ORIGINAL ARTICLE

Increased Body Mass Index Does Not Lead to a Worsening of Asthma Control in a Large Adult Asthmatic Population in Spain

J Sastre,[1] JM Olaguíbel,[2] A López Viña,[3] JM Vega,[4] V del Pozo,[5] C Picado,[6]

[1]Allergy Department, Fundación Jiménez Díaz-Capio and CIBER de Enfermedades Respiratorias (CIBERES) Madrid, Spain (Carlos III Institute, Ministry of Science and Innovation)
[2]Department of Allergy, Hospital Virgen del Camino, Pamplona, Spain
[3]Department of Pneumology, Hospital Puerta de Hierro, Majadahonda, Spain
[4]Department of Allergy, Hospital Carlos Haya, Málaga, Spain
[5]Immunology Department, Fundación Jiménez Díaz-Capio and CIBER de Enfermedades Respiratorias (CIBERES) Madrid, Spain (Carlos III Institute, Ministry of Science and Innovation)
[6]Department of Pneumology, Hospital Clinic, Universitat de Barcelona, Barcelona, Spain, and CIBER de Enfermedades Respiratorias (CIBERES), Spain (Carlos III Institute, Ministry of Science and Innovation)

Abstract

Background: Data on the association between obesity and asthma control are conflicting. We performed an analysis to elucidate the association between body mass index (BMI) and asthma control in a large sample of asthmatics.
Materials and Methods: Data were obtained from a previous study in which the Asthma Control Questionnaire (ACQ) and Asthma Control Test (ACT) were validated for a Spanish population. The study sample comprised 607 adult (≥18 years) asthmatic patients (61% female), of whom 235 (39%) had mild-persistent asthma, 246 (41%) had moderate-persistent asthma, and 126 (21%) had severe-persistent asthma.
Results: The analysis showed a significant but very low correlation between BMI and ACQ-forced expiratory volume in the first second of expiration (FEV_1) (*r*=0.1, *P*=.007) and ACQ-peak expiratory flow (PEF) (*r*=0.1, *P*=.010), but not ACQ-without lung function (wLF) (*r*=0.06, *P*=.116) or ACT. No significant association was found between BMI and asthma control as defined by physicians or according to ACT or ACQ (ACQ-FEV_1, ACQ-PEF and ACQ-wLF) scores. We found no significant associations between ACT, ACQs (ACQ-FEV_1, ACQ-PEF and ACQ-wLF), and BMI when BMI was classified as low (BMI, <18.5 kg/m^2), normal (18.5-24.9 kg/m^2), overweight (25-29.9 kg/m^2), obesity (BMI, ≥30 kg/m^2), or morbid obesity (BMI, >34.9 kg/m^2). However, the percentage of patients with poor control was slightly greater in patients with low BMI and obesity.
Conclusions: Using specific and validated tools, and in the context of clinical practice, this study did not find a relevant association between BMI and asthma control.

Key words: Asthma. Asthma control. Body mass index. Obesity. Asthma control questionnaire. Asthma control test.

Resumen

Antecedentes: Existen datos contradictorios sobre la asociación entre la obesidad y el control del asma.
Objetivo: En este estudio, se realizó un análisis para investigar la asociación del índice de masa corporal (IMC) y el control del asma en una muestra grande de pacientes asmáticos.
Materiales y Métodos: Los datos fueron obtenidos de un estudio anterior en el que se validó para una población española el ACQ (Cuestionario de Control del Asma) y el ACT (Asthma Control Test). Se incluyeron 607 asmáticos adultos (18 años o más) de los cuales eran 61% mujeres; 235 (39%) tenían asma leve persistente, 246 (41%) tenían asma persistente moderado y 126 (21%) tenían asma persistente grave.
Resultados: El análisis mostró una correlación significativa, pero muy baja entre el IMC, ACQ-VEF1 (*r*=0,1, *p*=0,007) y el ACQ-PEF (*r*=0,1, *p*=0,010) pero no para el ACQ-WLF (sin la función pulmonar) (*r*=0,06, *p*=0,116) o el ACT. No se encontró asociación significativa entre el IMC y el control del asma según la definición de los médicos o de las puntuaciones de los 3 ACQs (ACQ-VEF_1, FEM y ACQ-ACQ-WLF). No se encontraron asociaciones significativas entre el resultado del ACT o del ACQs (ACQ VEF1, ACQPEF y ACQ-WLF) y el IMC, cuando

el IMC fue clasificado como de bajo (IMC <18,5 kg/m^2), normal (18,5 ≤MC ≤ 24,9 kg/m^2), sobrepeso (25 IMC ≥ 29,9 kg/m^2), obesidad (IMC ≥ 30 kg/m^2) o la obesidad mórbida (IMC> 34,9 kg/m^2). Sin embargo, el porcentaje de pacientes con mal control fue ligeramente mayor en los pacientes con IMC bajo y obesidad (IMC ≥ 30 kg/m^2).
Conclusiones: Utilizando herramientas específicas y validadas y en el contexto de la práctica clínica, este estudio no encuentra una asociación clínicamente relevante entre el índice de masa corporal y el control del asma.

Palabras clave: Asma. Control de asma. Índice de masa corporal. Obesidad. Cuestionario de control de asma. Test de control de asma.

Introduction

Data suggesting a positive association between asthma and obesity remain controversial [1-3]. In a recent study performed in Spain, we observed that obesity was not associated with asthma in a population of adults [4]. Also debatable are previous reports of a positive association between obesity and worsening of asthma severity [5-7].

In their recent study, Clerisme-Beaty et al [8] did not find an association between obesity and asthma control in an urban asthmatic population in the United States. This observation, based on 4 validated asthma control questionnaires, persisted even after adjusting for forced expiratory volume in the first second of expiration (FEV_1), smoking status, race, sex, selected comorbid conditions, and long-term asthma medication. However, Lavoie et al [9] found that higher body mass index (BMI) and obesity act as potential behavioral factors related to decreased asthma control and quality of life though not to asthma severity.

The aim of this study was to analyze the association between body mass index (BMI) and asthma control in a large sample of asthmatics in Spain.

Material and Methods

Data were obtained from a previous study in which different Asthma Control Questionnaires (ACQ)—ACQ-FEV_1, ACQ-peak expiratory flow (PEF), and ACQ-without lung function (wLF)—and the Asthma Control Test (ACT) were validated for a Spanish population. Asthma was diagnosed according to the Global Initiative on Asthma (GINA) guidelines [10-12]. The study sample comprised 607 adult (≥18 years or older) asthmatic patients (61% female), of whom 235 (39%) had mild-persistent asthma, 246 (41%) had moderate-persistent asthma, and 126 (21%) had severe-persistent asthma. Our results showed that the Spanish version of the ACQ and ACT are reliable and valid questionnaires. We also demonstrated that replacement of FEV_1 with PEF, or its elimination, does not alter the measurement properties of the ACQ questionnaire.

Asthma control was classified as perceived by physicians, according to their clinical judgment and the results of spirometry testing. Levels of control were rated by the specialists with 5 response categories that were reduced to 2 categories in the present analysis: not controlled (not controlled, poorly controlled, somewhat controlled) and controlled (well controlled and completely controlled) [10-12]. Specialists performed this analysis based on the clinical history, exacerbations, and pulmonary function tests.

ACQ

The ACQ consists of 7 items concerning patients' experiences throughout the previous week, which they must respond to on a 7-point scale. Patients are asked to evaluate 6 items including nocturnal awakening, symptoms on waking, activity limitation, shortness of breath, wheeze, and rescue short-acting $ß_2$-agonist use, where 0 represents no impairment and 6 represents maximum impairment. Clinical staff provided the data for the seventh item on prebronchodilator FEV_1 and PEF (% predicted). All items are weighted equally and the ACQ score is the mean of the 7 components. Therefore, the score ranges from 0 (well controlled) to 6 (extremely poorly controlled) [10,11]. Scores below 1.0 were considered to represent well-controlled asthma and those above 1.5 to represent poorly controlled asthma [13].

ACT

The ACT is designed to measure asthma control without using pulmonary function values. It consists of 5 items used to evaluate different dimensions associated with asthma control over the preceding 4 weeks (shortness of breath, use of rescue medication, impact of asthma on daily activities, nocturnal awakening, and perception of asthma control), each of which offers 5 response options to be scored from 1 to 5. A final score ranging from 5 (poorest asthma control) to 25 (optimal asthma control) is obtained by adding up the scores from each item. Following internationally accepted guidelines, this questionnaire has been translated and culturally adapted for Spanish contexts and validated [12]. The cutoff point of >19 in the questionnaire was considered to represent well-controlled asthma.

Statistical Analysis

The association between BMI and asthma control was assessed. The Pearson χ^2 (physician perception of asthma control or different cutoffs from questionnaires and BMI classification) and analysis of variance (BMI, physician perception of asthma control, ACQ, and ACT) were used to assess the effects of obesity on categorical and continuous variables, respectively.

Results

We found that 5% of patients had a BMI <18.5 kg/m^2, 33.8% had a normal BMI (18.5-24.9 kg/m^2), 36.3% had overweight (BMI, 25-29.9 kg/m^2), 18% obesity (BMI, ≥30 kg/m^2), and

		Body Mass Index, kg/m^{2a}										
		<18.5		18.5-24.9		25-29.9		30-34.9		>34.9		
		n	%	n	%	n	%	n	%	n	%	% total
Physician assessment *P*=.33	Not well-controlled	19	63.3%	98	48.0%	96	43.4%	49	44.5%	19	47.5%	46.4%
	Well-controlled	11	36.7%	106	52.0%	125	56.6%	61	55.5%	21	52.5%	53.6%
Total		30	100.0%	204	100.0%	221	100.0%	110	100.0%	40	100.0%	100.0%
ACT *P*=.47	Not well-controlled	16	51.6%	90	44.3%	98	44.5%	59	54.1%	19	46.3%	46.7%
	Well-controlled	15	48.4%	113	55.7%	122	55.5%	50	45.9%	22	53.7%	53.3%
Total		31	100.0%	203	100.0%	220	100.0%	109	100.0%	41	100.0%	100.0%
ACQ-FEV1 *P*=.57	Not well-controlled	17	54.8%	94	46.1%	109	49.8%	58	53.2%	23	57.5%	49.9%
	Well-controlled	14	45.2%	110	53.9%	110	50.2%	51	46.8%	17	42.5%	50.1%
Total		31	100.0%	204	100.0%	219	100.0%	109	100.0%	40	100.0%	100.0%
ACQ-PEF *P*=.12	Not well-controlled	18	58.1%	79	39.7%	103	47.5%	55	51.9%	21	52.5%	46.5%
	Well-controlled	13	41.9%	120	60.3%	114	52.5%	51	48.1%	19	47.5%	53.5%
Total		31	100.0%	199	100.0%	217	100.0%	106	100.0%	40	100.0%	100.0%
ACQ-wLF *P*=.44	Not well-controlled	20	64.5%	103	50.5%	111	50.5%	62	56.9%	23	57.5%	52.8%
	Well-control	11	35.5%	101	49.5%	109	49.5%	47	43.1%	17	42.5%	47.2%
Total		31	100.0%	204	100.0%	220	100.0%	109	100.0%	40	100.0%	100.0%
Total	31	100.0%	204	100.0%	220	100.0%	109	100.0%	40	100.0%	100.0%	

Abbreviations: ACQ, Asthma Control Questionnaire; ACT, Asthma Control Test; FEV_1, forced expiratory volume in the first second of expiration; PEF, peak expiratory flow; wLF, without lung function.
[a]Statistical analysis performed using the χ^2 test.

6.6% morbid obesity (BMI, >34.9 kg/m^2). We also found a significant but very low correlation between BMI, ACQ-FEV$_1$ (r=0.1, P=.007), and ACQ-PEF (r=0.1, P=.010), but not ACQ-wLF (r=0.06, P=.116) or ACT.

No significant association was found between BMI and asthma control as defined by physicians or according to the ACT or ACQs (ACQ-FEV$_1$, ACQ-PEF, and ACQ-wLF) scores. We found no significant associations among ACT, ACQs (ACQ- FEV$_1$, ACQPEF and ACQ-wLF), and low BMI, normal BMI, overweight, obesity, or morbid obesity. However, the percentage of patients with poor control was slightly greater in cases of low BMI and obesity (Table).

Discussion

The prevalence of obesity among the adult population in Spain is 14.5% (95% confidence interval, 13.93%-15.07%) [14]. In the United States, approximately 30% of the population meets the criteria for obesity on the basis of a BMI >30 kg/m^2 [15]. In a study of American patients with persistent asthma [6], 37% had a BMI >30 kg/m^2; in our study, only 24.6% of patients had a BMI >30 kg/m^2. A recent study conducted in France [16] showed that only 12% of asthmatics had a BMI >30 kg/m^2. In this study, a BMI >25 kg/m^2 was not associated with asthma control, as indicated by inhaled corticosteroid use in the previous 12 months. Differences in the prevalence of obesity between the United States and European countries may explain the presence of obesity in asthmatic patients in these areas. However, we believe that this cannot explain the association between poor asthma control and obesity found in the study by Mosen et al [6]. The discrepancy between our results and those of Mosen et al could be due to the questionnaires used. Mosen et al applied the Asthma Therapy Assessment Questionnaire, which does not include items such as daytime symptoms, unlike the ACT and ACQ. We found a significant but very low correlation between BMI and ACQ-FEV$_1$ (r=0.1) or ACQ-PEF, but not when ACQ-wLF or ACT was used in the analysis. This very low correlation should be considered a negative result. In fact, this study confirms the findings of Clerisme-Beaty et al [8] in an urban asthmatic population in the United States in which the authors, using a similar methodology, observed no association between obesity and asthma control.

While Clerisme-Beaty et al [8] conclude that weight loss may not be an appropriate strategy to improve asthma control in adults, it seems clear that other studies have found higher asthma morbidity among obese individuals [17-20].

In conclusion, using specific and validated tools and in the context of clinical practice, this study did not find a clinically relevant association between BMI and asthma control.

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Joaquín Sastre

Allergy Department
Fundación Jiménez Díaz
Av. Reyes Católicos, 2
28040 Madrid
Spain
E-mail: jsastre@fjd.es

