The Prevalence of Weight Loss Assessed by Body Mass Index in Patients with Stable Chronic Obstructive Pulmonary Disease

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ABSTRACT:

BACKGROUND:

The association between chronic obstructive pulmonary disease (COPD) and weight loss has long been recognized and is a common clinical observation and it is one of the systemic manifestations of COPD. A number of studies have identified weight loss and low body mass index (BMI) as independent predictors of mortality and worse prognosis.

OBJECTIVE:

We have undertaken this study to confirm the association between BMI, weight loss and COPD and the relation to its severity.

METHODS:

A cross section study of 100 patients with stable COPD have been identified and classified according to Global initiative for Chronic Obstructive Lung Disease (GOLD) guideline. BMI have been calculated according to the formula: BMI=Body Weight (kg)/Height^2 (kg/m^2) Subjects; were classified according to the BMI in to three groups using World Health Organization guideline: underweight, normal weight and overweight also classified as current cigarette smokers and ex smokers.

RESULTS:

It had been shown in this study that the underweight more common in COPD (23%),compared with the control subjects only (7%).low BMI significantly associated with more severe stages of COPD and in current smoker than in Ex-smoker and with increase in age ,but there is no significant difference between gender and nutritional status .

CONCLUSION:

Weight loss is a prevalent condition in patients with COPD and BMI can be used to assess this relationship there was an interaction between smoking habits and BMI in COPD patients. BMI correlates well with FEV1 and COPD severity and can be used by every clinician because it is a simple, inexpensive, readily available tool.

KEYWORDS: chronic obstructive pulmonary disease (COPD), body mass index (BMI).

INTRODUCTION:

Chronic obstructive pulmonary disease (COPD) is a highly prevalent disease that has a large impact on quality of life for patients and their families and kills millions of people worldwide.Following the marked increase in tobacco consumption in developing countries. COPD is gaining global importance; if current trends continue, it will become the fifth leading cause of lost disability-adjusted life years and the third most important cause of death world-wide by 2020. [1], COPD is a preventable and treatable disease state [2]. The body mass index (BMI), or Quetelet index, is a statistical measure of the weight of a person scaled according to height. It was invented between 1830 and 1850 by the Belgian polymath Adolphe Quetelet during the course of developing "social physics"

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Body mass index is defined as the individual's body weight divided by The Square of their height

$$\mathrm{BMI} = \frac{weight\ (\mathrm{kg})}{height^2 (\mathrm{m}^2)}$$

The mechanisms underlying weight loss and muscle wasting are incompletely understood but likely involve an imbalance in ongoing processes of protein degradation and replacement. [10] Anorexia, inflammation, infection and pharmacological therapy are contributing factors in COPD weight loss, Cytokines-mediated cachexia similar to other end-organ failure syndromes is a possible mechanism in COPD patients [22, 23].

PATIENTS AND METHODS:

This is a cross section study 0f 100 patients with stable COPD, 76 male (76%) and 24 female (24%) enrolled through about ten months (from 1st-November 2007 -30th. August 2008) in outpatients clinic in Baghdad teaching hospital were fully examined and investigated and diagnosed as COPD based on☹(Age more than 35 years old , History of

chronic cough (productive). or History of shortness of breath Current or past smoking history with Post bronchodilator FEV1/ FVC less than 0.7 and FEV1 less than or equal to 80% of predicted by spirometry. Negative reversibility test to short acting bronchodilator (improvement in FEV1 less than 12% or less than 200ml) on aspirogram performed 10-15 minutes after inhalation of 400 mcg total dose of salbutamol or after 30 minutes of inhalation of 160 mcg anticholenergic ipratropium bromid.). Body Mass Index (BMI) was calculated by the equation: BMI = weight /heigh^2 (kg/m^2) and categorized in to four groups using World Health Organization guidelines: Under weight (<18.5kg/m^2). Normal weight (18.5-24.9kg/m^2). Overweight (25-29.9kg/m^2).Obese (30+kg/m^2) Subjects were classified as current cigarette smokers were those who smoked cigarettes every day or who had quit smoking < 2 years and ex or Former smokers were those who had quit smoking > 2 years.

RESULTS:

One hundred patients with stable COPD 76 patients 76% were males and 24 patients 24% were females. The median age is 58.31years; the age groups encountered in this study rang between 35 and 90 years. Subjects were classified according to GOLD criteria of COPD and we found that stage 0 (at risk) were 16 patients (16%) , stage 1 (mild) were 7 patients (7%), stage 2 (moderate) were 39 patients (39%), stage 3 (severe) were 23 patients (23%) and stage 4 (very severe) were 15 patients (15%). And among those patients 63 patients (63%) were current smokers and 37 patients (37%) were Ex-smokers (Table 1). Compared with control group, the underweight in COPD were 23 patients (23%) and 37 (37%) to be overweight according to their BMI while only 7 subjects of the control group were underweight (7%) and 61 subjects were overweight (61%), d.f. =2, p=0.002 (Table 2). From the underweight patients, 13 subjects (86.7%) were with stage 4 (very severe) of COPD, 9 (39.1%) were with stage 3 (severe), 1(2.6%) were with stage 2 (moderate), but nil in stage 1(mild) and stage 0 (at risk). While in overweight subjects is nil in stage 4, 5 (21.7%) in stage 3, 14(35.9%) in stage 2, 5 (71.4%) in stage 1 and 13(81.3%) in stage 0. d.f. =8, p= 0.001 (Table 3). BMI decrease with increase of the stages of COPD in this study, the mean of BMI in stage 4 is 17.9, in stage 3 is 20.9 , in stage 2 is 23.7 , in stage 1is 26.7 and 28.3 in stage 0 . d.f. =4, 99 p=0.001 (Table 4). The FEV1 (mean) in the underweight were 29.9, in normal weight were 58.9 and 70.6 in overweight, d.f. =2, 99 p=0.001 (Table 5). The mean age in underweight group were 63.2, in normal weight group 57.9 and in overweight group 55.7, d.f. =2, 99, p=0.03 (Table 5). Current smokers were 63 patients (63%) with BMI mean 22.4 while Ex-smokers were 37 patients (37%) with BMI mean 24.3 d.f.=98 , p=0.04 (Table 6), This table shows that BMI significantly lower in current smoker than in Ex-smoker. There is no significant correlation between gender and BMI d.f. =2, p=0.1 (Table 7).

Table 1: Characteristics of the sample

Variable	No.	Mean	SD
Age	100	58.31	10.86
Height(meter)	100	1.67	0.079
Weight(kg)	100	65.18	13.68
BMI(kg/m^2)	100	23.13	4.64
Sex	No.	%	
Male	76	76.0	
Female	24	24.0	
Smoking	No.	%	
Smoker	63	63.0	
Ex- smoker	37	37.0	
Stages of COPD	No.	%	
0	16	16.0	
1	7	7.0	
2	39	39.0	
3	23	23.0	
4	15	15.0	
Nutritional status	No.	%	
Underweight	23	23.0	
Normal	40	40.0	
Overweight	37	37.0	

Table 2: The relation between BMI and COPD.

Variable	Nutritional status					
	Underweight		Normal		Overweight	
	No.	%	No.	%	No.	%
COPD	23	23.0	40	40.0	37	37.0
Control	7	7.0	32	32.0	61	61.0

$\chi^2 = 15.3$, d.f. = 2, p = 0.00

Table 3: The relation between the nutritional status and COPD severity.

COPD stages	Nutritional status					
	Underweight		Normal		Overweight	
	No.	%	No.	%	No.	%
0	0	0.0	3	18.8	13	81.2
1	0	0.0	2	28.6	5	71.4
2	1	2.6	24	61.5	14	35.9
3	9	39.1	9	39.2	5	21.7
4	13	86.7	2	13.3	0	0.0
Total	23	23.0	40	40.0	37	37.0

$\chi^2 = 68.3$, d.f. = 8, p = 0.001

Table 4: The relation between BMI and COPD stages.

COPD stages	BMI		
	No.	Mean	SD
0	16	28.3	4.5
1	7	26.7	3.6
2	39	23.7	2.7
3	23	20.9	3.9
4	15	17.9	2.7

F=22.3, d.f.=4,99 , p=0.001

Table 5: The relation between nutritional status and Age and FEV1.

Variable	Underweight			Normal			Overweight		
	No.	Mean	SD	No.	Mean	SD	No.	Mean	SD
Age(yr)	23	63.2	2.2	40	57.9	11.9	37	55.7	10.9
	F = 3.6 , D.F. = 2, 99 , P = 0.03								
FEV1(L/sec)	23	29.9	11.1	40	58.9	16.4	37	70.6	16.1
	F = 51.2, D.F. = 2, 99 , P = 0.001								

Table 6: The relation between BMI and smoking habit .

Variable	BMI		
	No.	Mean	SD
Smoker	63	22.4	4.4
Ex-smoker	37	24.3	4.7

t= 2.02 , df=98, p=0.04

Table 7: The relation between nutritional status and gender in COPD.

Variable	Nutritional status					
	Underweight		Normal		Overweight	
	No.	%	No.	%	No.	%
Male	18	23.7	34	44.7	24	31.6
Female	5	20.3	6	25.0	13	54.2
Total	23	23.0	40	40.0	37	37.0

$\chi^2 = 4.3$, d.f. =2, p = 0.1

DISCUSSION:

Several studies have documented the association between nutritional depletion and weight loss in patients with established COPD, concomitantly there is a lack of prospective and retrospective studies in this subject in our country. In our study the statistical analysis had been shown that the underweight was more common among COPD group than in control group and the overweight was more common among control group than COPD group shown in table (2), also there was a significant relationship between the underweight group and low BMI and with the increase in COPD severity as shown in table (3) and (4).The correlation regression relationship was also statistically significant in which the underweight group is associated with decrease in FEV1 and increase in age. (Table 5)

The conclusion from the above that the underweight associated with more severe COPD and there is a significant correlation regression between BMI and FEV1.In this study we found that the BMI in the current smokers is less than in Ex-smoker. (Table 6), this conclude that there is a significant relation between smoking and weight loss in stable COPD patients. Also we found that there is no significant difference between gender and the nutritional status in this study.(Table 7) The association between COPD and weight loss had been recognized before many years and it had been suggested that it may contribute to increased mortality and morbidity in patients with COPD.

Our result not differ from that obtained from other Iraqi study by ALI.

H &HASHIM.M.ALKADHIMI, et al 2005 in AL-Kadhimiya Teaching Hospital, he found that the underweight more common in COPD group than that found in control group, and associated with more severe stages of COPD according to the American Thoracic Society classification [8]. He concluded that there was a significant relationship between low BMI and COPD and the correlation regression was also statistically significant in which low BMI is associated with more severe COPD. [10]. Wang et al conclusion similar to our study he found that BMI was significantly lower in COPD patients; BMI was also significantly lower in smokers than in non-smokers and BMI decreased with the increase of the stages of COPD. He concluded that the lower BMI was strongly associated with COPD, possibly as a risk factor for COPD independent of smoking, and a potential predictor for COPD severity. [9,10,11,12.13].

Ayse Baccioglu et al a Turkish study (Nutritional distribution in COPD) concluded that the nutritional disorders are common in COPD than in healthy cases; obesity's frequently is similar in both groups, malnutrition is more common in COPD. As COPD stage progresses, incidence of malnutrition increase. This indicates that airflow limitation and nutrition are related condition. [16] In the longitudinal study section (Harik-Khan et al) using Baltimore Longitudinal Study of Aging , which afforded us the opportunity to find out whether asymptomatic subjects with lower initial body mass were at a greater risk of COPD developing during subsequent follow-up, he concluded that men with low BMI are at increased risk for getting COPD. [17] Nemery et al raised the possibility that subjects who are susceptible to chronic obstructive lung disease may be leaner than subjects who were not susceptible. [18] Gray-Donald and coworkers studied the nutritional status and mortality in chronic obstructive pulmonary disease showed that 18% of a cohort of 348 patients with COPD was underweight. [19] Finally, low body weight has been identified previously as a poor prognostic indicator of survival in COPD but a recent retrospective study by Marquis K. et al analysis of 142 COPD patients showed that mid-thigh muscle cross-sectional area was a better indicator of prognosis than body mass index. This latter finding reinforces the concept that loss of FFM and in particular muscle mass is a common feature of COPD which has important implications for physical function, health status and survival. [20] As compared with these studies our study had the limitation of number of patients, duration of study, and lack of facilities but we hope that it clears the way for further research.

CONCLUSIONS:

- There is a significant degree of nutritional depletion and weight loss in COPD patients than in general population.
- The prevalence of underweight is more common with more severe COPD
- FEV1 correlates positively with BMI.
- There is a significant relation between smoking and weight loss.

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