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A STUDY ON CORRELATION BETWEEN BRONCHIAL ASTHMA CONTROL AND BODY MASS INDEX

Medicine

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ABSTRACT

Introduction: Airway hyper-responsiveness due to biochemical effects of adipose tissue related cytokines and adipokines, and mechanical changes in lung function due to obesity play an important role in outcome of asthma in obesity. In this study we correlate the severity of asthma and body mass index.

Methods: Cross-sectional- observational study including 78 patients with bronchial asthma confirmed by history, physical findings and pulmonary function test attending Father Muller Medical College Hospital during November 2018- December 2019.

Results Among 78 patients 27 (34.7%) had normal Body Mass Index (BMI), 35 (44.4%) were overweight and 16 (20.8%) were obese. Out of 35 overweight patients 15(46.8%) had uncontrolled asthma and 17(53%) had partly controlled asthma. Out of 16 obese patients 13(86.6%) had uncontrolled asthma and 2(13.3%) had partly controlled asthma. There was a significant correlation between BMI and asthma control with p – value <0.05.

Conclusion: Partly controlled and uncontrolled asthma were partly associated with overweight and obesity. There is a need for further studies to demonstrate the effect of weight reduction in asthma control

KEYWORDS

BMI-Body mass index; FEV1- Forced expiratory volume in one second; FVC- Functional vital capacity; GINA-Global initiative for asthma.

INTRODUCTION

Bronchial Asthma is a major health problem estimated to affect more than 300 million people of all ages and ethnic backgrounds worldwide.[1] Asthma is reversible inflammation of airways, characterized by recurrent attacks of shortness of breath, cough, and wheeze, affecting people of all ages.[2] asthma is diagnosed based on lung function test using spirometry, where there is reduced FEV1, FEV1/FVC ratio. Reversibility is demonstrated by a >12% and 200ml increase in FEV1. Body mass index is a measure of weight adjusted for height, calculated as weight in kilograms divided by the square of height in meters. Airway hyper-responsiveness due to biochemical effects of adipose tissue related cytokines and adipokines, and mechanical changes in lung functions due to obesity play an important role in outcome of asthma in obesity.[2] In this study we correlate the severity of asthma and body mass index. Camargo et al.[3] first described the association between obesity and asthma, numerous studies published during the past decade have demonstrated an increased risk of asthma and asthma-like symptoms in obese individuals[4,5,6,7] and, furthermore, there seems to be a dose response effect of increasing BMI on asthma incidence.[5]

METHODS

This is a cross sectional, hospital based, observational study with sample size of 78. The study was done over a period of 6 months from October 2019 after institutional ethics committee approval.

After obtaining written informed consent, a total of 78 subjects fulfilling inclusion criteria were included in the study. The details including the clinical history and examination findings were captured to a preformatted data sheet.

The control of asthma graded as well controlled, partly controlled and uncontrolled based on questionnaire is correlated with body mass index.

STATISTICALANALYSIS :

Statistical analysis was performed using SPSS software v20. Results wer reported as frequency and percentage. ANOVA test was used to evaluate the significance, p-value less than 0.05 was considered as significant.

INCLUSION CRITERIA:

1. Age between 16 to 80
2. Patients with bronchial asthma who were diagnosed based on history, physical examination and pulmonary function test.

EXCLUSION CRITERIA:

1. Bronchial asthma patients of age below 16 and pregnant female.
2. Patients not consenting for the study.
3. Patients with underlying diseases like any cancers, rheumatic diseases, acute and chronic liver disease, acute myocardial infarction; those who are taking oral steroids, those who were sputum positive pulmonary tuberculosis.

RESULTS

A total of 78 subjects were enrolled in this study. Among 78 participants 41 (53%) were female and 37 (47%) were male. Out of 78 participants, 72 (92.3%) participants had partly controlled and uncontrolled asthma.

Table1 depicts the body mass index of study population. Mean BMI was 26.38 and majority of patients were in overweight. 0ut of 78 patients 27 (34.7%) had normal BMI, 35(44.4%) were overweight and 16(20.8%) were obese.

Body Mass Index (Kg/m2)	No. of Patients	Percentage
Normal (18.5-24.9)	27	34.7
Over weight (25-29.9)	35	44.4
Obese (>30)	16	20.8

Association of Asthma control with BMI:

Out of 78 patients only 6 patients had well controlled asthma, 35(48.6%) had partly controlled and 37(51.4%) had uncontrolled asthma.

Table 2: association of asthma control with BMI

Variables	BMI			p- Value
	Normal	Over Weight	Obese	
Partly Controlled	16	17	2	0.002
Uncontrolled	9	15	13	0.003
Total	25	32	15	

As depicted in table 2 Among 35 patients with partly controlled asthma 17(48.5%) were overweight and 2(5.7%) were obese. In 37 patients with uncontrolled asthma 15 (40.5%) were overweight and 13(35.1%) were obese. Overweight and obesity were significantly associated with both partly controlled and uncontrolled asthma with p value <0.05.

DISCUSSION

According to GINA guidelines optimal control of asthma is essential to prevent morbidity and mortality of the disease. Asthma control is defined in terms of impairment and risk.

Impairment is the frequency and intensity of symptoms as well as the functional limitations experienced by the person. It is measured using various questionnaires such as the Asthma Control Test (ACT) or the Asthma Control Questionnaire (ACQ). Risk is possibility of future adverse events such as exacerbations and hospitalizations.[13] . In the past decade several studies have shown that asthma and obesity are associated with poor control and inadequate response [8-9]. In this study we correlate the asthma control and body mass index.

The causes for partly controlled and uncontrolled asthma is multifactorial. The American Thoracic Society workshop in 2010 concluded that "asthma in the obese may represent a unique phenotype of asthma, with more severe disease that does not respond as well to conventional therapy".[15]

In present study out of 78 patients only 6 patients had well controlled asthma, 35(48.6%) had partly controlled and 37(51.4%) had uncontrolled asthma. Out of 35 partly controlled patients 17 patients are overweight, and 2 patients were obese. Among 37 uncontrolled patients 15 patient and 13 patients are overweight and obese respectively which is 75.6%, however only 24.3% of patients had normal BMI.

Among 35 patients with partly controlled asthma 54.2% of patients were either overweight or obese. This shows a significant association between increasing BMI and poor asthma control.

Similarly Stansford[8] et al and Taylor[9] et al observed that obese asthmatics had worse asthma control. Several mechanisms to explain the association of obesity with more severe disease and poor control have been elucidated including mechanical airway changes, leptin adiponectin pathway in systemic inflammation, oxidative stress and steroid resistance.

Mechanical effects such as restricted chest wall and abdominal movement due to greater adiposity[10]. This can result in reduced total lung capacity and low expiratory reserve volume due to upward diaphragmatic displacement. Consequently, airway closure occurs at or above functional residual capacity in the dependent lung zones, which can lead to ventilation/perfusion mismatching. Immune and metabolic effects such as enhanced inflammatory/oxidative response to elevated leptin levels cause hyperresponsive airway.[11]

Youkou et al in a study done in Japan in 2011, found that obese asthmatics had more severe disease and higher utilization of inhaled salmeterol and leukotriene receptor antagonists.[14]

Similarly in a study done by Barros et al in Brazil found that obese asthmatics had worse asthma control.[12]

Poor control of asthma could be multifactorial which include inadequate treatment, poor compliance to lifestyle modification and stressors. As overweight and obesity is associated with poor asthma control, reduction in weight and BMI could be a nonpharmacological approach to asthma control in obese and uncontrolled asthmatic patients. However further study is required to study the effect of weight loss on asthma control.

Strength of our study:

Asthma symptoms control is graded based on GINA guidelines and compared with the body mass index.

Limitations of our study:

1. Study was conducted in single center and limited sample size.
2. This study do not demonstrate the effect of weight reduction in asthma control, hence there is a need for further studies to demonstrate the same.
3. This study do not consider the treatment of subjects as inadequate treatment can lead to uncontrolled asthma.

CONCLUSION

Partly controlled and uncontrolled asthma were significantly associated with overweight and obesity. There is a need for further studies to demonstrate the effect of weight reduction in asthma control.

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