Indicators of Asthma Control in Asthmatic Patients: Are they related to Depression?

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Abstract

BACKGROUND: Many patients with chronic illnesses suffer from depression. A poorly controlled asthma that presents with repeated attacks of breathlessness is a recognised risk factor for bipolar disorders. On the other hand, depression can aggravate asthma symptoms.

AIM: The aim of this study is to determine the indicators of the asthma control test (ACT) among the asthmatic patients who attend the outpatient clinic for follow-up and to investigate the relation between these indicators and clinical depression, using a standardised depression scale.

METHODS: A total of 38 adult asthmatic patients (29 women, age 17–85 years), with variable levels of control, were assessed using the ACT and the Beck Depression Inventory (BDI). Data obtained were analysed with the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) version 20. The association of depression with the various indicators of asthma control was analysed with the Chi-Square test. Statistical significance was determined at $p < 0.05$.

RESULTS: The uncontrolled asthma is associated with depression in 37% of all participants compared to 0% in the well-controlled group ($p = 0.002$). Depression is significantly related to asthma interference with daily activities ($p = 0.003$), breathlessness ($p < 0.001$), night symptoms ($p = 0.036$), use of bronchodilators ($p = 0.007$), and poor compliance with medical treatment ($p = 0.003$). The poor educational attainment and comorbidities have significant relations to both uncontrolled asthma and clinical depression ($p < 0.05$).

CONCLUSION: All indicators of the poor asthma control are associated with clinical depression. A significant proportion of the uncontrolled asthma patients suffers from depression. The possibility of improving asthma control with a pharmacological treatment of depression has to be considered.

Introduction

Asthma is a common chronic disease that affects as many as 334 million people worldwide. It is a cause of significant burden to the affected patients, often undermines the quality of life, not only due to its physical complications but also its psychological and social consequences [1]. The rapidly changing lifestyles in the Middle East are accompanied by an alarming increase in the prevalence of asthma. In Saudi Arabia, the prevalence is approaching one-quarter of the whole population [2]. Many factors, including genetic and environmental factors, appear to contribute to the aetiology of asthma. The factors that appear most important in triggering asthma exacerbations include dust mites, animal dander, cockroach particles, plant pollen, mould, viral infections, and certain drugs. Psychological factors and emotions also play a role. The airflow limitation in symptomatic patients is caused by contraction of the airway smooth muscle, vascular congestion, mucosal oedema and tenacious secretions. The increase in airway resistance causes a series of physiological and pathological alterations in the cardio-pulmonary system. Lung function tests can provide a direct measure of the degree of airway obstruction, but they may not reflect the real status of asthma control [3]. A disconnect between asthma control and the physiologic parameters of lung function has been suggested [3]. This indicates the presence of other abnormalities that may contribute to the poor outcomes of asthma management. Psychological factors, including depression, could be a possibility. Many patients with chronic illnesses like asthma suffer from depression. A poorly controlled asthma that presents with repeated attacks of breathlessness and an inability to breathe is very stressful to the patient and might be associated with different psychological disorders including panic attacks, anxiety, and depression [4]. The emotional stress can aggravate

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asthma symptoms resulting in persistence of the depressive symptoms. A management that focuses on dilating the airways and neglecting the psychological impact of the disease is unlikely to achieve optimum control of the problem.

Asthma is still underdiagnosed and inadequately controlled worldwide, despite effective treatment being available. In this country, a large number of asthmatic patients are not receiving adequate management [5]. It is important to evaluate the current practice of asthma management and to determine all factors that contribute to and associated with the aetiology of airway obstruction to improve patient's quality of life and asthma outcome.

Many patients with chronic illnesses suffer from depression. A poorly controlled asthma that presents with repeated attacks of breathlessness is a recognised risk factor for bipolar disorders [6]. On the other hand, depression can aggravate asthma symptoms. The aim of this study is to determine the indicators of the asthma control test (ACT) among the asthmatic patients who attend the outpatient clinic for follow-up and to investigate the relation between these indicators and clinical depression, using a standardised depression scale.

Methods

A descriptive cross-sectional study was conducted at the outpatient respiratory clinic of King Khalid and King Fahd Hospitals (Tabuk, Saudi Arabia) between February and April 2017. The ethical approval was obtained from the local Ethics Committee at the University of Tabuk and King Fahd Medical City (KFMC). Facilitation letters were sent to the hospitals. Written consent was obtained from each participant before his participation. The confidentiality of the participants was assured. The study followed the principles of the Declaration of Helsinki.

The asthmatic patients were approached during their follow-up visits to the outpatient department. Inclusion criteria were an adult (age > 15 years old), known asthmatic for at least one year, and presenting for follow-up. Exclusion criteria were age ≤ 15 years old, not known asthmatic or newly diagnosed (<1 year), and presenting with an acute exacerbation of asthma. Each participant was asked to fill an anonymous self-administered questionnaire that includes the questions of both the Beck Depression (BDI) Inventory [7], and Asthma Control Test (ACT) [8]. The BDI is a well-validated scale with a high sensitivity and specificity for detecting depression. It consists of 21 items including emotional, behavioural, and somatic symptoms. Each symptom is scored from 0 to 3. The ratings of mild, moderate, and severe

clinical depression are (10-18), (19-29) and (≥ 30), respectively [7]. The ACT is a well-validated and a reliable measure of asthma control. It is a 5-point scale that assesses the frequency of shortness of breath, general asthma symptoms, use of bronchodilators, the effect of asthma on daily activities, and an overall self-assessment of asthma control. The scores range from 5 (poor control of asthma) to 25 (complete control of asthma), with higher scores (20 to 25) reflecting greater asthma control [8]. ACT was used with kind permission from OPTUM Inc License No. QM040590. The obtained data was analysed with the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) version 20. Results were presented in the form of mean/ standard deviation or number's/ proportions. Student's t-test was used for analysis of the continuous variables. The association of depression with the various indicators of asthma control was analysed with the Chi-Square test. Statistical significance was determined at $p < 0.05$.

Results

A total of 38 asthma patients (76.3% females) participated in the study. Demographic features, asthma duration, and comorbidities are shown in Table 1. The majority (86.8%) were not working because they were still students or have no jobs.

Table 1: Characteristics of participants

Age (y)	Minimum	17
	Maximum	85
	Mean(SD)	41.2(22.8)
Gender (n(%))	Male	9(23.7)
	Female	29(76.3)
Duration of asthma (y)	< 10 y	11(28.9)
	≥ 10 y	27(71.1)
	Range	1-30
	Mean(SD)	12.0(8.1)
Education group (n(%))	Not graduated	22(57.9%)
	Graduated	16(42.1%)
Work group (n(%))	Working	5(13.2%)
	Not working	33(86.8%)
Co-morbidities (n(%))	Yes	11(28.9%)
	No	27(71.1%)

Asthma is well controlled in about one-third (34%) of all participants. The control has a significant association with a higher educational attainment of the participants (p < 0.001) and absence of comorbidities (p = 0.039). It has no relation to age, sex, work, or asthma duration (Table 2).

Table 3 shows the association between depression and the general characteristics of the participants. A significant relation is found between depression and the educational attainment of the participants, with the university graduates have a lower prevalence of depression (3%) compared to the non-graduates (35%; p = 0.012).

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Table 2: The relation of asthma control to age groups, sex, education, work, asthma duration, and presence of an additional medical illness

Parameter		Asthma Control Yes n (%)	No n (%)	Total	P value
Age group	< 40 y	4 (27%)	11 (73%)	15 (100%)	0.332
	≥ 40 y	9 (39%)	14 (61%)	23 (100%)	
Sex	Male	3 (33%)	6 (57%)	9 (100%)	0.640
	Female	10 (34%)	19 (66%)	29 (100%)	
Educational attainment	Not graduated	2 (9%)	20 (91%)	22 (100%)	< 0.001*
	Univ. graduate	11 (69%)	5 (31%)	16 (100%)	
Work group	Working	2 (40%)	3 (60%)	5 (100%)	0.770
	Not working	11 (33%)	22 (67%)	33 (100%)	
Asthma duration	< 10 y	3 (27%)	8 (73%)	11 (100%)	0.565
	≥ 10 y	10 (37%)	17 (63%)	27 (100%)	
Comorbidities	Yes	1 (9%)	10 (91%)	11 (100%)	0.039*
	No	12 (44%)	15 (56%)	27 (100%)	

* Significant p-value.

A significant relation is also found with the co-morbidities (p< 0.001). Depression is more prevalent in asthma patients who suffer from comorbidities (24%) compared to those without additional chronic medical problems (14%).

Table 3: The relation of depression to age groups, sex, education, work, asthma duration, and presence of additional medical illness

Asthma indicators	control	Normal	Mild mood disturbance	Border depression	Moderate depression	Severe depression	P value
Age group	< 40 y	9 (24%)	3 (8%)	1 (3%)	1 (3%)	1 (3%)	0.189
	≥ 40 y	10 (26%)	2 (5%)	0 (0%)	4 (11%)	7 (18%)	
Sex	M	5 (13%)	2 (5%)	1 (3%)	1 (3%)	0 (0%)	0.162
	F	14 (37%)	3 (8%)	0 (0%)	4 (11%)	8 (21%)	
University graduate	No	6 (16%)	3 (8%)	1 (3%)	4 (11%)	8 (21%)	0.012*
	Yes	13 (34%)	2 (5%)	0 (0%)	1 (3%)	0 (0%)	
Working	No	17 (45%)	3 (8%)	1 (3%)	4 (11%)	8 (21%)	0.305
	Yes	2 (5%)	2 (5%)	0 (0%)	1 (3%)	0 (0%)	
Asthma duration	< 10 y	4 (11%)	3 (8%)	1 (3%)	2 (5%)	1 (3%)	0.151
	≥ 10 y	15 (39%)	2 (5%)	0 (0%)	3 (8%)	7 (18%)	
Co-morbidities	Yes	1 (3%)	1 (3%)	0 (0%)	1 (3%)	8 (21%)	0.000*
	No	18 (47%)	4 (11%)	1 (3%)	4 (11%)	0 (0%)	

* Significant p-value.

Table 4 describes the association between depression and the indicators of asthma control. Depression is significantly associated with asthma interference with daily activities (p = 0.003), frequent breathlessness (p< 0.001), night symptoms (p = 0.036), frequent use of bronchodilators (p = 0.007), and less compliance with medical treatment (p = 0.003). The uncontrolled asthma is associated depression in 37% of all participants whereas the controlled asthma is associated with 0% (p = 0.002).

Table 4: Indicators of asthma control in relation to depression

Asthma control indicators		Normal	Mood disturbance	Border depression	Moderate depression	Severe depression	P value
Interference with work	Mostly	8 (21%)	4 (11%)	0 (0%)	3 (8%)	7 (18%)	0.003*
	Rarely	11 (30%)	1 (3%)	1 (3%)	2 (5%)	1 (3%)	
Frequency of breathlessness	≥ 3/ week	3 (8%)	4 (11%)	1 (3%)	4 (11%)	8 (21%)	0.000*
	< 3/ week	16 (42%)	1 (3%)	0 (0%)	1 (3%)	0 (0%)	
Night symptoms	≥ 1/ week	6 (16%)	4 (11%)	1 (3%)	5 (13%)	7 (18%)	0.036*
	< 1/ week	13 (34%)	1 (3%)	0 (0%)	0 (0%)	1 (3%)	
Frequency of bronchodilators	≥ 2/ week	6 (16%)	3 (8%)	0 (0%)	4 (11%)	7 (18%)	0.007*
	< 2/ week	13 (34%)	2 (5%)	1 (3%)	1 (3%)	1 (3%)	
Compliance with treatment	No	4 (11%)	5 (13%)	1 (3%)	5 (13%)	8 (21%)	0.002*
	Yes	15 (39%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Overall control	No	7 (18%)	4 (11%)	1 (3%)	5 (13%)	8 (21%)	0.005*
	Yes	12 (32%)	1 (3%)	0 (0%)	0 (0%)	0 (0%)	

* Significant p value.

Discussion

The uncontrolled asthma is a major health problem that imposes a negative impact on the country's health system and the patients' quality of life. In this study, asthma control has a significant association with a higher educational attainment of the participants and absence of comorbidities. This indicates the importance of health education as a tool for asthma management. It is worth noting that there is a paucity of data regarding the existence of health education for asthma patients in this country.

In addition to the different management aspects that include both pharmacological and non-pharmacological issues, the psychological impact of asthma is receiving an increasing worldwide attention. A recent study reported asthma as a risk factor for bipolar disease supported by suggestive evidence [6]. It is suggested that the evaluation of psychological as well as biological and adherence problems of asthma management might lead to a more efficient approach to improve the control and step down treatment in asthmatic patients [9].

A recent article presented results of seven years follow-up of asthma patients, who were investigated for the association of asthma with anxiety and depression, using a Hospital Anxiety & Depression Scale (HADS) [10]. The initial analysis showed depression in 14% of the participants, and the following analysis showed a long-term persistence of depression in 8% of the participants. The reported predictors of depression in this study were asthma control and lung function [10]. Similarly, in this study, a significant relation is found between depression and the educational attainment of the participants, with the university graduates having a lower prevalence of depression compared to the non-graduates. On the other hand, depression is more prevalent in asthma patients who suffer from comorbidities. The co-morbidities increase sufferings of the patients and impose an additional economic burden on them and their families. The finding that the majority of our patients are not working is alarming. The most common co-morbidities that may accompany severe asthma were quite variable [11]. However, the assessment of patients with uncontrolled asthma to identify and treat the co-morbidities is likely to improve the overall asthma control and the quality of life [11].

A significant finding of this study is that all the indicators of asthma control, based on the Asthma Control Test (ACT), are significantly associated with clinical depression, ranging from borderline to severe depression. These include the interference with daily activities, the frequent attacks of breathlessness, the interruption of sleep with night symptoms, the frequent use of bronchodilators, and the poor compliance with medical treatment. It is worth noting that severe asthma alone might not affect the daily life physical

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activity of the asthmatic patients, a finding that might consolidate the adverse effects of the psychological factors [12]. On the other hand, the presence of night symptoms that indicate a poor quality of sleep might be due to depression itself rather than poor asthma control [13]. The compliance with the pharmacological treatment of asthma is essential, not only for asthma control but also for the psychological wellbeing. Treating asthma is likely to minimise the depressive symptoms. The negative association between depression and treatment compliance is an established finding [14].

The study has many limitations that need to be considered. The sample size is small, and the sampling method depended on the voluntary participation of participants, and therefore, sampling bias is expected. Also, response bias is usually expected with the self-reporting questionnaires. Besides, the diagnosis of asthma was not confirmed with objective measurement of lung function. However, the used ACT and BDI are well validated and have high reliability.

In conclusion, the uncontrolled asthma is associated with clinical depression in a significant proportion of asthma patients. Screening for depression is highly recommended, especially in the poorly controlled patients. The possibility of improving asthma control with a pharmacological treatment of depression has to be considered.

Acknowledgement

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