ОЦЕНКА СВЯЗИ МЕЖДУ ОЖИРЕНИЕМ И БРОНХИАЛЬНОЙ АСТМОЙ

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Введение. Распространенность как ожирения, так и бронхиальной астмы в последние годы возросла. Мы попытались проанализировать связь ожирения и бронхиальной астмы.
Методы. В данное аналитическое исследование было включено 177 пациентов с бронхиальной астмой. Ожирение определялось как значение индекса массы тела (ИМТ) более 30. Тяжесть бронхиальной астмы устанавливалась согласно рекомендациям Национального института болезней сердца, легких и крови от 1997 г.
Результаты. Из 177 пациентов 80 были мужчинами, а 97 – женщинами. 38,4% выборки страдали ожирением. Не было установлено достоверного отношения между ИМТ и тяжестью бронхиальной астмы (P=0,76), однако, согласно коэффициенту корреляции Пирсона, отмечена положительная достоверная корреляция между величинами ИМТ и отношения объема форсированного выдоха за 1 с и жизненной емкости легких (ОФВ1/ЖЕЛ) (r=0,32, P=0,0001). У женщин с бронхиальной астмой избыточный вес встречался достоверно чаще, чем среди мужчин (p=0,001).
Обсуждение. В нашем исследовании была установлена достоверная корреляция между ИМТ и полом пациентов с бронхиальной астмой. Среди женщин отмечалась более высокая частота бронхиальной астмы и более высокий ИМТ по сравнению с мужчинами.

КЛЮЧЕВЫЕ СЛОВА: бронхиальная астма, ИМТ (индекс массы тела).

EVALUATION OF RELATIONSHIP BETWEEN OBESITY AND ASTHMA SEVERITY

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Background: The prevalence of both obesity and asthma has risen in recent years. We sought to investigate whether obesity may be related to asthma.
Materials and methods: In this analytical study, 177 patients with asthma were enrolled. Obesity was defined as a body mass index (BMI) greater than 30. Asthma severity was defined by using the National Heart Lung and Blood Institute 1997 guidelines.
Results: Of the 177 patients, there were 80 males and 97 females. 38.4 percent of the sample was obese. There is no significant relationship between BMI and asthma severity (P=0.76) but as established by Pearson's correlation coefficient a positive and significant correlation is present between BMI and FEV1/FVC values (r=0.32 & P=0.0001). Females with asthma were significantly more overweight than males (p = 0.001).
Conclusions: In our study, there was a significant correlation between body mass index and sex of patients with asthma. Women had the highest percentages of asthma compared to men, and had a higher body mass index than men.

KEYWORDS: Asthma, BMI (Body Mass Index).

INTRODUCTION

Asthma and obesity are both complex and multifactorial chronic health conditions, wherein host and environmental factors play a determinant role, and represent a serious economic and social burden on health care systems and patient's quality of life(1, 2). The prevalence of both obesity and asthma has risen in recent years despite improvement of the general health the United States (3-5). The prevalence of asthma increased from 8.4% in 1996 to 9.9% in 2006 and 10.9% in 2016 (6). Meanwhile, National Health and Nutrition Examination Survey (NHANES) data has indicated that almost one in three asthma patients were obese and that the prevalence of obesity between subjects with current asthma has increased from 21.3% (NHANES I) to 32.8% (NHANES III)(7). A meta-analysis showed that even modest weight reduction can improve clinical manifestations and the outcome of asthma(8).

The literature describes some plausible leads such as mechanical factors, inflammatory conditions and stress triggers(9). Indeed, several mechanisms have been proposed to explain the mechanism by which obesity causes changes in the respiratory tract that can lead to asthma. The release of certain inflammatory cytokines like IL-6 and TNF-α from adipose tissue causes transformations in the airways and increases airway hyper-reactivity(10).

Moreover, evidence suggests that obesity increases, not only, the risk of asthma, but also, the severity of respiratory symptoms by decreasing lung function and increasing airway hyper reactivity (11-13) Nevertheless, data from the previous National Health Survey (1998e99) indicated that obesity was not related with the prevalence of asthma(14).

Considering that there is no study about the relationship between obesity and asthma severity in northwest of Iran, we performed this study to determine the association between obesity and asthma severity.

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Received:01.06.2018. Accepted:. 24.07.2018

Table 1. Characteristics of participants according to asthma severity and data presented as proportions (%) and numbers, chi-square test; p-value<0.05

	Asthma severity				P-value
	Mild intermittent n=18	Mild persistent n=35	Moderate persistent n=101	Severe persistent n=23	
Gender					
Male (n=80)	11 (13.8%)	10 (12.5%)	45 (56.3%)	14 (17.5%)	0.04
Female (n=97)	7 (7.2%)	25 (25.8%)	56 (57.7%)	9 (9.3%)	
BMI					
BMI>30 (n=68)	6 (8.8%)	16 (23.5%)	38 (55.8%)	8 (11.9%)	0.76
BMI<30 (n=109)	12 (11%)	19 (17.4%)	63 (57.7%)	15 (13.9%)	
Age					
Age>40 (n=145)	14 (9.7%)	23 (15.9%)	85 (58.6%)	23 (15.9%)	0.008
Age <40 (n=32)	4 (12.5%)	12 (37.5%)	16 (50%)	----------	
Smoking					
No smoker (n=81)	12 (14.8%)	21 (25.9%)	41 (50.6%)	7 (8.7%)	0.11
Current smoker (n=60)	4 (6.6%)	7 (11.6%)	39 (65%)	10 (16.8%)	
Past smoker (n=36)	2 (5.5%)	7 (19.4%)	21 (58.3%)	6 (16.8%)	

PATIENTS AND METHOD

Participants and study design

After approval of the ethical committee of Urmia University of medical sciences, Adult patients from Urmia, Iran, who had diagnosis of asthma made by a pulmonologist in 12-month period from September 2016 through September 2017 were included in the study.

Asthma and BMI

Body mass index was calculated from recorded height and weight. The standard National Institutes of Health (NIH) definition of obesity was used. Patients were considered to be obese if BMI was greater than 30 kg/m2. Asthma severity was defined by using the NHLBI 1997 guidelines. These guidelines categorize asthma severity into four categories based on clinical symptoms, medication usage, and pulmonary function results. Patients were labeled as either being mild intermittent, mild persistent, moderate persistent, or severe persistent asthmatics. Mean BMI was calculated for each group.

Statistical analysis

Descriptive results are presented as means, percentage and standard deviations and are shown in tables and graphs. Qualitative data were analyzed using the Chi-square test while quantitative data were analyzed using the student t-test. In order to determine the relationships between variables, univariate logistic regression test was used. Data were handled using SPSS software v.21.

RESULTS

In this study 177 asthma patients were enrolled of which 114 (64.4%) had a history of hospitalization due to this disease. From the total study population (n=177) 34 (19.2%) of the patients had a history of hospitalization in an ICU ward and 143 (80.8%) had not been hospitalized in an ICU ward.

Of the 177 participants, 80 (45.2%) were males and 97 (54.8%) were females and the mean age in this study was 56.56±15.48 years old and the mean age of male patients was 57.85 ± 16.80 years old and female patients were 55.46 ± 14.29 years old. There was no significant difference between the age and gender of patients (p=0.33). 108 (61%) subjects had a history of corticosteroid use and 69 (39%) subjects had not used corticosteroids during the course of their disease. The mean FEV1 and FEV1/FVC values of the participants was 70.53±15.14 and 55.44±23.22, respectively.

Of 177 participants, 18(10.2%), 35 (19.8%), 101 (57.1%) and 23 (13%) subjects were diagnosed with mild intermittent, mild persistent, moderate persistent and severe persistent asthma, respectively. Table 1 summarizes the characteristics regarding socio-demographic and BMI of the participants according to asthma severity. Considering gender and age analysis, we observed significant positive relationships between the gender and age with asthma severity (P=0.04, 0.008 respectively) but there is no significant relationships between BMI and asthma severity (P=0.76).

Results reveal that 109 (61.6%) subjects had a BMI<30 kg/m2 and 68 (38.4%) subjects were obese. A mean BMI of 29.18±6.87 kg/m2 was reported. The average value in women and men was 26.33±4.97 kg/m2 and 31.16±6.18 kg/m2 respectively. Table 2 characteristics of participants according to BMI classes. As a response to the main objective of this study, it was revealed that of the 109 subjects with a BMI<30 kg/m2, 64 (58.7%) and 45 (41.3%) of the subjects were males and females, respectively. Of the 68 subjects with a BMI>30 kg/m2, 16 (23.5%) were male and 52 (76.5%) were female. A significant relationship is present between the gender of asthma patients and the body mass index (P=0.001). Mean FEV1/FVC in subjects with BMI<30 was 67.77 ±4.97 and 74.95 ±1083 in those with a BMI<30, revealing a meaningful relationship between FEV1/FVC value with the body mass index in asthmatic patients (P=0.002).

Asthma was under control in 20 (11.3%) patients out of 177 subjects, which 9 (45%) 10 (50%) and 1 (5%) were mildly, moderately and severely asthmatic, respectively. As established by Pearson's correlation coefficient a

Table 2. Characteristics of participants according to BMI classes and data presented as proportions (%) and numbers, chi-square test; p-value<0.05

	BMI > 30 Kg/ m² (n=68)	BMI < 30 Kg/ m² (n=109)	P-value
Gender			
Male	16 (23.5%)	64 (58.7%)	
Female	52 (76.5%)	45 (41.3%)	0.001
Age			
Age < 40	10 (16.8%)	23 (18.9%)	
Age > 40	58 (83.2%)	86 (81.1%)	0.023
FEV1/FVC	74.95±10.83	67.77±16.76	0.002
FEV1	57.16±22.26	54.36±23.84	0.43

positive and significant correlation is present between BMI and FEV1/FVC values (r=0.32 & P=0.0001) (figure 1). However no meaningful correlation was observed between FEV1 and BMI values (r=0.13 and P=0.06).

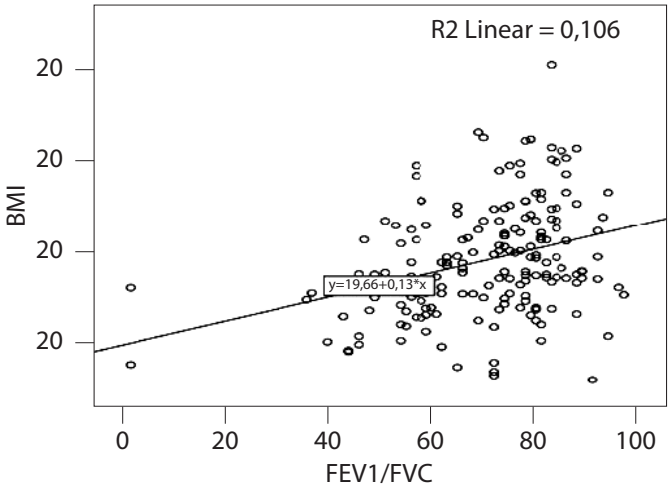

Fig. 1.

DISCUSSION

The current study was designed and executed with the objective of assessing the relationship between obesity and asthma severity in patients admitted to Imam Khomeini Hospital, Urmia, Iran. Study population consisted of 177 patients, of which 80 (45.2%) and 97 (54.8%) were males and females respectively. The average age of the participants was 56.5 ±15.6 years.

Asthma is one the most common diseases throughout the globe, affecting 10-12% of the adult and 15% of the pediatric population. Although asthma may initially present at any age, various exogenous and endogenous factors such as genetic predisposition, gender, airway hyper-reactivity, occupation, respiratory infections and obesity play an important role in the development of this disease. Various studies that the increase in the prevalence of asthma, especially in women, is a result of an increase in the prevalence of obesity. In this study, the body mass index of men was 26.33 ±4.97 kg/m2, opposing to a higher average BMI of 31.16 ±6.8 kg/m2 in women. In addition, the study population consisted of 97 women (54.8%), which was more than the male participants.

In a study performed by Tavasoli et al(13), 116 subjects between ages 16 and 83 (M=46.57 ±15.05 years) who met the inclusion criteria were enrolled. Initial analyses revealed that 73 females and 43 males were enrolled; gender-wise, the finds of this study are consistent with ours.

In this study 18 (10.2%), 35 (19.8%), 101 (57.1%) and 23 (13%) subjects were diagnosed with mild intermittent, mild persistent, moderate persistent and severe persistent asthma, respectively. A meaningful relationship was found to be present between gender and the severity of disease, which is presented in table 1. As recently revealed data suggest, obesity plays and important role in the etiology of asthma, hence the increased prevalence of asthma following the increased prevalence of obesity, especially in women (15). Also it has been established that obesity is a major risk factor in the development of asthma. In addition, obesity has a positive correlation with disease severity (Table2), which was also the case in this study; amongst subjects BMI>30 kg/m2, women were more prevalent compared to men (76.5 and 23.5%, respectively). These finds are consistent with that of Tavalsoli et al (13) which had assessed the relationship between obesity and disease severity of patients admitted to an asthma clinic in Tehran, Iran. They found that in general, women had a higher BMI average compared to men, leading to propose a relationship between asthma severity and obesity. The finds of their study revealed that obesity is a modifiable risk factor of asthma, which was consisted with the finds of our study.

In a study performed by Zammit et al (16), it was revealed that asthma is more prevalent and also more resistant to treatment amongst the obese. The finds of this study were also consistent with that of ours.

In a study performed by Cassol VE et al(17), it was revealed that a positive relationship is present between the prevalence of asthma and the female gender , which was consistent with the finds of our study and in a study performed by Chen YV et al(15), a meaningful relationship was observed between the prevalence of obesity and asthma in the female populations, which was consistent with ours.

In the current study, asthma was under control in 20 subjects of the total participants. Of these 20 subjects, 9 (45%) and 10 (50%) subjects were mildly and moderately asthmatic while 1 (5%) was severely affected by asthma. Following these finds and that of previous studies concerning the relationship between asthma and obesity, it may be concluded that the correction of obesity may help reduce both the prevalence and also severity of asthma in populations. However, further studies are required to establish this theory.

In conclusion, obesity and asthma are closely related, especially in the female population. Similar to the finds of other studies, a positive and meaningful correlation is present between the gender of patients and their BMI. Since obesity and asthma are both chronic diseases with heavy burdens, diseases prevalent throughout the globe, we suggest that case-control studies and screening tests be performed on patients with BMI>30 kg/m2 in order to aid in the better risk assessment of asthma in such patients.

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ЦИТИРОВАТЬ:

Рабипур М, Сейед Мохтари С.А., Мамизадех Х. Оценка связи между ожирением и бронхиальной астмой // Ожирение и метаболизм. — 2018. — Т.15. — No. 4 — С. 44-47. doi: 10.14341/OMET10083

TO CITE THIS ARTICLE:

Rabieepour M, Seyed Mokhtari SA, Mamizadeh H. Evaluation of relationship between obesity and asthma severity. *Obesity and metabolism*. 2018;15(4): 44-47. doi: 10.14341/OMET10083