



## A STUDY TO INVESTIGATE THE PREVALENCE OF METABOLIC AND METABOLIC LIKE SYNDROME IN STABLE COPD PATIENTS

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### ABSTRACT

**BACKGROUND:** Chronic Obstructive Pulmonary Disease (COPD) is associated with several extra-pulmonary systemic manifestations including metabolic and metabolic like syndrome. The objective of study was to assess prevalence of metabolic like syndrome among COPD patients.

**METHODS:** This study was conducted from April 2017 to March 2018. Total 67 COPD patients were classified according to GOLD guideline. International Diabetes Federation (IDF) guideline was used for metabolic syndrome (MetS).

**RESULTS:** Prevalence of MetS was 29.85%, highest (47.06%) in GOLD stage-II. If central obesity was excluded than prevalence of metabolic like syndrome was 55.27%, highest (70%) in stage-IV.

**CONCLUSIONS:** MetS is missed in advance stages of COPD due to absence of central obesity. Therefore "Metabolic Like Syndrome" should be coined in COPD where waist circumference is not included.

**KEYWORDS :** Chronic Obstructive Pulmonary Disease, Metabolic Syndrome, Metabolic Like Syndrome

### INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases<sup>1</sup>. The term chronic systemic inflammatory syndrome is proposed to take account of inflammatory nature of COPD and its comorbid conditions such as Metabolic syndrome (MetS). MetS has multiple risk factors that arises from insulin resistance accompanying abnormal adipose deposition and function. It is a risk factor for coronary heart disease, diabetes, fatty liver and several cancers. Obesity is seen in approximately 18% of patients with COPD and is far more common in early stages (stage-I and II)<sup>2</sup>.

Several studies<sup>3,4</sup> from North America have shown a prevalence of metabolic syndrome (29%-58%) in COPD patients. Tanni et al<sup>5</sup> reported that MetS was 36% in COPD patients. Indian data on the prevalence of MetS or its components in COPD are sparse. Dave et al<sup>6</sup>, reported MetS in 42% COPD cases.

The aim of this study was to investigate the prevalence of metabolic and metabolic like syndrome in stable COPD patients.

### METHODS

This prospective study was conducted in 67 COPD patients attending the Department of Tuberculosis and Respiratory Diseases, G.S.V.M. Medical College, Kanpur from April- 2017 to March-2018.

### INCLUSION CRITERIA :

- Stable COPD Patients.

### EXCLUSION CRITERIA :

- Other respiratory diseases such as pulmonary tuberculosis, bronchial asthma, interstitial lung diseases, obstructive sleep apnea and lung cancer.

- Known case of Ischemic heart disease and chronic renal failure.
- Unstable COPD patients with acute exacerbation.
- Patients attending hospital with cough and breathlessness were evaluated for COPD as per GOLD-2017. All routine blood investigations including complete lipid profile and plasma glucose estimation (FBS & OGTT) were done. Spirometry with reversibility was performed.

### METABOLIC SYNDROME DEFINED AS PER NEW INTERNATIONAL DIABETES FEDERATION IDF DEFINITION (IDF):

- Central obesity (defined as waist circumference >90 cm for men and >80 cm for women, with ethnicity specific values for other groups)
- Plus any two of the following four factors:
- Raised TG level: >150 mg/dl (1.7 mmol/L), or specific treatment for this lipid abnormality.
- Reduced HDL cholesterol: <40 mg/dl in males and < 50 mg/dl in females, or specific treatment for this lipid abnormality.
- Raised blood pressure: systolic BP  $\geq$  130 or diastolic BP 85 mm Hg, or treatment of previously diagnosed hypertension.
- Raised fasting plasma glucose (FPG)  $\geq$  100 mg/dl (5.6 mmol/L), or previously diagnosed type 2 diabetes.
- If FPG above 5.6 mmol/L or 100 mg/dL, Oral Glucose Tolerance Test is strongly recommended but is not necessary to define presence of the syndrome.

### STATISTICAL ANALYSIS

Performed using SPSS 22.0 software package and instat graphpad software. Variables were analyzed using student's t test, fisher exact test and chi square test and p <0.05 was considered significant.

### RESULTS

Total 67 patients were included for final analysis after exclusion criteria. Mean age of patients was 58.11 $\pm$ 9.99 years. Overall percentage of obese, overweight, normal weight and underweight were 31.3%, 23.9%, 29.8% and 14.9% respectively. Prevalence of Metabolic Syndrome in our study was 29.85%.

respectively. 50% female and 22.2% male were obese. Mean BMI of male was  $24.33 \pm 6.64 \text{ kg/m}^2$  and mean BMI of study population was  $26.22 \pm 7.22 \text{ kg/m}^2$ . The mean waist circumference of male was  $86.91 \pm 13.31 \text{ cm}$  while in female it was  $87.18 \pm 14.51 \text{ cm}$ .

Most parameters of lipid profile were deranged in study population. Among all parameters of lipid profile, raised

triglyceride was found in majority of patients (69.4%) followed by LDL (63.2%) and total cholesterol (63.2%). In female HDL was decreased in majority (58.3%) followed by LDL (36.8%) and total cholesterol (36.8%).

Raised Fasting Blood Sugar (FBS) was more in female (54.5%) than males (31.1%). Overall 38.8% patients had raised FBS or on antidiabetic drugs previously. (Table-1)

**Table-1: Comparison of various parameters between MetS and non-MetS COPD patients.**

Parameter	COPD with metabolic syndrome (n=20)	COPD without metabolic syndrome (n=47)	Name of test (student t test)	p value	Significant/Non-significant
Waist circumference	101 ± 11.17	81.30 ± 10.86	2.0047	0.329	Not significant
TG	202.26 ± 97.72	140.86 ± 94.81	2.0287	0.41	Not significant
HDL	50.26 ± 12.12	54.77 ± 12.76	2.0094	0.592	Not significant
Fasting blood sugar	133.22 ± 21.06	99.39 ± 20.06	2.0223	0.381	Not significant
Systolic BP	148.09 ± 29.31	126.41 ± 15.34	2.0527	0.0001	Significant

Metabolic syndrome was most common in GOLD stage two (47.06%). (Table-2)

**Table-2**

Gold Stage	Total Patients			Metabolic Syndrome	Total
I	5	Male	3	1	2(40%)
		Female	2	1	
II	17	Male	14	6	8(47.06%)
		Female	3	2	
III	35	Male	22	4	9(25.71%)
		Female	13	5	
IV	10	Male	6	0	1(10%)
		Female	4	1	
<b>TOTAL</b>	67(100%)				20(29.85%)

If we exclude central obesity as mandatory criteria for diagnosis of metabolic syndrome and have any two of four criteria (raised triglyceride, decreased HDL, raised blood pressure and raised fasting blood sugar) to diagnose metabolic like syndrome in stable COPD patients, then 42.2% male COPD patients and 81.8 % female COPD patients have metabolic syndrome. (Table-3 &4)

**Table-3**

Criteria Used	WAIST CIRCUMFERENCE CRITERIA NOT INCLUDED		
	2 out of 4 criteria used (Metabolic Like Syndrome)		
Gold Stages	Male	Female	Total
I	2 (66.6%)	1 (50%)	3 (60%)
II	5 (35.7%)	2 (66.6%)	7 (41.2%)
III	9 (40.9%)	11 (84.6%)	20 (57.1%)
IV	4 (66.6%)	3 (75%)	7 (70%)
<b>TOTAL</b>	20 (44.4%)	17 (77.3%)	37 (55.2%)

**Table-4**

GOLD Stages	Metabolic Syndrome	Metabolic Like Syndrome	p value	Significant/Non-significant
I	2	3	1.00	Not significant
II	8	7	0.72	Not significant
III	9	20	0.01	Significant
IV	1	7	0.02	Significant

**DISCUSSION**

Prevalence of metabolic syndrome in our study was 29.85% (40.91% in female and 24.44% in male.). Metabolic syndrome was most common in GOLD stage-II (47.06%) followed by stage-I (40%) followed by stage-III (25.71%) and it was only 10% in stage- IV. Henrik Watz et al<sup>8</sup> reported metabolic

syndrome in 47.5% patients with highest (53%) in stage- II, 50% in stage-I, 44% in stage-IV and 37% in stage-III. As per definition of metabolic syndrome, the central obesity is the basic prerequisite and less chance to find of metabolic syndrome in later stages of COPD due to absence of central obesity. Jesús Diez-Manglano et al<sup>9</sup> found the overall prevalence of metabolic syndrome in COPD patients was 42.9%, being more frequent in female (59.5%).

Maximum patients of metabolic syndrome (45.5%) were in stage-I & II combined and only 22.2% of patients were in stage- III & IV combined in our study. However, no significant variation was found in triglyceride levels, HDL levels, raised BP and raised FBS among various stages of COPD. It means that all parameters except central obesity were present in population and they were not affected by different GOLD stages.

If we exclude central obesity as mandatory criteria for diagnosis of MetS and have any two of four criteria (raised triglyceride, decreased HDL, raised blood pressure and raised fasting blood sugar) to diagnose, then 42.2% male COPD and 81.8 % female COPD (overall 55.2%) have metabolic like syndrome.

**CONCLUSION**

Advanced COPD patients do not have central obesity but they have other criteria fulfilling metabolic syndrome. So definition of metabolic syndrome should be reviewed for COPD patients and for other diseases with loss of fat and muscles mass. In other words central obesity should not be mandatory criteria in COPD.

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