Correlation Between Circadian Rhythm Sleep Disorder And Behavioral Changes In College Students

Revathi Srinivasan[1], Prathik. P[2], A.K. Vijay Krishna Kumar[3]

[1]Lecturer, Department of Physiotherapy, Dr. B. R Ambedkar College of Physiotherapy, Bangalore, India.

[2] Intern, Department of Physiotherapy, Dr. B. R Ambedkar College of Physiotherapy, Bangalore, India.

[3]Principal, Department of Physiotherapy, Dr. B. R Ambedkar College of Physiotherapy, Bangalore, India.

ABSTRACT

BACKGROUND: Circadian rhythm are biological processes that follow 24-hour cycle, synchronized with the day-night cycle of earth's rotation. The body's circadian rhythms, which govern various physiological processes over 24-hour cycle are regulated by molecular clockworks located within the brain. There is a bidirectional relationship which exists between behavioral changes and circadian rhythm. Changes in behavior, such as alterations in sleep patterns or exposure to light can influence the circadian rhythm, while the circadian rhythm also regulates various behaviors, including hormone release and metabolism.

AIM OF STUDY: " To find out the behavioral changes in college going students due to circadian rhythm sleep disorder."

METHODOLOGY: Subjects taken into consideration were from college going students ageing between 19-25 years. Preliminary questionnaire was prepared in google form which was later circulated through messaging app. Each student were asked to fill a set of Morningness-Eveningness questionnaire which consisted of 19 items and a set of Behavioral problem scale which consisted of 10 items. The data was later analysed to find out the correlation between circadian rhythm sleep disorder and behavioral problems.

RESULT: The result of this study is that, the mean MEQ score was 52.96 with a standard deviation of 7.39. Similarly, the mean BPS score was 12.28 with a standard deviation of 5.89.

The study found a negative correlation between MEQ and BPS, with an r-value of -0.230 and a p-value of 0.001. This indicates a weak but statistically significant inverse relationship between the two variables.

CONCLUSION: The current study concluded that the correlation between MEQ (Morningness-Eveningness Questionnaire) and BPS (Behavioral problem scale) scores is represented by an r value of -0.248, with a p-value less than 0.001. This negative correlation indicates that as MEQ scores increase, reflecting greater morningness, BPS scores tend to decrease, suggesting a lower presence of behavioral problem symptoms

KEYWORDS: Behavioral changes, Circadian rhythm, College students, Morningness Eveningness questionnaire, Sleep disorder.

INTRODUCTION

Circadian rhythms are internal processes that synchronize with the natural light-dark cycle of a 24hour day. They are regulated by molecular mechanisms within the brain. This synchronization allows organisms to adapt to daily environmental changes, such as sleep-wake cycles and metabolic processes.[1]

Lifestyle comprises a wide range of components which include goals, plans, attitude, behaviors and beliefs of an individual's personal life.[2]

Circadian fluctuations in behavioral, physiological, and metabolic factors are frequently observed in individuals with unipolar and bipolar disorders. The most noticeable variation occurs in mood, as depressed individuals often experience an improvement in their mood state during the evening. [3]

Extended artificial light at night and the availability of food at all hours have become integral part of modern life, but they often disrupt sleep patterns and promote sedentary behavior, leading to adverse effects on human health. The prevalence of fast food consumption, inadequate physical activity and daily work routines have contributed to circadian rhythm disruption, increasing the adverse health outcomes.[4]

College students often encounter various sleep issues that can affect their academic performance, health and behavior. Sleep deprivation is a prevalent issue among college students, influenced by both biological and social factors. Biological factors such as changes in circadian rhythm and hormonal fluctuations along with social factors like academic pressure and social activities. Sleep disturbances have been linked to attention deficit, increased risk-taking behavior, higher susceptibility to depression, impaired social relationships and compromised physical health.[5]

Sleep quality and duration differ not only in their effects on health and behavioral issues but also in their influence on school performance.[6]

Sleep disturbances are linked to the emergence of poor mental health, feelings of loneliness, heightened worry, anxiety and depression. [7]

Evening chronotypes reported more daytime sleepiness, greater attention problems, lower academic performance, and increased emotional distress compared to morning chronotypes.[8]

Sleep problems were associated with hindered learning, particularly reduced declarative and procedural learning, impaired neurocognitive performance, and lower academic achievement.[9]

Sleep disturbances have a complex relationship with depression, occurring both before and after its onset and recurrence.[10]

In this study, lifestyle changes of an individual can disrupt circadian rhythm, which leads to sleep disturbances in college students, which in turn can cause behavioral changes.

NEED OF THE STUDY

1. To find out circadian rhythm sleep disturbances in college students using MEQ Questionnaire.
2. To find out behavioral problems in college students using BPS Questionnaire.
3. To find out the correlation between circadian rhythm sleep disturbances and behavioral changes in college students.

HYPOTHESIS

- **NULL HYPOTHESIS (H0):**

There is no significant correlation between circadian rhythm sleep disorder and behavioral changes in college students.

- **ALTERNATE HYPOTHESIS (H1):**

There is significant correlation between circadian rhythm sleep disorder and behavioral changes in college students.

METHODOLOGY

Research Design – Observational Study

Study Sample - Sample size of 200 between the age group of 19-25 years of age based on inclusion and exclusion criteria.

Sample Method - Convenient Sampling

Sample Setting – Online mode.

Inclusion criteria -

- Both Male and Female college students
- Age group between 19-25
- Active participants

Exclusion criteria –

- Individuals with a predisposition of mental health disorder
- Individuals with other sleeping disorders

Outcome measures –

- Morningness-Eveningness questionnaire (MEQ)
- Behavioral problem scale (BPS)

Study procedure - Subjects taken into consideration were from college going students between age of 19-25 years. A total of 200 students both male and female were asked the questions. Each student were asked to fill Morningness-Eveningness questionnaire (MEQ) and Behavioral Problem Scale (BPS) which was created using Google form and was circulated through messaging app. The data was collected and later analysed to find out the correlation between circadian rhythm sleep disturbance and behavioral problems.

DATA ANALYSIS

The statistical analysis was done using SPSS 23.0. The categorical variables were represented in frequency and percentage . Numerical data were represented using median, mean and SD. Correlation was performed using Karl-Pearson's coefficient of correlation. A p-value less than 0.05 was considered statistically significant.

Table 1: Age distribution

Age	Frequency	Percent
<=20 years	67	33.5
> 20 years	133	66.5
Total	200	100%

The study consists of 200 participants, of which 33.5% are aged 20 years or younger, while the remaining 66.5% are over 20 years old. The average age was 21.41±1.71 years with minimum of 19 and maximum of 25 years.
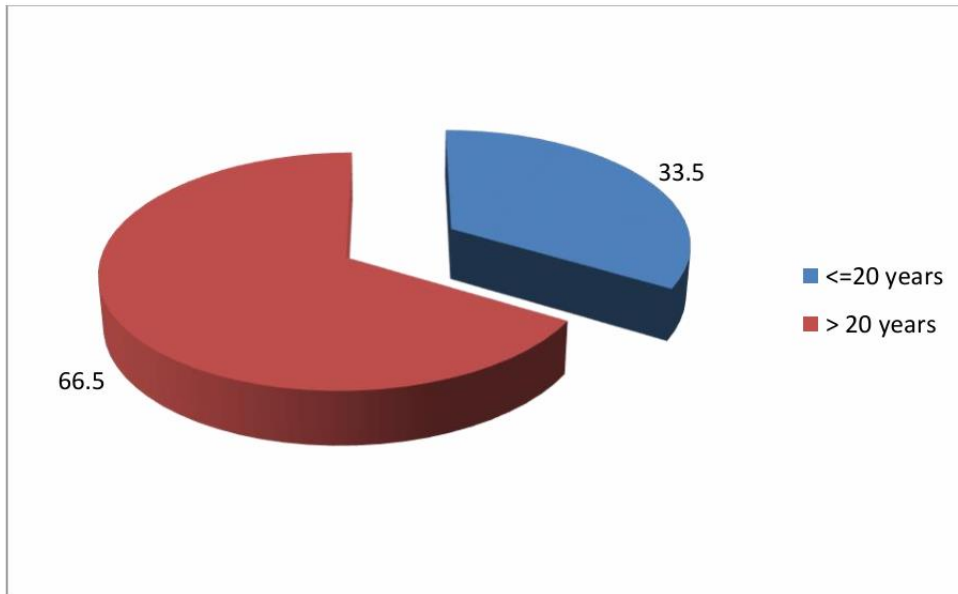
Figure 1 : Representation of age

Table 2 : Distribution based on gender

Gender	Frequency	Frequency
Female	105	52.5
Male	95	47.5
Total	200	100.0

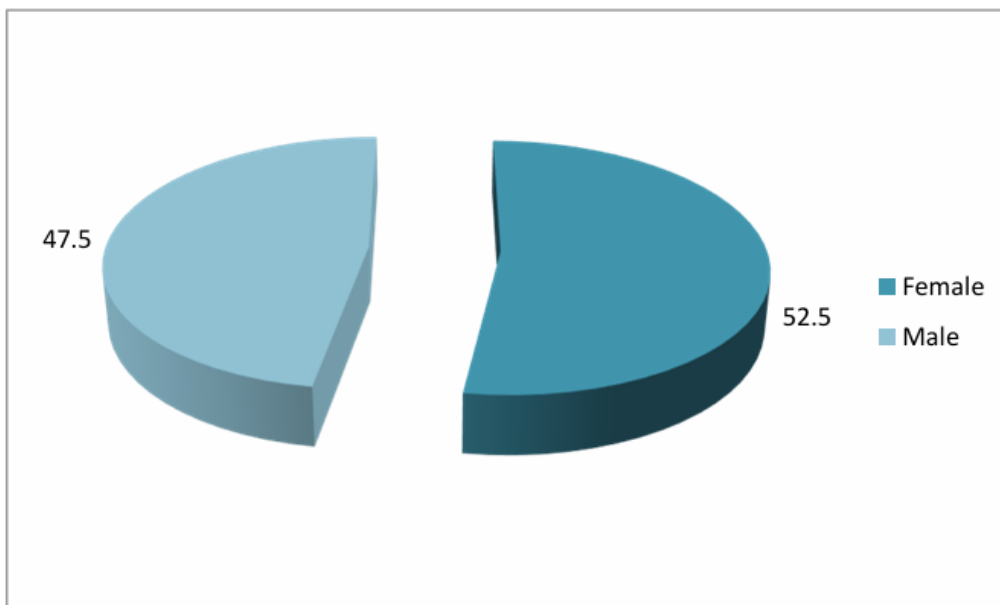Among the participants, 52.5% are female (105 participants) and 47.5% are male (95 participants).

Figure 2: Representation based on gender

Table 3: Descriptive statistics of MEQ and BPS Score

	N	Mean	Std. deviation
MEQ	200	52.9550	7.38823
BPS	200	12.2800	5.88855

The study, comprising 200 participants, revealed that the mean MEQ score was 52.96 with a standard deviation of 7.39. Similarly, the mean BPS score was 12.28 with a standard deviation of 5.89.
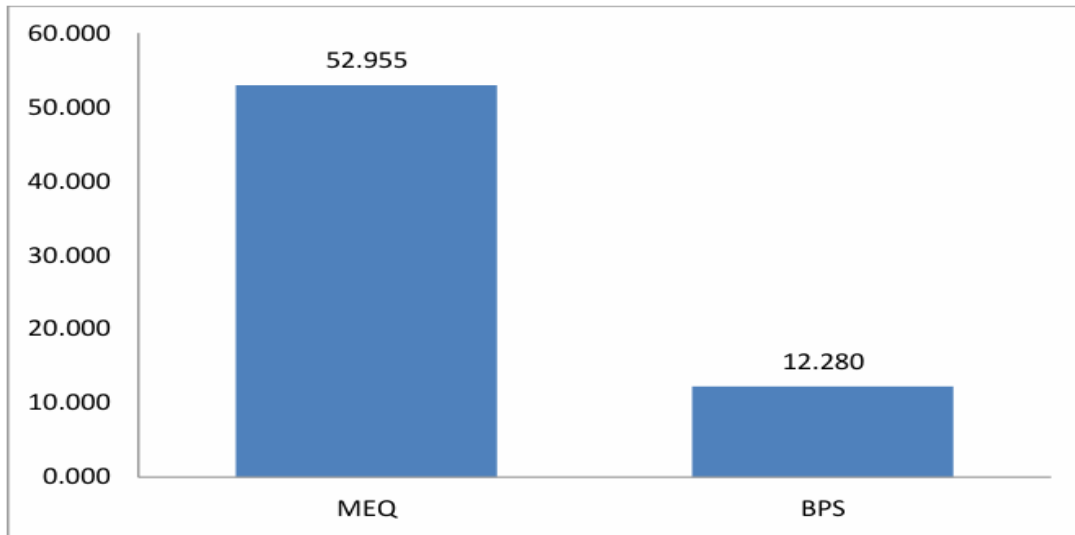

Figure 3: Representation of MEQ and BPS

Table 4: Correlation between MEQ and BPS

		BPS
MEQ	R value	-.230**
	P value	.001
	N	200

The study found a negative correlation between MEQ and BPS, with an r-value of -0.230 and a p-value of 0.001. This indicates a weak but statistically significant inverse relationship between the two variables.
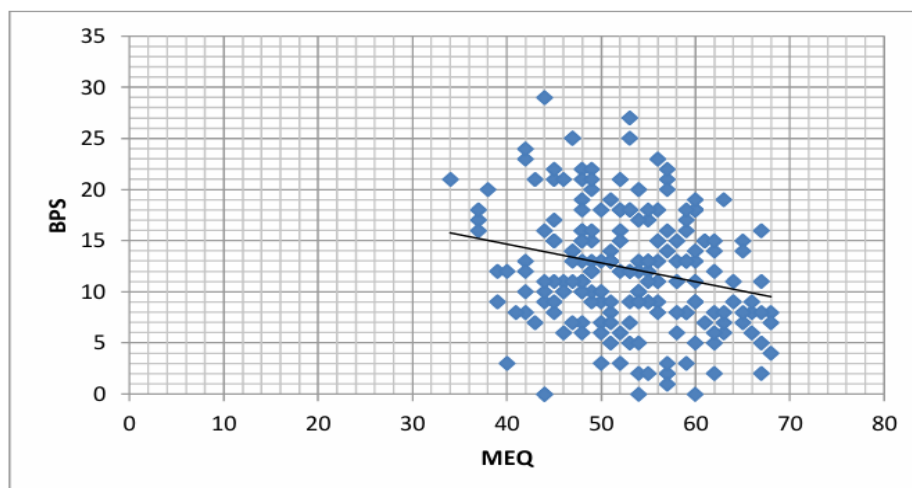

Figure 4: Scatter Diagram for MEQ and BPS

DISCUSSION

Circadian rhythms are internal manifestations of the solar day that permit adaptations to predictable environmental temporal changes. Circadian rhythms are internal processes that synchronize with the natural light-dark rhythm of a 24hour day. They are regulated by molecular mechanisms within the brain. This synchronization allows organisms to adapt to daily environmental changes, such as sleep-wake cycles and metabolic processes.[1]

Circadian rhythm can be affected by lifestyle and heredity which causes disruption in sleep leading to behavioral problems. It is increasingly apparent that sleep disturbances are associated with both emotional (e.g. anxiety and depression) and behavioral (e.g. attention and conduct) difficulties in young adults. Behavioral problems and cognitive functioning are associated with sleep disruption and risk-taking behaviors are impacted by sleep disruption. Inadequate sleep duration results in daytime sleepiness, fatigue, decreased concentration, irritable behaviors, and anger.[11] An evening chronotype, low sleep quality, and excessive daytime sleepiness were significantly associated with an increased risk of behavioral issues.[12]

In this current study, the aim was to find the correlation between circadian rhythm sleep disorder and behavioral changes. A total of 200 students both male and female were selected by fulfilling inclusion and exclusion criteria. Subjects taken into consideration were from college going students between age of 19-25 years. Morningness-Eveningness questionnaire (MEQ) and Behavioral Problem Scale (BPS) was created using Google form and was circulated through messaging app. Subjects were asked to fill the questionnaire completely.

The data was collected and later analysed to find out the correlation between circadian rhythm sleep disturbance and behavioral problems.

The scale used for the study is Morningness – Eveningness questionnaire consisting of 19 items, the scale was developed to assess individual differences in morningness and eveningness – the degree to which respondents are active and alert at certain times of day. The study, comprising of 200 participants, revealed that the mean MEQ score was 52.96 with a standard deviation of 7.39. Similarly, the mean BPS score was 12.28 with a standard deviation of 5.89.

Using morningness-eveningness questionnaire the sleep disturbances in college students were found. Behavioral changes were found using behavioral problem scale. Later the correlation between circadian rhythm sleep disturbances and behavioral changes were found to be inverse relationship. i.e. if morningness increases behavioral problems decreases.

CONCLUSION

The current study concluded that the correlation between MEQ (Morningness-Eveningness Questionnaire) and BPS (Behavioral problem scale) scores is represented by an r value of -0.230, with a p-value of 0.001. This negative correlation indicates that as MEQ scores increase, reflecting greater morningness, BPS scores tend to decrease, suggesting a lower presence of behavioral problem symptoms.

LIMITATIONS

- This study did not focus on factors influencing circadian rhythm disturbance; it studied only the change in circadian rhythm pattern and how it affects the behavior.
- Participants may provide false or socially desirable answers.

RECOMMENDATIONS

- Factors affecting circadian rhythm can be further studied.
- Behavioral lifestyle and their effect on sleep pattern can be further studied.

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