www.jmscr.igmpublication.org

Impact Factor 3.79
ISSN (e)-2347-176x

IGM Publication

Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Prevalence of Obstructive Sleep Apnea (OSA) In Young Patients with Ischemic Stroke

Authors
Ansari T .A, Sharma .A, Gupta .R, Mittal .M
Swami Rama Institute of Medical Science, Sawami Ran Nagar PO Doiwala Dist Dehradun 248140 Uttarakhand, India

Abstract

Objective: *To prevalence of obstructive sleep apnea (OSA) in young patients with ischemic stroke*

Method: *30 subjects were enrolled .we measured weight, height waist circumference and neck circumference and calculated body mass index, the risk of osa was assessed by using STOP –Bang Questionnaires*

Results: *In this study, OSA was diagnosed in 76.6% of stroke patients. The study shows that subjects with severe OSA were heavier, had higher body mass index and a larger neck circumference as compared to without OSA. In present study male predominance was seen in the OSA patients were (63.3%) and in female it was (13.3%). This finding has been supported by a number of earlier studies that had shown that OSA was more prevalent among males.*

Conclusion: *This study showed that OSA diagnosed on the STOP-Bang questionnaire. A STOP-Bang score of <3 will allow the healthcare team to rule out patients who do not have OSA. To prevent stroke in this general population of young due to OSA as it can reduce the risk of stroke and life style modification. Sleep apnea is a common disorder and if not recognized and treated due to stroke leads to significant morbidity and increased mortality. Particularly early recognition and treatment of OSA may improve cerebrovascular function. Treatment of OSA may represent a novel target to improve cerebrovascular health outcome.*

INTRODUCTION

In 2006, a population-based survey from New Delhi had reported that 3.6% subjects were suffering from Obstructive Sleep Apnea Hypopnea Syndrome (OSAHS) [(1)].The prevalence of obstructive sleep apnea (OSA) was found to be little higher in another hospital-based study conducted in Mumbai. This study included male patients aged between 35-65 years and reported that19.5% subjects were suffering from OSA. However, the OSAHS was less frequent and it was found in only 7.5% sample only [(2)].This difference could be attributed to excessive daytime sleepiness that has to be present in addition to apnea and hypoxemia in OSAHS subjects. Hence, excessive daytime sleepiness makes integral part of OSAHS but it is seen only in a proportion of OSA patients [(3)].

The ischemic stroke is third leading cause of death world- wide. It is commonly seen in elderly,

however, in past few years the prevalence has increased in younger age group [4]. A recent meta-analysis has suggested that OSA is an independent risk factor for the stroke. Considering the high prevalence of OSA among stroke patients, this paper recommended that all subjects with stroke must undergo a polysomnographic evaluation [5].

In the past few years a number of studies have examined prevalence of OSA in stroke patients; however, this has never been examined in young patients [5]. Hence, present study was planned to assess the prevalence of OSA in young patients presenting with ischemic stroke

AIMS AND OBJECTIVES

1. To find out frequency of Obstructive Sleep Apnea (OSA) in young stroke. (young ischemic patient < 45 years)
2. To find out association of various clinical and demographic factor in patients with young stroke with or without Obstructive Sleep Apnea (OSA).

MATERIALS AND METHODS

The study was conducted in the Department of General Medicine, Himalayan Institute of Medical Sciences (HIMS), Swami Ram Nagar, Dehradun over a period of one year. Subject was recruited from the inpatient and outpatient department HIMS Dehradun after obtaining their written informed consent.

Study Design

- Type of the study: Observational, cross sectional study
- Sample: Young patients presenting with ischemic stroke during one year duration as specified above were enrolled. 30 cases (minimum)
- Sampling methods- Convenient sampling.

Inclusion Criteria

- All young patients with ischemic stroke presenting for the first time

Exclusion Criteria:

Subjects presenting with:

- Trauma
- Intracranial space occupying lesion
- Cancer
- Meningitis

Protocol

The study was done after seeking approval from institutional ethics committee. The purpose of the study was explained to the patient and family member and a written informed consent was taken.

The study included young patients of Ischemic Stroke occurring for the first time presenting to the medicine OPD/IPD over a period of 12 months.

Stroke was diagnosed a person presenting with sudden onset neurological deficit (focal or generalized) lasting > 24 hours. This may be substantiated by neuroradiological evidences of compromised blood flow to brain.

Study subjects were asked regarding history of habitual snoring, daytime tiredness, observed pauses in breath during sleep (preferably in presence of bed-partner or a co-sleeper), to find out for OSA clinically.

Clinical examination of these subjects was done including detailed systemic examination and neurological examination. Anthropometric

assessment was done that included weight (in Kilograms), height (in centimeters), neck circumference (in centimeters), waist-hip ratio, and abdominal girth (in centimeters) at the level of umbilicus. Stroke severity was assessed using, NIHSS score and MRS score at the time of admission.

Following laboratory investigations were done to ascertain the cause of stroke and risk factors–

1. Complete haemogram
2. Blood sugar (Random)
3. Lipid profile (Fasting)
4. 2D-Echo(Cardiac abnormality)
5. Carotid Doppler(Carotid stenosis)
6. CT-brain/MRI-brain

RESULTS

The present study was carried out in the Department of Medicine at Himalayan Institute of Medical sciences over a period of one year to find out frequency of OSA clinical in young stroke and to find out association of various clinical and demographic factor in patients with young stoke with or without OSA

Table 1: Demographic Data of stroke patients

	OSA (N=23)	Without OSA (n=7)	P
Age	38.08±4.84	40.85±2.73	0.162
Height [cm] Mean (SD)	161.43±7.21	157.47±7.48	0.04
Weight [kg] Mean (SD)	84.87±12.08	63.43±7.82	<0.001
BMI [kg/m^2] Mean (SD)	32.07±4.16	25.23±3.39	<0.001
Neck Circumference	42.26±3.20	42.71±4.60	0.771
Hypertension	9	2	0.661
Diabetes mellitus	6	1	0.467

Table no 1 shows that patients with OSA have higher BMI as compared to without OSA. The weight and BMI was significantly higher compared to without OSA. The mean age,hypertension diabetes and neck circumference of cases with OSA and without OSA was not significant.

Table 2- Sex distribution of OSA patients and without OSA patients

Sex	OSA (n=23)	Without OSA (n=7)	P value
Male (%)	19 (63.3%)	7 (23.3%)	0.953
Female (%)	4 (13.3%)	1 (0.33%)	0.869

Table 2 shows that among OSA group, 63.3% were male and 13.3% were female, 23.3% male and 0.33% female were there in without OSA group, showing male predominant. OSA was common in males.

Table 3 - Anthropometric measurements of OSA patients

Anthropometric Measure	OSA (n=23)	Without OSA (n=7)	P value
Height [cm] Mean (SD)	161.43±7.21	157.47±7.48	0.04
Weight [kg] Mean (SD)	84.87±12.08	63.43±7.82	<0.001
BMI [kg/m^2] Mean (SD)	32.07±4.16	25.23±3.39	<0.001

Table 3 shows that OSA patients had higher BMI, they were taller and heavier as compared to patients without OSA. The weight and BMI wassignificantly higher than without OSA (p=0.001). The mean height of cases with OSA was 161.43 cm and without OSA was 157.47 cm the difference was statically significant (P<0.04).

Table 4: Stop Bang Criteria in patients with stroke

	CASE (n=30)	OSA (N=23)	Without OSA (n=7)	P
Snoring reported by [%]	30 (100%)	23 (76.7%)	7(23.3%)	0.015
Day time tiredness reported by [%]	28 (93.3%)	23 (76.6%)	5(17.8%)	0.002
Breathing pause observed in [%]	29 (96.7%)	27 (90%)	2(6.6%)	0.001
Systemic hypertension present in [%]	12 (40%)	11 (36.6%)	1(3.3%)	0.007
BMI [kg/m^2]	32.28±4.12	32.07±4.16	25.23±3.39	<0.001
Age [years]	38.73±4.55	38.08±4.84	40.85±2.73	0.162
Neck Circumference [cm]	42.36±3.49	42.26±3.20	42.71±4.60	0.771

Table 4 shows that OSA patients had statistically significant differences as compared to without OSA in snoring, day time tiredness, breathing pauses and systemic hypertension and BMI. They were taller, heavier and had larger neck circumference as compared to without OSA.

Table 5-Laboratory parameters of OSA patients and without OSA

Laboratory Parameter	OSA (n=23)	Without OSA (n=7)	P
Hb [g/dl] Mean (SD)	11.53±1.27	11.12±1.00	0.441
TLC [/cu mm] Mean (SD)	7050.03±1363.72	7198.87±1183.74	0.65
MCV [fl] Mean (SD)	83.82±5.89	86.12±4.76	0.10
PCV [%] Mean (SD)	44.76±15.66	38.74±5.22	0.330
MCH [pg] Mean (SD)	31.91±9.35	29.41±1.93	0.15
MCHC [%] Mean (SD)	32.36±2.19	33.34±1.83	0.06
Random blood sugar [mg%] Mean (SD)	104.9±24.04	95.80±8.31	0.05

Table 5 shows various laboratory values in OSA patients and without OSA patients. Both the groups were comparable with regards to laboratory parameters. The mean values of Hb and Total leukocyte count in our study was 11.53 g/dl and 7050 /cumm in cases which was comparable with the without OSA. Mean MCV in cases was 83.82 fl while that in without OSA was 86.12 fl. Values of PCV, MCH and MCHC in cases were 44.76 %, 31.91 pg and 32.36 %, while that of in without OSA were 38.74%, 29.41 pg and 33.34% respectively.Other lab parameters were not significant. This significance could be due to heamo concentration or polycythaemia which might be due to secondary hypoxemia. The random blood sugar was on the higher side could be due to the patient who were obese and were having higher BMI.

Table 6- Lipid profile in OSA patients and without OSA

Parameter	OSA (n=23)	Without OSA (n=7)	P value
HDL [mg/dl] Mean (SD)	34.2±7.03	49.9±10.01	0.67
LDL [mg/dl] Mean (SD)	91.97±34.70	89.30±78.32	0.86
VLDL [mg/dl] Mean (SD)	51.70±24.55	27.33±8.31	<0.001
Triglyceride [mg/dl] Mean (SD)	147.3±42.71	140.3±56.30	0.58

Table 6 shows that OSA patients had lower serum HDL and higher VLDL as compared to without OSA, although these were within normal range. The value of VLDL was statistically significant and it was <0.001. HDL was slightly lower and LDL was higher as compared to without OSA patients which suggest a risk factor for stroke.

Table 7- Comparison of Pulse and Blood Pressure of OSA patients and without OSA

Vitals	OSA (n=23)	NO OSA (n=7)	P value
Pulse [bpm] Mean(SD)	89.2±9.9	91±6.4	0.39
Systolic BP [mmHg] Mean (SD)	130±14.6	124±12.2	0.05
Diastolic BP [mmHg] Mean (SD)	85±10.30	79.9±10.6	0.03

Table 7 shows that patients with OSA have no significant difference of mean pulse rate, while systolic and diastolic blood pressure was significantly higher in OSA patients.

Table 8 -2D Echocardiography findings of OSA patients and without OSA

Parameter	OSA (n=23)	without OSA (n=7)	P value
LA size [cm] Mean (SD)	3.63±0.43	3.16±0.41	<0.001
LVESV [ml] Mean (SD)	53.17±16.69	36.90±9.3	<0.001
LVEDV [ml] Mean (SD)	68.06±30.44	59.77±12.66	0.17
LVEF [%] Mean (SD)	59.33±1.78	59.67±0.75	0.35
Pulmonary artery pressure [mmhg] Mean (SD)	19.57±7.89	14.77±3.55	0.004
LV Posterior Wall thickness [cm] Mean (SD)	1.26±0.13	0.65±0.25	<0.001
LVWT/LVEDV ratio [cm/ml] Mean (SD)	0.02±0.006	0.01±0.006	<0.001
Tricuspid Regurgitation [m/s] Mean	7.5	0	<0.001

Table 8 shows that left atrium was enlarged significantly in OSA patients, mean left atrium size was 3.63cmand mean LVESV was 53.17 ml (p=<0.001) and both values were statisticallysignificant in comparison to without OSA (p=<0.001). However there was no difference statistically in LVEDV and LVEF between both the groups (p= >0.05).

The OSA patients had higher mean pulmonary artery pressure as compared to without OSA. Here the mean pulmonary artery pressure was 19.57 mmHg in OSA patients and 14.77 mmHg in without OSA and their p value was less than 0.05 which was statistically significant. Left ventricular posterior wall thickness was more in OSA patients as compared to without OSA and its p value was statistically significant (p <0.001). The OSA

patients had higher LVWT/LVEDVratiowhich denotes left ventricular hypertrophy and tricuspid regurgitation ascompared with without OSA and was statistically significant (p< 0.001).

Table 9– Computed tomographyof brain findings of OSA patients and without OSA

	OSA (n=23)	NO OSA (n=7)	P value
ACA/MCA	1	0	0.583
MCA/TCA	0	2	0.019
MCA	21	4	0.498
PCA	1	1	0.399

Table 9 shows that patients with OSA have significant difference between without OSA at site of the infarct, while MCA was significantly higher in OSA patients p=0.038

Table 10- clinical improvement in OSA and without OSA patient during hospital stay

	OSA (n=23)	NO OSA (n=7)	P value
Hospital Stay	8.47+-1.50	7.71+-2.69	0.342
Improved	21	6	0.920
Satisfactory	2	1	0.699

Table 10 shows that patients with OSA have no significant difference between without OSA patients.

Table 11- Time of stroke in OSA and without OSA patients

	OSA (n=23)	NO OSA (n=7)	P value
Night	17	6	0.817
Morning	6	1	0.600

Table 11 shows that there is no significant difference between occurrence of stroke time in OSA and without OSA patients.

DISCUSSION

In this study, OSA was diagnosed in 76.6% of stroke patients. The study shows that subjects with severe OSA were heavier, had higher body mass index and a larger neck circumference as compared to without OSA. In present study male predominance was seen in the OSA patients were (63.3%) and in female it was (13.3%). This finding has been supported by a number of earlier studies that had shown that OSA was more prevalent among males. The male predominance could be related to a number of factors. It has been hypothesized that males have larger tongue, longer soft palate, and higher abdominal girth as

compared to females . All these are known risk factors for OSA. Such anatomical factors contribute to reduction in the upper airway space and compliance of chest. Hence, these factors predispose the males for the OSA.

Higher BMI suggests more fat in the body and this fat gets deposited in a number of areas in the body. These areas include abdominal cavity in males, gluteal and sub-cutaneus tissue in females and also the parapharyngeal fat pads. Amount of fat in parapharyngeal region is related to the neck circumference and hence, larger neck circumference is associated with high risk for OSA. However, contradictory studies are also available that did not find any difference between the OSA and without OSA on these measures. This is worth mentioning here that OSA depends upon a number of other factors that regulate the pharyngeal airway patency. Besides anatomical factors mentioned so far, those influence the patency of upper airway, other physiological factors like central chemo-sensitivity, tone of the pharyngeal dilator muscles, chest wall compliance, tracheal tug also affect the chances of development of OSA.

In present study, we found that OSA patients had low HDL and increased VLDL as compared to without OSA patients. Low HDL in OSA patients could be related to metabolic syndrome that is an integral part of the OSA pathology. The repetitive episodes of upper airway obstruction that are characteristic of OSA, results in intermittent hypoxia and large swings in intra-thoracic pressure that in turn trigger autonomic responses, and sympathetic over activity in patients with OSA. There is a direct link between the adrenergic system and lipid levels. The chronic elevated sympathetic activity in OSA patients may lower HDL and increase serum TG levels. Borgelet al demonstrated an influence of OSA on HDL levels. In their study, an independent association was found between the change in Apnea - hypopnea index (AHI) and the change in HDL and triglycerides respectively. Can et al found that OSA was associated with increased lipid levels. Total cholesterol, LDL and TGs values were increased in patients with OSA compared to without OSA. Iesatoet al reported that circulating lipoprotein lipase concentrations were lower in OSA patients as compared to those without OSA. Tan et al demonstrated that OSA subjects had greater degree of HDL dysfunction and increased oxidized LDL levels compared with controls. These studies found that AHI was the main determinant of HDL dysfunction in OSA patients.

In present study, we found that the LVESV was increased in OSA patients as compared to without OSA. Butt et al found LVESV was comparable between HTN, OSA subject and without OSA. Increase in LVESVI was associated with incremental LVEDVI and an increase in LAVI. LVESV has been found to be correlated with the propensity to cause CHF after 3-4 years. This study has found that increment in LVESVI was associated with increase in the proportion of male subjects and in those with history of MI. Furthermore, these effects were seen in patients with normal BMI (Approx 28). Increase in LVESVI was associated with progressive reduction of EF, yet it remained above 50%.

In this study, we found LVEDV was comparable between severe OSA patients and without OSA.

Similar study has been reported earlier, Butt et al found LVEDV in OSA patient was comparable to healthy subjects.

In this study, we found that ejection fraction was comparable between OSA patients and without OSA. Similar finding has been reported earlier. Olivera et al found that the LVEF was comparable between OSA cases and without OSA. Kaviraj et al compared the differences between mild, moderate, severe sleep apnea and they found the ejection fraction were comparable between three groups. Noda et al found that the ejection fraction was comparable between the subjects with mild OSA and moderate to severe OSA. Butt et al found that LVEF was comparable between OSA and healthy subjects. Altekin et al found that LVEF was comparable between healthy subject, mild OSA and severe OSA. Dursunoglu et al found that LVEF was comparable across mild, moderate and severe OSA groups.

In this study, all the OSA subjects complained of snoring, 76% reported day time tiredness, breathing pauses were observed by bed partners and 40% OSA patients were hypertensive. However, the daytime systolic and diastolic blood pressure was comparable between groups. Usui Y et al demonstrated that systolic blood pressure and diastolic blood pressure was not different between normal subjects and severe OSA patients. Lee et al demonstrated that increased systolic and diastolic blood pressure in OSA patients as compared to patients without OSA, but in this study the number of healthy control were less.

Rola et al. in their study on 55 patients of ischemic stroke found that 20(36.4%) patients had OSA whereas without OSA were present in 35(63.6%) patients.[4]

In present study out of 30 patients 23(76.6%) patients were OSA out of which 19(63.6%) were male and 4(13.3%) were female whereas without OSA patients were 8 (23.4%) out of which 7(23.3%)were males and 1(0.33%) were females.

The ideal diagnosis of OSA was done by PSG. We have done study using clinical STOP bang criteria .we had to conduct our study with a limited number of patients. These factors also contributed to the absence of an appropriate control group from the population, which was a limitation of our study. Since the history of habitual snoring and other clinical signs of OSA were present before stroke, we can presume that OSA might be a preceding risk factor for stroke, in accordance with the opinion that OSA constitutes a significant risk for stroke.

In our study PSG recordings were taken in three patients. We took BMI, age, neck circumference, and gender of the patients which helped in results. Study was done for 1 yr, 30 patients were taken. 1patient with OSA among 30patient completed PSG recording.

STOP-Bang questionnaire were included for data analysis. The median age of 30 patients was 45 yr, BMI 32kg/m^2 and neck circumference 42 cm. OSA was present in 76.6% patients.

It is estimated that patients with moderate-to-severe sleep apnoea are undiagnosed. OSA patients are known to have a higher incidence of stroke and greater duration of hospital stay.

In this study we found that there was no significant duration of hospitalization in both OSA and without OSA patients.

CONCLUSION

In this study it showed that patients had a greater probability of having OSA diagnosed on the STOP-Bang questionnaire. A STOP-Bang score of <3 will allow the healthcare team to rule out patients who do not have OSA. And to prevent stroke in this population of young due to OSA as a risk and improve life style modification. To prevent the stroke in this young population life style modification in general should be under taken to decrease this risk factor in causing stroke.

In those study was done with the proper demographic and clinical data showed the very significant and associative and to prevent the secondary stroke and to improve the life modifications of stroke in general population and also the decrease risk of stroke.

Sleep apnea is a common disorder that if not recognized and treated leads to significant morbidity and increased mortality. Early recognition and treatment of OSA may improve cerebrovascular function. Treatmentof OSA may represent a novel target to improve cerebro-vascular health outcome.

REFERENCES

1. Sharma SK, Kumpawat S, Banga A, Goel A. Prevalenceand risk factors of obstructive sleep apnoea syndrome in apopulation of Delhi, India. Chest.2006; 130 :149-56
2. Udwadia ZF, Doshi AV, L onkar SG, Singh CI. Prevalence ofsleep disordered breathing and sleep apnoea in middle-agedurban Indian men. Am J RespirCrit Care Med. 2004; 169:168-73.
3. Bassiri AG, Guilleminault C. Clinical features and evaluation of obstructive sleep apnea-hypopnea syndrome. In: Kryger MH, Roth T, Dement WC, editors. Sleep Medicine. Philadelphia: WB Saunders Company. 2000, p. 869-78.
4. Tosun A, Kokturk O, Karataş GK, Ciftçi TU, Sepici V. Obstructive sleep apnea in ischemic stroke patients. Clinics. 2008;63:625-30.
5. Johnson KG, Johnson DC. Frequency of sleep apnea in stroke and TIA patients: a meta-analysis. J Clin Sleep Med.2010; 6:131-7.
6. Harvey RL, Roth EJ, Yu D. Rehabilitation in stroke syndromes. In: Braddom RL, editor. Physical Medicine & Rehabilitation. Philadel-phia: Saunders Elsevier. 2007. p. 1175-12.
7. Malhotra A, White DP. Obstructive Sleep Apnoea. The Lancet. 2002; 360:237-45.
8. Young T, Palta M, Dempsey J, Skatrud J, Weber S, Badr S. The occurrence of sleep-disordered breathing among middle-aged adults. N Engl J Med. 1993; 328: 1230-35.
9. Marsh E, Biller J, Adams H, Marler JR, Hulbert JR, Love BB et al. Circadian variation in onset of acute ischemic stroke. Arch Neurol. 1990; 47:1178-80.
10. Gozal D, Daniel JM, Dohanich GP. Behavioral and anatomical correlates of chronic episodic hypoxia during sleep in the rat. J Neurosci. 2001;21:2442-