

**Effect of Body Mass Index & Waist Circumference on Severity of COPD patients****Anurag Chaurasia<sup>1</sup>, Anshuman Tiwari<sup>2</sup>, Jasmi J<sup>3\*</sup>**<sup>1</sup>Professor, Department Of Medicine, Shyam Sha Medical College, Rewa, Madhya Pradesh, India<sup>2</sup>Assistant Professor, Department Of Medicine, Shyam Sha Medical College, Rewa, Madhya Pradesh, India<sup>3</sup>PG Resident, Department Of Medicine, Shyam Sha Medical College, Rewa, Madhya Pradesh, India

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**Abstract**

**Introduction:** COPD is the major cause of morbidity and mortality worldwide. The link between COPD and BMI is subject of interest for many years. Waist circumference is also important anthropometric profile which should be measured in COPD patients. Therefore we plan to study status of BMI & Waist circumference in patients of COPD & correlate both with its severity. **Method:** We did an observational study on 100 COPD patients from April 2019 to June 2020 in medicine department, SSMC & SGMH Rewa. **Observation and results:** Most of patients (80%) in underweight category coming under more severe group with significant p value of 0.01. More than 70% patients in obese category coming in less severe group. 72% the patients with central obesity were falls under more severe group (GOLD 3 & GOLD 4) & 70% of patient without abdominal obesity were in less severe group (GOLD 1 & GOLD 2) with statistically significant p value of 0.00039. **Conclusion:** COPD is associated with Body Mass Index. COPD severity found to inversely related to BMI. These novel findings support Obesity Paradox. But highly significant negative association found between waist circumference and FEV1.

**Keywords:** COPD, BMI, Waist circumference.

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**Introduction**

World Health Organization defines COPD as a lung disease characterized by chronic obstruction of lung airflow that interferes with normal breathing and is not fully reversible. The healthcare burden of COPD can be as high as \$50 billion in countries like us where COPD is the third leading cause of mortality [1,2]. The classification of airflow limitation severity in COPD uses specific spirometric cut-points for purposes of simplicity. Relation of severity of COPD and nutrition has been the topic of extensive scientific research. BMI (Body Mass Index) is generally considered as a good indicator and used for the assessment of chronic energy deficiency of adults, especially in developing countries [3]. Indeed, BMI is a component in the calculation of the BODE index, a prognostic indicator of mortality [4]. In addition to general adiposity measured using BMI, fat distribution may be an important factor in the development of COPD. Abdominal adipose tissue contributes to systemic inflammation, which is related to the pathogenesis of COPD. Generally, Indian people have lower BMI and a higher percentage of body fat than Caucasians [5]. The objective of this study is to examine the association of general and abdominal adiposity measures with COPD severity.

**Material and method**

It was an observational study carried out from April 2019 to June 2020 in Department of Medicine, Shyam Shah Medical College and

Sanjay Gandhi Memorial Hospital, Rewa, MP. The study included 100 patients of COPD.

**Inclusion Criteria:** All the patients diagnosed as a case of COPD the diagnosis of COPD was done based on clinical history, examination & pulmonary function testing & staging done by GOLD criteria

**Exclusion Criteria:** 1. Age < 18 years

2. Patients with Respiratory Failure

3. Any contra-indication to perform Spirometry.

4. Critically ill

**Data collection method**

A detailed history was taken and recorded. The patients were thereafter subjected to complete clinical examination including relevant anthropometry, Laboratory investigations including PFT. Severity staging done by GOLD criteria for severity. Data collected was analysed by appropriate statistical methods.

**Statistical method:** Continuous variables were analysed using unpaired 't' test for normally distributed data. Discrete variables were studied using Wilcoxon rank sum test. Categorical variables were analysed using Chi square test. Odds ratio (OR) and 95% confidence intervals were calculated. A P value < 0.05 was taken as significant.

**Result**

In our observational Study following datas were obtained.

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**Table 1: Distribution of COPD patients according to Age (n=100)**

SI	Age (N)	GOLD 1	GOLD 2	GOLD 3	GOLD 4	P value
1	<50(13)	3(25%)	4(30%)	4(30%)	2(15%)	0.0889
2	50-70(72)	10(13%)	30(41%)	23(31%)	9(12%)	
3	>70(15)	1(6%)	4(26%)	3(20%)	7(46%)	
	<b>Total</b>	<b>14</b>	<b>38</b>	<b>30</b>	<b>18</b>	

Above table showed majority of the patients were in the age group of 50- 70 (72%) , followed by >70 (15%) , then by 70) majority is coming under GOLD 3&GOLD 4.(66%).

**Table 2: Distribution of COPD patients according to Gender**

Gender (N)	GOLD 1	GOLD 2	GOLD 3	GOLD 4	P value
<b>Male (70)</b>	10(14%)	30(42%)	19(27%)	11(15%)	>0.0723
<b>Female(30)</b>	4(13%)	8(26%)	11(36%)	7(23%)	
<b>Total</b>	<b>14</b>	<b>38</b>	<b>30</b>	<b>18</b>	

Above table showed majority of patients were Males (70%), they were mostly coming under GOLD 1& GOLD 2 (56%). Among female's majority (59%) coming under GOLD3 & GOLD 4.

**Table 3: Distribution of COPD patients according to BMI**

BMI (Kg/cm <sup>2</sup> )	GOLD 1	GOLD 2	GOLD 3	GOLD 4	P value
≤18.5 (31)	1(3%)	5(16%)	16(51%)	9(29%)	Chi-square: 21.43 P value: 0.01
18.5-22.9 (19)	3(10%)	8(42%)	5(26%)	3(16%)	
23-25 (16)	2(12.5%)	9(56%)	3(19%)	2(12.5%)	
>25 (34)	8(23.5%)	16(47%)	6(18%)	4(12%)	
<b>Total</b>	<b>14</b>	<b>38</b>	<b>30</b>	<b>18</b>	

Above table showed majority of patients in underweight (25) patients coming under less severe group with significant p value of 0.01.

**Table 4: Distribution of COPD patients according to Waist Circumference**

Waist Circumference	GOLD 1	GOLD 2	GOLD 3	GOLD 4	P value
<90 cm <80 cm(44)	4(9%)	27(61%)	8(18%)	5(11%)	0.00039
>90 cm >80 cm(56)	10(18%)	11(20%)	22(39%)	13(23%)	
<b>Total</b>	<b>14</b>	<b>38</b>	<b>30</b>	<b>18</b>	

Chi-square: 18.21

Above table showed that, 72% the patients with central obesity were falls under more severe group (GOLD 3&GOLD 4) & 70% of patient without abdominal obesity were in less severe group (GOLD 1&GOLD 2) with statistically significant p value of 0.00039.

**Table 5: Distribution of COPD patients according to Waist Hip Ratio**

WHR	GOLD 1	GOLD 2	GOLD 3	GOLD 4	P Value
<0.9 <0.8 (43)	5(12%)	24(56%)	08(18%)	6(14%)	P Value =0.014
>0.9 >0.8 (57)	9(16%)	14((26%)	22(38%)	12(21%)	
	14	38	30	18	

As above table shows 57% of patients are fulfilling criteria of abdominal obesity according to Waist Hip Ratio. Among this 59% of patients were in more severe GOLD 3 & GOLD 4. The data found to be statistically significant with p value 0.014.

**Discussion**

**Age**

Majority of the patients were in the age group of 50-70 (72%), followed by >70 (15%) , then by 70) majority is coming under GOLD 3&GOLD 4.(66%). All over, majority of patients are coming under GOLD 2 & GOLD 3 with insignificant P value of 0.0889 and

the mean age is 61±9 A study conducted by *Nabil jarad (2011)(6)* showed that increased prevalence of COPD in old age due to increased association of systemic comorbidities. Another study from European Respiratory Journal by *Pablo Sanchez (2014)[7]* compared COPD in younger age (65). younger population were 17% and older population were 53%. Results were larger proportion of patients are in the younger population (p=0.002) and the younger patients with COPD do not suffer from serious disease.

#### Gender

In our study, majority of patients were Males (70%), they were mostly coming under GOLD 1 & GOLD 2 (56%). Among females majority (59%) coming under GOLD3 & GOLD 4. P value calculated from chi square test found to be insignificant (>0.72). A study conducted by *(Mannino) (2002)[8]* concluded that although COPD has generally been considered a disease of men, mortality in women with COPD is increasing. Furthermore, a few studies suggest there may be gender-related differences in response to patient education. For example, males have shown better compliance with inhalers *(Chrystyn et al., 2014)[9]*, while female subjects are more likely to be admitted to emergency departments with exacerbations *(Celli et al., 2011)[10]*

#### Body Mass Index

The present study showed majority of patients in underweight were in more severe GOLD 3 & GOLD 4(80%). In normal BMI category majority were in less severe group (52% in GOLD 1& GOLD 2). Among obese (>25) patients coming under more in less severe group with significant p value of 0.01. *Poulain (2008)[11]* found that airflow obstruction was less severe in overweight/obese compared with normal weight patients (forced expiratory volume<sub>1</sub>: 51 ± 19% versus 31 ± 12% predicted, respectively, P < 0.01 *Gupta SS(2014)[12]* studied in northern India with similar topic and concluded that with increasing COPD stage BMI decrease in progressive manner. Another study by *Hany assal (2016)[13]* concluded that BMI of the patients was decreasing with severity of the disease (GOLD) and it was statistically significant (F = 4.116, P < 0.05).

#### Waist Circumference

In the present study, 72% the patients with central obesity were in more severe group (GOLD 3&GOLD 4) & 70% of patient without abdominal obesity were in less severe group (GOLD 1&GOLD2) with statistically significant p value of 0.00039. *Foumani[14]* Study showed Global Initiative For Chronic Obstructive Lung Disease score (p = 0.009), were observed to positively associate with WC. In fact, it is stated that with 1 cm increase in Waist Circumference FEV1 decreased by 11 ml. The study conclusion was WC is an easily measured parameter can be used to estimate pulmonary function rate in patients with COPD. *Yogesh Saxena (2008)[15]* assessed relationship between WC and respiratory parameters in Indian population and the results were showing highly significant negative association between WC and FEV1. *Yuechen (2007)[16]* concluded WC, but not BMI, is negatively and consistently associated with pulmonary function in normal-weight, overweight, and obese subject. That was a cross-sectional study of 1674 adults aged ≥18 y was conducted in a rural community. *Helala (2014)[17]* showed Waist Circumference was also negatively associated with FEV1 with a highly significant relation in the obese group with increased Waist Circumference.

#### Waist Hip Ratio

The present study shows 57% of patients were fulfilling criteria of abdominal obesity according to Waist Hip Ratio. Among this 59% of patients were in more severe GOLD 3 & GOLD 4. The data found to be statistically significant p value 0.014. *Lu Zhu(18)* concluded abdominal adiposity and underweight were risk factors for COPD. Both BMI and measures of abdominal adiposity should be considered in the prevention of COPD abdominal adiposity and underweight were risk factors for COPD.

#### Conclusion

It is essential to measure anthropometry of patient's Chronic Obstructive Pulmonary Disease in order to target the critical patients for prevention of complications & for the better management. Underweight patients need more clinical attention and early nutritional intervention for a better prognosis. Anthropometry is certainly the best & simple, cost effective, readily available tool in all areas of our country. We often failed to include in our clinical practices. Statistical importance of BMI, WC with COPD severity proved in present study. Thus, we recommend proper use of anthropometric measurements in each and every COPD patients.

#### Limitations

The study carry out in a single center. Subjective nature of spirometry may influence results,

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**Conflict of Interest: Nil**

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