

## Correlation Between Anthropometric Measures and Daytime Sleepiness in Young Adults

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### Abstract

**Background:** Current patterns of lifestyle, especially in young adults, linked to technological and social development, have led to an increased prevalence of sleep disorders. Excessive daytime sleepiness (EDS) when present hampers the quality of life of the individual and the overall productivity of the community as a whole. Three major hormones which influence the metabolism of the human body namely ghrelin, leptin and insulin are known to be affected by Inadequate sleep. The purpose of this study was to find if there is any correlation between Excessive daytime sleepiness and body composition in order that useful interventions may be found, to reduce the burden of these conditions.

**Methods:** The research involved 30 subjects between 18 to 25 years of age. Body mass index, waist-hip ratio and neck circumference was calculated and the daytime sleepiness was measured using the Stanford Sleepiness Scale (SSS). The Spearman rank correlation test was used for analysis.

**Conclusion:** Stanford Sleepiness Scale score was correlated with Body mass index, waist-hip ratio and neck circumference individually and the p value came to be 0.5876, 0.8145 and 0.9076 respectively which is not considered significant. Hence, no correlation was found between daytime sleepiness and Body mass index, Waist-hip ratio and Neck circumference.

**Keywords:** Correlation; Anthropometric measures; Daytime sleepiness; Young adults.

### Introduction

Excessive daytime sleepiness (EDS) is characterized by persistent sleepiness and a general lack of energy during the day after apparently adequate or even prolonged nighttime sleep. Studies

show that healthy, normal young adults, particularly college students, are sleepier than healthy, normal older adults.<sup>1,2</sup> The cause of the increased sleepiness among younger adults has not been definitively demonstrated. Although, not sleeping enough could

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be one of the major factors.<sup>1,2,3</sup> Three major hormones which influence the metabolism of the human body namely ghrelin, leptin and insulin are known to be affected by inadequate sleep.<sup>4</sup> Excessive Daytime Sleepiness (EDS) when present, especially in young adults hampers with the daily life of an individual and have been known to be associated with serious consequences.<sup>5</sup>

The Stanford Sleepiness Scale (SSS), is validated and one of the most commonly used scales to measure daytime sleepiness.<sup>6,7</sup> It is a one-item self-report questionnaire measuring levels of daytime sleepiness. The scale, which can be administered in 1-2 minutes, is generally used to track overall alertness/drowsiness during the day and is most effective in assessing daytime sleepiness in adults aged 18 years and above.

Body measurements namely height, weight, body mass index (BMI), body circumferences (waist, hip, and limbs), and neck circumferences are quantitative in nature and are universally used to assess body composition. Current patterns of lifestyle, transformed cultural habits, introduction of new technologies had resulted into life being more sedentary, especially in young adults. Obesity has always been proposed to affect sleep architecture via a combination of impairment to physiological mechanisms.<sup>8</sup>

This study aimed to find if there is any correlation between excessive daytime sleepiness and body composition so that useful interventions may be found, to reduce the burden of these conditions and increase the overall productivity and quality of life of young communities.

## Methods

A cross-sectional study was conducted in the physiotherapy OPD of a Tertiary Care Hospital in Mumbai across a duration of 6 months. Young adults aged from 18 to 25 years were selected by convenient sampling and a total of 30 subjects participated in the study. A small sample size was selected as this is a pilot study. Young adults, irrespective of their gender and with no major psychological and systemic disorders and those not on any physical fitness program were eligible to participate in this study.

The Stanford sleepiness Scale was used to assess Daytime sleepiness. It consisted of a seven-point rating scale with a maximum score of 7 corresponding to highest sleepiness level and a minimum score of 1 corresponding to lowest level of sleepiness. The subject was asked to rate his/her current sleepiness state and the score corresponding to the sleepiness level was noted as the Stanford sleepiness scale score.

Assessment of anthropometric measures namely body mass index, waist hip ratio and neck circumference were done.

For measuring the Body Mass Index, the weight (in kgs) of the subject was measured using a weighing scale and the height (in meters) of the subject was determined using a tape measure. The weight was then divided by the square of the height, and the resultant score was noted as the Body Mass Index. Body Mass Index of more than 22.9 was considered as the cut off for overweight and obesity.<sup>9</sup>

Waist Hip Ratio was calculated by dividing the waist circumference by the hip circumference. Measurements were taken with the help of a tape measure. The waist circumference was taken at the level of the smallest circumference, usually just above the belly button, and circled the whole way around the body and back to the starting point. The hip measurement was taken as the largest circumference around the buttocks. Waist Hip Ratio of more than 0.88 in males and more than 0.81 in females was considered as the cutoff for overweight/ obesity.<sup>9</sup>

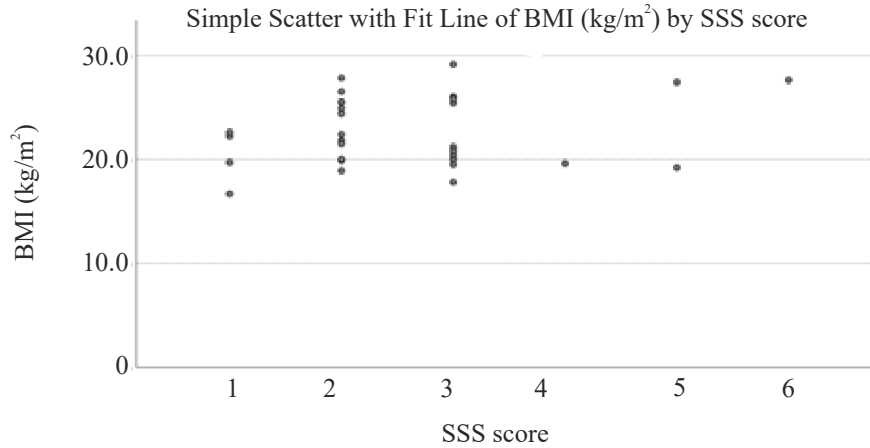
The Neck Circumference was measured using a tape measure taken at the level of the mid-neck, between the mid cervical spine and the mid anterior neck. In men with a laryngeal prominence (Adam's apple), measurement was taken just below the prominence. Neck circumference of more than 35.5 cms in males and more than 32 cms in females was considered as the cutoff for overweight/ obesity.<sup>10</sup>

The data was analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics including frequency, percentage, mean and standard deviation was used to analyze the study population. Spearman's Rank Correlation Coefficient Test was used to study the relationships between the variables. Differences were considered significant at  $p < 0.05$

**Results And Discussion**

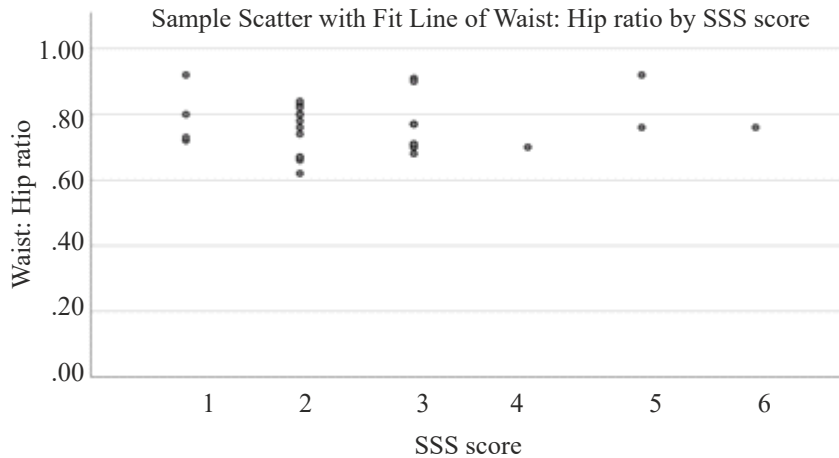
**Table 1: Distribution of Stanford Sleepiness Scale(SSS) Score and Body Mass Index (BMI), Waist-Hip Ratio (WHR), Neck Circumference (NC).**

	Frequency (n)					
	Normal BMI	Increased BMI	Normal WHR	Increased WHR	Normal NC	Increased NC
SSS score ≤ 4	17	10	21	6	11	16
SSS score ≥ 5	1	2	2	1	1	2



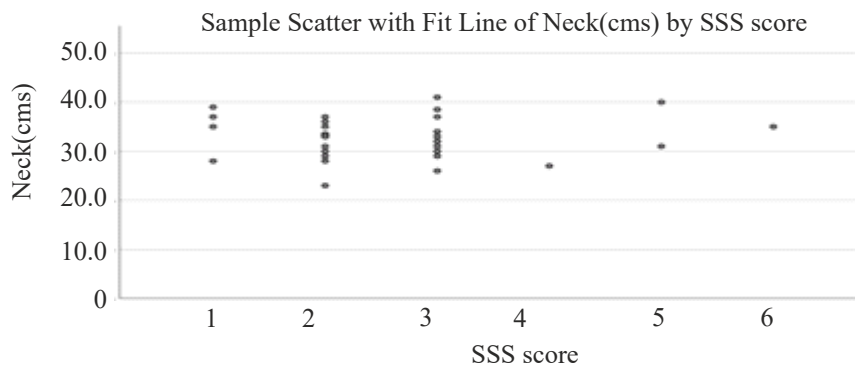
**Graph 1: Correlation Between Stanford Sleepiness Score (SSS) and Body Mass Index (BMI)**

According to Spearman Correlation coefficient test, the p value is 0.5876 considered not significant which indicates that there is no correlation between SSS Score and BMI. The rho value is 0.1031.



**Graph 2: Correlation Between Stanford Sleepiness Score (SSS) And Waist-Hip Ratio (WHR)**

According to Spearman Correlation coefficient test, the p value is 0.8145, considered not significant which indicates that there is no correlation between SSS Score and WHR. The r value is -0.0447.



**Graph 3: Correlation Between Stanford Sleepiness Score (SSS) and Neck Circumference (NC)**

According to Spearman Correlation coefficient test, the p value is 0.9076, considered not significant which indicates that there is no correlation between SSS Score and NC. The r value is -0.0221.

The ever-increasing cases of daytime sleepiness among young population has been shown to affect the daily life of the individual as it reduces the productivity. This is caused due to lack of alertness during the day when most tasks are to be carried out. Moreover, in recent times with almost all activities becoming mechanized, has led to the increasing adaptation to sedentary lifestyle. The goal of this study was to find correlation between Anthropometric Measures (BMI, WHR, NC) and Daytime Sleepiness. The analysis was done using Spearman's correlation coefficient test.

A total of 30 subjects were selected to participate in the study. Their age ranged from 18 years to 24 years with mean age of  $20.90 \pm 0.316$  years [Table 1]. This included 21 female participants and 9 male participants [Table 2]. Of these, 2 participants were underweight, 16 had normal Body Mass Index, 2 were overweight and 10 belonged to the obese category with a mean value of  $22.67 \pm 0.6163$  [Table 3]. A total of 25 subject had normal Waist -Hip Ratio and 5 had increased Waist-Hip Ratio with a mean value of  $0.7640 \pm 0.0145$  [Table 4]. 14 subjects had normal Neck Circumference whereas 16 subjects had increased Neck Circumference with a mean value of  $32.85 \pm 0.7930$  [Table 5]. The Stanford Sleepiness Scale Score ranged from 1 to 6 with 27 subjects scoring 4 and lower and only 3 subjects scoring 5 and higher with a mean value of  $2.60 \pm 0.218$  [Table 6]. Table 7, Table 8 and Table 9 shows the correlation between Stanford Sleepiness Scale Score with Body Mass Index, Waist-Hip Ratio and Neck Circumference respectively.

Previous studies done for finding out the association between obesity and daytime sleepiness have shown positive result which is not in accordance with the results of our study.

A study done by Maugeri *et al* showed that indices of obesity was indirectly proportional to the duration of sleep. Body mass index, waist hip ratio and body fat were taken into consideration and they all showed increased measures in subjects with decreased sleep duration. The prevalence of central obesity was also lower in long sleepers. The study also concluded that subjects with excessive daytime sleepiness had a higher Body mass index and waist hip ratio.<sup>3</sup>

One specific study done by Vgontzas *et. al.* on subjects ranging from age 17 to 58 years concluded that obese subjects without sleep apnea were much more sleepier during the day as compared to subjects with normal weight.<sup>15</sup>

Another study done by Resta *et. al.* on obese as well as non-obese subjects also showed similar results to the study done by Vgontzas.<sup>11</sup>

However, all of these studies have been done on a wide age group range and no study has been done specifically for younger adults in the Indian population. Our study specifically targets the young Indian population as obesity and daytime sleepiness are being constantly reported to be on the rise.

## Conclusion

The results of this study show that there is no correlation between Anthropometric Measures and Daytime Sleepiness in young adults.

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**Conflict of Interest:** Nil

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