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# A CROSS-SECTIONAL STUDY TO EVALUATE THE ANXIETY, SLEEP QUALITY AND COGNITIVE FUNCTIONS IN UNDERWEIGHT YOUNG ADULTS OF RURAL AREAS OF RAJASTHAN STATE

*Poonam Nagori[1], Preeti Hada[2], Vivekanand Das[3], Himanshu Sharma[1]*

[1]*Assistant Professor, Department of Physiology, Jhalawar Medical College, Jhalawar Rajasthan, India.*
[2]*Assistant Professor, Department of Anatomy, Jhalawar Medical College, Jhalawar Rajasthan, India.*
[3]*2nd Year P.G. Resident, Department of Anatomy, Jhalawar Medical College, Jhalawar Rajasthan, India.*

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**Corresponding Author:**
**Dr. Himanshu Sharma,**
Assistant Professor, Department of Physiology, Jhalawar Medical College, Jhalawar Rajasthan, India.
Email: dr.himanshusharma@yahoo.com

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ABSTRACT

**Background:** Studies related to the assessment of the underweight individuals in comparison to the healthy young adults are sparse in Rajasthan. It was reported that underweight individuals experience higher levels of stress, low sleep quality, and declined cognitive functions. The oObjective is to evaluate the anxiety, sleep quality, and cognitive functions in underweight young adults of rural areas of Rajasthan state.

**Materials and Methods:** The present case-control study was conducted at the Department of Physiology. 40 underweight male and female young adults were part of the study. 40 healthy young adults, age and gender-matched, were also recruited. Anxiety levels were assessed using the Generalised Anxiety Disorder Scale-7 (GAD-7). Sleep quality was assessed using the Insomnia Severity Index (ISI). Reaction time was assessed using reaction time apparatus.

**Results:** Anxiety scores were not significantly different between the underweight and healthy individuals. ISI scores were significantly higher in underweight individuals. Visual reaction time for red and green lights was longer in the underweight participants when compared with the healthy individuals. Auditory reaction times were also significantly longer in the underweight individuals when compared with the healthy individuals.

**Conclusion:** The study results support that the underweight individuals experience high levels of poor sleep quality and declined cognitive functions when compared with the healthy individuals.

**Keywords:** Underweight, Young adults, Stress, Anxiety, Memory.

## INTRODUCTION

BMI<18·5 kg/m2 is considered underweight. The prevalence of underweight among young women is a serious international health issue. However, the evidence on how being underweight negatively affects brain health and cognition is still unclear. It was reported that a healthy weight status is essential for effective cognitive functioning and academic success in young adult women, among whom being underweight is a serious health problem. Declined cognitive functions were reported in the underweight individuals.[1,2] It was suggested that a significant association was present between anxiety and BMI. However, the association is heterogeneous.[3] There was a strong relationship between perceived body weight and depression, 1 of every 4 students misjudged their body weight. Body perception of participants who were 'underweight' according to BMI was in the perception direction of obesity and those who were 'overweight' were in the perception direction of thinness. There was evidence for a curvilinear relationship between BMI and both sleep duration and insomnia for girls, whereas the relationship was linear for boys.[4] The studies on the assessment of anxiety, sleep, and cognition in underweight individuals are relatively less in India. Hence, the present study was undertaken to explore the variations in these parameters in underweight young adults in the rural areas of Rajasthan state.

**Objective:** To assess the anxiety, sleep, and cognitive functions in underweight young adults.

## MATERIALS AND METHODS

The present case-control study was conducted at the Department of Physiology. 50 underweight male and female young adults were part of the study after obtaining written informed consent. 50 healthy young adults, age and gender-matched, were also recruited after obtaining written informed consent. The following criteria was used to recruit the underweight young adults. Willing young adults of both genders within the age group of 18-24, BMI<18·5 kg/m2 were recruited for the study. Participants with any severe complications, under any medications or treatment, were excluded from the study. The sample size was calculated in consultation with a biostatistician. The power of the study is 0.8, and the alpha value is 0.05. The required sample size per group is 38. It was rounded to 40, considering any dropouts.

Assessment of anxiety: The GAD-7 scale is a standard scale to assess anxiety. It comprises seven questions that have to be rated on a four-point scale that is 0-3. O stands for not at all, and 3 stands for nearly every day 5

Assessment of sleep quality: The Insomnia Severity Index (ISI) will be used to assess sleep quality. It comprises of five questions which have to be rated on a 5-point scale. 0 stands for none, and 4 stands for very.[6]

Assessment of auditory and visual reaction time: The RT apparatus manufactured by the Anand agencies will be used to assess the auditory and visual reaction time. Visual reaction time was recorded for red and green light, and auditory reaction time was recorded for high and low pitch sounds.[7]

Statistical analysis: Data will be analyzed using SPSS 20.0 version. Student t-test will be used to assess the significance of the difference between the two groups. A probability value of less than 0.05 will be considered significant.

## RESULTS

Anxiety scores were not significantly different between the underweight and healthy individuals. ISI scores were significantly higher in underweight individuals. Visual reaction time for red and green lights was longer in the underweight participants when compared with the healthy individuals. Auditory reaction times were also significantly longer in the underweight individuals when compared with the healthy individuals [Table 1].

**Table 1: Comparison of anxiety, sleep quality, and reaction time among the underweight and healthy participants.**

| Parameter | Underweight (n=50) | Healthy (n=50) | P value |
|---|---|---|---|
| GAD-7 scores | 6.8±2.1 | 7.75±2.45 | 0.3463 |
| ISI Score | 5.92±1.38 | 3.79±1.67 | 0.0014* |
| VRT Red light (ms) | 0.23±0.06 | 0.16±0.03 | 0.0346* |
| VRT green light (ms) | 0.34±0.05 | 0.19±0.02 | 0.0002* |
| ART high-pitch sound (ms) | 0.26±0.07 | 0.20±0.03 | 0.0971 |
| ART low-pitch sound (ms) | 0.3±0.08 | 0.25±0.06 | 0.2686 |

VRT- Visual Reaction Time, ART- Auditory Reaction Time (*P<0.05 was significant)

## DISCUSSION

There is a tricky relationship between eating behavior and distress. Excess distress provokes emotional eating behavior, and emotional eating causes an increase in body weight.[8] Interestingly, it was reported that obesity attenuates the psychological behaviour.[9] The present study was undertaken to explore the variations in these parameters in underweight young adults in the rural areas of Rajasthan state. Intentional weight loss was also most common in females may be due to more consciousness about the body shape, but it is associated with negative effects.[10] It was reported that underweight is associated with significant morbidity and mortality and suggested immediate attention.[11] Another study reported that maternal underweight also leads to the underweight of the offspring. Further, it was reported that obesity in the mother during gestation is more common than underweight.[12] A study from Germany reported that there was an increase in the incidence of underweight inpatients, and they suggested that there is a need for the development of an intervention to stimulate appetite in these underweight patients. Interestingly, it was reported that gender has a minimal role in the underweight.[13] Both underweight and obesity are responsible for mortality and morbidity risk after lung transplantation.[14] In contrast, another study from Korea reported that underweight has no role in the mortality and morbidity.[15] However, it was reported that children with low body weight at an early age will continue the same in the later stages unless there is some intervention offered to them.[16] In adult population, it was reported that being underweight increases the risk of fractures.[17] Being underweight increases the risk of heart failure in patients with diabetes mellitus.[18] However, the studies where anxiety, sleep, and cognition assessment were performed in the underweight individuals was sparce. The present study observed no significant difference in the anxiety scores among underweight and healthy participants. However, there was a significantly lower sleep quality and reaction time in the underweight participants. There is a strong need to elucidate the hormonal and neural

mechanisms involved in these changes to develop an effective intervention for the management of the underweight.

## CONCLUSION

The study results suggest that underweight individuals experience poorer sleep quality and declined cognitive function compared to healthy individuals.

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