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Impact of asthma on anxiety, depression, and quality of life: a Moroccan study

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Abstract

Aim: This study aims to investigate the impact of asthma on quality of life, explore its associations with anxiety and depression, and identify the key determining factors.

Methods: A cross-sectional study was conducted in the pulmonology department of Hassan II University Hospital in Fez in 2021. Data were collected using an anonymous questionnaire that included sociodemographic, clinical, and therapeutic information. The Moroccan versions of the Hospital Anxiety and Depression Scale (HADS) and the Short-Form-12 (SF-12) scale were used to assess anxiety, depression, and quality of life. Descriptive analysis was performed, followed by univariate analysis to examine the associations between quality of life, anxiety, depression, and other factors, using statistical tests appropriate for the types of variables studied. A $p < 0.05$ was considered statistically significant. Data entry was performed using Excel 2013, and statistical analysis was conducted using SPSS version 26.

Results: Among the 67 patients included (77.6% women, 61.2% aged ≥ 50 years), wheezing (44.8%) and dyspnoea (26.9%) were the most frequent symptoms. Depression was significantly associated with pain ($p = 0.020$), and frequent hospitalizations ($p = 0.021$), while anxiety was more common among women ($p = 0.034$). For quality of life, patients with depression had lower physical component summary (PCS) scores ($p = 0.008$). Patients over 50 years old had significantly lower PCS and mental component summary (MCS) scores ($p = 0.001$ and $p = 0.002$, respectively). Illiterate patients had lower PCS scores ($p = 0.022$), hypertensive patients had lower PCS scores ($p = 0.032$), and a nearly significant difference for the MCS ($p =$

0.053). Diabetic patients had lower MCS scores (p = 0.034). Finally, a positive correlation was observed between respiratory function forced expiratory volume in 1 second (FEV1) and both PCS scores (p = 0.025) and MCS scores (p = 0.018).

Conclusions: This study underscores the importance of an integrated approach to enhancing the quality of life of asthmatic patients, taking into account respiratory, psychological, and social factors.

Keywords

Asthma, quality of life, anxiety, depression

Introduction

Asthma is a chronic respiratory disease characterized by inflammation and reversible airway obstruction, affecting millions of people worldwide and posing a significant public health challenge. According to the World Health Organization (WHO), an estimated 262 million people had asthma in 2019, resulting in 455,000 deaths, the majority of which occurred in low- and middle-income countries, where underdiagnosis and inadequate treatment remain persistent problems [1].

The prevalence of asthma represents a major global health burden, with rates varying based on geographic, demographic, and socioeconomic factors. Recent studies show an increasing prevalence of asthma in many regions. In 2019, the global prevalence of asthma among individuals aged 5 to 69 years was estimated at 11.5% for current wheezing and 9.8% for lifetime asthma, translating to approximately 754.6 million and 645.2 million cases, respectively [2]. The highest prevalence of current wheezing was reported in the African region (13.2%), while the lowest was seen in the Americas (10.0%).

In China, the prevalence of asthma significantly increased from 2011 to 2020, with notable regional variations. Coastal areas reported higher incidence and awareness rates [3]. In the United States, the overall prevalence of asthma among adults was 8.41% between 2005 and 2018, with a particularly marked upward trend among young adults [4]. The SNAPSHOT program, which assessed asthma prevalence in five Middle Eastern countries, revealed rates ranging from 4.4% in Turkey to 7.6% in the Gulf region, with higher rates among women and older adults [5].

Asthma has a significant impact on the quality of life (QoL) of affected individuals. Numerous studies highlight the strong correlation between asthma control, patient education, and overall well-being. Poor asthma management often leads to a reduced QoL, emphasizing the need for effective self-care strategies and adequate patient education. A positive relationship between asthma control and QoL exists, with better-controlled asthma correlating with improved QoL scores [6]. Additionally, better patient knowledge about asthma management is linked to better QoL outcomes, as evidenced by a significant correlation between knowledge levels and QoL scores [7].

The association between asthma and psychological disorders such as anxiety and depression is well-documented, with a significant interaction that impacts asthma management. Studies indicate that individuals with asthma often experience higher levels of anxiety and depression, which can negatively affect asthma control. A study of 175 Jordanian adults with asthma found that 53.14% experienced both anxiety and depression, and 60.57% had inadequate asthma control [8]. A study in Thailand found that 17.86% of asthma patients experienced anxiety, and 8.92% suffered from depression, with higher rates observed in those with poorly controlled asthma [9]. In Portugal and Spain, 36% of patients with persistent asthma reported symptoms of anxiety, while 12% reported symptoms of depression [10].

The Moroccan healthcare system has made progress, but it faces significant challenges in managing chronic diseases like asthma. These challenges include a lack of qualified personnel, insufficient infrastructure, and limited access to quality treatments, especially in rural areas. Managing comorbidities such as cardiovascular diseases and diabetes remains difficult. Improved management strategies and better awareness within communities are needed for more effective asthma management. Although studies on

asthma have been conducted in various regions, there is a lack of research specifically focusing on QoL, anxiety, and depression among asthma patients in the Moroccan context. The primary aim of this study is to examine the impact of asthma on QoL, anxiety, and depression in asthmatic patients in Morocco, and to identify their determinants.

Materials and methods

Study design and population

This cross-sectional study was conducted in 2021 in the Department of Pulmonology at Hassan II University Hospital in Fez. It included patients aged 18 years and older with a confirmed asthma diagnosis. Participants were informed about the study's objectives and invited to participate. Individuals consulting for other conditions or with a history of psychiatric disorders prior to their asthma diagnosis were excluded.

Data collection

Data were collected from multiple sources. The first step involved analyzing participants' medical records to extract key information, including sociodemographic data such as age, gender, place of residence, marital status, education level, occupation, monthly income, and smoking status. Medical and surgical histories, respiratory function test results (spirometry), and relevant clinical data—such as asthma type, symptoms, forced expiratory volume in 1 second (FEV1) levels, and administered treatments—were also collected. To supplement missing data and evaluate participants' QoL using the Short-Form-12 (SF-12) scale, as well as their anxiety and depression levels using the Hospital Anxiety and Depression Scale (HADS) scale, a telephone survey was conducted. This survey was carried out in strict adherence to data confidentiality and participants' rights. Asthma classification followed the Global Initiative for Asthma (GINA) guidelines, based on symptom evaluation and pulmonary function test results [11].

The study was conducted after obtaining approval from the Ethics Committee of Hassan II University Hospital in Fez. All participants were informed about the study procedures and provided their informed consent, with assurances of anonymity and confidentiality.

Assessment of QoL

QoL was assessed using the SF-12 scale, a shortened version of the SF-36 scale, developed and analyzed by Ware et al. [12]. This scale has been validated in the Moroccan dialect, making it suitable for evaluating the health status of the population [13]. The SF-12 questionnaire consists of 12 items and generates two summary scores: the mental component summary (MCS) and the physical component summary (PCS). Scores range from 0 to 100, with higher scores indicating a better QoL [14]. The scale covers eight dimensions:

- Physical health (PCS): physical functioning (PF), role physical (RP), bodily pain (BP), and general health (GH).
- Mental health (MCS): vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH).

Scores were calculated according to the SF-12 scale guidelines [15]. A score above 50 indicates a better QoL compared to the general population. "Impaired QoL" was defined as a score below the overall average QoL [16].

Assessment of anxiety and depression

Anxiety and depression were assessed using the Moroccan version of the HADS [17]. Developed by Zigmond and Snaith [18] in 1983, this scale was initially designed to screen for anxiety disorders and depressive syndromes in hospitalized patients in non-psychiatric departments. It was later validated for use in outpatient settings [18].

The HADS is a self-assessment scale comprising 14 items: seven related to anxiety (total score A) and seven related to depression (total score D). Each item is scored from 0 to 3 based on the intensity of symptoms experienced over the past week. The total score for each subscale ranges from 0 to 21, with higher scores indicating more severe symptoms. The following thresholds have been established for each subscale:

- A score of 0 to 7 is considered normal.
- A score of 8 or higher indicates a significant disorder [19].

Statistical analysis

A descriptive analysis was conducted for all variables. Frequencies were calculated for qualitative variables, while means and standard deviations were used for quantitative variables. The association between anxiety, depression, and qualitative variables was analyzed using the Chi-square test or Fisher's exact test in cases of small sample sizes. For quantitative variables, a Student's *t*-test was performed. Associations between qualitative variables and QoL scores were examined using the Student's *t*-test, after verifying data normality with the Kolmogorov-Smirnov test. For quantitative variables, Pearson's correlation test was applied. A *p*-value of < 0.05 was considered statistically significant. All analyses were performed using SPSS software, version 26.

Results

Descriptive analysis

We included 67 patients, of whom 77.6% were women. The majority (61.2%) were aged 50 years or older, 77.3% were illiterate, 14.9% were smokers, 14.9% had diabetes, and 14.9% had hypertension. Stage III or IV asthma was present in 82.1% of patients, while 66.1% had controlled asthma. The most frequent symptom was wheezing (44.8%), followed by dyspnea (26.9%), (Table 1).

Table 1. Description of sociodemographic and clinical characteristics

Variables	*N* (%)
Age	
< 50 years	26 (38.8)
≥ 50 years	41 (61.2)
Gender	
Male	15 (22.4)
Female	52 (77.6)
Habitat	
Rural	49 (76.6)
Urban	15 (23.4)
Marital status	
Married	40 (75.5)
Unmarried	13 (24.5)
Level of education	
Illiterate	34 (77.3)
Literate	10 (22.7)
Profession	
Unemployed	24 (54.5)
Employed	20 (45.5)
Lives	
Alone	4 (7.1)
With family	52 (92.9)

Table 1. Description of sociodemographic and clinical characteristics (*continued*)

Variables	*N* (%)
Step	
I or II	10 (17.9)
III or IV	46 (82.1)
Level of control	
Well controlled	37 (66.1)
Poorly controlled	19 (33.9)
Comorbidity	
Hypertension	10 (14.9)
Diabetes	10 (14.9)
Cardiac disease	7 (10.4)
Surgical antecedents	17 (25.8)
Smokers/ex-smokers	10 (14.9)
Cough	27 (40.3)
Dyspnea stage mMRC ≥ 2	18 (26.9)
Cyanosis	8 (14.0)
Sputum	15 (22.4)
Wheezing	30 (44.8)
Pain	6 (9.0)
Hemoptysis	6 (9.0)
Infection	14 (20.9)
Fatigue	16 (23.9)
Weight loss	11 (16.4)
Anorexia	8 (11.9)
Patient under oxygen therapy	
Yes	6 (9.0)
No	61 (91.0)
Number of treatments	
< 2	20 (29.9)
≥ 2	47 (70.1)
Number of exacerbations	
< 2/year	39 (58.2)
≥ 2/year	28 (41.8)
Number of hospitalizations	
< 2/year	59 (88.1)
≥ 2/year	8 (11.9)
Duration of disease: mean (± SD)	11.9 ± 8.8
FEV1: mean (± SD)	1.7 ± 0.8

The missing data are due to non-responders and potential input errors or incomplete information from medical records. FEV1: forced expiratory volume in 1 second; mMRC: Modified Medical Research Council Dyspnoea Scale

Anxiety and depression analysis

Data analysis reveals several significant associations between the studied variables and the occurrence of depression and anxiety. Depression was significantly more common among patients experiencing pain (83.3% vs. 31.1%, $p = 0.020$) and those with ≥ 2 hospitalizations per year (75.0% vs. 30.5%, $p = 0.021$). Additionally, anxiety was associated with depression, with a prevalence of 50.0% in anxious patients compared to 21.2% in non-anxious patients ($p = 0.014$). As for anxiety, gender was the only significant factor identified, with a higher prevalence in women (57.7%) than in men (26.7%, $p = 0.034$), (Table 2).

Table 2. Factors associated with anxiety and depression: results of bivariate analysis

Variables	Depression			Anxiety		
	No *n* (%) 43 (64.2)	Yes *n* (%) 24 (35.8)	*p*-value	No *n* (%) 33 (49.3)	Yes *n* (%) 34 (50.7)	*p*-value
	95% CI = (52.7; 75.7)	95% CI = (24.3; 47.3)		95% CI = (37.3; 61.2)	95% CI = (38.8; 62.7)	
Gender			0.147			0.034
Male	12 (80.0)	3 (20.0)		11 (73.3)	4 (26.7)	
Female	31 (59.6)	21 (40.4)		22 (42.3)	30 (57.7)	
Pain			0.020			0.967
No	42 (68.9)	19 (31.1)		30 (49.2)	31 (50.8)	
Yes	1 (16.7)	5 (83.3)		3 (50.0)	3 (50.0)	
Number of hospitalizations			0.021			0.716
< 2/year	41 (69.5)	18 (30.5)		30 (50.8)	29 (49.2)	
≥ 2/year	2 (25.0)	6 (75.0)		3 (37.5)	5 (62.5)	
Anxiety			0.014			-
No	26 (78.8)	7 (21.2)		-	-	
Yes	17 (50.0)	17 (50.0)		-	-	

QoL analysis

The QoL analysis reveals significant associations with both physical (PCS) and mental (MCS) components. PCS scores are significantly lower in patients with depression (33.9 ± 13.9) compared to those without depression (42.5 ± 9.1, $p = 0.008$). Patients aged 50 and older also have lower PCS scores (32.9 ± 13.7) than those under 50 (43.3 ± 9.1, $p = 0.001$). Additionally, illiterate patients (32.7 ± 13.8) have lower PCS scores than literate patients (43.7 ± 8.8, $p = 0.022$), as do hypertensive patients (28.9 ± 12.6) compared to non-hypertensive patients (38.4 ± 12.7, $p = 0.032$). A positive correlation is observed between respiratory function (FEV1) and PCS ($r = 0.30$, $p = 0.025$).

Regarding MCS, patients aged 50 and older have lower scores (30.2 ± 21.1) than those under 50 (45.2 ± 12.1, $p = 0.002$). Similarly, diabetic patients have lower MCS scores (24.0 ± 13.8) compared to non-diabetic patients (38.1 ± 18.0, $p = 0.034$). A positive correlation is also observed between FEV1 and MCS ($r = 0.31$, $p = 0.018$), (Table 3).

Table 3. Factors associated with impaired physical and mental quality of life: results of bivariate analysis

Variables	PCS (M ± SD)	*p*-value	MCS (M ± SD)	*p*-value
Total score	36.9 ± 13.1		35.9 ± 19.4	
Depression		0.008		0.672
No	42.5 ± 9.1		36.7 ± 23.4	
Yes	33.9 ± 13.9		34.6 ± 9.5	
Age		0.001		0.002
< 50 years	43.3 ± 9.1		45.2 ± 12.1	
≥ 50 years	32.9 ± 13.7		30.2 ± 21.1	
Level of education		0.022		0.095
Illiterate	32.7 ± 13.8		30.3 ± 22.2	
Literate	43.7 ± 8.8		42.9 ± 13.7	
Hypertension		0.032		0.053
No	38.4 ± 12.7		37.9 ± 19.1	
Yes	28.9 ± 12.6		25.0 ± 18.7	

Table 3. Factors associated with impaired physical and mental quality of life: results of bivariate analysis (*continued*)

Variables	PCS (M ± SD)	*p*-value	MCS (M ± SD)	*p*-value
Diabetes		0.080		0.034
No	38.1 ±12.3		38.1 ± 18.0	
yes	30.3 ± 15.9		24.0 ± 13.8	
FEV1: (*r*)	*r* = 0.30	0.025	*r* = 0.31	0.018

MCS: mental component summary; PCS: physical component summary; FEV1: forced expiratory volume in 1 second

Factors influencing physical and mental QoL: results of the multivariate analysis

Table 4 presents the results of the multivariate analysis using multiple regression to identify factors associated with impaired physical (PCS) and mental (MCS) QoL. Regarding physical QoL, age is significantly associated with a decrease in the PCS score [β = –0.007, 95% CI (–0.01; –0.005), $p < 0.001$], indicating that aging leads to a deterioration in physical QoL. Concerning mental QoL, hypertension is significantly associated with a decrease in the MCS score [β = –0.099, 95% CI (–0.183; –0.016), $p = 0.020$], suggesting that hypertensive individuals have poorer mental QoL. Depression is also a key determinant, with a significant decrease in the MCS score among depressed patients [β = –0.127, 95% CI (–0.185; –0.068), $p < 0.001$].

Table 4. Factors associated with impaired physical and mental quality of life: results of multivariate analysis by multiple regression

Variables	PCS		MCS	
	Adjusted β (95% CI)	*p*-value	Adjusted β (95% CI)	*p*-value
Age	–0.007 (–0.01; –0.005)	< 0.001	-	-
Hypertension		-		0.020
Yes	-		–0.099 (–0.183; –0.016)	
No	-		Reference	
Depression		0.001		< 0.001
Yes	0.136 (0.056; 0.216)		–0.127 (–0.185; –0.068)	
No	Reference		Reference	

MCS: mental component summary; PCS: physical component summary

Discussion

The primary objective of this study was to assess how asthma affects QoL, anxiety, and depression among asthmatic patients in Morocco while identifying the associated determinants. The results show that 50.7% of participants experience anxiety, and 35.8% suffer from depression. The high prevalence of these conditions may partly stem from the study setting, as the University Hospital Center (CHU) primarily treats patients with advanced stages of the disease. These findings align with several international studies, though some differences exist. For example, a study in Brazil reported that 58.5% of patients with severe asthma experienced anxiety, while 48.8% suffered from depression [20]. Additionally, a study in Jordan found that 53.14% of asthmatic patients experienced both anxiety and depression [8]. This prevalence is similar to the anxiety levels observed in our study, reinforcing the strong association between poor asthma control—commonly seen in the studied populations—and psychological disorders. However, researchers in Thailand and Europe (Portugal and Spain) reported lower proportions, particularly among patients with better asthma control [9, 10]. These differences underscore the impact of population characteristics and asthma control levels on the prevalence of psychological disorders.

Findings from both the literature and our study highlight several determinants of anxiety and depression in asthmatic patients. The prevalence of these psychological disorders is higher among female asthmatic patients, a trend also reported in studies by Rabelo et al. [20] and Karsaneh et al. [8]. This increased susceptibility may be attributed to hormonal differences, heightened stress sensitivity, or variations in emotional and social responses between genders.

A low level of education is another factor associated with higher rates of anxiety and depression. Our results, along with those from the literature, such as the study by Cunha et al. [10], indicate that illiterate patients or those with limited education experience greater psychological distress. This may be due to a lack of understanding of asthma management strategies, leading to poor disease control and increased psychological stress. Additionally, younger patients tend to exhibit higher anxiety rates, whereas depression is more pronounced in older individuals. This disparity, observed in multiple studies, may be linked to age-specific concerns: younger patients often worry about how asthma will affect their future, while older individuals may struggle with the cumulative impact of comorbidities and physical limitations. Moreover, the presence of comorbidities such as hypertension or diabetes further exacerbates the psychological burden in asthmatic patients. These conditions worsen disease perception and increase functional limitations, as observed in the study by Rabelo et al. [20]. Moreover, recent studies in neuroimmunology have revealed that inflammatory mechanisms may play a crucial role in the development of depression and anxiety in asthmatic patients. For example, Laumet et al. [21] demonstrated that CD3+ T cells are essential in resolving inflammatory pain and depressive-like behaviors, suggesting potential neuroimmune interactions that could explain the co-occurrence of asthma and psychological disorders [21]. This perspective could be explored further in future studies to better understand the complex relationship between asthma and mood disorders.

In this study, the QoL of asthmatic patients, assessed through PCS and MCS scores, was significantly influenced by various sociodemographic and clinical factors. The average PCS was 36.9 ± 13.1, while the MCS was 35.9 ± 19.4, reflecting an overall reduced QoL in this population. These scores are lower than those reported in some international studies, particularly in settings where asthma control is better. For instance, Ahmed et al. [7], found that patients with better asthma control had significantly higher QoL scores. In our study, this discrepancy may be attributed to the high prevalence of patients with advanced forms of the disease. The literature also underscores the impact of comorbidities, such as obesity and multimorbidity, on QoL and psychological well-being. In our study, conditions like hypertension and diabetes were associated with lower QoL scores, consistent with the findings of Tribuntceva et al. [22]. Managing asthma becomes more challenging with multimorbidity due to drug interactions, treatment side effects, and the worsening of chronic conditions such as diabetes or hypertension. In Morocco, cultural, socio-economic, and healthcare factors play a significant role in asthma management. Cultural beliefs, inequalities in access to care, and air pollution worsen the condition. Additionally, psychological disorders such as anxiety and depression negatively impact patients' QoL. To improve asthma management, healthcare strategies must adopt a comprehensive approach that considers these factors.

This study addresses a major public health issue in Morocco: the impact of asthma on QoL, anxiety, and depression—an area that remains underexplored in this context. The use of validated scales, such as the SF-12 and HADS, ensures reliable assessments of the QoL in asthmatic patients, making the findings comparable to international data. The results offer valuable insights for improving asthma management, particularly by considering psychological aspects and addressing common comorbidities. By expanding local knowledge on asthma, this study facilitates comparisons with research conducted in other countries, enhancing its relevance both locally and internationally.

However, this study has several limitations. The cross-sectional nature prevents the establishment of causal links between the identified factors and QoL or psychological disorders. Additionally, the study population comes exclusively from a university hospital, which could introduce selection bias by including more patients with severe or advanced forms of asthma. This limits the generalizability of the results to the broader population of asthmatic patients, particularly those with milder forms of the disease. Another limitation is the potential bias introduced by non-respondents, as some patients could not be reached or chose not to participate in the telephone survey. Additionally, the use of medical records for data collection may have led to errors in data entry or missing information, which could impact the accuracy and completeness of the data. To address biases related to non-respondents, we implemented phone reminders and encouraged active participation to maximize the response rate. Furthermore, to minimize biases associated with medical record use, we ensured a rigorous approach to data collection and extraction by adhering to standardized protocols and cross-checking the extracted information whenever possible.

In conclusion, this study highlights the significant impact of asthma on patients' QoL, particularly in relation to the interplay between depression, anxiety, comorbidities, and socio-demographic factors. The findings emphasize the need for a comprehensive approach to asthma management, one that addresses not only respiratory symptoms but also the psychological and social factors affecting patients. To optimize clinical outcomes and improve overall well-being, it is essential to integrate strategies for managing anxiety and depression into asthma treatment protocols.

Abbreviations

FEV1: forced expiratory volume in 1 second

HADS: Hospital Anxiety and Depression Scale

MCS: mental component summary

PCS: physical component summary

QoL: quality of life

SF-12: Short-Form-12

Declarations

Author contributions

NB: Methodology, Data curation, Formal analysis, Writing—original draft, Supervision. BA, NO, NT, MB, MS, MCB: Writing—review & editing. SEY, HB: Data curation. SEF: Conceptualization, Investigation, Writing—review & editing. All authors read and approved the submitted version.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical approval

The study was approved by the Hassan II University Hospital Ethics Committee, Fez, [Reference: 26/18].

Consent to participate

Informed consent to participate in the study was obtained from all participants.

Consent to publication

Not applicable.

Availability of data and materials

Data for public use is no longer available. The confidential data analyzed in this study can be obtained upon request at nassibabahra@gmail.com.

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