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Measuring Adiposity and Its Relationship with Circadian Rhythm and Cognitive Function among Young Medical Graduates

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Abstract

This study investigates the interrelationships between adiposity, circadian rhythm, and cognitive function among young medical graduates. Data from 150 participants, including Body Mass Index (BMI), Morningness-Eveningness Questionnaire (MEQ) scores, and Standardized Mini-Mental State Examination (SMMSE) scores, were analyzed. The findings suggest that individuals with an evening chronotype tend to have higher BMI, and morning types exhibit better cognitive performance. These results highlight the impact of circadian alignment on metabolic and cognitive health, emphasizing the importance of lifestyle modifications for young adults.

Introduction

Adiposity, characterized by excess body fat, has been linked to metabolic disorders, cardiovascular diseases, and cognitive impairment. Circadian rhythms are critical in regulating physiological functions, including metabolism and cognition. Disruptions in these rhythms have been associated with obesity and cognitive decline. Young medical graduates often face irregular sleep patterns due to academic pressure and hospital duties, making them an ideal population for studying these interconnections. This study aims to assess the relationship between adiposity, circadian rhythm, and cognitive function in this demographic group.

Methods

Study Design and Participants: A cross-sectional study was conducted among 150 young medical students in their early 20s. Participants were recruited from a medical college, with an equal distribution of males and females.

Data Collection

Body Mass Index (BMI): Height and weight were measured using standardized procedures. BMI was calculated as weight (kg) divided by height squared (m^2) and classified into four categories:

Underweight (<18.5 kg/m^2)

Normal weight (18.5 - 24.9 kg/m²)

Overweight (25 - 29.9 kg/m²)

Obese (≥30 kg/m²)

Circadian Rhythm Assessment Morningness-Eveningness Questionnaire (MEQ) was used to classify participants into chronotypes:

Morning type (MEQ score: 42-86)

Intermediate type (MEQ score: 31-41)

Evening type (MEQ score: 16-41)

Cognitive Function Measurement Cognitive performance was assessed using the Standardized Mini-Mental State Examination (SMMSE), with scores ranging from 0 (severe cognitive impairment) to 30 (optimal cognitive function).

Statistical Analysis Correlations between BMI, MEQ scores, and SMMSE scores were determined using Pearson's correlation coefficient. Statistical significance was set at $p < 0.05$.

Results

Participant Characteristics

Total participants: 150 (mean age: 22.5 years, range: 21-25 years)

Gender distribution: Male (44%), Female (56%)

BMI Distribution:

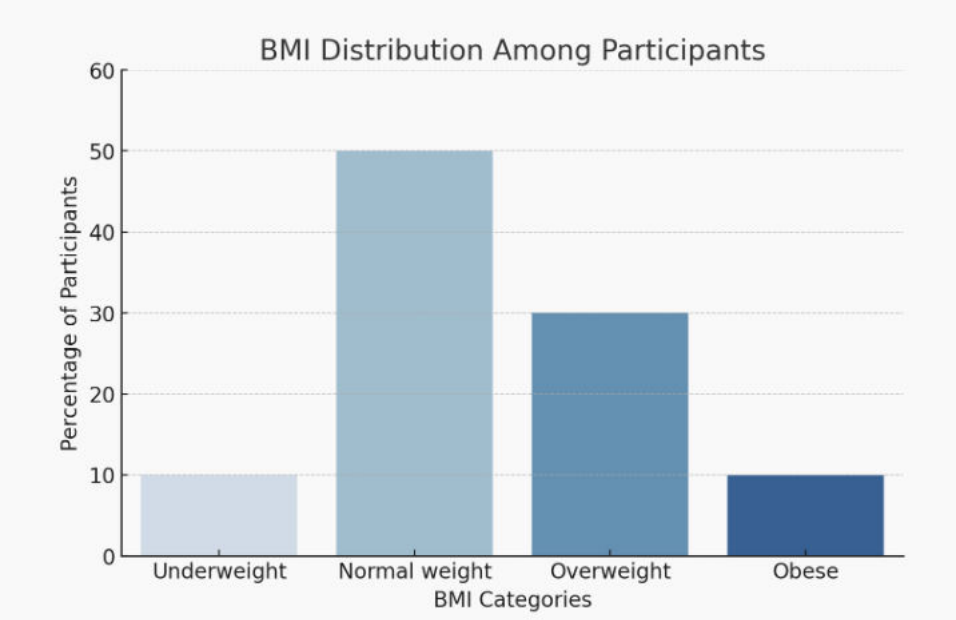

Figure 1: BMI Distribution Among Participants – Shows the proportion of underweight(10%), normal weight(50%), overweight(30%), and obese(10%) individuals.

Chronotype distribution:

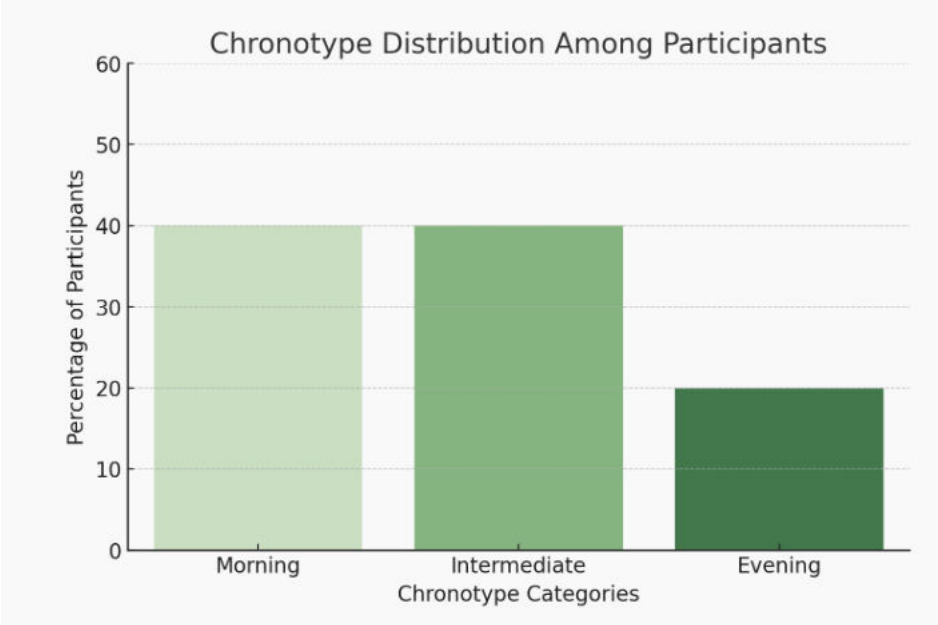

Figure 2: Chronotype Distribution Among Participants – Depicts the percentage of participants classified as Morning (40%), Intermediate (40%), Evening (20%) types.

Cognitive function (SMMSE): Mean score 25.8

Adiposity and Circadian Rhythm The study revealed a statistically significant correlation between BMI and chronotype ($p < 0.05$). The majority of participants classified as overweight or obese belonged

to the evening chronotype category. Conversely, morning-type individuals were predominantly of normal weight, suggesting a possible link between circadian misalignment and increased adiposity.

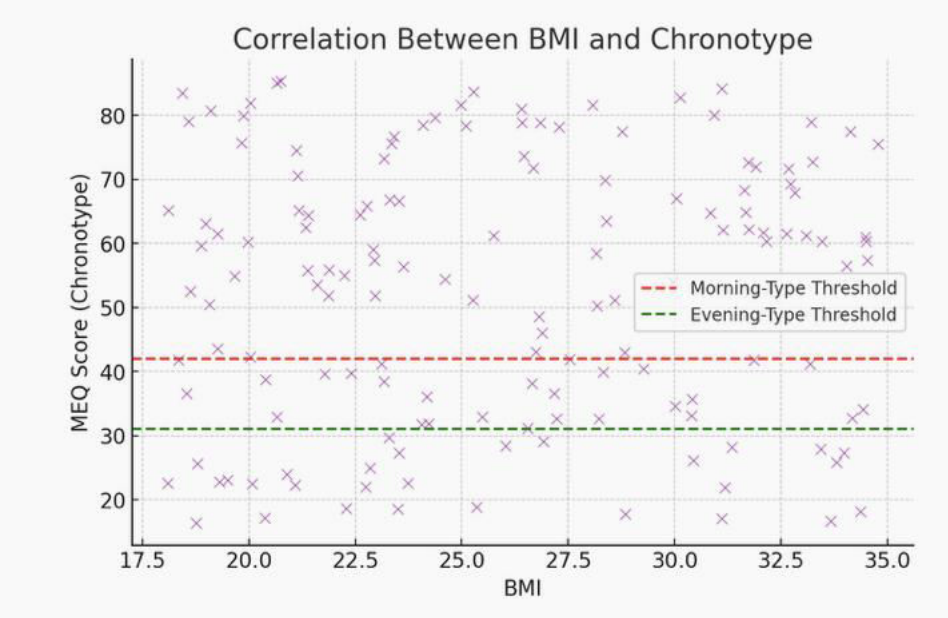

Figure 3: Correlation Between BMI and Chronotype – Shows the relationship between BMI and MEQ scores, with threshold lines indicating morning and evening chronotypes.

Circadian Rhythm and Cognitive Function Participants with a morning chronotype exhibited significantly higher SMMSE scores (Mean: 27.5) compared to evening types (Mean: 24.3, $p < 0.05$). This finding aligns with existing literature that indicates morning types tend to have better cognitive performance and alertness during early hours compared to their evening-type counterparts.

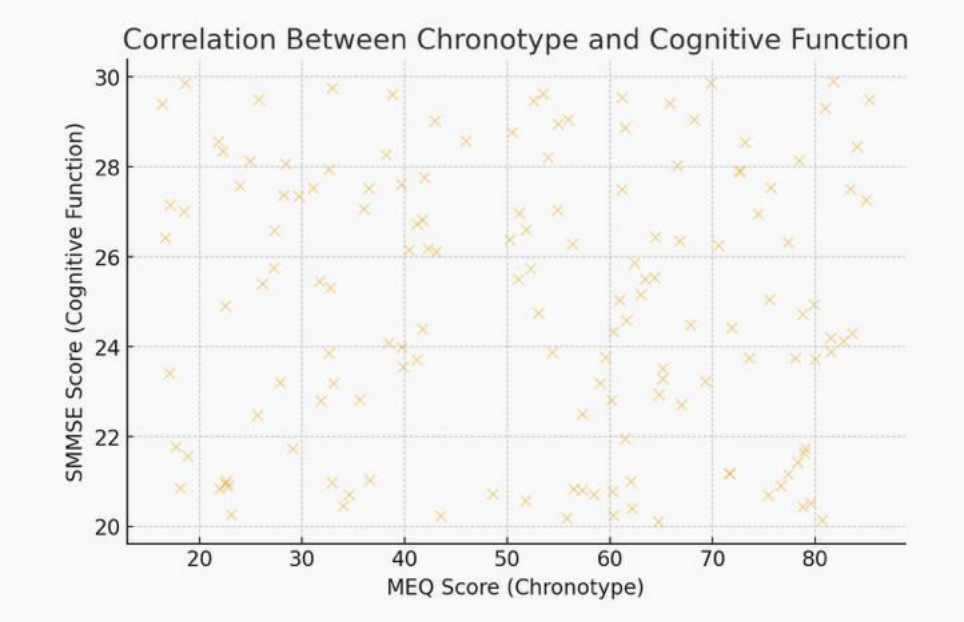

Figure 4: Correlation Between Chronotype and Cognitive Function – Illustrates the association between MEQ scores and SMMSE scores (cognitive function).

Discussion

Association Between Adiposity and Circadian Rhythms Our study found that overweight and obese participants were more likely to exhibit evening chronotypes. This aligns with previous research suggesting that circadian misalignment contributes to metabolic dysregulation and an increased risk of obesity. Evening chronotypes often experience shorter sleep duration, reduced physical activity, and irregular eating habits, which can lead to metabolic disturbances and weight gain.

Impact of Circadian Rhythm on Cognitive Function Participants with morning chronotypes showed significantly higher SMMSE scores compared to evening chronotypes ($p < 0.05$). Previous studies have demonstrated that early chronotypes exhibit improved attention, memory recall, and executive function. The misalignment of circadian rhythm in evening types may disrupt cognitive processes, contributing to decreased cognitive efficiency.

Effect of Adiposity on Cognitive Function Although our data did not show a significant direct correlation between BMI and cognitive function, existing literature suggests that obesity, particularly in young adults, is associated with reduced memory performance and executive dysfunction. However, in our study, this relationship may have been mitigated by factors such as age and overall good health.

Conclusion: This study underscores the interdependence of adiposity, circadian rhythm, and cognitive function. The significant correlation between evening chronotype and obesity suggests that disruptions in circadian rhythm may contribute to weight gain. Moreover, the findings highlight that early chronotypes tend to have superior cognitive function, underscoring the importance of maintaining a stable circadian rhythm. Future research should examine the longitudinal impact of circadian misalignment on both metabolic and cognitive outcomes.

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