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CORRELATION OF BODY MASS INDEX WITH PULMONARY FUNCTION PARAMETERS AND GRADE OF BREATHLESSNESS IN COPD PATIENTS WITH METABOLIC SYNDROME

General Medicine

Dr. Pukazhenhti. K* *Corresponding Author

Dr. N. Meenakshi

Dr. Aruna Shanmuganathan

Dr. Ragulan .R

Dr. Muthukumaran

Dr. Uma Ganesh

Dr. Nisha Ganga

KEYWORDS

BACKGROUND AND JUSTIFICATION

- Metabolic syndrome is a disorder with complex interrelated cardiovascular risk factors.
- Since COPD is considered as a systemic disease, patients with COPD and Metabolic syndrome have higher risks of developing cardiovascular morbidity and mortality.
- Several studies from different parts of the world have shown metabolic syndrome has a prevalence of 25.6-60.9% in COPD patients (1).
- Body Mass Index (BMI) in COPD is variable and underweight or obesity phenotype may be present.
- Hence the present study has been undertaken to correlate BMI with Modified Medical Research Council (mMRC) grade, 6 Minute Walk Test (6MWT), FEF 25-75% and FEV1 in COPD patients with metabolic syndrome.

AIMS AND OBJECTIVES

- To correlate BMI with mMRC grade, 6MWD, FEF25-75% and FEV1 in COPD patients with metabolic syndrome.

MATERIALS AND METHODOLOGY

- STUDY DESIGN - Prospective Observational Study
- STUDY PERIOD - 1 Year (Oct. 2016 - Oct. 2017)
- VENUE - Department of Respiratory Medicine, CHRI
- SAMPLE SIZE - 32 stable COPD patients (GOLD- 2017) who were diagnosed with metabolic syndrome (modified NCEP ATP III criteria) were included in the study.
- All the patients included in the study were subjected to detailed clinical history and examination. Their BMI was calculated, mMRC grade noted, 6MWT measured and PFT was done using True flow by NDD machine. .
- STATISTICAL ANALYSIS - Data was analyzed using SPSS Version 22.0. IBM Corp Armonk, NY; 2013.
- P value < 0.05 was considered statistically significant.
- BMI was then correlated with mMRC grade, 6MWD, FEF25-75% and FEV1 using Pearson correlation.

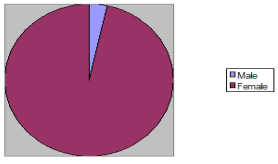
RESULTS

DESCRIPTIVE ANALYSIS OF AGE IN STUDY POPULATION (N=32)

Parameters	Mean±sd	Median	Min	Max	95% Cilower	95% Ciupper
AGE	54.45±9.32	53.00	40.00	78.00	52.16	56.75

- The mean age was 54.45 ± 9.32 in the study population, minimum age was 40 years and maximum age was 78 years in the study population with a male preponderance (77.30%) (95% CI 52.16 to 56.75)

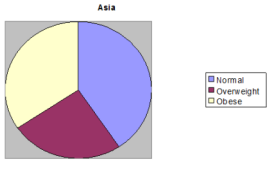
DESCRIPTIVE ANALYSIS OF GENDER IN THE STUDY POPULATION (N=32)



Gender	Frequency	Percentage
Male	25	78.12%
Female	07	21.88%

- There was predominantly a male preponderance

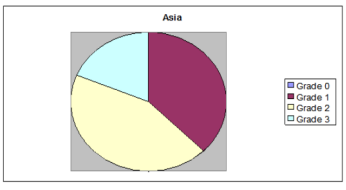
DESCRIPTIVE ANALYSIS OF BMI IN THE STUDY POPULATION (N=32)



BMI	Frequency	Percentage
18.5- 22.9	13	40.6%
23- 24.9	08	25%
>25	11	34.4%

- Among the study population, 34.4% (11) participants were obese, 25% (8) were overweight and remaining 40.6% (13) were normal.

DESCRIPTIVE ANALYSIS OF MMRC GRADE IN THE STUDY POPULATION (N=32)



mMRC	Frequency	Percentage
0	0	0%
1	12	37.5%

2	14	43.75%
3	6	18.75%
4	0	0%

- Among the study population, the majority (43.75%) were grade 2, followed by grade 1 (37.5%)

COMPARISON OF MEAN FEV1 ACROSS THE BMI CATEGORIES (N=32)

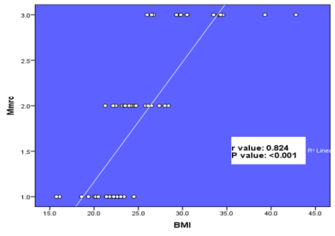
BMI Categories	FEV1Mean ± Std. Dev	Mean difference	95% Confidence Interval for Mean		P value
			Lower Bound	Upper Bound	
Normal (18.5 to 22.9)	2 ± 0.74	(base line)			
Over weight (23 -24.9)	1.9 ± 0.79	0.11	-0.33	0.54	0.629
* Obesity (>25and above)	1.54 ± 0.52	0.45	0.07	0.84	0.02

- There was a statistically significant positive correlation between BMI and FEV1

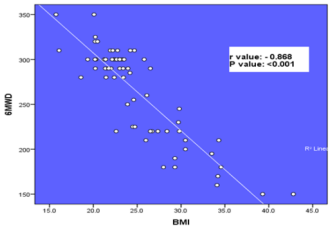
CORRELATION OF BMI WITH mMRC and 6MWD IN THE STUDY POPULATION

PARAMETER	PEARSON CORRELATION	P VALUE
MMRC	0.824	<0.001
6MWD	-0.868	<0.001

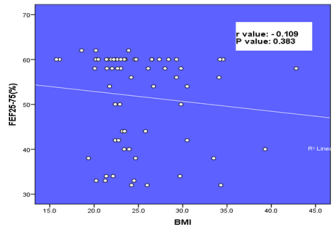
SCATER PLOTS DIAGRAM OF CORRELATION BETWEEN BMI WITH MMRC IN THE STUDY POPULATION(N=32)



SCATER PLOTS DIAGRAM OF CORRELATION BETWEEN BMI WITH 6MWD IN THE STUDY POPULATION (N=32)



SCATER PLOTS DIAGRAM OF CORRELATION BETWEEN BMI WITH FEF25-75(%) IN THE STUDY POPULATION (N=32)



PARAMETER	PEARSON CORRELATION	P VALUE
FEF25-75(%)	-0.109	0.383

RESULTS

- There was a strong positive correlation between BMI and mMRC (r value: 0.824, P value: <0.001)
- There was a strong positive correlation between BMI and FEV1 (P value : 0.020)
- There was a strong negative correlation between BMI and 6MWD (r value: -0.868, P value: <0.001)
- The correlation between BMI and FEF 25-75(%) (r value: -0.109, P value: 0.383) was not statistically significant

DISCUSSION

- COPD is a complex and heterogeneous condition with significant extra-pulmonary manifestations that among others include cardiovascular disease, skeletal muscle dysfunction, and diabetes
- Metabolic syndrome is a common metabolic disorder described as a complex of interrelated cardiovascular risk factors
- The metabolic syndrome is found to be more frequent in chronic obstructive pulmonary disease (COPD). The presence of inflammatory markers in circulation, sputum, and broncho-alveolar fluid suggest systemic inflammation is one of the potential mechanisms responsible for both COPD and metabolic syndrome in CPOD.
- Physical inactivity, skeletal muscle dysfunction, hypogonadism, and steroid use are also important causes of the metabolic syndrome in COPD
- Obesity plays a major role in the development of the metabolic syndrome and has been identified as an important risk factor for diseases such as type 2 DM and cardiovascular disease.
- It is linked to respiratory diseases such as obstructive sleep apnea and obesity hypoventilation syndrome . A potential link between obesity and COPD is also increasingly recognized, although very little is known about the mechanisms underlying this association.
- Increasing BMI is typically associated with a reduction in forced expiratory volume in one second (FEV1), forced vital capacity (FVC), total lung capacity, functional residual capacity and expiratory reserve volume
- A south East Asian study(2) which was done on 90 COPD patients that correlated BMI with COPD and FEV1 showed no significant correlation between BMI and COPD stage or the FEV1 demonstrable by statistical analysis
- However in this study there was a positive correlation between BMI and FEV1
- Also South Indian study(3) on relation between BMI,FEV1 and 6MWT in stable COPD patients which showed no statistical difference of FEV1 and 6MWT between lower and higher BMI groups
- Whereas in my study there was a negative correlation between BMI and 6MWD and a positive correlation between BMI and FEV1
- Also a western study (4)were correlation of BMI and FEF25-75% was done and showed higher the FEF25-75% was associated with lesser COPD exacerbation and in the present study there was a negative correlation between the two parameters

CONCLUSION

- In COPD patients with Metabolic Syndrome, increase in BMI is associated with a higher mMRC grade and lesser 6MWD.
- In the PFT parameters, decrease in small airway function (FEF25-75%) was observed in patients with increase in BMI, however increase in BMI was associated with higher FEV1.
- Even though there was an increase in mMRC grade and decrease in 6MWD in obese COPD patients with metabolic syndrome, the COPD severity assessed by FEV1 showed a positive correlation which needs to be evaluated and further studies which relate other anthropometric measurements like fat free mass index can be better substitute for more accurate assessment.

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