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The Silent Struggle: Investigating Obstructive Sleep Apnea And Its Impact On Metabolic Health Among Medical Students

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ABSTRACT:

Purpose: Obstructive Sleep Apnea (OSA) is an underrecognized condition in young adults that may contribute to early metabolic disturbances. This study aimed to assess the risk of OSA among MBBS students and explore its association with metabolic parameters–specifically blood pressure and random blood glucose levels.

Methods

A cross-sectional study was conducted among 67 medical students (aged 18–24 years) at Manipal Tata Medical College, Jamshedpur. Participants completed the STOP-BANG questionnaire to evaluate OSA risk. Anthropometric parameters including body mass index (BMI) and body fat percentage were measured using the OMRON body-fat analyzer. Random blood glucose was recorded using a glucometer, and blood pressure was measured using a standard sphygmomanometer. Correlation and linear regression analyses were conducted to assess relationships between STOP-BANG scores and metabolic outcomes.

Results

The mean BMI of the participants was 24.18 kg/m², and the mean body fat percentage was 26.84%. STOP-BANG scores showed a significant positive correlation with systolic blood pressure ($r = 0.477$, $p < 0.001$), while correlations with diastolic blood pressure ($r = 0.132$, $p = 0.287$) and random blood glucose ($r = 0.080$, $p = 0.518$) were weak and statistically insignificant. Linear regression analysis indicated that STOP-BANG scores moderately explained the variance in systolic blood pressure ($R^2 = 0.228$) but had minimal explanatory power for diastolic pressure ($R^2 = 0.017$) and blood glucose ($R^2 = 0.006$).

Conclusion

The study highlights a significant association between OSA risk and elevated systolic blood pressure in young adults, emphasizing the need for early identification and intervention. Although no significant associations were observed with diastolic blood pressure or blood glucose, these findings support integrating OSA screening into routine health assessments for medical students to mitigate potential long-term cardiovascular risks.

KEYWORDS: *Obstructive Sleep Apnea, STOP-BANG Questionnaire, Medical Students, Blood glucose, Blood Pressure, Metabolic health.*

INTRODUCTION

BACKGROUND:

Snoring is often dismissed as an amusing quirk, a minor annoyance, or even something to be embarrassed about. It is typically associated with the elderly or those struggling with obesity, and is rarely seen as a cause for concern. But what if snoring was more than just a harmless sound? What if it were an early indicator of a serious health condition, one that could have long-term metabolic and cardiovascular consequences? More importantly, what

if it was affecting young adults, especially students who are already under immense academic and psychological stress?

Obstructive Sleep Apnea (OSA) is a sleep disorder characterized by recurrent episodes of airway obstruction during sleep, resulting in fragmented sleep, oxygen deprivation, and systemic inflammation. While traditionally linked to middle-aged individuals, young adults, including students, may be equally vulnerable due to their erratic sleep schedules, high stress levels, and often unhealthy lifestyle choices. Despite this, OSA remains underdiagnosed in this population, largely because snoring and sleep disturbances are trivialized or overlooked. Untreated OSA is more than just a nighttime problem; it has far-reaching implications. It can contribute to increased blood pressure, impaired glucose metabolism, and long-term cardiovascular risks. This study aims to assess the prevalence of OSA among MBBS students and explore its potential relationship with random blood sugar levels and blood pressure. By bringing attention to this overlooked issue, we hope to encourage early screening and preventive strategies, ensuring that the youth prioritize their health just as much.

METHODS

This cross-sectional study was conducted at Manipal Tata Medical College, following approval from the Institutional Ethical Committee (MTMC/IEC/2024/80), Jamshedpur, with a sample of 67 MBBS students aged 18–24 years. Participants were selected based on predefined inclusion and exclusion criteria. Non-consenting students, those having chronic cardiovascular diseases, or those outside the age range are being excluded. Healthy consenting volunteers were included in the study.

Data collection involved the administration of a structured questionnaire, which included the validated STOP-BANG questionnaire to assess the likelihood of OSA. The STOP-BANG questionnaire is a reliable screening tool for obstructive sleep apnea (OSA) due to its high sensitivity, ease of use, and strong predictive ability. It effectively identifies individuals at risk for moderate to severe OSA, particularly in clinical and surgical settings. The questionnaire's structured approach, incorporating key risk factors such as snoring, tiredness, and BMI, enhances its accuracy in detecting OSA.(6)

Anthropometric measurements such as BMI, body fat percentage, and body weight were recorded using the OMRON body-fat meter. For biochemical assessments, capillary blood samples were collected using a sterile lancing device, and random blood sugar levels were measured using a glucometer. Blood pressure readings were taken using a sphygmomanometer to evaluate any potential association between OSA and metabolic parameters. Strict biosafety protocols were maintained throughout the study. All equipment used for sample collection was sterilized before and after use, and biomedical waste was disposed of according to standard regulations. Ethical approval was obtained, and informed consent was secured from all participants prior to data collection.

The data collected was analyzed using descriptive statistics to summarize participant characteristics. The relationship between OSA and metabolic parameters, including blood sugar levels and blood pressure, was examined using appropriate statistical methods, such as correlation and regression analysis, with adjustments for confounding factors like BMI and sleep quality.

RESULT

Table 1 Anthropometric table

S.NO	STATISTICS	HEIGHT (cm)	WEIGHT (kg)	BMI	BODY FAT %
1.	Mean	165.9	66.13	24.18	26.84
2.	Median	164.5	64.5	24.6	27.4
3.	Minimum	149.5	115.2	16.2	6.9
4.	Maximum	190.2	23.9	34.1	40.9
5.	Deviation	10.26	16.85	4.35	8.14

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Table 2 Correlation – Obstructive sleep apnoea

SNO.	PARAMETER	r(CORRELATION COEFFICIENT)	P- VALUE
1.	Systolic blood pressure	**0.477**	**<0.001**
2.	Diastolic blood pressure	0.132	0.287
3.	Random blood sugar	0.080	0.518

Systolic blood pressure shows strong (**r=0.477)** and significant **(P- value =<0.001)** correlation with obstructive sleep apnoea based on the STOP-BANG score.Diastolic blood pressure shows moderate **(r=0.132) (P-value=0.287)** correlation with obstructive sleep apnea based on the STOP-BANG score.Random blood sugar shows weak **(r=0.080) (P- value=0.518)** correlation with obstructive sleep apnea based on the STOP-BANG score.

Table 3 Linear regression

Component	Intercept	R^2
Systolic blood pressure	**83.89**	**0.228**
Diastolic blood pressure	66.29	0.017
Random blood sugar	103.13	0.006

Systolic blood pressure shows (**R^2= 0.228)** moderate model, variables explain some variance. Diastolic blood pressure shows **(R^=0.017)** Very weak model, little to no explanatory power.Random blood sugar shows **(R^2=0.006)** Very weak model, little to no explanatory power.

❖ **Graphs**

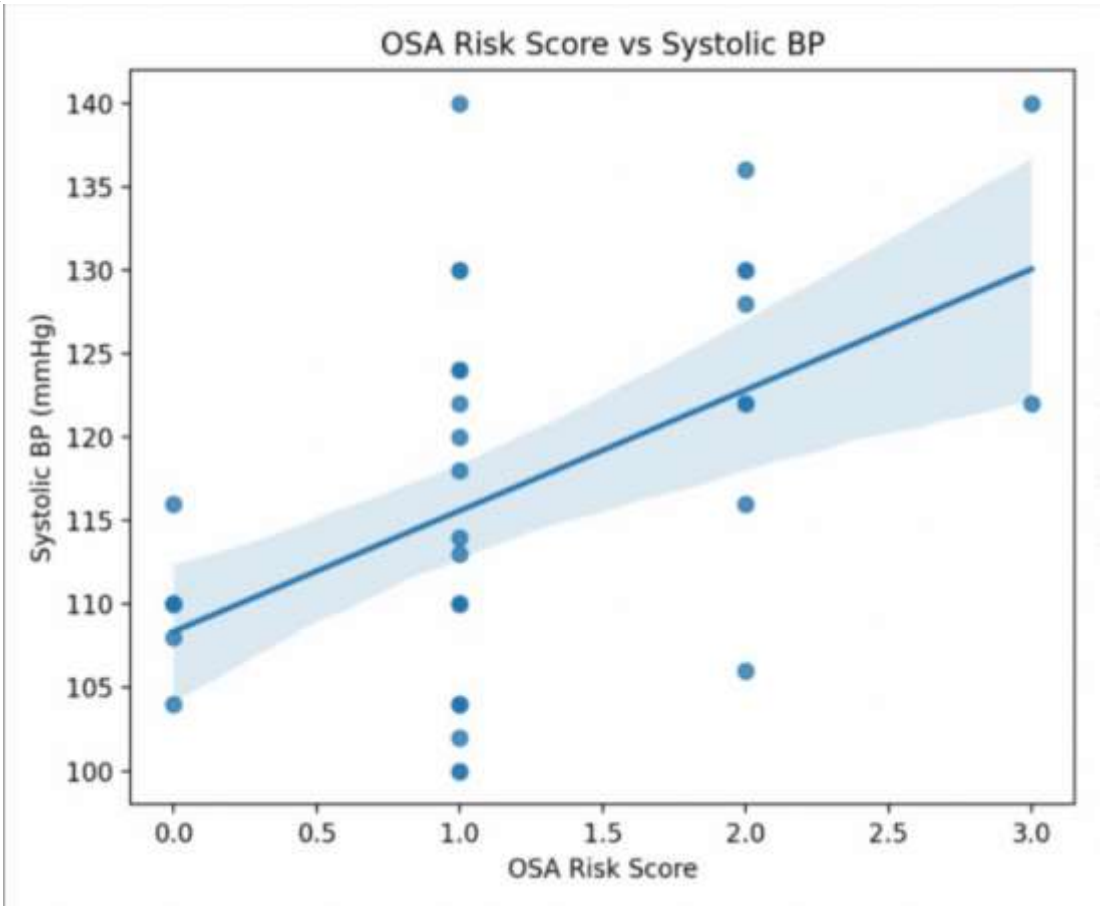

Figure 1: OSA Risk Score(x-axis) vs. Systolic Blood Pressure(y-axis)

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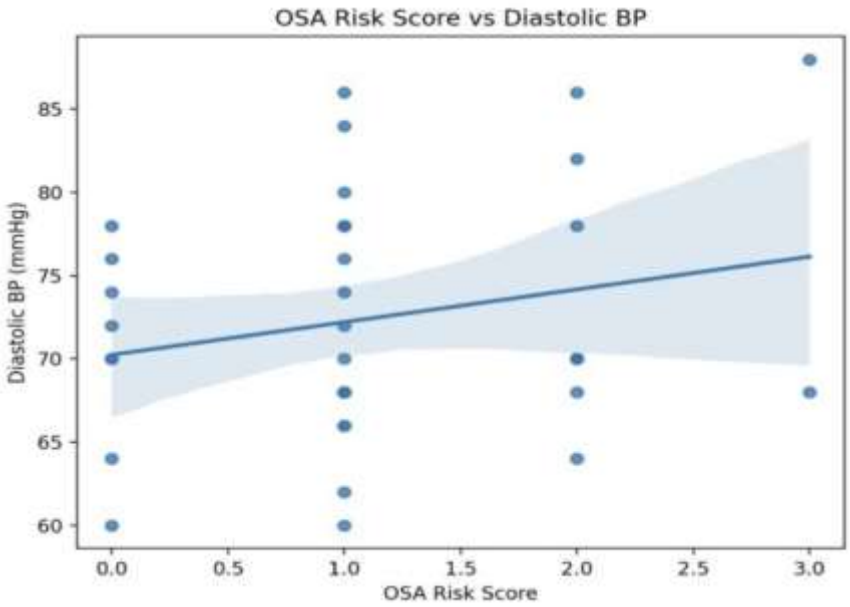

Figure 2: OSA Risk Score(x-axis) vs. Diastolic Blood Pressure(y-axis)

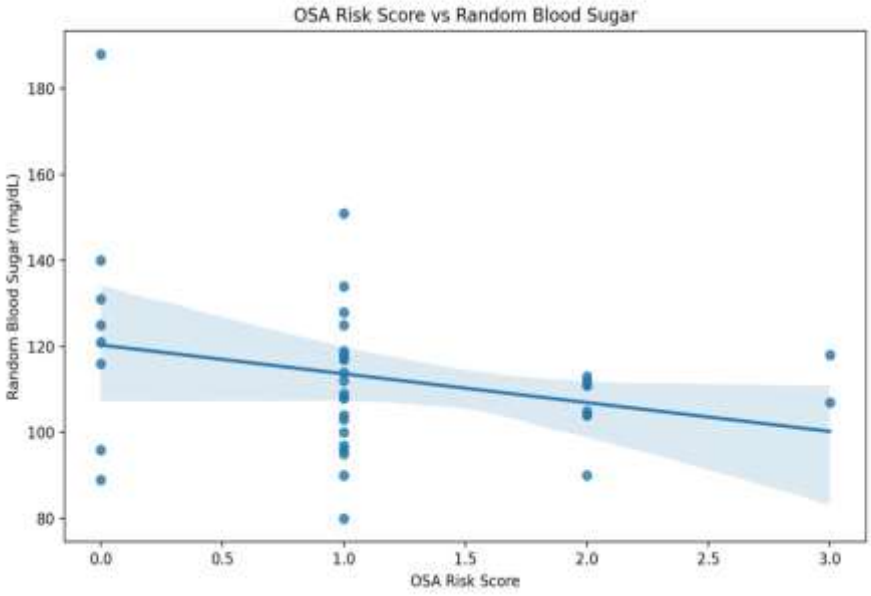

Figure 3: OSA Risk Score(x-axis) vs. Random Blood Glucose(y-axis)

My manuscript has no associated data.

DISCUSSION

Our study found a strong and statistically significant correlation between systolic blood pressure (SBP) and OSA severity as measured by the STOP-BANG score (r=0.477, P-value <0.001). This aligns with the findings of *Brown J et al;*. **(4)**, who highlighted the role of OSA in hypertension pathogenesis, emphasizing intermittent hypoxia and sympathetic overactivation as key mechanisms. Similarly, *Han B et al.* **(3)** demonstrated that OSA contributes significantly to hypertension, particularly in cases of uncontrolled blood pressure. Our results further support this relationship, reinforcing that OSA should be considered a critical factor in systolic hypertension.

In contrast, the correlation between diastolic blood pressure (DBP) and OSA in our study was moderate (r=0.132) and statistically insignificant (P-value = 0.287). This partially aligns with the findings of *Wang Q et al;*.

(7) , who noted that while both SBP and DBP are affected by OSA, the impact on DBP may be less pronounced. While *Li M et al.* **(8)** found that OSA severity correlated more strongly with systolic rather than diastolic hypertension, which is consistent with our findings. The weaker correlation in DBP suggests that while OSA does influence blood pressure, its effect may be more significant in systolic rather than diastolic regulation.
Our study found a weak correlation between random blood sugar (RBS) and OSA (r=0.080, P-value = 0.518), indicating that OSA may not have a strong direct effect on glycemic control in our sample. This contrasts with *Mehrdad* M *et al* **(2)**and *Zhang J et al*(**9**), who reported a stronger association between OSA and glycemic dysregulation. However,[*Paschou SA et al*(**1**) highlighted that the relationship between OSA and glycemic control might be influenced by additional factors such as insulin resistance, obesity, and long-term diabetes duration. The discrepancy between our findings and previous studies may be attributed to sample characteristics, study design, and confounding variables such as body mass index (BMI) and metabolic syndrome prevalence.

CONCLUSION

Our study reinforces the well-established link between OSA and hypertension, particularly in relation to systolic blood pressure. The findings of this study underscore the critical need for early recognition of obstructive sleep apnea, particularly in individuals with elevated systolic blood pressure. Hypertension is not just a number on a chart it is a silent threat that gradually erodes health, increasing the risk of heart disease and stroke. By demonstrating a strong link between OSA and systolic hypertension, this study highlights the urgency of integrating sleep apnea screening into routine clinical practice. The weaker correlations with diastolic blood pressure and random blood sugar serve as a reminder that OSA's impact is complex, requiring deeper exploration. Beyond statistics, this research is about real lives people unknowingly battling the effects of disordered sleep, waking up tired, struggling with unmanageable blood pressure, and facing long-term health risks.

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