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

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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 (FEV1) (r=0.1, P=0.007) and ACQ-peak expiratory flow (PEF) (r=0.1, P=0.010), but not ACQ-without lung function (wLF) (r=0.06, P=0.116) or ACT. No significant association was found between BMI and asthma control as defined by physicians or according to ACT or ACQ (ACQ-VEF1, ACQ-PEF and ACQ-wLF) scores. We found no significant associations between ACT, ACQs (ACQ-VEF1, ACQ-PEF and ACQ-wLF), and BMI when BMI was classified as low (BMI, <18.5 kg/m2), normal (18.5-24.9 kg/m2), overweight (25-29.9 kg/m2), obesity (BMI, ≥30 kg/m2), or morbid obesity (BMI, >34.9 kg/m2). 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.

We also demonstrated that replacement of FEV1 with PEF, or its severe-persistent asthma. Our results showed that the Spanish 246 (41%) had moderate-persistent asthma, and 126 (21%) had (61% female), of whom 235 (39%) had mild-persistent asthma, Global Initiative on Asthma (GINA) guidelines [10-12]. The study a Spanish population. Asthma was diagnosed according to the different Asthma Control Questionnaires (ACQ–ACQ-FEV1, 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 (FEV1), 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-FEV1, 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 FEV1 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 β2-agonist use, where 0 represents no impairment and 6 represents maximum impairment. Clinical staff provided the data for the seventh item on prebronchodilator FEV1, 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 χ2 (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/m2, 33.8% had a normal BMI (18.5-24.9 kg/m2), 36.3% had overweight (BMI, 25-29.9 kg/m2), 18% obesity (BMI, ≥30 kg/m2), and
<table>
<thead>
<tr>
<th>Body Mass Index, kg/m²&lt;sup&gt;a&lt;/sup&gt;</th>
<th>&lt;18.5</th>
<th>18.5-24.9</th>
<th>25-29.9</th>
<th>30-34.9</th>
<th>&gt;34.9</th>
<th>% total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n</strong></td>
<td><strong>%</strong></td>
<td><strong>n</strong></td>
<td><strong>%</strong></td>
<td><strong>n</strong></td>
<td><strong>%</strong></td>
<td><strong>n</strong></td>
</tr>
<tr>
<td><strong>Physician assessment</strong>&lt;br&gt;&lt;sup&gt;P=.33&lt;/sup&gt;</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Not well-controlled</td>
<td>19</td>
<td>63.3%</td>
<td>98</td>
<td>48.0%</td>
<td>96</td>
<td>43.4%</td>
</tr>
<tr>
<td>Well-controlled</td>
<td>11</td>
<td>36.7%</td>
<td>106</td>
<td>52.0%</td>
<td>125</td>
<td>56.6%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>30</td>
<td>100.0%</td>
<td>204</td>
<td>100.0%</td>
<td>221</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>ACT</strong>&lt;br&gt;&lt;sup&gt;P=.47&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Not well-controlled</td>
<td>16</td>
<td>51.6%</td>
<td>90</td>
<td>44.3%</td>
<td>98</td>
<td>44.5%</td>
</tr>
<tr>
<td>Well-controlled</td>
<td>15</td>
<td>48.4%</td>
<td>113</td>
<td>55.7%</td>
<td>122</td>
<td>55.5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>31</td>
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<td>203</td>
<td>100.0%</td>
<td>220</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>ACQ-FEV1</strong>&lt;br&gt;&lt;sup&gt;P=.57&lt;/sup&gt;</td>
<td></td>
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<td></td>
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<tr>
<td>Not well-controlled</td>
<td>17</td>
<td>54.8%</td>
<td>94</td>
<td>46.1%</td>
<td>109</td>
<td>49.8%</td>
</tr>
<tr>
<td>Well-controlled</td>
<td>14</td>
<td>45.2%</td>
<td>110</td>
<td>53.9%</td>
<td>110</td>
<td>50.2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>31</td>
<td>100.0%</td>
<td>204</td>
<td>100.0%</td>
<td>219</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>ACQ-PEF</strong>&lt;br&gt;&lt;sup&gt;P=.12&lt;/sup&gt;</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Not well-controlled</td>
<td>18</td>
<td>58.1%</td>
<td>79</td>
<td>39.7%</td>
<td>103</td>
<td>47.5%</td>
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<tr>
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<td>13</td>
<td>41.9%</td>
<td>120</td>
<td>60.3%</td>
<td>114</td>
<td>52.5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>31</td>
<td>100.0%</td>
<td>199</td>
<td>100.0%</td>
<td>217</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>ACQ-wLF</strong>&lt;br&gt;&lt;sup&gt;P=.44&lt;/sup&gt;</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not well-controlled</td>
<td>20</td>
<td>64.5%</td>
<td>103</td>
<td>50.5%</td>
<td>111</td>
<td>50.5%</td>
</tr>
<tr>
<td>Well-controlled</td>
<td>11</td>
<td>35.5%</td>
<td>101</td>
<td>49.5%</td>
<td>109</td>
<td>49.5%</td>
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<tr>
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<td>204</td>
<td>100.0%</td>
<td>220</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Abbreviations: ACQ, Asthma Control Questionnaire; ACT, Asthma Control Test; FEV₁, forced expiratory volume in the first second of expiration; PEF, peak expiratory flow; wLF, without lung function.

*Statistical analysis performed using the χ² test.*
6.6% morbid obesity (BMI, >34.9 kg/m²). We also found a significant but very low correlation between BMI, ACQ-FEV1 (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-FEV1, ACQ-PEF, and ACQ-wLF) scores. We found no significant associations among ACT, ACQs (ACQ-FEV1, 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/m² [15]. In a study of American patients with persistent asthma [6], 37% had a BMI >30 kg/m²; in our study, only 24.6% of patients had a BMI >30 kg/m². A recent study conducted in France [16] showed that only 12% of asthmatics had a BMI >30 kg/m². In this study, a BMI >25 kg/m² 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 questionnaire 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-FEV1 (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.

Acknowledgments

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The authors have no conflicts of interest to disclose.

References


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