.org/10.1111/jsr.12371
16. Montemurro N. The emotional impact of COVID-19 : From medical staff to common people. Brain Behavior and Immunity. 2020;00:0889-1591.
Available:https://doi.org/10.1016/j.bbi.2020.03.032
17. Hood MM, Reutrakul S, Crowley SJ. Night eating in patients with type 2 diabetes. Associations with glycemic control, eating patterns, sleep, and mood. Appetite. 2014;79:91–96.
Available:https://doi.org/10.1016/j.appet.2014.04.009
https://who.int/news-room/fact-sheets/detail/depression
18. Füzéki E, Groneberg DA, Banzer W. Physical activity during COVID-19 induced lockdown: Recommendations. J Occup Med Toxicol. 2020;15:25.
Available:https://doi.org/10.1186/s12995-020-00278-9
19. Roenneberg T, Kantermann T, Juda M, Vetter C, Allebrandt KV. Light and the human circadian clock. Handb Exp Pharmacol. 2013;217:311–31.
20. Robinson E, Boyland E, Chisholm A, Harrold J, Maloney NG, Marty L et al. Obesity, eating behavior and physical activity during COVID-19 lockdown: A study of UK adults. Appetite. 2020;156:104853.
Available:https://doi.org/10.1016/j.appet.2020.104853
21. Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, Zheng J. The psychological impact of the COVID-19 epidemic on college students in China. Psychiatry Res. 2020;287:112934.
Available:https://doi.org/10.1016/j.psychres.2020.112934
22. Wang C, Pan R, Wan X, Tan Y, Xu L, Mcintyre RS, et al. A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. Brain Behav Immun. 2020;87:40–48.
Available:https://doi.org/https://doi.org/10.1016/j.bbi.2020.04.028
23. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, Ho RC. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. Int J Environ Res Public Heal. 2020;17:1729.
Available:https://doi.org/http://dx.doi.org/10.3390/ijerph17051729
24. Gopal A, Sharma AJ, Subramanyam MA. Dynamics of psychological responses to COVID-19 in India: A longitudinal study. PLoS One. 2020;15:20.
Available:https://doi.org/10.1371/journal.pone.0240650
25. Hoefer M, Allison SC, Schauer GF, Neuhaus JM, Hall J, Dang JN, et al. Fear conditioning in frontotemporal lobar degeneration and Alzheimer's disease. Brain. 2008;131:1646–1657.
Available:https://doi.org/10.1093/brain/awn082
26. Orzech KM, Grandner MA, Roane BM, Carskadon MA. Digital media use in the 2 h before bedtime is associated with sleep variables in university students. Comput Human Behav. 2016;55(A):43–50.
DOI:10.1016/j. chb.2015.08.049

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/68253