Original Research

An evaluation of Asthma control using the Asthma control test in patients at the University Hospital, Agadir, Morocco.

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Abstract

Background: Asthma is a common chronic disease, and asthma control is the major therapeutic objective, thus ensuring a good health-related quality of life. This study aimed to evaluate the level of asthma control in a sample of asthmatic patients followed in allergology consultation during our training using the asthma control test (ACT) and its correlation with other parameters.

Methodology: This is a cross-sectional study of 66 asthmatic patients who were followed in pulmonology consultation at Agadir University Hospital after completing the asthma control test questionnaire over 6 months (June to December 2021).

Results: The age of the patients ranged from 17 to 76 years, with an average age of 41.36 +/- 13.31 years. There was a predominance of females in this sample, representing 54.5% of the patients against 45.5% of males. All patients were on inhaled corticosteroid therapy (ICS) (as monotherapy in 25.8% of cases and in combination with a long-acting beta-2 mimetic (LABA) in 74.2% of cases). 60.6% of the patients were from low socioeconomic levels, of which 28.8% were from rural areas. 22.7% of the participants were illiterate. Allergic rhinitis was found in 66.6% of patients and allergic conjunctivitis in 45.5%. Active smoking was found in 16.7% of cases. Obesity was found in 10 patients (15.2% of cases). According to the ACT, asthma was totally controlled in 37.9% of cases and partially controlled in 43.9% of patients.

Conclusion: The level of asthma control found in this study was lower compared to other populations. The study also showed that better ACT scores and asthma control correlated with higher socioeconomic levels.

Keywords: *Asthma Control; ACT; CHU Souss Massa.*

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Quick Response Code:

Introduction:

Asthma is a chronic disease that varies in severity and frequency from person to person [1]. It is a public health problem because of its frequency and the difficulties of management [2]. This condition is triggered by viral infections, physical exercise, exposure to allergens, changes in weather, laughter, and other irritants that can limit physical activity, and sometimes require emergency medical care, and can be fatal.

The diagnosis of the disease is primarily clinical with the following classic symptoms of cough, wheezing, and chest tightness [3]. These symptoms are associated with variable expiratory flow due to bronchoconstriction, thickening of the airway wall, and increased mucus production [3]. Other tests other than spirometry with reversibility testing can be used as well, including the methacholine challenge and peak expiratory flow variability [3].

The management of asthma consists of non-pharmacological treatment combining both effective medication and adapted education and medicinal means, mainly corticosteroids and B2-mimetic bronchodilators.

Patients with this disease continue to suffer from a delay in diagnosis and therefore from undertreatment, which is responsible for irreversible damage to the lower airway (bronchioles), which would impair the respiratory function in adulthood and have considerable consequences on the daily lives of the patients. Asthma is a pathology that can even be fatal [5], and the risk of death is consequently higher, in patients with uncontrolled asthma. Progress in understanding the physiopathological mechanisms as well as the improvement of therapeutic strategies focused on inflammation now allow the asthma patient to lead a (quasi) normal life while preserving or restoring his respiratory function [6].

The prevalence and incidence of asthma has been steadily increasing since the 1970s. Although it has reached a plateau in some Western countries, the prevalence of asthma continues to increase in other parts of the world, particularly in developing countries. Morocco has seen an increase in its prevalence in recent years rising to 10–15%. This prevalence is not precise, as there is no registry of this disease in the kingdom [6].

The Global Initiative for Asthma (GINA) has issued international recommendations for the management of asthma and the assessment of the level of control of its symptoms [7]. Controlled asthma is characterized by infrequent daytime symptoms (less than twice a week), absence of nighttime symptoms and activity limitation, use of rescue medication limited to twice a week, and normal lung function [7].

Asthma control is assessed to avoid complications, improve the quality of life of patients, decrease morbidity and mortality, and preserve lung function. Asthma control is the extent to which the effects of asthma are noticeable to the patient or have been reduced or eliminated by treatment [8].

The objective of our work is to describe the level of asthma control and explore the factors associated with control in the population of asthmatic patients consulting the Souss Massa University Hospital in Agadir. The majority of Moroccan asthma patients underestimate their condition, our role is to help them maintain optimal control.

Materials and Methods

We conducted a cross-sectional study from June to December 2021 at the university hospital souss Massa of Agadir, Morocco. We opted for convenience sampling, which is non-probabilistic. The patients included in the study were those who presented to the pulmonology consultation with a clinically confirmed diagnosis of asthma due to the unavailability of the spirometer during the study period. They

had to be 12 years of age or older. Patients with other chronic respiratory diseases were excluded, as were patients with psychiatric disorders and pregnant women. It is after this selection that we were able to calculate the sample size.

Participants had been instructed on what medication to use and how to monitor their daytime and nighttime symptoms. Also, patient data such as socio-demographic, socioeconomic status information and comorbidities were obtained from clinical evaluation Pulmonologists clinically assessed the level of asthma control using the Asthma Control Test (ACT) for each participant. The tool is a 5-item questionnaire for assessing the asthma control of individuals aged 12 and over. The first four questions concern asthma symptoms such as shortness of breath frequency, the impact on daily life, and the use of rescue medication. Before the test, the fifth question is a self-assessment of the patient's asthma control. The questions are scored from 1 (worst) to 5 (best), and the ACT score is the sum of the responses, giving a maximum best score of 25. An ACT score of 19 or less is the cutoff point defining uncontrolled asthma. The main spoken language in Morocco is the Moroccan Arabic dialect. So, the ACT's questions have been translated into Moroccan Arabic, checked, and validated by an experienced staff of pulmonologists at the university hospital in Agadir, Morocco. The Arabic version of the ACT has also been professionally translated and distributed by the pharmaceutical company Glaxo Smith Kline. The ACT in Arabic has a sensitivity of 52% and a specificity of 94%. The positive predictive value was 45% and the negative predictive value was 94%. Thus, the questionnaire was administered by the pulmonologists.

Data analyses were conducted using the Statistical Package for Social Sciences (SPSS), version 26.0. Hypothesis testing was conducted at an alpha of 0.05. Means with standard deviation were used to report continuous variables, while proportions were used to report categorical variables.

Dependent variables and associated factors to ACT scores and control level like age, level of education, or medical insurance coverage, and health information like BMI, comorbidities, or smoking status were tested using an ANOVA test for quantitative variables and a chi-2 test, a test that checks whether the observed frequencies in one or more categories correspond to the expected frequencies, for qualitative variables.

The proportion of participants with an acceptable level of asthma control was calculated for each explanatory variable modality, and the odds ratio was calculated with its 95% CI.

All patients provided informed consent to participate in the study. Parental consent was obtained for participants younger than 18 years old.

Results
Socio-demographic and health characteristics of participants
There were 66 participants in the study, with a predominance of females (54.5%). The mean age was 41.4 ± 13.3 years old. The participants were mostly from urban areas (71.2%) with a low socioeconomic status (60.6%). Less than a third were analphabets (22.7%).

Concerning the participants' health information, they were mainly non-smokers (83.3%) and not drug consumers (97.0%). The majority had a Body Mass Index <30 (84.8%) and more than half had allergic rhinitis (60.6%). Almost half of the participants suffered from anxiety (47.0%) and conjunctivitis (45.5%).

Table 1: socio-demographic characteristics of participants

		Participants (N=66)	
		Number (n)	Percentage (%)
Gender	Female	36	54.5
	Male	30	45.5
Living area	Urban	47	71.2
	Rural	19	28.8
Socio-economic level	High	8	12.1
	Moderate	18	27.3
	Low	40	60.6
Education level	Illiterate	15	22.7
	Attended primary school	32	48.5
	Attended secondary school	15	22.7
	University	4	6.1
family history			
	Asthma in family	21	31.8
	Allergic rhinitis in family	20	30.3
	Conjunctivitis in family	16	24.2
Medical history			
	Allergic rhinitis	40	60.6
	Depression/anxiety	33	50.0
	Gastroesophageal reflux disease	31	47.0
	Conjunctivitis	30	45.5
	Kidney disease	17	25.8
	Hypertension/Heart disease	17	25.8
	Diabetes	13	19.7
	Eczema	12	18.2

	Sleep disorder	12	18.2
	Polyposis	12	18.2
	Food allergy	3	4.5
	Drug allergy	2	3.0
Toxicity history			
	Smoking	11	16.7
	Alcohol	11	16.7
	Cannabis	2	3.0
Body Mass Index	≤30	56	84.8
	>30	10	15.2

Asthma control in participants

To control asthma, the majority of participants were on inhaled corticosteroid therapy and LABA, while the others had inhaled corticosteroid therapy monotherapy, with the respective proportions of 74.2% and 25.8%. Concerning the Asthma Control Test (ACT) results, less than half of the patients had well-controlled asthma (37.9%), and the majority had either partially or not-controlled asthma (62.1%). Table 2: Asthma control in participants according to the ACT

Table 2: Asthma control in participants according to the ACT

		Number (n)	Percentage (%)	CI 95% (LB-UB)
Asthma Control Test				
	Well-controlled	25	37.9	26.2 - 50.6
	Partially controlled	29	43.9	31.7 - 56.7
	Not controlled	12	18.2	9.8 - 29.6

CI: confidence interval; LB: Lower bound; UB: Upper Bound

Factors associated with asthma control

The main factors associated with asthma control were the presence of allergic rhinitis (p=0.012), eczema (P=<0.001), smoking (P= 0.005) and comorbidities such as obesity and gastroesophageal reflux disease. (P= 0.006)

Table 3: Associated factors to asthma control

		ACT		p-value
		controlled	Not controlled	
		(n=25)	(n=41)	
Âge	Mean (sd)	37.6 (12.7)	43.7 (13.3)	0.07
Sex	Male	13 (52.0%)	17 (41.5%)	0.404
	Female	12 (48.0%)	24 (58.5%)	
Personal History				
	Allergic rhinitis	20 (80.0%)	20 (48.8%)	0.012
	Food allergy	2 (8.0%)	1 (2.4%)	0.293
	Conjunctivitis	8 (32.0%)	22 (53.7%)	0.086
	Eczema	11 (44.0%)	1 (2.4%)	< 0.001
Family History				
	Familial Asthma	19 (76.0%)	2 (4.9%)	< 0.001
	Familial rhinitis	19 (76.0%)	1 (2.4%)	< 0.001
	familial conjunctivitis	16 (64.0%)	0 (0.0%)	< 0.001
Toxic History	smoking	0 (0.0%)	11 (26.8%)	0.005
	Cannabis	0 (0.0%)	2 (4.9%)	0.262
	Alcohol	0 (0.0%)	11 (26.8%)	0.005
Environment	Urban	12 (48.0%)	35 (85.4%)	0.001
	Rural	13 (52.0%)	6 (14.6%)	
Social Level	High	7 (28.0%)	1 (2.4%)	0.006
	Medium	4 (16.0%)	14 (34.1%)	
	low	14 (56.0%)	26 (63.4%)	

Educational level	Illiterate	6 (24.0%)	9 (22.0%)	0.030
	Primary school	7 (28.0%)	25 (61.0%)	
	Secondary	9 (36.0%)	6(14.6%)	
	University	3 (12.0%)	1(2.4%)	
Number of Exacerbations (in the past year)	1	17 (68.0%)	2 (4.9%)	< 0.001
	2	1(4.0%)	28 (68.3%)	
	3	7(28.0%)	11 (26.8%)	
Treatment	inhaled corticosteroids thérapy	16 (64.0%)	1 (2.4%)	< 0.001
	Corticosteroid therapy + LABA	9 (36.0%)	40 (97.6%)	

LABA: Long-Acting Beta-Agonist

Discussion:

The main objective of the present study was to evaluate asthma control and investigate the factors that could influence it in a population of asthmatic adults receiving care in an allergy clinic at the university hospital in Agadir. The primary factors correlated with poor disease control included low socioeconomic conditions, the presence of allergic rhinitis, age at onset, and the duration of the disease. Additionally, poor compliance with treatment contributed to inadequate control of the condition.

Recommendations have evolved considerably since the establishment of GINA. One of the first classifications to assess asthma control in treatment-naive patients was developed. While many items assessed severity, there was a lack of focus on control. [10].

According to GINA, asthma control is a major goal of treatment. The assessment of the noticeable impact of asthma on patients is essential for evaluating disease control. Asthma control currently includes two key areas of focus: symptom control and management of risk factors for further deterioration [11]. The degree of control is assessed by the presence of disease symptoms (both daytime and, especially, nocturnal), the use of short-acting beta-2 agonists, and the limitation of daily activities due to asthma [11]. Current recommendations emphasize the importance of achieving optimal control of the disease and its symptoms through thorough clinical assessment.

Despite all the recommendations on asthma management and control, the majority of asthmatics remain inadequately controlled. Good control of the disease has been correlated with the use of a fixed combination of inhaled corticosteroids and a long-acting beta-2 agonist. In France, 6 out of 10 asthmatics are either not controlled or only partially controlled. Factors associated with poor control include low socioeconomic status, active smoking, and overweight or obesity. [12]. In a study conducted in Casablanca, it was concluded that asthma was controlled in only 50.2% of cases. The causes of uncontrolled asthma were dominated by noncompliance with treatment, the presence of allergic rhinitis,

obesity, and gastroesophageal reflux [13]. In Europe, they found a rate of non-control of asthma of 45% [14]. Our results, by the literature, show that the patients followed for asthma in an allergology consultation at the University Hospital of Agadir remain insufficiently controlled despite the implemented means.

The female predominance (54.5%) in this study has also been found in several studies [9, 13]. This predominance is explained by a correlation with the rhythm of hormonal life such as puberty, menstruation, pregnancy, and menopause [15, 16]. Our patients' average age was 41.4 years (13.3), which was older than the average age in a 2015 study [13]. This can be attributed to the lack of specialized information about asthma among our patients. Some patients believe that if they are diagnosed with the disease as a child or at a certain age, they will not be able to worsen their condition, especially after a long period without signs or symptoms. These patients often forget that asthma frequently begins in childhood, but it can also manifest and re-emerge in adulthood [10]. The extreme ages of our patients (17 and 76 years) are approximately the same as those of other authors (15 and 80 years) [13]. This shows that asthma is a real public health problem and does not spare any age group or geographical area of the world.

Poor socioeconomic conditions, poor compliance, smoking, and certain comorbidities (obesity, allergic rhinitis, gastroesophageal reflux disease) are the main factors associated with poor asthma control.

 Non-adherence to treatment is one of the most frequent causes of asthma non-control, emergency room visits, hospitalization for acute asthma, and death [17]. The rate of non-adherence is highly variable and depends on the means of assessment used. In the European Community Respiratory Health Survey, the rate of good compliance was between 45% and 60% [18]. Non-compliance is often justified by some patients due to a lack of resources and the inability to financially support long-term treatment. As a result, some patients occasionally express a need for medication to adhere to their treatment. When possible, practitioners provide medical samples to patients in need. A 2013 US study found that low socioeconomic status was a significant risk factor for poor asthma control [19], as well as a lack of social security coverage in some patients, making medication difficult to obtain. Additional public health efforts are needed in developing countries to improve the management of these patients.

As noted by the study done in Casablanca [13], allergic rhinitis was one of the causes of the non-control of asthma in our population. This comorbidity has a negative impact on the quality of life of asthmatic patients [20]. Allergic rhinitis should be systematically investigated and treated in all asthmatic patients [21]. In our context, the search for rhinitis was systematic. Among the allergens, house dust mites are also known to be a risk factor for the development of asthma and rhinitis [22]. In Morocco, mites are the most common allergen found in various cities [23].

Smoking is a modifiable factor that adversely affects lung function and is a common cause of poor asthma control. In a French study, the incidence of active smoking among adolescents with asthma was 9%, while passive smoking was reported at 45.7%. Smokers experienced more frequent respiratory symptoms than non-smokers. The impact of asthma on school, family, and psychological life varies depending on the patient's smoking status [24]. Smoking cessation is therefore an important measure to implement to achieve asthma control. Our study did not find a significant association between smoking and asthma control; however, the prevalence of smoking in our population was 16.7%. Our results indicate that there is still much work to be done in promoting smoking cessation for both asthmatics and the general population.

The relationship between obesity and asthma is complex and not fully understood. Obesity has been identified as a factor that aggravates bronchial hyperreactivity and the local and systemic inflammatory responses that are particularly pronounced in obese individuals. Animal models support these hypotheses, although the clinical evidence is less clear and varies from one study to another.[25,26] Our study did not find a significant correlation between BMI and asthma control. This could be explained by the relatively small size of our study.

Gastroesophageal reflux is also a significant comorbidity in asthma and is a factor in disease worsening and instability [27]. The lack of correlation between reflux and asthma control in our study could also be due to the sample size. A larger population could have produced different results.

The advantage of our study is that the evolution of the recommendations allowed for the modulation of therapy and the definition of uncontrolled asthma using the ACT questionnaire. The clinical implication of our study is that personalized asthma education is likely to be beneficial; it takes no more than 10 minutes and can lead to an increase in ACT scores, enabling a significantly greater proportion of patients to achieve well-controlled status.

The limitation of our study is that conducting research in a hospital environment within a public institution may have introduced biases in the recruitment of asthma patients. Specifically, asthma patients with a favourable socioeconomic status are less likely to seek care at public institutions. This could affect the prevalence of asthma control and, consequently, the identified causes of uncontrolled asthma.

Conclusion

Asthma is one of the most frequent chronic pathologies in the world and is a cause of morbidity and mortality mainly in developing countries, especially in the population of patients consulting the Souss Massa University Hospital in Agadir. Current international recommendations emphasize the need to obtain optimal control of the disease and its symptoms. In our study, it was important to evaluate this control with validated questionnaires such as the ACT and identify the risk factors of negative evolution to limit the risk of exacerbation or alteration of the respiratory function.

Competing interests:
The authors declare that they have no competing interests in this section.

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