Obesity and Asthma Severity Among Adults Presenting to the Out Patient Clinic

Hashim M. Al-Kadhimi, Haider Noori Dawood

ABSTRACT:

BACKGROUND:

Recent studies have suggested a relationship between asthma and obesity. The risk for developing asthma increases with increasing obesity among individuals. Yet little is known about how obesity influences asthma.

OBJECTIVE:

To determine whether a relation of Obesity to asthma exists among adults presenting to the out patient respiratory clinic , and *the correlation between Obesity and spirometric changes in patients with asthma*.

METHODS:

A cross-sectional study was done for one hundred patients aged 17 to 70 years patients with asthma diagnosed by clinical and pulmonary function test , in the respiratory outpatient's clinic in AL Kadhmia Teaching Hospital.

Collected from May to December 2010 The following parameters were assessed:

Weight, height, body mass index, gender,spirometric parameters which includes of forced expiratory volume in 1 second (FEV1), forced vital capacity(FVC),FEV1\FVC ratio, and forced expiratory flow50% (FEF50%)

RESULTS:

There were 100 asthmatic patients,32 male and 68 female. There age between 17-70 year, classified into four groups according to BMI. There was significant relation between obesity and asthma (p=0.03),this relation was statistically significant in female(p=0.003) but not in male.

spirometry in male showed no statistically significant (p-value > 0.05) for FEV1, FVC FEV1\FVC ratio, FEF50% in both non obese and obese, but in female statistically significant for FEV1\FVC(p 0.05) ,FEF50% (p 0.036) , while no statistically significant for FEV1, FVC in both groups, for both male and female according to BMI there is statistically significant for FEF50% (p 0.015),while no statistically significant for FEV1\FVC, FVC, FEV1 in both groups.

CONCLUSION:

There was a significant relation between asthma and obesity , in female ,but not in male. There is statistically significant difference for FEF50% ,and FEV1\FVC in obese female .Also there is statistically significant difference for FEF50% in both male and female according to BMI.

***KEY WORDS*:** asthma, obesity, BMI

INTRODUCTION:

Obesity is significantly related to increased prevalence and incidence of asthma[1]. In a meta-analysis of two prospective studies that evaluated the impact of BMI on the incidence of asthma in adults, asthma was more likely in patients who were overweight or obese than in patients who had a normal body weight [2]

Gender specificity found that the obesity and asthma association is stronger in women than in men[3].

Department of Internal Medicine Alnehrain Collage of Medicine.

Obesity also appears to worsen asthma control[4],and it can increase asthma severity[5], and often show a reduced response to standard asthma medications[6].

The basic mechanism for the relationship between obesity and asthma has not been established, but mechanical factors, aspects of the systemic inflammation related to obesity including changes in energy-regulating hormones, comorbidities of obesity, or common etiologies may contribute[7,8]. Adipocytes may release proinflammatory hormones that in turn could contribute to the reported increase and

severity of asthma in the obese population[9]. Many of the literatures focused on the relationship between obesity and airway inflammation and asthma has focused on the role of leptin[10]. Leptin, the product of the *Ob* gene, is increased in obese humans and is also a central mediator of inflammation in obesity; it shares structural homology with long-chain helical cytokines, such as IL-6, and has been shown to regulate T-cell proliferation and activation, recruit and activate monocytes and macrophages, and promote angiogenesis[11].

Respiratory system compliance is reduced by at least three factors

in obesity: excess soft tissue weight compressing the thoracic cage, fatty infiltration of the chest wall, and an increase in pulmonary blood volume[12]. This reduction in respiratory system compliance results in an increased oxygen cost of breathing[13]

Obesity may be associated with a reduced expiratory reserve volume (ERV), functional residual capacity (FRC), and tidal volume[14].

Factors associated with asthma could lead to an increase in obesity. Inactivity or inability to exercise in asthmatic subjects or those with atopy could cause weight gain[15].

It is known that the perception of airflow limitation is different according to sex and it has been suggested that obesity could be more related to dyspnea than to airflow limitation[16]. one study reported an association of body mass index with asthma severity in women, but not in men[17].

Obesity and asthma may be determined by common genetic mechanisms[10]. Hallstrand and colleagues found that the correlation between obesity and asthma is predominantly caused by shared genetic risk factors for both conditions [18]

PATIENTS AND METHODS:

Subjects and Design:

We recruited obese and nonobese patientss from AL Kadhmiya Teaching Hospital outpatient clinics. Participants were eligible if they had diagnosed asthma by clinical and pulmonary function test on anti asthmatic medications , all were ≥ 17 years old, considered obese (body mass index [BMI] ≥ 30 kg/m^2) or nonobese (normal weight or ungerweight BMI < 25 kg/m^2 and overweight BMI between 25- 29 kg/m^2) according to the criteria of the current international classification[19], and they were all nonsmokers. The comparism was between these two groups(obese and non obese),in the asthmatic patients.

The patients were on a bronchodilator with or without regular maintenance therapy.

Asthmatic patients who were pregnant , co morbid illness, smokers , on maintenance oral steroid and those who were unable to do pulmonary function test were excluded. History was taken from the patients regarding the age, sex, maintenance treatment of asthma and smoking.

Measurements:

Height, weight were measured, Body mass index (BMI) is defined as the individual's body weight in (kg) divided by the square of his or her height in meter. The formulae universally used in medicine produce a unit of measure of kg/m^2.BMI= mass(kg) \ (height(m))²(20).BMI defined according to the National Institutes of Health (NIH) that defined a normal BMI as 18.5-24.9,overweight as BMI is 25-29.9, Obese Class I is 30-34.9 , Obese Class II is 39-39.9 ,and Obese Class III is more than 40[19].Spirometry was also conducted and the parameters of forced expiratory volume in 1 second (FEV1), forced vital capacity(FVC),FEV1\FVC ratio, and forced expiratory flow 50%(FEF50%), were measured .

Statistical analysis:

Descriptive tables showing means and standard deviation for FEV1,

FVC, FEV1\FVC ratio, and FEF50% .t-test was used to check the difference between obese and nonobese . ANOVA was used to check the difference between different body mass index groups . A p value < 0.05 was taken as significant .

RESULTS:

One hindered patients were included in the study, 32 male and 68 female, 42 were non obese and 58 were obese.

Table 1 show classification of patients according to the National Institutes of Health (NIH) as under weight and normal body weight ,over weight ,obese I ,obese II .Under and normal weight (1st group) was 16 patients (9 male and 7 female) ,over weight (2nd group) 26 patients (10 male and 16 female), obese 1 (3rd group) was 24 (10 male and 16 female) ,obese 2 (4th group) was 34 (3 male and 31 female) .The age of 1st group between 17-61year (mean 34.9 ± 17.3),2nd group between 17-70 year(mean 34.7 ± 14.6) , 3rd group between 20-64year (mean 40.8 ± 11.6) , 4th group between 20-70 year (mean 46.2 ± 10.9) .

Table 2 show the asthmatic patients according to gender and obesity in which there is no statistically significant (p-value > 0.05) for male in both non obese and obese ,but statistically significant difference for female (p-value

0.003),and for both gender (p-value 0.03) in both groups.

Table 3 show the descriptive analysis of spirometry in male according to obesity in which no statistically significant (p-value > 0.05) for FEF50% , FEV1\FVC ratio, FVC, FEV1 in both non obese and obese.

Table 4 show the descriptive analysis of spirometry in female according to obesity in which statistically significant for FEF50% (p 0.036) , FEV1\FVC(p 0.05) ,while no statistically significant (p-value > 0.05) for FVC, FEV1 in both non obese and obese.

Table 5 Descriptive analysis for both male and female according to BMI in which statistically significant for FEF50% (p 0.015)) ,while no statistically significant (p-value > 0.05) for FEV1\FVC, FVC, FEV1 in both non obese and obese.

Table 1: Demographical analysis

	Normal\under weight	Over weight	Obese I	Obese II	Total
Number	16	26	24	34	100
Age	34.9 ± 17.3 (17-61)	34.7 ± 14.6 (17.70)	40.8 ± 11.6 (20-64)	46.2 ± 10.9 (20-70)	
Gender					
Male	9	10	10	3	32
Female	7	16	14	31	68

Table 2 : Asthmatic patients according to gender and obesity

Gender	BMI < 30 kg/m^2	BMI ≥ 30 kg/m^2	P-value
Male	19	13	0.2
Female	23	45	0.003*
Total	42	58	0.03*

*statistically significant

Note: National Institutes of Health (NIH) (20)

Table 3 : Descriptive analysis of spirometry in male according to obesity.

Obese		Number	Mean	P-Value
FEF50%	non obese	19	42.784 ± 27.869	0.940
	Obese	13	42.131 ±16.666	
FEV1\FVC	non obese	19	73.957 ± 16.079	0.403
	Obese	13	78.487 ± 12.7006	
FVC	non obese	19	67.579 ± 9.379	0.206
	Obese	13	62.038 ± 14.896	
FEV1	non obese	19	62.005 ± 19.996	0.775
	Obese	13	59.615 ± 18.713	

Table 4: Descriptive analysis for female according to obesity.

Obese		Number	Mean	P-Value
FEF50%	non obese	23	52.061 ± 29.667	0.036*
	Obese	45	38.408 ±22.178	
FEV1\FVC	non obese	23	85.584 ± 12.101	0.05*
	Obese	45	75.514 ± 14.245	
FVC	non obese	23	69.857 ± 17.306	0.808
	Obese	45	70.987 ± 18.503	
FEV1	non obese	23	38.87 ± 15.354	0.233
	Obese	45	44.93 ± 10.851	

*statistically significant

Table 5: Descriptive analysis for both male and female according to BMI

		Number	Mean	P-Value
FEF50%	Normal	16	35.000 ± 20.290	
Over weight		26	55.781 ± 6.049	
Obese I		24	41.537 ± 20.598	0.015*
Obese II		34	37.419 ± 3.673	
Total		100	42.864 ± 24.856	
FEV1\FVC	Normal	16	74.927 ± 16.238	
Over weight		26	83.646 ±13.526	
Obese I		24	75.567 ±12.494	
Obese II		34	76.613 ± 14.922	0.127
Total		100	77.921 ± 14.444	
Normal		16	66.475 ±15.887	
FVC	Over weight	26	70.273 ± 13.111	
Obese I		24	69.729 ± 20.133	0.896
Obese II		34	68.453 ± 16.686	
Total		100	68.916 ± 16.441	
Normal		16	59.175 ± 21.571	
FEV1	Over weight	26	70.165 ± 18.801	
Obese I		24	62.008 ± 19.973	0.245
Obese II		34	63.097 ± 16 .250	
Total		100	64.046 ± 18.853	

*statistically significant

DISCUSSION:

According to a study by the CDC, obese adults were 66% more likely than adults of normal weight to have asthma[21]. Both cross-sectional[22,23] and longitudinal[24,25] studies have attempted to document a link between these two chronic disorders. This study is the first to examine the association between BMI and asthma among adults presenting to the out patient respiratory clinic in Iraqi AL Kadhmia Teaching Hospital.

In this study 68% of the people enrolled were women. This is expected because asthma is generally more often related to obesity in women than men in adult [26,27]. This may be due female sex hormones especially the estrogen, as shown by Hamano et al[28].

In this study asthmatic patients were significantly more in obese than non obese that is go with result of Shaheen et al[3],and of Schachter [22] who also reported that asthmatic patients were significantly higher in obese than non obese. This may be due to mechanical factors, aspects of the systemic inflammation, comorbidities of obesity[7,8].

The results in this study were significantly more in obese female than nonobese but not in male, Shaheen et al[3] ,and Chen et al[29] have also reported similar result. These results may be due to sex hormones have been loosely linked to risk of asthma and other atopic disorders. For example, asthma prevalence is higher among women than men during the reproductive years, but not earlier[30],and Postmenopausal estrogen use appears to increase asthma risk[31].Also may be due to high level of liptin in female as shown in Rosenbaum et al[32] who mentioned that for equivalent BMI, leptin levels are higher in women than in men.

In this study the results of spirometric analysis in male is not significantly different according to the FEV1, FVC FEV1\FVC ratio, FEF50% in both non obese and obese. This is may be result from small number of male in the study, while in female FEV1\FVC ratio , FEF50% are significantly different between non obese and obese. Alaa et al [33]showed no correlation in FEV_1between obese and non obese in patients asthma.

In both gender spirometric analysis showed that FEF50% is significantly different in both groups. Andréa et al [27] show no significantly different according to the FEF50% , FEV1\FVC ratio, FVC, FEV1 in both non obese and obese.

CONCLUSION:

There was significant relation between asthma prevelance and obesity , in female ,but no in male. There is no statistically significant difference for FEF50% ,and

FEV1\FVC,FVC,FEV1 in obese male. There is statistically significant difference for FEF50% ,and FEV1\FVC in obese female .Also there is statistically significant difference for FEF50% in both male and female according to BMI.

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