

RELATIONSHIP OF MOOD DISORDERS TO ASTHMA CONTROL - A PROSPECTIVE STUDY

Clinical Science

Babiloo Kishore

Department of Paediatrics, Kovai Medical Center and Hospital, Kovai.

Sobha

Professor of Pulmonary Medicine, Amrita Institute of Medical Sciences, Amrita Viswa

Subramaniam*

Vidya Peetam, Kochi. *Corresponding Author

ABSTRACT

Mood disorders-poor asthma control correlation may have clinical implications in patients with poorly controlled asthma, in whom the presence of anxiety and depression should be investigated and treated for better asthma control. The purpose of the study was to find a better understanding of the correlation between poor asthma control and mood disorders as the implications of the link was poorly understood and reported. This was a cross sectional prospective study on 100 asthmatic patients attending respiratory unit & casualty of a tertiary hospital in central Kerala was done using asthma control test (ACT), Hospital Anxiety and Depression Scale (HAD) and spirometry. The objectives were to find correlation between poor asthma control and mood disorders, to find influence of factors like age, sex, body mass index (BMI) and smoking. From our study it was found that poor asthma control was commonly seen in older age groups women, people with higher BMI, with a worse pulmonary function, and in people with mood disorders (anxiety and/or depression) Mood disorders were seen in older and obese and it had no significant sexual prevalence. There was a significant correlation between smoking & depression.

KEYWORDS

Mood disorders, Asthma control

INTRODUCTION

Despite important advances in diagnosis and treatment, the prevalence of asthma has increased among all age, sex, and racial groups to affect approximately 100 to 150 million people worldwide.¹ Asthma ranges in severity from mild to life-threatening with an intermittent or course. The prevalence of asthma has increased substantially over the past several decades, making it the most common chronic disease among youth worldwide, though the causes of this increase are unknown.

In patients with difficult asthma, a high prevalence of undiagnosed psychiatric morbidity, particularly depression, has been reported and in turn, psychological factors such as anxiety, depressive disorders and/or personality disorders may asthmatic patients to near fatal or fatal asthma.² Population-based studies have shown that adults with asthma are more likely than adults without asthma to have depressive and anxiety disorders. Clinic-based studies of outpatients with asthma have also consistently shown elevated rates of depressive and anxiety disorders, although there has been great variability in the rates that have been reported. Psychiatric disorders are often undetected and untreated among patients with asthma.³ About 20% of people who suffer from asthma also suffer from depression.⁴ Emotional causes were frequently thought to lead to asthma exacerbations.⁵

Interestingly, rates of psychiatric disorders (particularly depressive disorders [DDs] and anxiety disorders [ADs]) have been shown to be up to six times more prevalent among asthma patients (16 to 52% for ADs, and 14 to 41% for DDs) compared to rates observed in the general population.¹ Psychological stress activates hypothalamic-pituitary-adrenocortical axis and sympathetic nervous system, leading to increase in cortisol and catecholamine secretion. Cortisol and catecholamines can suppress Th₁ cytokines like IL-12 and IFN- γ which may then shift immune response towards Th₂ phenotype. This dysregulation is believed to play a role in the pathogenesis of asthma with increased levels of IL-4, IL-5 and IL-13 causing aggravation of existing inflammation after an inhaled antigen exposure.⁵

Achieving optimal asthma control relies on several behavioral factors (*like* self-monitoring, treatment adherence, and managing environmental triggers) that may be influenced by chronic negative mood states like depression.^{6,7,8} Asthmatics who either don't receive care or receive inadequate care for their asthma symptoms are more likely to experience depression. During depression, asthmatic patients are less likely to follow their prescribed medications and self-care programme. In turn, this neglect can cause asthmatic symptoms to worsen, which causes depression to worsen, creating a vicious cycle.⁴

If underlying depression or anxiety is not considered, this may lead to unnecessary medication changes and testing, poor adherence, higher rate of symptoms, higher medical costs and potentially higher mortality.⁵ Even though it is generally accepted that anxiety and depression is common in asthmatic patients and that there is a close

correlation between psychiatric disorders and asthmatic outcomes, such as poor control of asthma symptoms, implications and practical consequences of this link remain weak and is poorly understood.⁹ Better understanding of mood disorders-poor asthma control correlation may have clinical implications, mainly in patients with poorly controlled asthma in whom the presence of anxiety and depression should be investigated.²

The study was designed for assessing the effect of mood disorders on asthma control and correlate it with other factors that may influence this correlation

MATERIALS AND METHODS:

This cross-sectional prospective observational study was carried out in a tertiary care teaching hospital in India. The study period was 2 months and was carried out after obtaining the Institutional Ethics committee approval 100 consecutive patients of both sexes and of age 4 and above, who have symptoms consistent with diagnosis of asthma, receiving pharmacological treatment according to the Global Initiative for Asthma (GINA) guidelines¹⁰ and a >12% increase in forced expiratory volume in 1 second (FEV₁) following inhalation of 400 μ g Salbutamol are included in the study. Written informed consent was obtained from all. In case of children, informed consent was obtained from their parent/ guardian. Participants were asked to fill in the self-reported Hospital Anxiety and Depression Scale (HAD) "scale consisting of 14 questions, 7 related to anxiety and 7 related to depression. The HAD questionnaire gives clinically meaningful results as a psychological screening tool, in clinical group comparisons and correlation studies with several aspects of disease and quality of life. The questionnaire was found to perform well in assessing the symptom severity and cases of anxiety disorders and depression in both somatic, psychiatric and primary care patients and in general population.

Level of asthma control, was assessed by both Asthma Control Test (ACT)¹¹ and GINA guidelines¹⁰ Spirometry, performed according to ATS/ERS guidelines¹² using predicted values for FEV₁ and forced vital capacity

ACT questionnaire is a validated self-administered questionnaire including 5 questions related to the last 4 weeks: episodes of breathlessness, nocturnal awakenings, limitation of daily activities, need for rescue medication and patient self rating of asthma control. Each question includes five response modalities with a score ranging from 1 to 5 by increasing the level of asthma control. ACT questionnaire for children of age group 4-11 years is different. It consists of 7 questions, 4 to be answered by the child (nocturnal awakenings, cough during asthma, limitation of activities and the child's self rating on his/her asthma on the day) and 3 to be answered by the parent (daytime asthma symptoms, days of wheeze, night awakenings). Scoring of the child's questionnaire ranges from 0-3 and

the parent's from 0-5. Well controlled asthma by ACT was defined by a score ≥ 20 According to GINA guidelines, the disease was defined poorly controlled when three or more features of partly controlled asthma (diurnal or nocturnal asthma symptoms, limitation of activities, need of reliever/rescue treatment, exacerbations, $FEV_1 < 80\%$ of predicted or personal best) were present in any of the past 4 weeks.

In addition, Peak expiratory flow rate which can be an important aid in both the diagnosis and monitoring of asthma was measured by a peak flow meter. The data obtained were analyzed using Epi Info software and chi square test (or Fisher's exact test for variables with less than 5 frequencies per category) was used to find the significance of the correlations.

OBSERVATIONS AND RESULTS:

Total number of patients included in the study was 100. Out of this 66 were females and 34 were males. 84 had poorly controlled asthma and 16 had well controlled asthma. 44 patients had anxiety and 31 patients showed depression. 23 patients (5 among males and 18 among females) had both anxiety and depression. Poor asthma control was mainly seen in people having mood disorders (anxiety or/and depression) (Fig 1). This was found to be statistically significant ($P=0.00067$). The patients were analyzed according to their age groups. This showed that Poor asthma Control was mainly seen in older age groups (51-65 years and >65 years) ($P=0.0288$) (fig 2). Similarly Mood disorders were also common among older age groups ($P=0.0005$). Female patients showed larger number of poorly controlled asthmatics compared to males (89% vs 73%), but this was not statistically significant. Mood disorders also had no correlation with sex. Though numbers suggest that mood disorders are prevalent in females, it was not statistically significant ($P=0.06625$) (table 1). Poor asthma control was more seen in people with higher BMI ($P=0.0175$). This was true in the case of mood disorders also with people with higher BMI being more prone for having them ($P=0.0066$) (fig 3). Poor asthma control was seen in patients with lower pulmonary function. (Fig 4). Spirometry values were obtained only from 79 patients. Rest of the patients came to casualty due to acute exacerbation of bronchial asthma and they were unable to blow through the spirometer. There was positive correlation between smoking and depression in males ($P=0.0046$). There were no female patients who smoked. As a part of the study, we also assessed socio economic status of the patients. From our study socio economic status had no significant relation between asthma control ($P=0.0571$) nor mood disorders ($P=0.4875$) (table 1). We also asked about the employment of all the patients. Mood disorders were common in retired people ($P=0.0005$) while asthma control had no significant relation with employment ($P=0.1665$) from our study. (table 1).

DISCUSSION

Asthma is a chronic inflammatory disorder which involves airway hyper responsiveness and bronchial obstruction leading to cough, wheezing, dyspnoea and chest tightness. It is a disorder of conducting airways characterized by T helper2 cell mediated inflammation and increased mediator release.³ Asthmatics who either don't receive care or receive inadequate care for their asthma symptoms are more likely to experience depression. During depression, asthmatic patients are less likely to follow their prescribed medications and self-care programme. In turn, this neglect can cause asthmatic symptoms to worsen, which causes depression to worsen, creating a vicious cycle.⁴ If underlying depression or anxiety is not considered, this may lead to unnecessary medication changes and testing, poor adherence, higher rate of symptoms, higher medical costs and potentially higher mortality.⁵

Asthma control as well as management of the associated depression may vary from region to region based on factors like socio economic standards, availability of health care facilities as well as the physicians awareness regarding the close relationship between the two. The present study was undertaken to identify the prevalence of depression and its relationship to the control of asthma in a hospital setting. Few other contributory factors both for depression and poor control of asthma were also studied in this prospective evaluation. In our study, 66 of the patients were females and 34 were males and 84 out of 100 patients had poorly controlled asthma [25 among males (73.5%) and 59 among females (89.4%)] By statistical analysis it was found to be significant ($P=0.0262$), this may be due to the fact that women receive inadequate care for their asthma symptoms, so they may neglect their prescribed medications and self care programme leading to poorly

controlled asthma. Our study showed no sexual prevalence for mood disorders.

Out of 100 patients 48 had anxiety [table 1] and 31 had depression. 23 patients (5 among males and 18 among females) had both anxiety and depression. Among the 56 patients with mood disorders, 53 (94.6%) patients had poor asthma control and there was significant statistical association ($P=0.00067$). The correlation between psychiatric disorders and asthma can be explained on the basis that psychiatric disorders such as anxiety and depression increase the perception of symptoms thereby reducing the perception of asthma control level. Poorly controlled asthma may lead to an increase in anxiety and/or depression.

Di Marco² et al did a cross sectional study on 315 asthmatic outpatients hospitals to find a correlation between anxiety, depression and asthma control by Asthma Control Test (ACT) and Hospital Anxiety Depression (HAD) scale. Patients with poorly controlled asthma were more anxious and/or depressed. Lavoie et al¹ suggest that depressive and anxiety disorders were associated with worse asthma-related quality of life, with only depressive disorders being associated with worse asthma control. People affected with mood disorders were higher in our study. Feldman et al³ and Oraka et al¹³ suggest that psychiatric diagnoses were frequently seen with functionally impaired asthma as was seen with our results too. Walters et al¹⁴ suggested that depression was common in asthma control and it led to increase in mortality.

In our study, all the people who were older (51-65 & >65 years) had poorly controlled asthma. This could be due to negligence from the part of family members, poor compliance to medications, inadequate care, or neglecting self-care programs and medications. Presence of comorbidities, use of multiple medications, impairments in dexterity, eyesight and cognitive status and poorer perception of airway limitation also cause poor asthma control in older people. The poor compliance to asthma therapy by older people has been reported before.¹⁵ We also found that mood disorders are more prevalent in older age groups. This may be due to constant presence of illness, presence of comorbidities, family pressures and need for increased intake of medicines.

Katon et al¹⁶ reported that both adult and child/adolescent populations with asthma appear to have a high prevalence of anxiety disorders. According to them older people anticipate illness as a predictable late-life stressor as part of growing old. Although they may have difficulties, they may see themselves as on par with others of their age. Whereas, younger patients may find it difficult to come to terms with enforced changes in lifestyle, with this leading to psychological morbidity. Cleland et al¹⁷ also reported similar observations and found that study it was found that anxiety and depression levels were higher in patients aged less than 60 years, with apparent decrease in depression and anxiety with advancing age. This was contrary to our findings. This might be due to the social and economic factors prevalent in our study population.

In our study, 96.3% of the people who were overweight (BMI 25-29.9 Kg/m^2) and all the patients who were obese (BMI $>30 Kg/m^2$) had poorly controlled asthma. There was significant statistical association between high BMI and poor asthma control ($P=0.0175$). The reasons could be that in obese people the lungs are under-expanded and the size of breaths is smaller. In addition, people that are obese experience chronic low grade systemic inflammation. This systemic inflammation appears to originate in the fat tissue, which can affect the smooth muscles in the airways causing the airways to narrow excessively leading to asthma.^{18,19} This could be the reason for presence of poorly controlled asthma in obese patients.

From our study, higher BMI was significantly associated with mood disorders (anxiety and/or depression). This may be due to stigma and discrimination arising from obesity or due to presence of other illnesses. Scott KM et al²⁰ study reported that obesity was significantly associated with any mood disorder, major depressive disorder and anxiety disorders²⁰; having results similar to our study.

Study conducted by Laforest L et al²¹ found that smoking, female sex, and a body mass index of greater than 30 kg/m^2 were all independent determinants of inadequate control of asthma and all these factors were seen responsible for poor asthma control as per our results too.

In our study, 28(35.45%) people who had undergone spirometry had poor pulmonary function ($FEV_1 \leq 60\%$) all of them had poorly controlled asthma according to ACT. In our study, there was significant correlation between smoking & depression. This may be due to the fact that immediately after smoking, levels of many neurotransmitters associated with mood elevation, including norepinephrine, dopamine and acetylcholine, increase. However, they eventually decrease, typically to levels lower than prior to smoking, which can lead to feelings of depression and nicotine cravings. Study done by Michael Windle et al²² found that teen-agers who were heavy smokers at the beginning of the study were more likely to grow more depressed over time than were those who smoked less heavily or not at all. This was seen in accordance with our findings also.

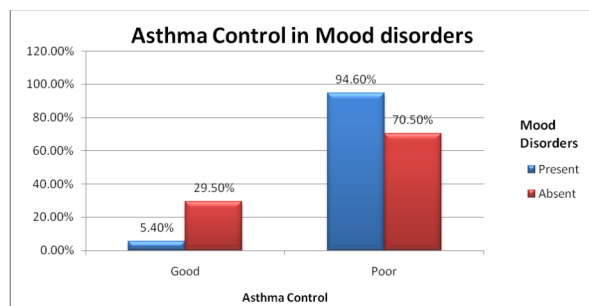


Fig 1 Asthma control in presence of mood disorders

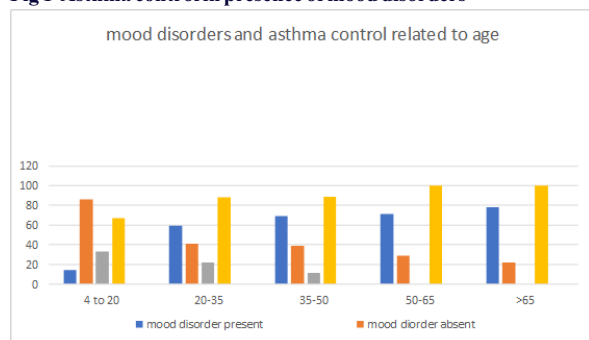


Fig 2 Relationship of asthma control to mood disorders in relationship to age

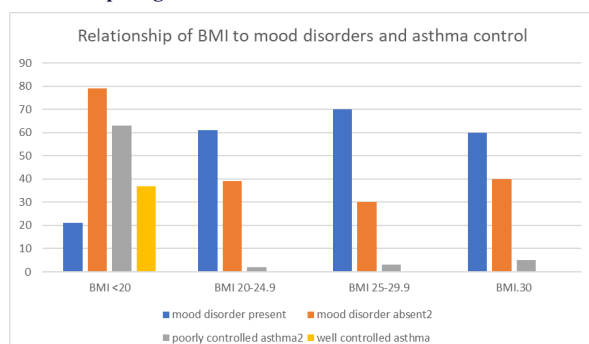


Fig 3 Relationship of asthma control to mood disorders in relationship to BMI

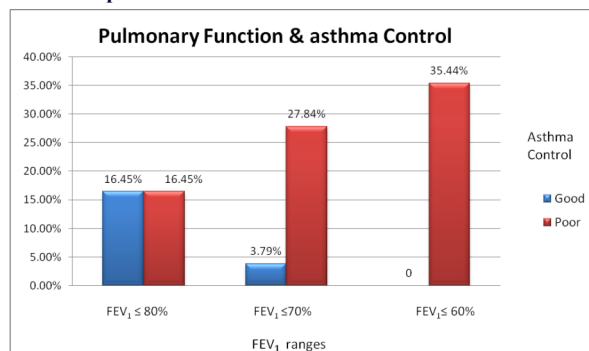


Fig 4 Pulmonary Function and asthma control

Table 1 Basic demographic details

	Mood disorders		Asthma control		total
	present	absent	poor	good	
Male	15 (44%)	19 (56%)	25 (73.5%)	9 (26.5%)	34
Female	41 (62.%)	25 (38%)	59 (90%)	7(10%)	66
High Socioeconomic status	47(54%)	40(44%)	76(87%)	11(13%)	87
Low socioeconomic status	9(69%)	4(31%)	8(61%)	5(39%)	13
employed	13(40%)	19(60%)	26(81%)	69(19%)	32
Retired	1	15(93%)	16(100%)	0	16
unemployed	30(58%)	22(42%)	42(80%)	10(20%)	52

CONCLUSIONS

We found that anxiety and depression are frequent in asthmatic patients and is associated with poor asthma control. Poor asthma control was more seen in older, women, obese, with a worse pulmonary function, more anxious and/or depressed. Mood disorders were seen in older and obese and it had no significant sexual prevalence. There was also a significant correlation between smoking & depression. Mood disorders-poor asthma control correlation may have clinical implications in patients with poorly controlled asthma, in whom the presence of anxiety and depression should be investigated and treated for better control of asthma. If underlying depression or anxiety is not considered, this may lead to unnecessary medication changes and testing, poor adherence, higher rate of symptoms, higher medical costs and potentially higher mortality.¹

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