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Interlink between Obesity Hypoventilation Syndrome and Obstructive Sleep Apnea. Do we need to screen patients for OHS in obese OSA patients?

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Abstract:

Introduction: Around 90% of patients with OHS have coexistent obstructive sleep apnea (OSA) defined by an apnea–hypopnea index (AHI) >5 events/h, with nearly 70% having severe OSA (AHI > 30 events/h).3 Prevalence of OHS is between 8% and 20% in obese patients referred to sleep centers for evaluation of SDB. As prevalence of OHS in OSA patients dats from Nepal is not available we planned to carry out the study and to address gaps in diagnosis and management. **Methodology:** This is a cross sectional observational study done in OM hospital and research centre from 2018 January to 2019 June. Awake daytime Arterial blood gas(ABG)was obtained and patients having PaCO2 more than 45 mmHg were diagnosed as obesity hypoventilation syndrome in a recently diagnosed patients with OSA. **Results:** 32 patients diagnosed to have OSA and whose BMI is more than 30 were included in the study. Among 32 patients 26 (81.25%) were male and 6 (18.75) were female.Among all patients who underwent level A polysomnography 3 (12.5%) had mild OSA,4(16.66%) had moderate and 17 (53.12%) had severe OSA. 8 (25%)patients had normal diagnostic polysomnography. Among these patients 3(12.5%) who had mild OSA has BMI between 30-35,16 (66.66%) patients who had BMI between 30-35 ,2 had mild 3 had moderate and 11 had severe OSA. Patients with BMI more than 40,5(28.3%) had OSA among which 21 had moderate and 4 had severe OSA. **Conclusions:** As OHS is often misdiagnosed even in patients with severe obesity, we strongly recommended screening in obese patients with OSA for OHS as early recognition and effective treatment are important in improving morbidity and mortality in this group of patients.

Key Words: Interlink, Obesity hypoventilation syndrome, OSA

Introduction:

Obesity hypoventilation syndrome (OHS) is commonly defined as a combination of obesity (BMI >30 kg per m2) and waking arterial hypercapnia (Pa,CO2>45 mmHg).[1,2] Approximately 90% of patients with OHS have coexistent obstructive sleep apnea (OSA) defined by an apnea–hypopnea index (AHI) >5 events/h, with nearly 70% having severe OSA (AHI > 30 events/h).[3] Prevalence of OHS is between 8% and 20% in obese patients referred to sleep centers for evaluation of SDB.[4,5,6,7] As the prevalence of obesity is unknown in the general population and obesity is a strong predictor for OSA and to address gaps in diagnosis and management and improve patient-centered outcomes we carry out the study to look for OHS in obese patients with body mass index more than 30 and already diagnosed to have OSA.

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Methodology:

This is a cross sectional observational study done in OM hospital and research centre from 2018 January to 2019 June.All the patients who were to have obstructive sleep apnea and whose BMI is more than 30 were enrolled for the study. To grade the severity of sleep apnea, the number of events

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per hour is reported as the apnea-hypopnea index (AHI). An AHI of less than 5 is considered normal. An AHI of 5-15 is mild; 15-30 is moderate and more than 30 events per hour characterizes severe sleep apnea.[6]

Awake daytime Arterial blood gas(ABG)was obtained and patients having PaCO2 more than 45 mmHg were diagnosed as obesity hypoventilation syndrome. Patient with obstructive or restrictive lung diseases were excluded from the study. Convenience sampling was done and minimum sample size was calculated as % of OHS in OSA4. The total sample for the study was 32. Bias present in the study such as selection bias and interviewer's bias were minimized as possible. All the data were collected and entry was done in Microsoft excel. Point estimate at 95% CI was done along with frequency and proportion for binary data.

Results:

32 patients diagnosed to have OSA and whose BMI is more than 30 were included in the study. Daytime ABG in an awake state is done in all the individuals. Patients having PCO2 more than 45 were diagnosed as OHS. Among 32 patients enrolled for the study 21 had hypertension and 12 had type 2 diabetes for which they were taking regular medications.

Table 1. Baseline characteristics of patients

Gender	Number	Percentage
Male	26	81.25%
Female	6	18.75
Age		
20-40	20	62.5%
40-60	10	31.25%
>60	2	6.25%
BMI		
>30- <35	9	28.12%
≥35-<40	16	50%
>40	7	21.87%
Severity of OSA		
AHI 5-15	3	12.5%
AHI more than 15-30	4	16.66%
More than 30	17	53.12%
Normal: less than 5	8	25%

Among 32 patients 24 had OSA among which 3 (12.5%) had mild,4(16.66%) had moderate and 17 (70.83%) had severe OSA .It was seen more in male (79.16%) than female (20.83%).

Table 2: OHS in OSA patients:

Total	Number with OHS	Percentage
Male	19	79.16%
Female	5	20.83%

Table 3: Interlink of OHS with OSA according to body mass index (BMI):

BMI	OHS (Number with %)	Severity of OSA
30-35	3 (12.5%)	Mild :1 Moderate : 0 Severe : 2
More than 35-40	16 (66.66%)	Mild: 2 Moderate : 3 Severe : 11
More than 40	5 (20.83%)	Mild : 0 Moderate:1 Severe : 4

Patient with BMI between 30-35, 3(12.5%) patients had OHS among which 1 had mild and 2 had severe OSA. Patient with BMI between 35-40,16 (66.66%) had OHS among which 2 had mild,3 had moderate and 11 had severe obstructive sleep apnea.Patients with BMI above 40, 5 (20.83%) had OHS among which 1 had moderate and 4 had severe OSA.

Discussion

Despite the availability of effective therapies, most patients with OHS remain undiagnosed and untreated until late in the course of the disease when they present to high-acuity settings with acute-on-chronic hypercapnic respiratory failure .[8,9] During this delay, patients with OHS use more healthcare resources than eucapnic patients of comparable obesity.[10] OHS misfortunately is misdiagnosed even in patients with severe obesity who are hospitalized with hypercapnic respiratory failure .[11]

Early recognition and effective treatment are

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important in improving morbidity and mortality. Two-thirds of OSA patients are obese, particularly with android type obesity. Obesity is associated with many other medical conditions including sleep-disordered breathing.

The role of obesity as a risk factor for the development of obstructive sleep apnoea (OSA) is well established.[12] For example, two studies performed in South America reported that over 80% of morbidly obese patients had OSA.[12,13] In addition, a recent study performed in primary care in the UK in adults older than 50 years reported that subjects with a BMI of 40kg/m2or over were 27.39 times (95% CI 24.64– 30.46) more likely to have OSA ($p<0.0001$).[14]

Male gender and increasing age are also considered as risk factorsforOSA.[15] OSA is one of the most common sleep disorders which can occur on similar incidence to that of type II diabetes and twice than that of asthma.[16] In the UAE, the prevalence of OSA in the adult population has been estimated to be around 7%. In our study male patients number was higher than female,this may be due to the fact that OSA is more common in male than female and in our part of the world male seek medical attention more than female.15>50% of severely obese patients (BMI >40 kg per m2) are affected by severe OSA .17In our study also 24 out of 32 patients had OHS.Among patients with BMI greater than 40 maximum(4) out of 7 patients had severe obstructive sleep apnea and 1 had moderate obstructive sleep apnea.Multiple studies have reported a prevalence of OHS between 8% and 20% in obese patients referred to sleep centers for evaluation of SDB which is lower than seen in our study.[4-7] But in other studies 90% of patients with OHS have coexistent obstructive sleep apnea (OSA)defined by apnea–hypopneaindex (AHI) >5 events/h, with nearly 70% having severe OSA (AHI>30 events/h).18In general, a prevalence of 5% is typically seen in patients with SDB with BMI of 30 to 34.9 kg/m2, 10% is typically seen in patients with BMI of 35 to 40 kg/m2, and 20% is seen in patients with BMI .40 kg/m2.[4] In a metaanalysisdone by Chaoling Liu et al among 575 patients (28%) with Obesity Hypoventilation Syndrome were diagnosed from 2085 Obstructive Sleep Apnea patients.[19] This also highlights the importance of screening for OHS in OSA patients.It is important for clinical doctors to differentiate OHS and OSA when making a diagnosis. OHS is an exclusionary diagnosis while OSA can be diagnosed by polysomnography.

Conclusion

In a resource poor settings like Nepal where sleep studies facilities are available only in few places, patients who are obese and having OSA, simple tests like ABG to screen for OHS are needed. As OHS is often misdiagnosed even in patients with severe obesity. We strongly recommended screening in obese patients with OSA for OHS as early recognition and effective treatment are important in improving morbidity and mortality in this group of patients.

Conflict of interest:None

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