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## A study in obese patient's for sleep disordered breathing

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### Abstract

**Introduction-**As the modern life style is dominantly accepted by our society along with sedentary life style our society is getting obesity as a gift, a gift that is costing human species a lots of health problems and one of them is sleep disturbances and sleep disorders specially obstructive sleep apnoea (OSA). OSA itself leads to hyper tension and other systemic manifestations.so we decide to study obese patients and related sleep disorder specially OSA.

### Aims/Objectives:

- 1 To analyze SDB in obese patients.
- 2 To analyze whether SDB is a risk factor for hypertension in obese individuals.

**Material and Methods:** This cross sectional study was conducted at the department of pulmonology of People's College of Medical Sciences and Research centre, Bhopal, M.P. The duration of the study was 1 and half years. Total of 100 patients were included in this study.

**Results And Conclusion-** Obesity has a very high and proportionate correlation with sleep disordered breathing. Obstructive sleep apnea is the predominant sleep disordered breathing in our study population. Moderate and severe obstructive sleep apnea correlates very highly for predicting hypertension and maybe considered as a risk factor for the same.

**Keywords:** Obesity, Sleep Disorders, Obstructive Sleep Apnoea.

### Introduction

**Background:** Obesity is strongly linked with respiratory symptoms and diseases, including exertional dyspnea, obstructive sleep apnea syndrome (OSAS), obesity hypoventilation syndrome (OHS), chronic obstructive pulmonary disease (COPD), asthma, pulmonary embolism, and aspiration pneumonia<sup>[1, 3]</sup>. Obesity is strongly linked with sleep disorder breathing in previous studies. Earlier studies have evaluated sleep disordered breathing in obese patients but these studies have been conducted in developed world where demography and lifestyles are different from that of an Indian population. Hence this observational study was conducted to understand pattern of sleep related breathing disorder in obese individual with reference to Indian population the present study is being undertaken to study the effects of increasing BMI on sleep disorder breathing.

### Aims/Objectives

To analyze SDB in obese patients. To analyze whether SDB is a risk factor for hypertension in obese individuals.

### Material and Methods

This cross sectional study was conducted at the Department of Pulmonology of People's College of Medical Sciences and Research Bhopal M.P. The duration of study was one and half years (Dec 2013 to april-2015.)

Simple random sampling technique was used for selection of desired samples according to inclusion-exclusion criterion. Clinical History was taken, general Examination, Bio-Chemical Parameter and Overnight sleep study (Overnight Polysomnograph analysis) was done.

### Inclusion Criteria

Age group, 18-80 year.  
Informed and willing patients who have consented for data recording.

**Exclusion Criteria**

- Patients who showed unwillingness for study.
- Patient not tolerating sleep study.
- Other co-morbid conditions like bronchial asthma, coronary artery disease, chronic obstructive airway disease.
- Patient with upper airway abnormality
- Patients with pure central sleep apnea.
- Known hypothyroid patient.

**Methodology**

A total of 100 obese patients fulfilling inclusion criteria were randomly chosen from the outpatient department of pulmonology of People's College of Medical Sciences and Research Bhopal M.P. The patients were explained clearly about the study and their willingness to participate in the study was recorded in a consent form, duly signed by them. A total of 100 such subjects were available for the study. Epworth sleepiness scale score (ESSS) were used to assess the sleep disordered breathing (SDB). The questionnaire was handed to patient at the time of history recording and collected when the analysis was performed. Polysomnograph analysis, body mass index (BMI), neck circumference, pulmonary function test and clinical history were carried out in assistance of nursing staff and sleep study technician. Asian classification of obesity suggested by World Health Organization was used for assessment of BMI. Bio-chemical parameters of subjects were identified. Statistical analysis was done using Statistical Package of Social Science (SPSS Version 19; Chicago Inc., USA). Data comparison was done

by applying specific statistical tests to find out the statistical significance of the comparisons. Significance level was fixed at  $P \leq 0.5$ .

**Observations and Results**

The present study entitled "A study of sleep disordered breathing in obese patients" is carried out in the department of pulmonology of People's College of Medical Sciences and Research Bhopal M.P. A total of 100 subjects randomly selected for study. Out of them 56 subjects were male and 44 were female. The age of all subjects were obtained in the ranges from 18 to 80 years. The mean spread of age for total selected subjects (N=100) was 45.55 years. The following tables are showing the analyzed results with interpretations.

**Table 1:** Demographic distribution of study subjects

| Age(Years)      | Male N(%)          | Female N(%) | Total     |
|-----------------|--------------------|-------------|-----------|
| 15-30           | 6(10.7%)           | 6(13.6%)    | 12(12.0%) |
| 31-45           | 22(39.3%)          | 16(36.4%)   | 38(38.0%) |
| 46-60           | 22(39.3%)          | 15(34.1%)   | 37(37.0%) |
| ≥61             | 6(10.7%)           | 7(15.9%)    | 13(13.0%) |
| <b>Total</b>    | 56                 | 44          | 100       |
| <b>Mean age</b> | <b>45.55 years</b> |             |           |

Table 1 reveals demographic distribution of all 100 pts taken in study. 56 patients were male and 44 patients were female. Most of them were in 30-60 years age group. Mean age was 45.5 yrs.

**Table 2:** Association of BMI with gender & age

| Sex                | BMI (kg/m <sup>2</sup> ) |                      |                       | Total | Chi Square Value | P Value          |
|--------------------|--------------------------|----------------------|-----------------------|-------|------------------|------------------|
|                    | Overweight N(%)          | Obesity class I N(%) | Obesity class II N(%) |       |                  |                  |
| Male               | 0(0.0%)                  | 3(5.4%)              | 53(94.6%)             |       | 5.385            | 0.068(NS)        |
| Female             | 3(6.8%)                  | 5(11.4%)             | 36(81.8%)             |       |                  |                  |
| <b>Age (years)</b> |                          |                      |                       |       | <b>18.395</b>    | <b>0.005(HS)</b> |
| 15-30              | 2(16.7%)                 | 3(25.0%)             | 7(58.3%)              | 12    |                  |                  |
| 31-45              | 1(2.6%)                  | 4(10.5%)             | 33(86.8%)             | 38    |                  |                  |
| 46-60              | 0(0.0%)                  | 0(0.0%)              | 37(100.0%)            | 37    |                  |                  |
| ≥61                | 0(0.0%)                  | 1(7.7%)              | 12(92.3%)             | 13    |                  |                  |
| <b>Total</b>       | 3(3.0%)                  | 8(8.0%)              | 89(89.0%)             | 100   |                  |                  |

Table 2 shows that obesity class II is more in male pts (94.6%) as compared to female (81.8%). Overweight and Obesity class I are more in female.

In overweight group all the pts are in younger age group (15-45) and as age increases grade of obesity increases. In 46-60 yrs all the pts (100%) were in obesity class II. In more than 61 yr age group 92.3% pts were in obesity class II (P=.005).

**Table 3:** Association of BMI with Severity of Apnoea (AHI)

| Severity of Apnoea(AHI) | BMI (kg/m <sup>2</sup> ) |                       |                      | Total | Chi Square Value | P Value          |
|-------------------------|--------------------------|-----------------------|----------------------|-------|------------------|------------------|
|                         | Over weight N(%)         | Obesity Class I N (%) | Obesity Class II (%) |       |                  |                  |
| Mild                    | 3(23.1%)                 | 4(30.8%)              | 6(46.2%)             | 13    | <b>34.663</b>    | <b>0.001(HS)</b> |
| Moderate                | 0(0.0%)                  | 3(10.0%)              | 27(90.0%)            | 30    |                  |                  |
| Severe                  | 0(0.0%)                  | 1(1.8%)               | 56(98.2%)            | 57    |                  |                  |
| <b>Total</b>            | 3(3%)                    | 8(8%)                 | 89(89%)              | 100   |                  |                  |

All patients with BMI (23-24.9)(overweight) have mild AHI. There are total 8 patients in obesity class –I group (BMI 25-29.9). Out of them 4 patients (50%) have mild AHI, 3 patients (37.5%) have moderate AHI and 1 patient (12.5%)

Have severe AHI. There are 89 patients in obesity class II (BMI ≥30) group. Out of them 63% have severe AHI. Above data shows positive association of BMI with severity of apnea (AHI) which is statically significant.

**Table 4:** AHI\_Type and HTN Crosstabulation

|          |                   | HTN               |        | Total  |        |
|----------|-------------------|-------------------|--------|--------|--------|
|          |                   | NO                | Yes    |        |        |
| AHI_Type | Mild              | Count             | 8      | 0      | 8      |
|          |                   | % within AHI Type | 100.0% | .0%    | 100.0% |
|          |                   | % within HTN      | 16.0%  | .0%    | 8.0%   |
|          | Moderat           | Count             | 16     | 11     | 27     |
|          |                   | % within AHI Type | 59.3%  | 40.7%  | 100.0% |
|          |                   | % within HTN      | 32.0%  | 22.0%  | 27.0%  |
|          | severe            | Count             | 26     | 39     | 65     |
|          |                   | % within AHI Type | 40.0%  | 60.0%  | 100.0% |
|          |                   | % within HTN      | 52.0%  | 78.0%  | 65.0%  |
| Total    | Count             | 50                | 50     | 100    |        |
|          | % within AHI Type | 50.0%             | 50.0%  | 100.0% |        |
|          | % within HTN      | 100.0%            | 100.0% | 100.0% |        |

*p*<.05 which is statically significant.

Chi-Square Tests

|                              | Value               | df | P value |
|------------------------------|---------------------|----|---------|
| Pearson Chi-Square           | 11.526 <sup>a</sup> | 2  | .003    |
| Likelihood Ratio             | 14.639              | 2  | .001    |
| Linear-by-Linear Association | 10.777              | 1  | .001    |
| N of Valid Cases             | 100                 |    |         |

Discussion: The overall results of our study investigating association of BMI with sleep disorder breathing are consistent with results of previous studies on subject <sup>[4, 6]</sup>. Our research contribute to body of research that has established a link between sleep disorders and BMI.

We found a significant strong association between BMI and apnoea hypopnoea index. The mean BMI of individuals was 39.6 ± 5.5 kg/m<sup>2</sup>. Mean AHI of our study population was 32.67 ± 12.63 events/hour. All overweight patients in our study have mild apnea while in obesity class II 90% have moderate apnea and 98.2% have severe apnea. These data are consistent with observations that have been made in literature. In one study incidence of OSA is more than 70% in study population and incidence of OSA increases as BMI increases. Another study concluded that even modest weight control are likely to be effective in managing SDB and reducing new occurrence of SDB. The exact mechanism underlying the effect of obesity on the risk of developing OSA are still unclear. It may be the result of fat deposition on upper airway wall or changes in upper airway function.

In our study patients with severe AHI 60% patients were hypertensive as compared to 40% of patients who were non hypertensive which was statistically significant. Our study supported the results of previous studies <sup>[7-10]</sup> which showed that OSAHS is an independent risk factor for hypertension and that improvement in BP correlated as strongly with improvement in sleepiness as with OSA severity.

**Conclusion**

This preliminary study confirmed that obesity has a very high and proportionate correlation with sleep disordered breathing. Obstructive sleep apnea is the predominant sleep disordered breathing in our study population. Moderate obstructive sleep apnea correlates very highly for predicting hypertension and maybe considered as a risk factor for the same.

**Limitations**

Number of study subjects and study duration is very small for application to general population.

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