

A study of correlation between BMI and bronchial asthma

Karthik T, Srilakshmi Prabhu*, and Sundar Bhat

Father Muller's Medical College, Father Muller Road, Kankanady, Mangaluru, Karnataka 575002 India

QR Code



*Correspondence Info:

Dr. Srilakshmi Prabhu
Father Muller's Medical College,
Father Muller Road, Kankanady, Mangaluru,
Karnataka 575002 India

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Abstract

Aim: To assess the relation between body-mass index and bronchial asthma.

Study Design: Cross sectional correlation.

Materials and methods: 150 patients with bronchial asthma attending Father Muller Medical College Hospital, Mangaluru were studied over a period of 18 months from 1 October 2015 to 31 March 2017. The severity of symptoms was correlated with body mass index, to find out if there is an association between obesity and severity of symptoms.

Analysis: Collected data were analyzed by frequency, percentage, mean, standard deviation and tests such as Karl-Pearson correlation coefficient, t-test and chi-square test.

Results: In this study severity of the symptoms were correlated with body mass index and it did not show a statistically significant difference between severity and BMI, comparison of body mass index and combined severity of symptoms, statistically significant difference was seen in obese individuals with combined moderate persistent and severe persistent symptoms as compared to underweight and normal individuals.

Keywords: Body Mass-Index, Bronchial Asthma, Obesity.

1. Introduction

The word Asthma is derived from Greek, which means 'panting'. In susceptible individuals it causes recurrent wheezing, shortness of breath, chest tightness and coughing. Extensive study has been conducted to know about the pathogenesis but the factors contributing to it, is still unclear. One among those factors is obesity. Obesity is a state of excess adipose tissue mass and it is the most common nutritional disorder in the industrialized world. Obesity contributes to a number of metabolic complications. The precise measurement of body fat is quite challenging and accurate methods are not applicable to large populations. Therefore, surrogate markers such as Body Mass Index (BMI) are used to define obesity in population studies. Obesity itself causes impairment in respiratory physiology by reducing tidal volume and functional residual capacity. This study aims to correlate severity of bronchial asthma and obesity.

2. Materials and methods

The study was a cross sectional correlation study. The data was collected from 150 patients in Father Muller IJBR (2018) 09 (11)

Medical College Hospital over a period of 18 months from 1 October 2015 to 31 March 2017. The patients included were those more than 18 years of age and those whom diagnosis was confirmed by peak expiratory flow meter i.e. diurnal variation of more than 10% or increase in FEV1>12% or 200ml after inhalation of bronchodilator. Those with history of smoking, ischemic heart disease and pregnant women were excluded from the study. For each of the patients a written informed consent was taken and demographic characteristics, age, sex were documented. Participants were screened for bronchial asthma using reversibility of bronchial asthma or diurnal variation of PEFr using mini wright peak flow meter-digital. After confirmation of diagnosis participants were classified based on GINA criteria for severity of symptoms into (i) intermittent, (ii) mild persistent, (iii) moderate persistent and (iv) severe persistent using frequency of exacerbations, nocturnal symptoms, frequency of short acting beta₂-agonist inhalers usage. The severity of symptoms was correlated with body mass index, to find out if there is an association between obesity and severity of symptoms. Collected data were analyzed by frequency, percentage,

mean, standard deviation and tests such as Karl-Pearson correlation coefficient, t-test and chi-square test.

3. Results

In this study of 150 patients, the age ranged from 18 to 65 years with a mean age of 39.13 years (± 13.0). Most patients belonged to the age group of 41-50 patients (46). In this study, 84 patients (56%) were females and 66 (44%) were males with female-to-male sex ratio of 1.2:1. Patients were categorized based on WHO criteria for BMI for Asians into underweight ($BMI < 18.5 \text{ kg/m}^2$), Normal ($18.5-22.9 \text{ kg/m}^2$), Overweight ($23-24.9 \text{ kg/m}^2$) and Obese ($BMI > 25 \text{ kg/m}^2$). Of the patients, the mean BMI noted 23.96 kg/m^2 (± 4.80). Most were obese 55 (36.7%), 44 (29.3%) were normal, 31 (20.7%) were overweight and 20 (13.3%) were underweight. Bronchial asthma was categorized based on GINA guidelines. Among 150 patients assessed, 39 (26%) had mild intermittent, 59 (39.3%) had mild persistent, 42 (28%) had moderate persistent and 10 (6.7%) had severe persistent symptoms. Daily usage of inhalational corticosteroids was assessed in the study. Out of 150 patients, 62 (41.3%) were on daily Inhalational corticosteroid usage.

Daily inhalational corticosteroid use was assessed according to the severity of bronchial asthma. Of the patients with mild persistent symptoms 27/59 (43.5%) used inhalation corticosteroids the most on a daily basis. 8/39 (12.9%) with mild intermittent symptoms, 22/42 (35.5%) with moderate persistent symptoms and 5/10 (8%) with severe persistent symptoms were on daily inhalational corticosteroid usage. In this study daily, Inhalational corticosteroid usage was compared with BMI. It was found that a greater number of obese and underweight individuals used Inhalational corticosteroids on daily basis as compared to normal individuals. Female patients had more severe symptoms as compared to their male counterparts irrespective of their BMI and this was found to be significant. (p value = 0.012 and Chi square = 10.897). On comparison of Body mass index and severity of bronchial asthma symptoms, there was no statistically significant difference between BMI and severity of disease (p value = 0.280) (Figure 1). However, a subgroup analysis showed that obese individuals were found to have significantly a greater number of patients with moderate persistent to severe persistent disease as compared to non-obese patients (Chi square = 8.137, P value = 0.043). (Figure 2)

Figure 1: Difference between BMI and severity of disease

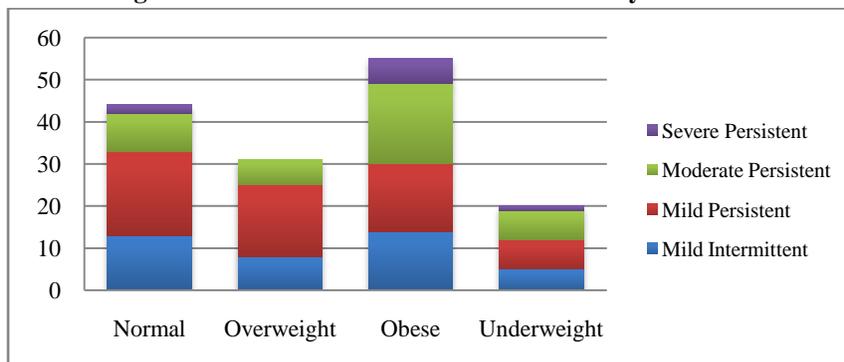
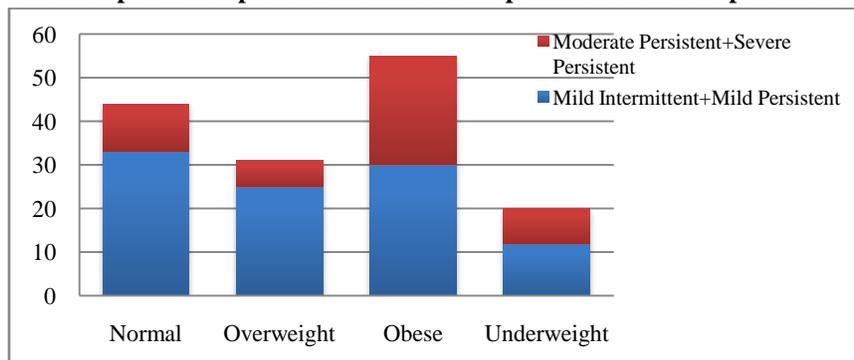


Figure 2: Comparison of patients with moderate persistent to severe persistent disease



4. Discussion

In this study mean age of the subjects were 39.13 years as compared to similar studies done by Akerman *et al*, Lavoie *et al* and Maden *et al* where the mean age was 43.9, 49 and 48.4 years respectively.[1-3] The female: male ratio was 1.2:1, when compared to similar study conducted

by Lavoie *et al*, Maden *et al* and Akerman *et al* where the sex ratio was found to be 1.5:1, 3.3:1 and 3.7:1.[3-5]

Among 150 subjects mean BMI was found to be 23.96 kg/m^2 as compared to similar study conducted by Akerman *et al* and Lavoie *et al* where the mean BMI was found to be 34.8 kg/m^2 and 27 kg/m^2 . [1,3]

In this study subjects were classified into obese individuals if BMI > 24.9 Kg/m² (Based on WHO criteria for BMI for Asians), whereas in other similar study conducted patients were classified into obese individuals if BMI > 29.9 Kg/m² (Based on WHO criteria for BMI for western population). The prevalence of obese individuals was 36.7% as compared to the study conducted on western population by Lavoie *et al*, Pelegrino *et al* and Akerman *et al* where the prevalence was 25%, 32% and 72% respectively.[1,3,4]

Severity of bronchial asthma symptoms were classified based on GINA guidelines using factors including frequency of short acting beta-2 agonist usage, hospital admissions, nighttime awakenings and symptoms. In our study 39(26%) had mild intermittent symptoms, 59(39.3%) had mild persistent symptoms, 42(28%) had moderate persistent symptoms and 10(6.7%) had severe persistent symptoms. This was compared with the study conducted by Pelegrino *et al* and Maden *et al* who used similar classification system for defining severity.[2,4]

In this study only 10% of obese individuals had severe persistent symptoms as compared to 32%, 24% and 20% of obese individuals in the studies conducted by Pelegrino *et al*, Taylor *et al* and Akerman *et al*. [3-5]

In this study severity of the symptoms were correlated with body mass index and it did not show a statistically significant difference between severity and BMI, whereas other similar study conducted by Kapse *et al* in Indian population showed more severe symptoms in overweight and obese individuals and in the study conducted by Nadi *et al* showed negative association between BMI and severity of asthma severity.[6,7] In this study on comparison of body mass index and combined severity of symptoms, statistically significant difference was seen in obese individuals with combined moderate persistent and severe persistent symptoms as compared to underweight and normal individuals which is similar to the findings shown in Kapse *et al*. [6] In this study conducted, 54/110 (49%) patients were using Inhalational corticosteroids as compared to the study conducted by Pelegrino *et al* in which 118/154 (76%) patients were on Inhalational corticosteroids.[4]

Limitations

In this study the duration and compliance of inhalational corticosteroid usage was not included. Patients on oral steroids were not excluded in this study which may have an influence on the body mass index.

References

- [1]. Lavoie KL, Bacon SL, Labrecque M, Cartier A, Ditto B. Higher BMI is associated with worse asthma control and quality of life but not asthma severity. *Respiratory medicine* 2006; 100:648-57.
- [2]. Maden E, Teke T, Yosunkaya S, Yavsan DM, Dinç M, Metineren R. Asthma severity and body mass index relationship. *European Respiratory Journal* 2011; 38:989.
- [3]. Akerman MJ, Calacanis CM, Madsen MK. Relationship between asthma severity and obesity. *Journal of Asthma* 2004; 41:521-6.
- [4]. Pelegrino NR, Faganello MM, Sanchez FF, Padovani CR, Godoy ID. Relationship between body mass index and asthma severity in adults. *Jornal Brasileiro de Pneumologia* 2007; 33:641-6.
- [5]. Taylor B, Mannino D, Brown C, Crocker D, Twum-Baah N, Holguin F. Body mass index and asthma severity in the National Asthma Survey. *Thorax* 2008; 63:14-20.
- [6]. Kapse V, Bagrecha M, Totewad D, Gosavi R. A study of association of body mass index with severity of bronchial asthma in 132 patients. *Journal of Evolution of Medical and Dental Sciences* 2014; 3:7058-67.
- [7]. Nadi E, Zeraati F, Ansari M, Tavana S, Fallah HH. Association of asthma severity with body mass index among adults. *Acta Medica Iranica* 2007; 45:383-8.