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An association of Lifestyle Behaviour and Obstructive Sleep Apnea (OSA) among the College Students: A cross-sectional study

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Abstract
Aim & Background: Obesity was found to be one of the risk factors in the causation of Obstructive Sleep Apnea among adolescents. The present study intends to find out the prevalence of OSA among student population post pandemic.
Methods: The study was a cross-sectional study of 785 college students belonging to the 18-23 age group. Data collected were demographics, lifestyle habits, including physical activity. Berlin scale and Epworth sleepiness scale were used to identify OSA. Anthropometry measurements were taken.
Results: The participants consisted of 478 females (60.9%) and 307 males (39.1%). 10.2% of the participants were classified as overweight and 60.1% as obese. A total of 102 participants (13%) were engaged in regular physical activity. According to the Berlin questionnaire, only one percent of participants had high risk for developing Obstructive Sleep Apnea (OSA). However, as per Epworth Sleepiness Scale assessment, 26% of the participants had sleep apnea. No significant association was found between BMI, NC, and OSA in this study
Conclusion: The study is very crucial as it informs on the social background, lifestyles, and medical status of the study subjects. Nevertheless, it is imperative to conduct more studies utilizing a larger sample size together with comprehensive assessment techniques and longitudinal follow-up.
Clinical Significance:
This research provides the importance of the incidence of obesity among college students as the significant risk for Obstructive Sleep Apnea (OSA). These findings emphasize the need for specifically directed interventions as well as preventive measures in addressing the issue of obesity and its related problems. This paper examines the effectiveness of various screening measures which include the Berlin questionnaire and Epworth sleepiness scale in selecting those that are likely to have OSA. Healthcare professionals require this information to select appropriate assessment tools and correctly interpret results.
Keywords: Obstructive Sleep Apnea, Lifestyle, Exercise, Physical Activity, Cross-Sectional Study.

INTRODUCTION:

"Globesity" is the term used by WHO to indicate the increased prevalence of obesity in humans all over the world. Obesity is one of the risk factors for obstructive sleep apnea (OSA)[1]. Obesity is a known risk factor for OSA, as excess weight can cause fatty tissue to accumulate in the neck region and narrow the airway, making it more difficult to breathe during sleep. OSA results in the increase of visceral fat dysfunction, which plays a crucial role in the relation of obesity with Metabolic Syndrome. Visceral fat is the location that produces a variety of chemokines, such as inflammatory cytokines and adipokines which could lead to metabolic dysfunction[2].

Neck circumference was found to be an easier and additional way to assess the OSA risk[3]. Studies have shown that OSA is prevalent among students, particularly those who are overweight or obese. One study found that 20% of college students screened positive for OSA, with obesity being a significant risk factor. Another study found that OSA was more common among high school students who were overweight or obese compared to those who were not. OSA has been found to cause depression and anxiety disorders in adolescents[4]. High risk for OSA was found to be higher in male adolescents and they have been positively correlated to poor academic performance in a Jordanian study[5]. In the same study, snoring was observed in 11% and excessive daytime sleepiness in about 30%.
The worldwide prevalence of OSA in adults is 4–9% and in Indian adults it was 2.1–4.9% In 6-15-year-old children, the prevalence is reported at 9.5%[6]. The pandemic has forced students to attend classes from home. In addition to that, physical activity was compromised. There was increased consumption of unhealthy food during times of emotional distress and there has been reduced sleep quality due to odd time consumption of such foods. These changes were accompanied by a more sedentary lifestyle due to increased screen time[7]. Despite the recognized relationship between obesity and OSA, there is a lack of contemporary data on OSA prevalence and its association with lifestyle changes among Indian college students, especially following the COVID-19 pandemic. Most existing studies focus on Western populations or older adults, leaving this demographic under-studied. Additionally, the combined use of both Berlin and Epworth sleepiness scales in this context is rare and may provide new insights into OSA screening accuracy and prevalence estimates.

OBJECTIVES:
The objective of the study is to estimate the prevalence of OSA among college students and to find out the association between lifestyle behaviour and OSA.
This study addresses the gap in knowledge regarding OSA risk in the Indian college student population in the post-pandemic era and evaluates the utility of two widely used screening tools (Berlin and Epworth scales) in this specific context.

MATERIAL AND METHODS:
Study design and site: This cross-sectional study was conducted at a Professional college in Chengalpattu district of Tamil Nadu.
Study population
The study population constituted college students of the Chengalpattu district irrespective of discipline belonging to the 18-23 age group. Those who had craniofacial deformities, airway diseases, congestive cardiac failure, asthma, those who were on steroid therapy, hypothyroidism and those who had recent upper airway surgery or were on steroid therapy were excluded.
Sample size determination
In this study, formula for the cross-sectional study was used, i.e. $n=4pq/l^2$. The prevalence of OSAS in India was 4% to 13%. For the calculation of sample size, a prevalence of 10% is taken. p=10%, q=90%, l=2%. The total sample size included was 785.
Sampling method
The study site was chosen in the district was based on simple random sampling. Those who fulfilled the inclusion criteria were included till a sample size of 785 was attained.
Study period
The study period was during October 2023 - March 2024
Study tool
The study tool was a pretested, validated questionnaire that was translated into the local language. The data collected were baseline profiles such as demographics, lifestyle habits, including physical activity. Berlin scale and Epworth sleepiness scale were also used.
Berlin scale is a questionnaire that had ten questions categorised into three classes- snoring, daytime sleepiness and obesity/hypertension. Persistent symptoms in two or more snoring-related questions were defined in category one. Persistent daytime sleepiness, drowsy driving, or both was classified as category two. Those with history of hypertension or a BMI greater than 30 kg/m^2 was classified under category

three. Individuals classified as high risk for OSA were those who scored high in at least two of three categories.

Epworth sleepiness scale had an eight-item questionnaire that is self-reported which asks patients to rate their chances of dozing or falling asleep, in eight different situations. This is marked on a four-point likert scale ranging from 0 ("would never doze") to 3 ("high chance of dozing"). The ESS helps to determine the presence of sleep apnea syndrome.

Conduction of study

The institutional ethical committee approval was obtained before the start of the study. After obtaining the written informed consent from the patients, the questionnaire was administered to the participants. Anthropometry measurements were taken. The outcome variable was the presence of OSA.

Data entry and analysis

Data collected were entered in and analysed with IBM SPSS version 22. Categorical and quantitative data were analysed with relevant tests of significance. Means for quantitative data and Proportions for categorical data were calculated. An Independent t-test was applied. P-value of < 0.05 was considered to be significant.

RESULTS

Among the total 785 participants, 478 (60.9%) were females and 307 (39.1%) were males. The age of the study participants ranged from 19 to 24 years with mean (SD) age of the in years was 19 (±0.9). Among the participants, 10.2% were overweight and 60.1% were obese as per Asian Indian criteria for BMI. (Table 1). Smokers and alcoholics were very minimal - 0.4% and 0.8% respectively. 102 (13%) study participants underwent regular physical activity. (Table 2). Among the study participants, 12 (1.5%) had thyroid disease- hyperthyroidism, 10 (1.3% had hypertension) and diabetes 14 (1.8%). Snoring was reported by 78 (9.9%) of study participants and the mean (SD) of Epworth sleepiness score was 3.32 (±) 1.9 with a range of 2 to 8. Only one percent of participants was at high risk for developing OSA as per Berlin scale. The possibility of sleep apnea was found to be in 26% of the participants as per Epworth Sleepiness Scale assessment. (Table 3).

An Independent t-test was applied to find an association between neck circumference and BMI in the risk of developing sleep apnea syndrome. There was no association found between BMI, Neck circumference and sleep apnea in our study. (Table 4)

DISCUSSION

In this study, we have investigated various demographic and health-related factors among 785 study participants. The participants consisted of 478 females (60.9%) and 307 males (39.1%). Based on the Asian BMI criteria, 10.2% of the participants were classified as overweight and 60.1% as obese. The prevalence of smoking and alcohol consumption was negligible, with only 0.4% and 0.8% of participants reporting these habits, respectively.A total of 102 participants (13%) were reported engaging in regular physical activity. A small percentage of the participants had certain medical conditions, including 1.5% with thyroid disease (hyperthyroidism), 1.3% with hypertension, and 1.8% with diabetes.The study also assessed sleep-related parameters among the participants. Snoring was reported by 78 participants (9.9%), and the mean Epworth sleepiness score was 3.32 with a standard deviation (±1.9), ranging from 2 to 8. In the present study, only 1% of participants were at high risk for developing Obstructive Sleep Apnea (OSA). However, the Epworth Sleepiness Scale assessment indicated a possibility of sleep apnea in 26% of the participants. No significant association was found between BMI, NC, and risk of developing OSA in this study.Our findings are unique as they highlight a surprisingly low prevalence of high-risk OSA by Berlin scale, despite a high prevalence of obesity, and a much higher proportion of students identified as at risk by the Epworth Sleepiness Scale. This discordance between screening tools has not been well documented in Indian college populations. The study thus provides important evidence for clinicians and public health practitioners regarding the limitations and strengths of these tools in young adults, and underscores the need for context-specific screening strategies.Several studies have investigated the prevalence of OSA, and risk factors associated with sleep apnea. One common finding is that sleep apnea affects both genders, although there may be variations in prevalence rates and symptom presentation. For

instance, some studies have reported a higher prevalence of sleep apnea in males, while others have found comparable rates between genders. The activity of upper airway dilator muscles and the anatomy of the oropharynx are the two important aspects behind the gender disparity in the prevalence of obstructive sleep apnea[8]. Previous similar studies have reported a strong association between obesity and the risk of sleep apnea[9]. Since the study population included in this study consisted of young adults, there was a negative relation between obesity and OSA. Obesity is a strong risk factor for developing obstructive sleep apnea (OSA) due to increased deposition of fat around the upper airway, which leads to airway obstruction during sleep. Studies have demonstrated that individuals with higher BMI values are more likely to experience sleep apnea symptoms and have a higher apnea-hypopnea index (AHI), that measures the severity of sleep apnea events[10].Moreover, neck circumference (NC) has also been identified as an independent predictor of sleep apnea. Studies have consistently shown that an increased NC is associated with an increased risk of developing OSA[11]. The rationale behind this association lies in the fact that a larger neck circumference reflects increased soft tissue and fat deposition in the upper airway, leading to airway collapse during sleep. Contrary to the current study, no significant association was found between NC and sleep apnea. Another research has highlighted the importance of NC affects the airway mechanism by narrowing it as fat accumulation increases. This increases the circumference of the neck, producing respiratory system instability which makes it a useful anthropometric marker for identifying individuals at risk of sleep-disordered breathing[12].The prevalence of sleep apnea varies across different populations and ethnicities. The Asian population, including Indians, has been shown to have a higher predisposition to developing sleep apnea, even at lower BMI levels compared to other ethnic groups. Therefore, using BMI criteria specific to Asian populations is crucial for accurately identifying individuals at risk for sleep apnea in this context.The assessment of sleep apnea risk through various questionnaires, such as the Epworth Sleepiness Scale and the Berlin Questionnaire, has proven to be useful in identifying individuals who may require further diagnostic testing. However, it is important to acknowledge that these questionnaires have limitations and are not definitive diagnostic tools for OSA. Polysomnography, a comprehensive sleep study, remains the gold standard for diagnosing sleep apnea and determining its severity.Overall, the study provides valuable information about the demographic profile, lifestyle habits, and health conditions of the participants. However, further research with a larger sample size, more comprehensive assessment methods and longitudinal follow-up are necessary to validate the findings and provide more conclusive evidence regarding the risk factors and prevalence of OSA in the study population under investigation.

Clinical Significance:

This research provides the importance of the incidence of obesity among college students as the significant risk for Obstructive Sleep Apnea (OSA). Given the paucity of data on OSA and lifestyle risk factors in Indian college students, especially post-pandemic, these findings are important for public health planning and clinical practice. They suggest a need for targeted screening and intervention strategies that are tailored to the unique behavioural and demographic characteristics of this population. Thus, it highlights the need for appropriate intervention and prevention efforts on obesity and its consequent effects. The relationship of obesity with OSA and consequent depressive and anxious effects shows why health care ought to be comprehensive. Apart from its physical benefits, addressing obesity can as well have some psychological benefits especially in teenagers' mental well-being. This implies that OSA might be related to poor academic performance. This stresses the need for considering sleep disorders amongst others as necessary components of the discourse on academic challenges among college students. Improving sleep quality may lead to benefits of having better results in school activities. This article examines efficiency of various screening methods including the Berlin Questionnaire or ESS for determining people with a high risk from OSA. Such information is very important for any health worker when choosing relevant evaluation instruments as well as accurate interpretation of results. Finally, the study recognizes that there are aspects which still need to be improved on, and other more appropriate study methods can be employed in subsequent studies. The study underlines this potential public health significance with a large proportion of students being obese and with some evident signs of sleep apnea. Since they are at risk of developing numerous sleep-disorder related issues, obesity interventions and a general promotion

of healthy sleeping habits within the college student population could prove to have widespread repercussions on lessening the load on the prevalence of such sleep problems in general.

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