

A Study on the Sleep–Wake Behavior during COVID-19 Lockdown and its Effect on Menstrual Cycle

Sir,

The coronavirus (COVID-19) pandemic and lockdown imposed some physiological and psychological stresses among all. A lot of spare time and work from home through online mode during lockdown increases the screen time even during late night. As a result, the duration of light exposure is significantly elevated accordingly and the circadian rhythm of sleep–wake behavior is altered. To maintain the physiological homeostasis, the normal circadian rhythm of sleep–wake behavior is important. The hormonally regulated female physiological characters are sensitive in this context.^[1] There are reports that the sleep–wake behavior may be affected by different phases of menstrual cycle and plasma melatonin level.^[2] It is well known that the dysfunction in menstrual behavior has pronounced effects on the quality of life, involving mood changes, infertility, and pregnancy complications. Therefore, the crosstalk between the sleep–wake behavior and menstrual cycle is important in this context of COVID-19 lockdown. In the present study, the effort was to understand the version of the crosstalk between these two behaviors on the basis of survey analysis.

During the COVID-19 lockdown, an online survey was conducted among 231 adult menstrual women between the age groups of 18 and 28 years. To eliminate the occupation-related influence on the menstrual cycle, only the students were included in the survey. The information about the sleep–wake behavior (duration of sleep and time of going to bed at night) and menstrual behavior (length of the cycle) was collected from the experience differences between before and after lockdown. The information about the screen time and depression during lockdown was also collected. The response of survey (categorical data) was converted to nominal characters for statistical analysis, and IBM_SPSS (IBM SPSS Statistics for Windows, Armonk, NY) statistical software is used to identify the significance of difference and relation. All the categorical data were presented on frequencies and percentages. Paired samples *t*-test was used to compare the responses between before and after lockdown. For the significant relation, among the going to bed time, sleep duration, and irregularities of menstrual cycle, the binary logistic regression (95% confidence interval for EXP [B]) was used for the present study.

The results showed, the body mass index (BMI) of 18–28 years of female students was 17.88 ± 0.312 (mean \pm standard error of the mean [SEM]) and the starting age (years) of menstrual cycle was 13.64 ± 0.109 (mean \pm SEM). From the response of the survey, it was revealed that during lockdown, the habit of going to bed at night after 12 P.M was significantly increased.

Although the duration of sleep (more than 7 h per day) was not increased significantly, the values of the responses of the survey showed a clear trend [Table 1]. As the habit of sleep was shifted from before 12 PM to after 12 PM with a more than 7-h sleep, the morning wake time was also shifted accordingly. As a result, the PM–AM cycle of sleep–wake behavior was converted to AM–AM cycle. The observation also indicates a significant change in the menstrual behavior during lockdown. The irregularity (either <24-day cycle or more than 34-day cycle) of menstrual cycle was significantly increased after COVID-19 lockdown period [Table 1]. From the binary logistic regression, it was found that the time of going to bed had significant ($P < 0.01$) relation with the irregularities of menstrual cycle. The positive response against the questionnaire regarding the increased screen time per day during lockdown was 78.35%, which was important enough to support the present scenario. Interestingly, only 46.75% of sample population was depressed during the lockdown period [Table 1].

From the statistical observation of the survey, it is clear that the BMI of 18–28 years of students is within normal range, so the overweight may not be the influencing factor behind the behavioral changes of menstrual cycle during lockdown. From the neurophysiological point of view, an adequate sleep with its circadian rhythm (PM:AM cycle) is important for the hormonal homeostasis. Melatonin is secreted by the pineal gland in response to darkness, hence it is known as hormone of darkness and it opens the sleep gate. Animal experiments in rodents have revealed that melatonin has the ability to reduce sleep onset time and increase sleep duration.^[3] On the light of clinical trial, low nocturnal melatonin production and secretion have been documented in elderly insomniacs, and exogenous melatonin has been shown to be beneficial in treating sleep disturbances of these patients.^[4] On the other hand, melatonin affects the female reproductive system

Table 1: Response of the survey among female students (18–28 years) in before and after COVID-19 lockdown (n=231)

Variables (n)	Frequency, n (%)	
	Before lockdown	After lockdown
Duration of sleep (>7 h)	159 (68.83)	182 (78.78)
Going to bed at night after 12 p.m.	62 (26.83)	83 (35.93)*
Irregularity of menstrual cycle	25 (10.82)	48 (20.77)*
Screen time is increased during lockdown	-	181 (78.35)
Depressed during lockdown	-	108 (46.75)

* $P < 0.05$ paired samples *t*-test

by acting upon the ovaries. It acts on the ovaries by acting on gonadotropin-releasing hormone (GnRH), thereby effecting the release of gonadotropins (GnRH is responsible for the release of luteinizing hormone and follicle-stimulating hormone from the anterior pituitary gland).^[5]

During lockdown, the habit of engagement with screen (it may be due to android phone, laptop, or television) even up to 1–2 AM increases the light exposure during night. It is well known that the rate of melatonin secretion is suppressed by the light exposure to the eyes. Therefore, the light exposure at night due to screen light during the lockdown may alter the rhythm of melatonin. The alteration of the rhythm is stimulated by the late morning waking. The observed irregularities of menstrual cycle after lockdown may be results due to the altered level of melatonin and gonadotropins. The effect of other factors such as stress, depression, and pathophysiological influences on the altered level of gonadotropins may not be excluded from the interpretation. However, within the normal range of BMI, the late-night light exposure with a late morning waking may have some effect on the menstruation-regulating hormones. However, the altered melatonin rhythm may be the connecting factor between the irregularities of menstrual cycle and altered sleep–wake behavior during lockdown. Therefore, it is important to maintain the natural sleep–wake circadian rhythm of PM:AM cycle. Hence, the habit of going to bed before 12 night with an adequate sleep may provide a normal female hormonal health. It is very alarming for the female young generation that their reproductive system is under threat due to their bad habit of late-night engagement with screen.

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Conflicts of interest

There are no conflicts of interest.

Goutam Dutta, Karthiga Murugesan¹

Department of Physiology, Prabhat Kumar College, Conati, West Bengal,

¹Biomedical Engineering, Agni College of Technology, Chennai, Tamil Nadu, India

Address for correspondence: Dr. Goutam Dutta,
Department of Physiology, Prabhat Kumar College, Karkuli, Contai - 721 404,
West Bengal, India.
E-mail: emailgouta@gmail.com

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