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Association of Anxiety and Depression with Levels of Asthma Control, Severity, and Quality of Life among Adults with Bronchial Asthma.

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KEYWORDS

Asthma, Anxiety, Depression, Quality of Life, Asthma Control, Psychiatric Comorbidity, GINA

ABSTRACT:

Background: Bronchial asthma (BA) is a chronic respiratory disorder characterized by variable airflow limitation and significant impairment of quality of life (QoL). Emerging evidence suggests that psychiatric comorbidities, particularly anxiety and depression, are highly prevalent among patients with asthma and can further compromise asthma control and severity.

Objective: To evaluate the association of anxiety and depression with levels of asthma control, severity, and quality of life among adults with bronchial asthma.

Methods: This cross-sectional study was conducted at the Department of Respiratory Medicine, Chettinad Hospital and Research Institute, Tamil Nadu, India, enrolling 117 adults with physician-diagnosed asthma. Asthma severity (GINA classification), control (Asthma Control Questionnaire), and QoL (Asthma Quality of Life Questionnaire) were assessed. Anxiety and depression were measured using the Hamilton Anxiety (HAM-A) and Depression (HAM-D) rating scales. Associations were analyzed using chi-square tests and one-way ANOVA, with $p < 0.05$ considered significant.

Results: Among the 117 participants (mean age 37.15 years; range 18–58 years. 58.1% female), 65% (n=76) exhibited anxiety symptoms and 35%(n=41) had depression. Statistically significant associations were found between poor asthma control and higher anxiety ($p < 0.001$) and depression ($p = 0.03$) levels. Increased asthma severity was also associated with higher psychological distress levels ($p < 0.001$). The quality of life was significantly impaired in patients with anxiety and depression ($p < 0.001$).

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Conclusion: Psychological distress was strongly associated with poor asthma control, greater disease severity, and a lower quality of life in adults with asthma. Integrating routine mental health assessments and collaborative care into asthma management is essential for improving outcomes and achieving holistic patient care.

Introduction

Bronchial asthma (BA) is a chronic inflammatory respiratory disorder characterized by episodic airway obstruction, bronchial hyperreactivity, and variable symptoms such as wheezing, dyspnea, and cough. Globally, asthma affects approximately 260 million individuals and significantly impacts patient quality of life (QoL), healthcare utilization, and morbidity. Despite advancements in asthma management, disparities persist owing to varying resource availability and patient education, leading to suboptimal disease control in some patients.

Emerging evidence has highlighted a significant association between asthma and psychiatric comorbidities, particularly anxiety and depression. Several international and regional studies have demonstrated that these conditions negatively influence asthma control and exacerbate symptom severity, contributing to poorer overall outcomes. For instance, anxiety and depression are reported at higher rates among patients with asthma than among the general population, with a notable prevalence among individuals with severe forms of asthma. However, while this association is well established in Western populations, there is a paucity of comprehensive data from the Indian context, where social, cultural, and healthcare delivery factors may shape the expression and impact of psychological distress.

While the relationship between psychiatric conditions and asthma severity is increasingly being recognized, substantial gaps remain in understanding the specific impacts of these mental health disorders on asthma control and patient QoL across diverse populations and settings. Few studies have systematically evaluated these associations in Indian adults, and limited attention has been given to how anxiety and depression interact with asthma severity and quality of life in this region.

This underscores the need for comprehensive evaluations that integrate psychological screening with routine asthma management strategies. Addressing these gaps is critical for informing targeted interventions, improving therapeutic strategies, and enhancing patient-centered outcomes in asthma care.

Aim and Objective:

To evaluate the association of anxiety and depression with levels of asthma control, asthma severity, and quality of life among adults with bronchial asthma.

Materials and Methods

Study Design and Setting

This cross-sectional study was conducted at the Department of Respiratory Medicine, Chettinad Hospital and Research Institute (CHRI), Tamil Nadu, India. This study spanned 18 months and included participant recruitment, assessment, and data analysis.

Participants

The study enrolled adult patients (aged 18–65 years) diagnosed with bronchial asthma according to the Global Initiative for Asthma (GINA) guidelines. Eligible participants had confirmed variable airflow limitation confirmed through bronchodilator reversibility testing and provided written informed consent.

Inclusion Criteria

- Age between 18 and 65 years
- Clinical diagnosis of bronchial asthma with objective evidence of variable airflow limitation(according to GINA Classification)
- Consent to participate in the study and undergo psychiatric evaluation

Exclusion Criteria

- Known history of psychiatric illness
- Pregnancy
- Presence of other significant pulmonary diseases (e.g., tuberculosis, bronchogenic carcinoma)

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- History of thoracic surgery (e.g., pneumonectomy, lobectomy, thoracotomy)
- Severe systemic illnesses (e.g., CHF Stage III/IV, CKD, unstable angina, neurological conditions)
- Active substance use disorder
- Age > 65 years

A known history of psychiatric illness was determined by participant self-report during the study interview and, where available, review of medical records.

Sample Size

Estimation

The sample size was calculated using the standard formula for prevalence studies, based on an estimated prevalence (p) of anxiety and depression in asthma of 22% as previously reported by Nair et al. [10]: n = 4p(q)/d^2

Where: n = required sample size, p = estimated prevalence of the condition (22%), q = 100 − p (i.e., 78%), d = absolute precision (8%), 4 = constant for 95% confidence level

Substituting the values: n = 4*22*(100-22)/8x8 = 107

The calculated sample size was **107**.

A 10% margin was added to account for attrition.

107+(10% of 107)=107+10.7≈117

Thus, the final sample size required was **117 participants**.

Data Collection Instruments

- A structured questionnaire was used to record socio-demographic and clinical details.
- Psychological assessment tools included:
  - Hamilton Anxiety Rating Scale (HAM-A)
  - Hamilton Depression Rating Scale (HAM-D)
- Asthma-related parameters were assessed using:
  - GINA classification for asthma severity
  - Asthma Control Questionnaire (ACQ)
  - Asthma Quality of Life Questionnaire (AQLQ)

Study Procedures

1. Eligible participants were screened and enrolled after informed consent (n = 117).
2. Baseline assessments included psychological evaluation (HAM-A and HAM-D) and asthma assessments (ACQ, AQLQ, and GINA classification).
3. Patients with clinically significant anxiety or depression (using the score ranges used to categorize participants into Mild and Moderate anxiety/depression for the HAM-A and HAM-D scales) were referred to the Department of Psychiatry for further management.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 21.0. Descriptive statistics (frequencies, means, and standard deviations) were used to summarize baseline variables. Associations between variables were analyzed using:

- Chi-square or Fisher's exact test for categorical variables
- Independent sample t-tests and one-way ANOVA for continuous variables
- A p-value < 0.05 was considered statistically significant

Ethical Considerations

This study was approved by the Institutional Human Ethics Committee (IHEC-I/2006/23; dated 31.05.2023). Participation was voluntary, and written informed consent was obtained from all participants. Confidentiality and data anonymity were strictly maintained. The study was self-funded with no external financial support.

Results

Demographic Characteristics

A total of 117 adult patients participated, with a mean age of 37.15 years (range 18–58 years). Most of the participants (58.1%) were female. The distribution by age was as follows: young adults (18–30 years: 30.8%),

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middle-aged adults (31–45 years: 48.7%), and older adults (46–60 years: 20.5%).

Table 1: Age and Gender

Age Category	Female (n, %)	Male (n, %)	Total (n,%)
18–30 years	19 (52.8%)	17 (47.2%)	36 (30.8%)
31–45 years	39 (68.4%)	18 (31.6%)	57 (48.7%)
46–60 years	10 (41.7%)	14 (58.3%)	24 (20.5%)
Total	68 (58.1%)	49 (41.9%)	117 (100%)

Table 1 shows the distribution of the study population by age and gender.

Table 2: Smoking History and Family History of Asthma in the study population

Variable	Category	Frequency (n=117)	Percentage (%)
Smoking History	Never	93	79.5
	Ex-smoker	11	9.4
	Current smoker	13	11.1
Family History of Asthma	Yes	41	35
	No	76	65

Among the 117 participants, mostly 79.5% had never smoked , while 9.4% were ex-smokers, and 11.1% were current smokers . A family history of asthma was present in 35% of the cases .

Table 3: Asthma-related Characteristics of the Study Population

Variable	Category	Frequency (n=117)	Percentage (%)
Asthma Exacerbation at Baseline	Yes	44	37.6
	No	73	62.4
Current Asthma Severity (GINA Classification)	Mild Persistent	30	25.6
	Moderate Persistent	57	48.7
	Severe Persistent	30	25.6
Asthma Control Status	Partially Controlled	81	69.2
	Uncontrolled	36	30.8

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Asthma- Quality of life	Good	19	16.2
	Moderate	77	65.8
	Poor	13	11.2
	Severely Impaired	8	6.8

At the time of assessment, 37.6% of patients experienced asthma exacerbations. Based on the GINA classification, 48.7% had moderate persistent asthma, while 25.6% each had mild persistent and severe persistent asthma. In terms of asthma control, 69.2% had partially controlled asthma, and 30.8% had uncontrolled asthma, indicating a substantial need for improved asthma management. In terms of QOL(AQLQ), most participants (65.8%) reported moderate QoL. Good QoL was noted in 16.2%, while 11.1% had poor QoL and 6.8% had severely impaired quality of life. These findings highlight that nearly half of the study participants had moderate-to-severe disease, a majority were only partially controlled, and most reported a moderate quality of life.

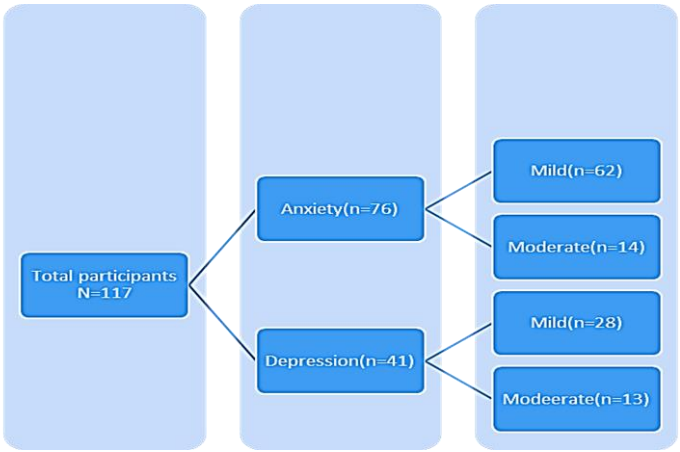

Figure 1: Showing the distribution of participants with Anxiety and Depression.

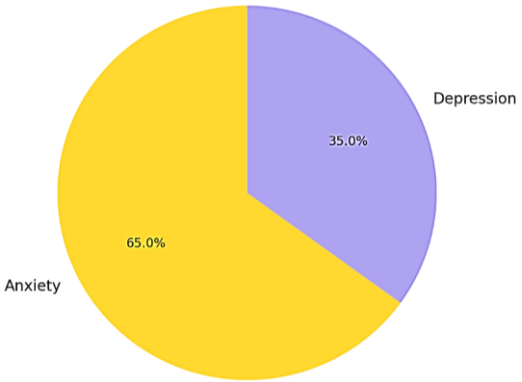

Figure 2: Showing the distribution of participants with Anxiety(65%) and Depression(35%)

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Table 4: Distribution of Anxiety and Depression

Scale	Category	Frequency (n)	Percentage (%)
Hamilton Anxiety	Mild	62	53
	Moderate	14	12
	No Anxiety	41	35
Total	117		

Among the 117 participants, 65% (n=76) had anxiety. Among them, 53% had mild anxiety, 12% had moderate anxiety, and 35% had no anxiety .

Table 5: Distribution of Depression

Scale	Category	Frequency (n)	Percentage (%)
Hamilton Depression	Mild	28	23.9
	Moderate	13	11.1
	No Depression	76	65
Total	117		

Among the 117 participants, 35%(n= 41) had depression. Among these 23.9% had mild depression, 11.1% had moderate depression and 65% had no depression.

It is important to note that the “No Anxiety” and “No Depression” groups are not mutually exclusive. Several participants classified as having “No Anxiety” still exhibited symptoms of depression, and conversely, some with “No Depression” displayed anxiety symptoms. This overlap reflects the distinct yet interrelated nature of anxiety and depression in the asthma population and underscores the need to assess both conditions independently.

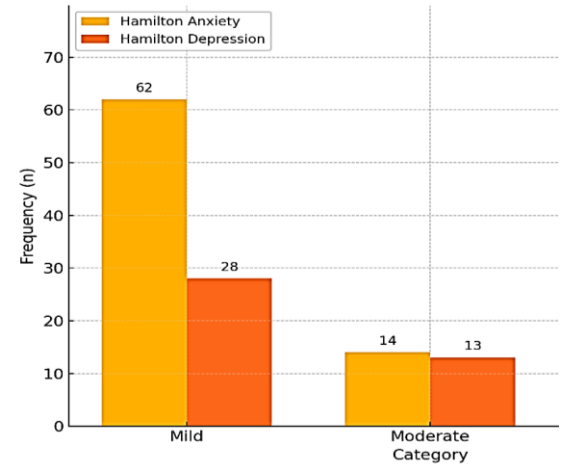

Figure 3: Showing the distribution of participants with Anxiety and Depression.

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Table 6: Association Between Asthma Control Status and Hamilton Anxiety Levels (HAM-A)

Asthma Control Status	Mild Anxiety (n, %)	Moderate Anxiety (n, %)	No Anxiety (n, %)	Total (n)
Partially Controlled	54 (66.7%)	0 (0.0%)	27 (33.3%)	81
Uncontrolled	8 (22.2%)	14 (38.9%)	14 (38.9%)	36
Total	62 (53.0%)	14 (12.0%)	41 (35.0%)	117
Chi-square (df = 2) 41.010 p < 0.001				

Among those with **partially controlled asthma**, 66.7% had mild anxiety and 33.3% had no anxiety. In contrast, the **uncontrolled asthma** group showed an even spread: 22.2% had mild anxiety, while 38.9% had moderate anxiety, and 38.9% had no anxiety. These results indicated that poor asthma control is associated with higher levels of mild anxiety. A significant association was found between asthma control status and Hamilton Anxiety levels.

Table 7: Association Between Asthma Control Status and Hamilton Depression Levels (HAM-D)

Asthma Control Status	Mild Depression (n, %)	Moderate Depression (n, %)	No Depression (n, %)	Total (n)
Partially Controlled	22 (27.2%)	5 (6.2%)	54 (66.7%)	81
Uncontrolled	6 (16.7%)	8 (22.2%)	22 (61.1%)	36
Total	28 (23.9%)	13 (11.1%)	76 (65.0%)	117
Chi-square (df = 2). 7.043 p = 0.030				

In the **partially controlled** group, 66.7% had no depression , 27.2% had mild depression, and 6.2% had moderate depression. In the **uncontrolled** group, only 61.1% had no depression, while 16.7% had mild depression and 22.2% had moderate depression. A statistically significant association was found between asthma control status and depression levels (Chi-square = 7.043, df = 2, p = 0.030). These findings suggest that poorer asthma control is associated with higher levels of depressive symptoms.

Table 8: Association Between Asthma Severity (GINA Classification) & Hamilton Anxiety Categories

Asthma Severity (GINA Classification)	Mild Anxiety (n, %)	Moderate Anxiety (n, %)	No Anxiety (n, %)	Total (n)
Mild Persistent	27 (90.0%)	0 (0.0%)	3 (10.0%)	30
Moderate Persistent	27 (47.4%)	10 (17.5%)	20 (35.1%)	57
Severe Persistent	8 (26.7%)	4 (13.3%)	18 (60.0%)	30
Total	62 (53.0%)	14 (12.0%)	41 (35.0%)	117
Chi-square (df=4) 27.837 p < 0.001				

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Among those with **mild persistent asthma**, 90% had mild anxiety and 10% had no anxiety. In the **moderate persistent group**, 47.4% had mild anxiety, 17.5% moderate anxiety, and 35.1% had no anxiety. Interestingly, in the **severe persistent group**, 26.7% had mild anxiety and 13.3% had moderate anxiety, and 60% had no anxiety. Overall 53% had mild anxiety, 12% had moderate anxiety and 35% had depression symptoms but no anxiety. A statistically significant association found between asthma severity (according to GINA classification) and anxiety levels measured using the HAM A scale (Chi-square (df=4) 27.837,$p < 0.001$).

These findings highlight varying anxiety levels across asthma severities, with moderate persistent asthma showing the widest range of anxiety responses.

Table 9 : Association Between Asthma Severity (GINA Classification) & Hamilton Depression Categories

Asthma Severity (GINA Classification)	Mild Depression (n, %)	Moderate Depression (n, %)	No Depression (n, %)	Total (n)
Mild Persistent	3 (10.0%)	0 (0.0%)	27 (90.0%)	30
Moderate Persistent	16 (28.1%)	4 (7.0%)	37 (64.9%)	57
Severe Persistent	9 (30.0%)	9 (30.0%)	12 (40.0%)	30
Total	28 (23.9%)	13 (11.1%)	76 (65.0%)	117
Chi-square (df = 4) 22.902.		**p < 0.001**		

In the **mild persistent** group, 90% had no depression and 10% had mild depression. Among those with **moderate persistent asthma**, 64.9% had no depression, 28.1% had mild depression, and 7% had moderate depression. In the **severe persistent** group, depression was more: 30% had mild depression, 30% had moderate depression, and only 40% had no depression.

Overall, 65% of participants had no depression, while 23.9% showed mild and 11.1% moderate depression, indicating a clear link between increased asthma severity and higher depression levels. A significant association was found between asthma severity (GINA classification) and depression levels measured using the HAM D scale (**Chi-square (df = 4) 22.902. p < 0.001**).

Table 10: Association of AQLQ Categories and Hamilton Anxiety HAM-A Levels

AQLQ Category	Mild Anxiety (n %)	Moderate Anxiety (n %)	No Anxiety (n %)	Total (n %)	Fisher's Exact Test (p)
Good	19 (100.0%)	0 (0.0%)	0 (0.0%)	19 (16.2%)	p < 0.001
Moderate	35 (45.5%)	8 (10.4%)	34 (44.2%)	77 (65.8%)	
Poor	3 (23.1%)	3 (23.1%)	7 (53.8%)	13 (11.1%)	
Severe	5 (62.5%)	3 (37.5%)	0 (0.0%)	8 (6.8%)	
Total	62 (53.0%)	14 (12.0%)	41 (35.0%)	117 (100.0%)	

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In the **good QOL** group 100.0% reported only mild anxiety . Among those with **moderate QOL** 45.5% had mild anxiety, and 10.4% had moderate anxiety. In the **poor QOL** group, 53.8% reported no anxiety, while 23.1% each had mild and moderate anxiety. In the **severe QOL impairment** group, 62.5% exhibited mild anxiety and 37.5% had moderate anxiety, with no anxiety. Overall, 53.0% had mild anxiety, 12.0% moderate anxiety, and 35.0% no anxiety. A statistically significant association was observed ($p < 0.001$) between AQLQ and Anxiety Levels.

Table 11: Association of AQLQ Categories and Hamilton Depression HAM-D Levels

AQLQ Category	Mild Depression	Moderate Depression	No Depression	Total(n=117)	Fisher's Exact Test (p)
Good	0 (0.0%)	0 (0.0%)	19 (100.0%)	19 (16.2%)	$p < 0.001$
Moderate	28 (36.4%)	6 (7.8%)	43 (55.8%)	77 (65.8%)	
Poor	0 (0.0%)	7 (53.8%)	6 (46.2%)	13 (11.1%)	
Severe	0 (0.0%)	0 (0.0%)	8 (100.0%)	8 (6.8%)	
Total	28 (23.9%)	13 (11.1%)	76 (65.0%)	117 (100.0%)	

Among those in **moderate** QOL group, 36.4% had mild depression, 7.8% had moderate depression, and 55.8% had no depression. Among participants with **poor** QOL, 53.8% experienced moderate depression and none had mild depression, while 46.2% reported no depression. Overall, 23.9% had mild depression, 11.1% had moderate depression, and 65.0% had anxiety but no depression. A significant association was observed between AQLQ categories and depression severity ($p < 0.001$).

Discussion:

This study provides a comprehensive analysis of the relationship between psychological comorbidities and the core aspects of asthma management, revealing a significant interplay between mental health and clinical outcomes in adult patients with bronchial asthma. These findings confirm that anxiety and depression are highly prevalent in this population and are strongly associated with poorer asthma control, increased asthma severity, and diminished quality of life. This underscores the critical need to integrate mental health assessment and the critical need to integrate mental health assessment and care into standard asthma management protocols to achieve better patient-centered outcomes in the future.

The study population of 117 adults was predominantly female (58.1%), which is consistent with the literature suggesting gender disparities in asthma perception and mental health. Chhabra et al noted that women with asthma often report poorer asthma control, and lower quality of life, which may predispose them to a higher psychological burden [5].

Several clinical and lifestyle factors were noteworthy in the present study. Nearly 80% of the patients were never-smokers, reflecting global trends among patients with asthma. However, investigating outcomes in the minority who smoke is a warranted area for future studies, as this habit often correlates with worse mental health. Notably, 35% of participants reported a family history of asthma. This supports the findings of Nair et al. that a familial link does not mitigate psychological distress; on the contrary, such lived experiences can heighten anxiety about disease progression [10].

The primary finding of this study was the significant burden of psychological distress among the participants. A total of 65% of the patients were found to have anxiety, while 35% had depression. For instance, Faye et al. reported that panic symptoms and anxiety significantly impair the quality of life in patients with asthma [1], while Moussas et al. found higher rates of

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these comorbidities in patients with asthma than in those with other chronic respiratory diseases [2]. Furthermore, Amelink et al. demonstrated that severe asthma is frequently accompanied by elevated anxiety and depression [3]. These data collectively underscore that psychological distress is not merely incidental but is deeply embedded in the asthma experience.

The study revealed that suboptimal asthma management was common: 48.7% of patients had moderate persistent asthma, while 100% were either partially controlled (69.2%) and uncontrolled (30.8%). This likely reflects a selection bias inherent to tertiary referral centers, where patients with more severe or difficult-to-manage asthma are overrepresented. As a result, the findings may not be generalizable to all asthma patients, particularly those managed in primary care who may have better disease control. This aligns with observations by Ali et al. that poor asthma control correlates with a reduced quality of life and heightened psychological distress [6].

Our data demonstrated a strong and statistically significant relationship between asthma control and the severity of anxiety and depression ($p<0.001$). Patients with uncontrolled asthma were substantially more likely to experience moderate anxiety (38.9%) and moderate depression (22.2%) than those with partially controlled disease. This confirms the conclusion of Urrutia et al. that a lack of asthma control is linked to greater psychological distress, which in turn may further compromise disease management [8].

While the overall trend demonstrates a strong association between poor asthma outcomes and increased psychological distress, several subgroup results were unexpected. For instance, a majority of patients with severe persistent asthma (60%) and all patients with severely impaired quality of life (100%) reported No Anxiety or No Depression, respectively.

Notably, the No Anxiety and No Depression groups are not synonymous with the absence of all psychological distress. Many patients with No Anxiety still had depressive symptoms, and vice versa. This overlap underscores the fact that anxiety and depression, while often co-occurring, can manifest independently. Such nuances in mental health presentation may help explain some of the counterintuitive findings, such as the presence of psychological symptoms in patients not captured by a single scale.

This study observed a clear relationship between asthma severity and psychological symptoms ($p<0.001$), paralleling the findings of Lomper et al. that the negative impact of anxiety and depression intensifies as asthma severity increases [4]. In our study, individuals with mild persistent asthma had predominantly had mild anxiety (90.0%) and mild depression(10%). Among those with moderate persistent asthma, (47.4%) had mild anxiety and (17.5%) had moderate anxiety, (28.1%) had mild depression and (7.0%) had moderate depression. Patients with severe persistent asthma had the highest rates of moderate depression (30.0%), mild anxiety(26.7%) and moderate anxiety (13.3%). This shift is consistent with the findings of Amelink et al., who found that patients with increased asthma severity, had significantly more psychiatric symptoms [3].

Consequently, quality of life was robustly associated with mental health status ($p<0.001$). Patients who reported a good quality of life (AQLQ score) only had mild anxiety and no depression. Among those with a moderate quality of life, 45.5% had mild anxiety and 36.4% experienced mild depression, and 7.8% had moderate depression. Conversely, among those with a poor quality of life, over half (53.8%) experienced moderate depression and 23.1% had mild anxiety and 23.1% had mild depression. This finding resonates with studies by Tribuntceva et al. and Ali et al., who identified psychological comorbidities as a key mediator in the decline in quality of life. [6, 9].

These findings highlight a robust association between asthma severity, poor control, and psychological distress. The relationship is complex and likely multifactorial, including biological factors (inflammation, cytokines, corticosteroid effects), behavioural factors (symptom hypervigilance, avoidance, poor adherence), and social factors (stigma, reduced participation, financial stress).

These findings corroborate the growing consensus that mental health screening and intervention should be standard components of asthma care. Incorporating validated tools, such as HAM-A and HAM-D into routine clinical practice could identify at-risk patients earlier and more effectively. Urrutia et al. demonstrated that treating anxiety and depression in asthma leads to measurable improvements in disease control and quality of life [8]. Our findings strongly reinforce this

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perspective: addressing mental health is not ancillary but essential to improving overall asthma outcomes.

Conclusion

In conclusion, this study confirmed a profound and clinically significant association between psychological distress and asthma outcomes in adults with asthma. Our findings revealed a strong association between poor asthma control and greater disease severity and the presence of anxiety and depression. This psychological burden is associated with severely impaired the quality of life, and appears to contribute to a vicious cycle that complicates effective disease management. This evidence strongly supports the integration of mental health assessments into routine clinical practice. Therefore, implementing standardized screening and collaborative care models that include mental health professionals is not merely beneficial but also essential for improving clinical control, enhancing quality of life, and achieving holistic care for patients with asthma.

Limitations:

This study utilized a cross-sectional design, which restricts the ability to infer causal relationships among anxiety, depression, and asthma outcomes. Data were collected from a single tertiary care facility, potentially limiting external validity and generalizability. In addition, small sample sizes in certain subgroups (e.g., only eight patients with severely impaired QoL) reduce statistical power for these categories. By excluding patients with known psychiatric illness, our findings reflect only undiagnosed or subclinical psychological distress and may underestimate the true prevalence of psychological comorbidity in the broader asthma population.

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