



EFFECT OF COVID – 19 PANDEMIC ON THE BIOLOGICAL RHYTHMS AND MENTAL HEALTH IN MEDICAL STUDENTS AND USE OF COPING STRATEGIES: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: The COVID-19 Pandemic had a high impact on the education system especially medical education. The shift from physical to online classes, social distancing has placed medical students under harsh psychological conditions leading to mental stress, post-traumatic stress disorder which is disregarded. Hence, we are aiming to assess and correlate the biological rhythms, coping strategies, and mental health in medical students.

Materials & Methods: All the medical students who are pursuing MBBS in Medical Colleges in Hyderabad were enrolled in this Cross-Sectional Study. Each student was assessed based on the following tools i.e Biological Rhythms Interview of Assessment in Neuropsychiatry (BRIAN), **Brief-COPE**, and **PHQ-4**. Data is analyzed using SPSS version 22 for Windows. A comparison of means is done by using the t-test and ANOVA. Association studies were done using the chi-square test and Pearson's correlation test.

Results: 261 participants participated in the study, 186 (71.3%) were females and 72 (27.6%) were males. Sixty-two (23.8%) participants each were from 1st Year and 2nd Year respectively. The majority of students were suffering from depression and anxiety. This was supported and contributed by the higher scores on the avoidant coping skills. The correlational studies showed a significant positive correlation between number of hours spent on screen and disturbed circadian rhythm ($p < 0.0001$), avoidant coping skills ($p = .013$), anxiety ($p = 0.027$), depression ($p = 0.048$). A disturbed circadian rhythm had a positive significant correlation with avoidant coping skills ($p < 0.0001$), anxiety ($p < 0.0001$), depression ($p < 0.0001$). The scores for avoidant coping skills had a positive significant correlation with anxiety ($p < 0.0001$), depression ($p < 0.0001$).

Conclusion: A disturbed circadian rhythm was observed in students due to the pandemic lockdown. A disturbed circadian rhythm contributes to the higher employment of avoidant coping strategies. The higher use of avoidant coping strategies has been known to increase the risk of anxiety and depression as was also seen in this study.

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INTRODUCTION

Novel CoronaVirus Disease (COVID-19) originating from China, has spread ubiquitously and drastically all over the world. The World Health Organization has declared COVID-19 as a pandemic on 14th March. India now has the largest outbreak of COVID-19. [1-3] In many countries in the world, including India, have also taken specific measures to decrease the spread like lockdown and social distancing. [4] During the lockdown, all the non-essential services, including universities, have been shut down. Many universities suspended the classes and switched to online teaching; the lives of students have changed drastically. [5] This phenomenon of social isolation has placed students in harsh psychological conditions, putting them under a lot of pressure to perform academically; students are more vulnerable to develop mental health conditions. [6]

The overall impact on education and mental health of the university environment on students is still unknown, and it is expected to be very vast. [7-8] Few studies have shown that young adults between 18 and 35 years old tend to have a high and growing prevalence of sleep problems. Young adults make extensive use of social media devices that interact with daily activities, including sleep which could have a broadly negative effect on the biological rhythm outcomes of young adults. [9-11] According to an Ehlers and Clark theoretical model [12], after encountering any traumatic event, individuals may make a pessimistic analysis of the trauma. This further leads to quickly adapting maladaptive strategies to maintain Post Traumatic Stress Disorder symptoms such as invasion, arousal symptoms, and strong negative emotions. [13] The coronavirus (COVID-19) outbreak may result in mental health problems like stress, anxiety, and depression for a lot of individuals, including

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students, which may be disregarded and has a major impact on their emotional responses and coping strategies.^[14-15]

An unprecedented pandemic, which is causing an unexpected impact on the mental health of students, is very crucial to analyze the biological rhythms and stress coping strategies and mental health. The orderly biological rhythms and positive stress coping strategies influence sound mental health and, ultimately, the better clinical outcome. Hence, we are aiming to assess and correlate the biological rhythms, coping strategies, and mental health in medical students.

Primary Objective

- To assess the biological rhythms, coping strategies, and mental health among the medical students during the COVID pandemic.
- To analyze the association of biological rhythms and coping strategies with mental health during the COVID pandemic.
- **Study Site:** Tertiary medical college hospital
- **Study Population:** Medical Students
- **Study Design:** a cross-sectional study
- **Time frame:** 1 month
- **Inclusion Criteria:** All the subjects who are pursuing MBBS and those who gave the consent will be included.
- **Exclusion Criteria:** The subjects who do not give consent are excluded. The interns and other health care professionals are excluded.
- **Methodology:** The self-report questionnaire is designed by below mentioned tools. The data is collected through the online survey and the analysis is done.

Tools Used

The self-report questionnaire is made by using the following tools.

Biological Rhythms Interview of Assessment in Neuropsychiatry (BRIAN) was used to assess the following domains (Sleep, Activity, Social, Diet, and Predominant Rhythms).^[16]

Brief-COPE is used to assess avoidant and approach coping skills.^[17]

PHQ-4 is used to assess mental health (anxiety and depression)^[18]

Statistical Methods

- Data will be analyzed using SPSS version 22 for Windows. Demographic variables will be described using frequencies, percentages. Mean, and standard deviation will be calculated for scores on scales. A comparison of means will be made using the t-test and ANOVA. Association studies will be done using the chi-square test and Pearson’s correlation test. P-value is set at 0.05

RESULTS

At the start of the study 263 participants met the criteria. Two participants did not provide informed consent and were dropped from the study. Out of the 261 participants who participated, 186 (71.3%) were females and 72 (27.6%) were males. Sixty-two (23.8%) participants each were from 1st Year and 2nd Year respectively. Twenty-four (9.2%) were from Final year part I and 113 (43.3%) participants were from Final

year part II. The mean age for females was 20.90 ± 5.41 years and for males was 21.43 ± 7.37 years. Among the participants (59.7%) spent more than 5 hours on a digital screen out of whom female participants were a majority. A higher number of final year part II participants (71) said they spent more than 5 hours on a digital screen. The average number of online classes during the pandemic was 2-3 hours. The difference in the number of online classes held was found to be statistically significant (p=0.018).

Table 1 Demographics

		YEAR			
		First Year (n=62)	Second Year (n=62)	Third Year (n=24)	Fourth Year (n=113)
Gender	Female	42	40	15	89
	Male	19	22	9	22
	Prefer Not to say	1	0	0	2
Have you been diagnosed with COVID 19 during this period?No	Yes	58	62	24	108
	Yes	4	0	0	5
How many hours do you spend on a digital screen?< 2 hours	2-5 hours	5	2	1	1
	> 5 hours	27	21	7	41
	> 5 hours	30	39	16	71
The number of hours of online classes conducted daily?1-2	2-3	35	24	9	33
	>3	20	35	13	63
	>3	7	3	2	17
Anxiety	No	41	42	16	72
	Yes	21	20	8	41
Depression	No	38	38	15	67
	Yes	24	24	9	46

Ninety participants (34.4%) were classified as having anxiety of which the majority were from final year part II (n = 41). The majority of them were of mild severity (n = 72). 103 participants (39.4%) were classified as having depression of which the majority were from final year part II (n = 46). The majority of them were of mild severity (n = 84). The participants scored higher on Approach coping skills (15.17 ± 3.24) as against the Avoidant coping skills (11.50 ± 2.86). Participants from 1st Year scored higher on Approach coping (15.75 ± 3.04), while final year part II participants scored higher on Avoidant coping skills (11.64 ± 3.08).

Table 2 Comparison of means

Year		Age	Anxiety	Depression	Avoidant	Approach
Ist Year	Mean	20.161	2.0000	2.3226	11.5806	15.7500
	Std. Deviation	9.3145	1.82873	1.59686	2.70881	3.04979
	Mean	19.871	2.1290	2.3065	11.1774	14.4355
IInd Year	Std. Deviation	.9318	1.93741	1.88687	2.60689	3.13688
	Mean	21.042	2.1250	2.3333	11.5625	15.5000
	Std. Deviation	1.0417	1.56906	1.57885	2.87535	2.91175
Final Year Part I	Mean	22.159	2.3628	2.4071	11.6416	15.2035
	Std. Deviation	5.7299	1.85194	1.84021	3.08761	3.42564
	Mean	21.038	2.1992	2.3563	11.5096	15.1782
Total	Std. Deviation	5.9877	1.83936	1.76489	2.86170	3.24272

Table 3 Comparison of circadian rhythm

Year		Report					
		Sleep	Activity	Social	Diet	Chronotype	CircadianRythm
Ist Year	Mean	11.1129	10.6129	8.5323	7.2097	6.7258	44.1935
	Std. Deviation	4.61681	4.03003	3.41510	3.02523	1.77570	14.33080
	Mean	10.8871	9.9194	7.8226	6.8871	6.3871	41.9032
IInd Year	Std. Deviation	3.97577	3.47496	3.25186	2.99784	1.72118	11.77481
	Mean	11.0833	9.5000	7.7917	6.5833	6.7917	41.7500
	Std. Deviation	4.39285	2.85901	3.45127	2.08341	1.81729	12.66028
Final Year Part I	Mean	10.9292	9.8230	7.9558	6.8938	6.7168	42.3186
	Std. Deviation	4.11599	3.80843	3.38692	3.06874	1.78019	13.07415
	Mean	10.9770	10.0038	8.0460	6.9387	6.6475	42.6130
Total	Std. Deviation	4.20982	3.70706	3.36009	2.95415	1.76458	13.01329

The mean scores for the circadian rhythm assessment was 42.61 ± 13.01 with males scoring 43.36 ± 13.31 and 1st-year participants scoring 44.19 ± 14.33 among gender and year of study groups respectively. The subscales Sleep (10.97 ± 4.20)

and Activity (10.00 ± 3.70) dysfunction was comparatively higher among the subscales. None of the differences in assessment scales were statistically significant.

The correlational studies showed a significant positive correlation between number of hours spent on screen and circadian rhythm ($r = .227, p < 0.0001$), avoidant coping skills ($r = .154, p = .013$), anxiety ($r = 0.137, p = 0.027$), depression ($r = 0.123, p = 0.048$). The scores for circadian rhythm had a positive significant correlation with avoidant coping skills ($r = .489, p < 0.0001$), anxiety ($r = 0.593, p < 0.0001$), depression ($r = .638, p < 0.0001$). The scores for avoidant coping skills had a positive significant correlation with anxiety ($r = 0.503, p < 0.0001$), depression ($r = .493, p < 0.0001$). Approach coping skills had negative correlation with circadian rhythm, anxiety, depression which were not statistically significant

DISCUSSION

261 participants were included in the study after meeting the criteria and receiving consent. They were then provided with assessment questionnaires for the responses. Female participants were a majority in the sample. Most of the participants belonged to the final year MBBS II. Female participants majorly spent more than 5 years on digital viewings. Average online classes held were 2-3 hours per day. Final year II students scored higher for depression and anxiety severity. This was supported and contributed by the higher scores on the avoidant coping skills by the final year II students. The first-year scored higher on the approach coping skills. This can be explained by the higher exposure to stress and curriculum burden in final year II students during the pandemic. The high disturbance was seen in the circadian rhythms in the sample, with males and first-year students showing higher dysfunction of the circadian rhythm. The sleep and activity domains had higher levels of dysfunction. This can be explained by the lockdown enforced for long periods which had an impact on daily schedules and ADL in addition to the restriction of physical activity.

Correlation studies were done. Increased number of hours spent on screen was seen to cause higher levels of rhythm dysfunctions ($p < 0.0001$), more avoidant coping mechanisms ($p = 0.013$), anxiety ($p = 0.027$), depression ($p = 0.048$). Higher dysfunction in circadian rhythms led to increased use of avoidant coping skills ($p < 0.0001$), higher anxiety ($p < 0.0001$), and depression scores ($p < 0.0001$). Increased use of avoidant coping skills also causes higher chances to develop anxiety ($p < 0.0001$) and depression ($p < 0.0001$). Approach coping skills were seen to reduce circadian rhythm dysfunction, anxiety, and depression but were not found to be statistically significant.

CONCLUSION

A disturbed circadian rhythm was observed in students due to the pandemic lockdown. Factors like stress, the year of education, higher time spent on screens affected the circadian rhythm. The sleep and activity domains had higher levels of dysfunction. A disturbed circadian rhythm contributes to the higher employment of avoidant coping strategies. The higher use of avoidant coping strategies has been known to increase the risk of anxiety and depression as was also seen in this study.

Limitations

1. Small sample size due to non-responses.
2. The study being a cross-sectional study design did not allow to monitor the development/progress in disturbances as the pandemic progressed.
3. Possible unseen factors that contribute to the findings. The factors may be explored in a follow-up study

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Conflict of Interest: NIL

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