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Original Research Article

The correlation of the severity of polysomnography with clinical assessment in cases of adult OSA in a tertiary hospital

Suresh V.*, Gowri Shankar M., Prabhu D., Natarajan S.

Department of ENT, Govt. Stanley Medical College Hospital, Chennai, Tamil Nadu, India

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***Correspondence:**
Dr. Suresh V.,
E-mail: sureshvadivel83@gmail.com

ABSTRACT

Background: Now days increasing number of people with sleep related breathing disorders especially obstructive sleep apnea are reporting every day in our institute, which is a tertiary referral centre. The objective was to correlate between clinical assessment andpolysomnographic features in an obstructive sleep apnea patient.
Methods: A total number of 60 cases were analyzed retrospectively and those who were already clinically assessed and diagnosed as OSA by AHI>5/h in overnight PSG study. The clinical history, body mass index, Epworth sleepiness scale score and full night polysomnograpic data were obtained for all 60 cases. The age and gender differences in OSA cases were analyzed. The correlations between the BMI, ESS score, AHI, oxygen saturation sleep apnea, Epworth sleeps scale and apnea hypopnea index were explored.
Results: Of the 60 cases OSA were analyzed, the mean (SD) age was 36.62 (±11.90) years and the men was mostly affected 96.7% than women only 3.3%. Of 60 cases, 30% of patients having mild form, 25% of patients moderate form, 45% of patients having severe form. The obese patients affected more 83.3% (50/60) than normal only 10% (6/60). The clinical symptom were analyzed by ESS score the normal 18.3%, mild 18.3%, moderate 28.3% and severe 35%. The mean oxygen saturation and heart rate of OSA patients were 72.35 (±11.47) and 69.90 (±15.26) respectively.
Conclusions: The BMI and ESS score were positively correlated with severity of OSA. The oxygen saturation and heart rate were negatively correlated with OSA.

Keywords: Obstructive sleep apnea, Polysomnography, Epworth sleepiness scale, Body mass index, Apnea hypopnea index

INTRODUCTION

Obstructive sleep apnea is the most common sleep disordered breathing. The most recent analysis prevalence of OSA in general population is 5% .[1] The prevalence of OSA varies significantly based on the population studied and how OSA is analyzed (e.g., testing methodology, scoring criteria used, apnea-hypopnea index (AHI) threshold .[2] The OSA has been estimated to be 14% of men and 5% of women.[3] Various mechanisms may exist including body fat distribution, craniofacial differences and female hormones. Obesity is important risk factor for OSA. The exact relationship between obesity and OSA are not well understood. It is multifactorial including BMI, neck soft tissue mass, parapharyngeal and lingual adipose deposition.[4] Any weight gain is not necessarily cause OSA , an increase the soft tissue mass around the airway, other factors such as pharyngeal muscle tone and the biophysical compliance between airway patency and critical closing pressure are more important for OSA.[5]

The assessment of history and clinical findings are not enough to diagnose the OSA. The subjective and objective analysis is important to diagnose the OSA. Epworth sleepiness scale (ESS) is most commonly used for subjective analysis. The ESS is a self reported questionnaire involving eight questions to assess the propensity for day time sleepiness.[6] Although this cannot reliable distinguish between simple snoring and OSA. A combination of clinical history, Epworth sleepiness scale and body mass index can be used to screen out non apneic snorers.[7] The objective analysis is laboratory polysomnography, which is gold standard test for OSA.[8]It consists of simultaneous recording physiological parameter related to sleep and wakefulness. The aim of this study is to correlate the clinical characteristics and polysomnographic outcome of OSA patients.

METHODS

This study was performed in dept. of otorhinolaryngology and head & neck surgery, Govt. Stanley medical college, Chennai between January 2017 to December 2017.

Inclusion criteria

The persons whose age between 15 to 65 yrs with snoring and daytime somonolance was included in this study.

Exclusion criteria

The person who have cardiovascular disease, stroke, neuromuscular disorder were excluded.

The access to patient records was approved by the local ethical committee, and patient confidential was maintained. The anthropometric data including age, gender, body mass index and detailed clinical history were recorded. Excessive day time sleepiness was assessed by an ESS score of >10. Total of 60 cases that underwent level I laboratory PSG test were AHI >5 events per hour consider OSA.

All statistical analysis was performed by using IBM. SPSS statistics software 23.0 version. To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean and S.D were used for continuous variable. To find the significant difference in the multivariate analysis the one way ANOVA with Turkey's Post-Hoc test was used. To assess the relationship between the variables Pearson's correlation was used. In both the above statistical tools the probability value.05 is considered as significant level.

Table 1: Polysomnography report sheet.

							Study Date: 10/7/2017		
Patient name:	ent2karthikeyan, Karthi			Recording			Alice6LDe		
Sex:	M			Height:			64.0in.		
D.O.B.:	12/13/1989			Weight:			150.0lbs.		
Age:	27 years			B.M.I:			25.7lb/in^2		
Times and durations									
Lights off clock time	10:51:29PM	Total recording time (TRT):					439.4 minutes		
Lights on clock time	6:10:53AM	Time in bed (TIB):					439.4 minutes		
		Monitoring time (MT):					357.0 minutes		
Summary									
REI 18.3	OAI	6.2		CAI 6.6		Lowest Desat		86	
Respiratory events									
	Index	**Total# of mean duration**		**Max duration**			**#of events by position**		
	(#/ hour)	Events	(sec)	(sec)	Supine	Prone	Left	Right	Up
Central apneas	6.6	39	17.3	34.0	0	0	0	0	39
Obstructive apneas	6.2	37	17.5	29.0	0	0	1	2	34
Mixed apneas	2.9	17	17.0	28.5	0	0	0	0	17
Hypopneas	2.7	16	26.7	50.0	0	0	0	0	16
Apneas+hypopneas	18.3	109	18.7	50.0	0	0	1	2	106
RERAs	0.0	0	0.0	0.0	0	0	0	0	0
Total	18.3	109	18.7	50.0	0	0	1	2	106
Time in position					0.1	0.2	0.4	1.4	354.9
REI in position					0.0	0.0	150.0	85.7	17.9

REI is the number of respiratory events per hour. OAI is the number of obstructive apneas per hour. CAI is the number of central apneas per hour. Lowest Desat is the lowest blood oxygen level that lasted at least 2 seconds.

Figure 1: Polysomnography testing in sleep lab.

Table 2: Sleep test report.

Oximetry summary		
	Dur. (min)	%TIB
<90%	1.3	0.3
<85%	0.0	0.0
<80%	0.0	0.0
<70%	0.0	0.0
Total Dur (min) <0		min
Average (%)		97
Total # of Desats		0
Desat Index (#/hour)		0.0
Desat Max (%)		0
Desat Maxdur (sec)		0.0
Lowest SpO2% during sleep		86
Duration of Min SpO2(sec)		5
Highest SpO2% during sleep		100
Duration of Max SpO2 (sec)		77
Heart Rate Stats		
Mean HR during sleep	81.5(BPM)	
Highest HR during sleep	196(BPM)	
Highest HR during TIB	196(BPM)	
Lowest HR during sleep	57(BPM)	
Lowest HR during TIB	14(BPM)	
Snoring summary		
Total snoring episodes	0	
Total duration with snoring	minutes	
Mean duration of snoring	seconds	
Percentage of snoring	%	

RESULTS

A total of 60 patients were recruited to this study with an age of (36.62±11.908); 58 patients were male and 2 patients were female. AHI parameter according to BMI categories, among the patients recruited to this study BMI was normal in 10%, overweight in 67% and obese in 83.3%. According to AHI mild were identified in 30%, moderate in 25%, severe in 45%. Pearson's correlation analysis was used to compare BMI and AHI. The analysis showed BMI was positively correlated with AHI (Table 3). The obese individual tended to have severe AHI than normal and overweight individuals (p value 0.054). The AHI parameter according to ESS, the ESS score were normal in 18.3%, mild in 18.3%, moderate in 28.3% and severe in 35%. Pearson study showed the ESS and AHI were positively correlated (Table 4).

Table 3: Correlation between BMI and OAI shows positive correlation.

Correlations			
		BMI	OAI
BMI	Pearson correlation	1	0.250
	Sig. (2-tailed)		0.054
	N	60	60
OAI	Pearson correlation	0.250	1
	Sig. (2-tailed)	0.054	
	N	60	60

Table 4: Correlation between ESS and OAI shows positive correlation.

Correlations			
		OAI	ESS
OAI	Pearson correlation	1	0.398**
	Sig. (2-tailed)		0.002
	N	60	60
ESS	Pearson correlation	0.398**	1
	Sig. (2-tailed)	0.002	
	N	60	60

**Correlation is significant at the 0.01 level (2-tailed).

Table 5: Correlation between OAI and SPO2 shows negative correlation.

Correlations			
		OAI	SPO2
OAI	Pearson correlation	1	-0.459**
	Sig. (2-tailed)		.000
	N	60	60
SPO2	Pearson correlation	-0.459**	1
	Sig. (2-tailed)	0.000	
	N	60	60

**Correlation is significant at the 0.01 level (2-tailed).

The average oxygen saturation in our study was 72.35±11.47. We used Pearson's co-efficient to establish the correlation between AHI and oxygen saturation. The analysis showed AHI had negatively correlated with oxygen saturation (p-0.459) (Table 5). The average heart rate in our study group was 69.90±15.260. When comparing the severity of AHI with heart rate there was a weak positive correlation (p-0.119) (Table 6), suggest that severity of sleep apnea exhibit some effects on heart rate.

Table 6: Correlation between OAI and HR shows positive correlation.

Correlations			
		OAI	HR
OAI	Pearson correlation	1	0.119
	Sig. (2-tailed)		0.363
	N	60	60
HR	Pearson correlation	0.119	1
	Sig. (2-tailed)	0.363	
	N	60	60

DISCUSSION

Patient with OSA have experience of excessive day time sleepiness, impaired concentration, recurring nocturnal awakening and non-restorative sleep with an increased risk of cardiovascular disease, stroke, metabolic syndromes and road traffic accident. This will lead substantial socio-economic implication.[9]In this study, we revealed that most affected population were young adult working male rather than female. This is accordance with previous epidemiological studies by Lurie.[10] In our study who are all overweight and obese person more vulnerable to get OSA. It showed that, when the person increases with the BMI value will reflect the severity of disease in PSG study report. Cheng et al showed that the BMI might be the of indicator the severity of OSA and would be screen for OSA in the general population.[11] In this study the participants were those suspected of OSA and included mainly middle aged male compare to elderly people. But it doesn't mean that the elderly people not affect OSA, it's due to lack of awareness. Previous study suggested that the prevalence of OSA is increase with age.[12]

The ESS is widely used for clinical evaluation of sleep disordered breathing, because of its simplicity and convenience Damiani et al.[13] We found that the severity of ESS score was directly affecting the severity of AHI in PSG study. But some other study showed ESS had a large number of false negative results limiting its utility for assessing the severity of disease by PSG study, because the individual who have day time sleepiness may maximize or minimize the symptom.

In this study, most of the participants who had AHI >5 in PSG study consider as OSA without desatuaration of oxygen <5%. Peppard et al suggested OSA may impact large proportion of the population than indicated, because the subject is AHI>5 without oxygen desatuaration.[2] The heart rate was variable in OSA patient in PSG study. According to Cifcin et al, people with OSA are repeated episode of falling oxygen level lead to variety of physiological changes that affect the heart rate and blood vessels. During this episode heart is stressed which increase the heart rate and blood pressure.[14]

CONCLUSION

In this work, OSA is most common disease that affecting the young working population because changes in life style of the society. The clinical evaluation of OSA is best to assessed by BMI and ESS score. It gives the value to assess the severity OSA by PSG study. But we need future study about the classification of symptom, anthropometric measurement scale and sleepiness scale questionnaire according to Indian population.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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