

# Association of Perceived Stress Scale with the Severity of Obstructive Sleep Apnea in Pakistani Population

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## ABSTRACT

**Background:** Obstructive Sleep Apnea (OSA) is a prevalent sleep disorder characterized by recurrent episodes of partial or complete upper airway obstruction during sleep, leading to disruptions in breathing patterns and, consequently, reduced oxygen level. OSA has traditionally been viewed as a sleep-related physiological disorder, there is growing recognition that psychological factors, such as stress, may play a role in its onset and progression. **Objective:** To evaluate the association of Perceived Stress Scale with the severity of Obstructive Sleep Apnea in Pakistani Population. **Study Design:** Prospective cross-sectional study. **Settings:** untreated OSA individuals at Pulmonary Vascular and Sleep Disorders division of Dow University Hospital in Karachi, Pakistan. **Duration:** Study was done during a period of six months from May 2022 to October 2022. **Methods:** Patients OSA diagnosis through overnight Polysomnography with AHI of more than 5, and OSA participants above 18 years of age were included. A stress questionnaire was filled out when the individual came for overnight Polysomnography. The Sleep technologist measures the anthropometric measurements like height, and weight through height scales and weight machines, the neck circumference through the inch tape, BMI was computed through a formula which is weight in kg/height in meter<sup>2</sup>, and stress was evaluated through the Perceived Stress Scale (PSS). Data analysis was performed by using IBM SPSS statistics 26. **Results:** A total of 167 OSA patients participated in the study. There were 100 (60%) male and 67 (40%) female individuals. The mean age of females who perceived stress was 53.7 ± 10.5 years which is higher from males 47.9 ± 13.1 years. Low stress was found in moderate and severe OSA as compare to mild OSA, similarly 49% moderate stress in Moderate OSA and 52% moderate stress in Severe OSA patients respectively. The percentage of high stress was significantly prominent in Mild OSA in comparison to Moderate and Severe OSA. The result of the study shows that the perceived stress scale is significantly correlated with Obstructive sleep apnea (p<0.001). **Conclusion:** The outcomes of this study reveal a direct significant correlation between OSA and the Perceived Stress Scale. The findings underscore the importance of ongoing investigation to delve into potential underlying mechanisms.

**Keywords:** OSA, Perceived stress, Correlation, Local population.

## INTRODUCTION

Obstructive Sleep Apnea (OSA), which is described by repeated episodes of impaired breathing while sleeping, is doubtlessly the most prevalent kind of sleep-disordered breathing. It is a condition characterized by the upper airway being partially or completely blocked during sleep, leading to reduced oxygen levels and

disruptions in sleep due to awakenings.<sup>1</sup> As reported by the American Academy of Sleep Medicine, the number of partial or full cessations of breathing for each hour while sleeping and the apnea/hypopnea index is used to assess the severity of OSA through Polysomnography. AHI is used to diagnose OSA when it is more than 5. According to widely accepted clinical standards, OSA severity is

classified as mild (AHI 5 to 15), moderate (AHI 15 to 30), or severe (AHI > 30).<sup>2</sup> About 10% of individuals have obstructive sleep apnea (OSA), which increases the risk of co-morbid physical and mental health conditions and can lead to all-cause death.<sup>3</sup> Daytime sleepiness, poor sleep efficiency, and co-morbidities like high anxiety levels of anxiety and depressive symptoms are all indicators of OSA,<sup>4,5</sup> however, there is little correlation between the severity of OSA and its symptoms. These associated symptoms are frequently why patients initially visit the doctor, who recommends them for Polysomnography that yields an OSA diagnosis.<sup>4</sup> Following an OSA diagnosis, psychological problems are typically treated either directly by anxiety and depression medication or indirectly by managing OSA using continuous positive airway pressure (CPAP) therapy.<sup>6</sup> Stress is a physiological and psychological response to challenging or demanding situations. It occurs when an individual perceives a situation as threatening, overwhelming, or beyond their ability to cope. This response can manifest in various physical, emotional, and cognitive symptoms. Lately, there has been an increasing prevalence of stress affecting various aspects of life.<sup>7</sup> Furthermore, adults who have both OSA and major depression concurrently described experiencing more prolonged and intense bouts of depression.<sup>8,9</sup> OSA also has an impact on various aspects of health behaviors and overall quality of life. The connections and interactions among OSA risk, health behaviors, and symptoms of depression are considered a significant public health issue.<sup>8</sup> Nonetheless, our comprehension of these associations and the mechanisms that underlie them remains uncertain.<sup>8</sup> Moreover, individuals with pre-existing chronic health conditions who experience stress are more likely to experience worse outcomes.<sup>10</sup> This implies that if stress is addressed in individuals with OSA (Obstructive Sleep Apnea), it could potentially result in better overall outcomes.<sup>10</sup> Perceived Stress Scale (PSS) is a widely used psychological assessment tool designed to measure an individual's perception of stress in their life.<sup>11</sup> It has been used in several investigations to look into the association between stress and various health issues. It is a tool for assessing how stressful people perceive their situation to be, and measures how unpredictable, uncontrolled, and overburdened people feel about their lives.<sup>12</sup> As far as we know now, the PSS-10 has not been translated or used in studies with OSA individuals in Pakistan. Therefore, there is a lacking to understand of the actual association between stress and the severity of obstructive sleep apnea. The objective of this study is to illustrate the association of the Perceived Stress Scale with the severity of obstructive sleep apnea in the Pakistani population.

## METHODS

This prospective cross-sectional study was conducted with untreated OSA individuals at Pulmonary Vascular and Sleep Disorders division of Dow University Hospital in Karachi, Pakistan. Study was done during a period of six months from May 2022 to October 2022. The inclusion criteria were OSA diagnosis through overnight Polysomnography with AHI of more than 5, and OSA participants above 18 years of age on the data collecting day. The individuals were excluded who have mental disorders other than depression or anxiety, current use of psychotic medicines, patients who have taken the CPAP therapy, and a female who is pregnant. The patients were diagnosed with obstructive sleep apnea by the Polysomnography test in the Sleep Lab of Dow University Hospital. Approval of the research has been taken from the Institutional Review Board of Dow University of Health Sciences. Participants were recruited by Non-Random Purposive sampling, and informed and written consent was obtained before enrollment and provided detailed information about the study. In addition, every participant explained the possible risks and benefits which were correlated with participation in the study. We collected the data of the participants who identified as a patient with obstructive sleep apnea and record the patient's height, weight, BMI, Apnea-Hypopnea Index, the circumference of the neck, and PSS. A stress questionnaire was filled out when the individual came for overnight Polysomnography. The Sleep technologist measures the anthropometric measurements like height, and weight through height scales and weight machines, the neck circumference through the inch tape, BMI was computed through a formula which is weight in kg/height in meter<sup>2</sup>, and stress was evaluated through the Perceived Stress Scale (PSS) which is a 10-item questionnaire from this tool; we assessed the stress level as low, moderate, and severe. Low stress is indicated by a PSS score of 0 - 13, moderate stress by 14 - 26, and high perceived stress by 27 - 40.<sup>10</sup> Data analysis was performed by using IBM SPSS statistics 26. Continuous variables were calculated by means and standard deviation. Categorical variables like gender, sleep apnea, and Perceived Stress were measured through frequencies and percentages and the group comparison with the Chi-Square test by taking (p-value = <0.05) as level of significance.

## RESULTS

A total of 167 OSA patients participated in the study. There were 100 (60%) male and 67 (40%) female individuals. OSA patients have elevated BMI. There was no substantial difference in Body Mass Index between the males and females groups of OSA patients. The mean age of females who perceived stress was  $53.7 \pm 10.5$  years which is higher from males  $47.9 \pm 13.1$  years. Mean

characteristics of both males and females of OSA patients are mentioned in Table 1.

Table 2 depicted the prevalence of Perceived stress in OSA patients. The results shows that low stress was found in moderate and severe OSA as compare to mild OSA, similarly 49% moderate stress in Moderate OSA and 52% moderate stress in Severe OSA patients respectively. On the contrary, the percentage of high stress is significantly prominent in Mild OSA in comparison to Moderate and Severe OSA. The result of the study shows that the perceived stress scale is significantly correlated with Obstructive sleep apnea ( $p < 0.001$ ).

**Table 1: Mean of characteristics among OSA patients n=167**

Characteristics	Male (n=100)	Female (n=67)
Height (cm)	169.3 ± 9.0	154.2 ± 7.0
Weight (kg)	100.3 ± 18.0	94.9 ± 18.7
BMI (kg/m <sup>2</sup> )	35.0 ± 6.1	39.5 ± 7.5
Age (years)	47.9 ± 13.1	53.7 ± 10.5
Neck circumference (cm)	44.0 ± 2.8	41.6 ± 2.8

**Table 2: Prevalence of Perceived Stress Scale in OSA patients**

Severity of Apnea	Perceived Stress Scale			P-value
	Low Stress	Moderate Stress	High Stress	
Mild OSA (N = 19)	7 (36.8)	3 (15.8)	9 (47.4)	<0.001
Moderate OSA (N = 66)	27 (40.9)	32 (48.5)	7 (10.6)	
Severe OSA (N = 82)	33 (40.2)	43 (52.4)	6 (7.3)	
Total (N = 167)	67 (40.1)	79 (47.3)	21 (12.6)	

## DISCUSSION

High perceived stress levels can lead to sleep disturbances and exacerbate OSA symptoms due to disrupted sleep patterns. The link between the Perceived Stress Scale (PSS) and the severity of Obstructive Sleep Apnea (OSA) is a subject of considerable interest in the realm of sleep medicine and psychology. The purpose of this research was to investigate the link between the Perceived Stress Scale and the severity of Obstructive Sleep Apnea. Among those who reported experiencing stress, the average age for females was 53.7 years with a standard deviation of 10.5, which was higher than that of males, who had an average age of 47.9 years with a standard deviation of 13.1. The study included 100 (60%) male participants and 67 (40%) female participants. In the

comparison of this study Wong JL *et al*<sup>10</sup> reported that there were 44 individuals with untreated Obstructive Sleep Apnea (OSA), with an average age of 51.2 years and out of these, 13 were female, and 31 were male. Men are 2-3 times more likely than women to have OSA, and its prevalence seems to rise gradually with age.<sup>13</sup>

In this study, 47% of untreated OSA patients have moderate stress whereas 40% have low stress. Moreover, only 12% patients have severe stress in our Pakistani population. Another research revealed that in comparison with the healthy group, the combined OSA group had greater mean stress levels (PSS). In general, PSS values in OSA patients came into the low-stress category, whereas PSS values in controls came into the moderate stress category. Comparing OSA females to OSA males, PSS scores were nearly identical.<sup>10</sup> Previous research on psychological problems showed that stress was related to the prevalence of OSA but not the severity. Furthermore, the data show that psychological stress is a manifestation of OSA and is meticulously associated with anxiety and depression disorders.<sup>14</sup> We observed elevated levels of anxiety and depressive symptoms along with excessive sleep in the untreated OSA individuals, which is consistent with other research findings.<sup>15</sup> To our knowledge, however, this analysis is the first to assess the probability of stress among OSA patients in the Pakistani population. Bjorvatn *et al*<sup>16</sup> observed that OSA severity and stress were not significantly correlated. Lee *et al.* evaluate the severity of patients' depression, and they observed that patients with mild OSA were more likely to experience depressive symptoms than those who have severe OSA.<sup>17</sup> We also observed in our study that 47% mild OSA patients have high stress in comparison to moderate and severe OSA. In order to examine the relationship between stress and the severity of OSA, Garbarino *et al.* did a systematic evaluation of the literature that comprised 73 publications. Despite there being a limited number of studies that contained relevant data, it was noted that the majority of the literature does not indicate the existence of a link between the severity of OSA and the prevalence of stress or anxiety.<sup>18</sup> There are a number of strengths in our study. First, the OSA was diagnosed through a standard method that is Polysomnography. Our current investigation is limited and affects the efficacy and the generalizability of the results due to the small sample size taken from a single organization. Although the causal connections are not apparent and further research is needed, anxiety is linked to OSA and sleep disturbances.<sup>19,20</sup>

## CONCLUSION

The results of this research indicate a correlation between OSA and the perceived stress scale and this study emphasizes the need for continuous analysis in order to

examine potential mechanisms involved. Addressing these interactions may offer crucial knowledge to improve patient care and assist in identifying patients who could be suffering from underlying stress. Research on the relationship between managing OSA and the chance of developing depression or anxiety may lead to helpful strategies for both prevention and intervention.

## LIMITATIONS

The research employed a cross-sectional design with a relatively modest sample size, which could limit the generalizability of the findings to a broader population. Furthermore, the study has not adequately controlled for confounding variables that can influence both perceived stress and OSA severity.

## SUGGESTIONS / RECOMMENDATIONS

Further longitudinal or interventional studies in order to investigate causal relationships and offer a more comprehensive understanding of the association between perceived stress and the severity of Obstructive Sleep Apnea (OSA). These studies should also rigorously address confounding variables to enhance the accuracy of the findings.

## CONFLICT OF INTEREST / DISCLOSURE

None.

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