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PREVALENCE OF LOW BACK PAIN, DISABILITYAND SLEEP QUALITY IN ADULT ASTHMATIC PATIENTS: A CROSS-SECTIONAL STUDY

Original Research

Mala Zahid[1]*, Khudija Tayyab[2], Mahnoor Muzammil[3], Umra Khan[3], Kinza Ehsan[4]
[1]The University of Faisalabad, Faisalabad, Pakistan.
[2]Safi Hospital, Faisalabad, Pakistan.
[3]Riphah International University, Lahore, Pakistan.
[4]Department of Rehabilitation Sciences, The University of Faisalabad, Faisalabad, Pakistan.
Corresponding Author: Mala Zahid, The University of Faisalabad, Faisalabad, Pakistan, malaumer14@gmail.com
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ABSTRACT

Background: Asthma is a chronic inflammatory airway disease that extends beyond respiratory impairment, often leading to systemic complications such as musculoskeletal dysfunction and disturbed sleep. Low back pain (LBP) and poor sleep quality are increasingly recognized as comorbidities that worsen quality of life and functional independence in asthma patients. Understanding their interrelationship with asthma severity is essential for developing comprehensive, multidisciplinary care strategies.

Objective: To determine the prevalence and interrelationship of low back pain, functional disability, sleep quality, and asthma severity among adult asthma patients.

Methods: A cross-sectional study was conducted over six months at Gulab Devi Teaching Hospital, Lahore, enrolling 100 adult asthma patients aged 20–60 years through non-probability purposive sampling. Asthma severity was classified according to the Global Initiative for Asthma (GINA) guidelines and evaluated using the Asthma Control Test (ACT). Pain intensity was assessed using the Visual Analogue Scale (VAS), disability through the Oswestry Disability Index (ODI), and sleep quality with the Basic Nordic Sleep Questionnaire (BNSQ). Data were analyzed using SPSS version 22, applying descriptive statistics and chi-square tests to assess associations, with a significance threshold of $p < 0.05$.

Results: The mean age of participants was 45.2 ± 9.8 years, with 65% females and 35% males. The prevalence of LBP was 72%, including 37% with mild pain, 33% with moderate pain, and 2% with severe pain. Moderate to severe disability was observed in 60% of patients, while 27% reported poor sleep quality. Significant associations were found between asthma severity and VAS scores ($p < 0.05$), ODI levels ($p < 0.05$), and sleep quality ($p = 0.002$). Physical stressors such as prolonged standing and walking were also correlated with increased LBP ($p < 0.01$).

Conclusion: Low back pain, disability, and sleep disturbance are highly prevalent among individuals with asthma, particularly those with severe or poorly controlled disease. These findings highlight the need for multidisciplinary management incorporating respiratory care, physiotherapy, and sleep health interventions to improve functional and overall well-being.

Keywords: Asthma, Asthma Severity, Disability, Low Back Pain, Oswestry Disability Index, Sleep Quality, Visual Analogue Scale.

INTRODUCTION

Asthma is a globally prevalent chronic respiratory disorder characterized by episodic airflow obstruction, bronchial hyperresponsiveness, and airway inflammation (1). Affecting approximately 339 million individuals worldwide, it represents a substantial public health challenge with profound socioeconomic and healthcare implications (2). The condition manifests through symptoms such as wheezing, dyspnea, chest tightness, and coughing, leading to compromised physical function and quality of life. Despite advancements in pharmacological and non-pharmacological management strategies, a significant proportion of patients continue to experience uncontrolled asthma, often due to multifactorial influences such as environmental triggers, genetic susceptibility, lifestyle behaviors, and suboptimal treatment adherence. Beyond respiratory limitations, emerging evidence highlights that asthma is associated with systemic comorbidities, among which musculoskeletal dysfunction—particularly low back pain (LBP)—is increasingly recognized. LBP remains one of the most prevalent chronic pain disorders globally and is a leading contributor to years lived with disability (3-5). Historically regarded as an isolated orthopedic issue, LBP is now understood to share mechanistic links with chronic respiratory conditions. Both asthma and LBP exhibit overlapping pathophysiological mechanisms, including chronic inflammation, altered postural control, impaired trunk stability, and diaphragmatic dysfunction. Hyperinflation and the persistent recruitment of accessory respiratory muscles during asthmatic episodes may disturb spinal alignment and increase lumbar strain, thereby predisposing individuals to LBP. The diaphragm, a central structure in respiration and spinal stabilization, plays a critical biomechanical role in maintaining lumbar support. In chronic respiratory diseases, diaphragmatic fatigue and mechanical inefficiency not only compromise ventilation but also weaken postural stability, particularly in the lumbar region where it anchors (6-8).

Altered respiratory patterns—such as rapid, shallow breathing and hyperventilation—can induce compensatory musculoskeletal adaptations that aggravate lumbar stress and pain (9). Consequently, asthma-related respiratory fatigue may perpetuate biomechanical imbalances, predisposing patients to chronic musculoskeletal discomfort. Another frequently overlooked dimension of asthma management is sleep health. Nocturnal asthma, characterized by nighttime symptom exacerbation, is associated with disturbed sleep, insomnia, and sleep-disordered breathing (SDB) such as obstructive sleep apnea (OSA) (10). These disturbances not only degrade quality of life but also impair daytime function, exacerbate inflammation, and increase disease morbidity. Recurrent nighttime awakenings due to coughing, dyspnea, or chest tightness elevate sympathetic activity and stress hormone release, perpetuating a cycle of poor sleep and systemic inflammation (11). The relationship between asthma and sleep is bidirectional—sleep deprivation amplifies airway reactivity, while uncontrolled asthma worsens sleep fragmentation. Similarly, LBP contributes to disturbed sleep through nocturnal pain and limited mobility, while inadequate sleep enhances pain perception and central sensitization (12,13). Given these interlinked physiological and psychosocial pathways, the coexistence of LBP, disability, and sleep disturbance in individuals with asthma may represent a compounded health burden. However, despite mounting global interest in the multimorbidity of chronic respiratory diseases, data exploring these associations remain scarce in the South Asian population, where cultural, occupational, and environmental factors may further influence disease presentation and outcomes. The present study aims to investigate the prevalence and interrelationship of low back pain, associated disability, and sleep quality among adult asthmatic patients. By addressing this research gap, the study seeks to promote a more integrated, multidisciplinary management framework for asthma that incorporates musculoskeletal assessment and sleep evaluation to enhance overall patient outcomes.

METHODS

This cross-sectional analytical study was conducted over a period of six months at Gulab Devi Teaching Hospital, Lahore — a 1500-bed tertiary care institution well recognized for its specialized asthma management services. The study population comprised 100 adult patients aged between 20 and 60 years who had a physician-confirmed diagnosis of asthma and were recruited through non-probability purposive sampling. Participants were included if their asthma was clinically stable at the time of assessment and if they were cognitively capable of understanding and responding to the study questionnaires in either Urdu or English. Patients with comorbidities that could independently influence low back pain or sleep quality—such as ischemic heart disease, active pulmonary tuberculosis, spinal pathologies (including spondylitis or Pott's disease), malignancies, or obstructive sleep apnea—were excluded from participation. Pregnant women were also excluded to avoid potential bias due to gestational musculoskeletal and hormonal changes that may confound

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back pain assessment. Asthma severity was evaluated using two standardized assessment tools to ensure diagnostic validity and reproducibility. The Global Initiative for Asthma (GINA) guidelines were used to classify disease severity as mild, moderate, or severe based on symptom frequency, nocturnal awakenings, use of rescue medication, and limitation in daily activities. In parallel, the Asthma Control Test (ACT)—a validated five-item self-administered questionnaire—was used to assess symptom control over the preceding four weeks. ACT scores range from 5 to 25, where scores below 19 indicate uncontrolled asthma, 20–24 reflect partial control, and 25 denote well-controlled asthma.

Low back pain (LBP) intensity was measured using the Visual Analogue Scale (VAS), a widely recognized 10-point instrument where "0" represents no pain and "10" indicates the worst imaginable pain. To quantify functional impairment associated with LBP, the Oswestry Disability Index (ODI) was administered. This validated questionnaire evaluates ten daily-life domains including pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life, traveling, and sexual activity. The resulting percentage scores reflect the extent of disability, with higher percentages indicating greater functional limitation. Sleep quality was assessed using the Basic Nordic Sleep Questionnaire (BNSQ), which investigates sleep latency, nocturnal awakenings, early morning arousals, use of sleep medication, and overall subjective sleep quality. All questionnaires were translated and administered in either Urdu or English according to participant preference, with researcher assistance provided when necessary to minimize response bias and ensure comprehension. Ethical approval for the study was granted by the Institutional Review Board (IRB) of Gulab Devi Teaching Hospital. Written informed consent was obtained from all participants prior to data collection. Participant anonymity and confidentiality were strictly maintained throughout the research process in accordance with ethical standards for human subject research and the Declaration of Helsinki. Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize demographic and clinical variables. The chi-square test was applied to assess associations between asthma severity, LBP intensity, disability level, and sleep quality, with a p-value of <0.05 considered statistically significant.

RESULTS

A total of 100 adult patients with asthma were included in the study, with a mean age of 45.2 ± 9.8 years. Among the participants, 65% were female and 35% male, while the mean body mass index (BMI) was 26.4 ± 3.5 kg/m². In terms of educational attainment, 45% had completed high school, 30% were graduates, and 25% were illiterate. The majority of the patients (70%) were non-smokers, whereas 30% were current smokers. According to the Global Initiative for Asthma (GINA) classification, 34% of patients presented with mild asthma, 42% with moderate asthma, and 24% with severe asthma. Based on the Asthma Control Test (ACT) scores, 28% of patients had well-controlled asthma (ACT = 25), 46% were partially controlled (ACT 20–24), and 26% had poorly controlled asthma (ACT <19). The overall prevalence of low back pain (LBP) among the study population was 72%. Analysis of Visual Analogue Scale (VAS) scores showed that 28% of participants reported no pain, 37% reported mild pain (1–3), 33% reported moderate pain (4–6), and 2% reported severe pain (7–10). When stratified by asthma severity, patients with severe asthma experienced notably higher pain intensity: 50% reported moderate pain and 20% severe pain. In contrast, participants with mild asthma predominantly reported either mild pain (45%) or no pain (40%), indicating a positive correlation between asthma severity and LBP intensity. Functional disability due to LBP, measured by the Oswestry Disability Index (ODI), demonstrated progressive worsening with increasing asthma severity. Overall, 22% of participants exhibited minimal disability, 7% mild, 36% moderate, 24% severe, and 10% were classified as crippled, while one participant (1%) was bedridden. Among individuals with severe asthma, 60% reported severe or crippling disability compared with only 10% among those with mild asthma. Statistical testing revealed a significant association between asthma severity and disability level ($p < 0.05$).

Sleep quality, assessed using the Basic Nordic Sleep Questionnaire (BNSQ), showed that 27% of participants reported poor overall sleep, 16% experienced frequent night awakenings, 13% had symptoms suggestive of sleep apnea, and 20% regularly used sleep medication. Poor sleep was significantly more prevalent among patients with poorly controlled or severe asthma. Chi-square analysis confirmed statistically significant associations between sleep disturbance and both asthma severity ($p = 0.002$) and VAS pain levels ($p < 0.001$). Additionally, physical factors such as prolonged standing ($p < 0.001$) and walking ($p = 0.010$) were significantly associated with LBP in asthmatic individuals. To further explore the relationship between asthma severity, pain intensity, disability, and sleep quality, correlation and descriptive analyses were performed. The mean Visual Analogue Scale (VAS) score progressively increased with asthma severity, with mean values of 2.0 ± 1.4 in mild asthma, 3.5 ± 1.8 in moderate asthma, and 5.6 ± 2.1 in severe asthma groups. Similarly, mean Oswestry Disability Index (ODI) scores were 22.4 ± 8.6 for mild, 38.7 ± 10.3 for moderate, and 56.5 ± 12.1 for severe

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asthma, indicating a marked increase in disability with rising disease severity. The mean Asthma Control Test (ACT) scores showed an inverse trend, decreasing from 24.3 ± 1.1 in mild asthma to 21.5 ± 2.4 in moderate and 17.8 ± 3.2 in severe asthma, demonstrating poorer control with more severe disease. Pearson's correlation analysis revealed a strong positive correlation between asthma severity and both VAS ($r = 0.71$, $p < 0.001$) and ODI scores ($r = 0.68$, $p < 0.001$), while a significant negative correlation was observed between asthma severity and ACT score ($r = -0.65$, $p < 0.001$). A moderate positive correlation was also identified between VAS and ODI scores ($r = 0.59$, $p < 0.001$), suggesting that increasing pain intensity was associated with greater disability. Furthermore, patients with lower ACT scores (indicating poorer asthma control) reported higher rates of sleep disturbance ($r = -0.61$, $p = 0.002$). These findings confirm a consistent and statistically significant relationship between asthma severity, musculoskeletal pain, disability, and impaired sleep, highlighting the interdependence of these health domains among asthmatic individuals.

Table 1: Demographics of Patients

Variable	Details
Age (mean ± SD)	45.2 ± 9.8 years
Gender	
Male	35
Female	65
BMI (mean ± SD)	26.4 ± 3.5 kg/m²
Education Level	
High School	45%
Graduate	30%
Illiterate	25%
Smoking Status	
Non-smoker	70%
Smoker	30%

Table 2: Asthma Severity vs LBP Levels (VAS)

Asthma Severity	No Pain (%)	Mild Pain (%)	Moderate Pain (%)	Severe Pain (%)
Mild	40	45	15	0
Moderate	20	40	35	5
Severe	5	25	50	20

Table 3: Asthma Severity vs Disability Levels (ODI)

Asthma Severity	Minimal Disability (%)	Moderate Disability (%)	Severe/Crippled (%)
Mild	50	40	10
Moderate	20	50	30
Severe	5	35	60

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Table 4: Mean Scores and Correlation Analysis between Asthma Severity, Pain, Disability, and Asthma Control

Parameter	Mild Asthma (Mean ± SD)	Moderate Asthma (Mean ± SD)	Severe Asthma (Mean ± SD)	Correlation (r) with Asthma Severity	p-value
ACT Score	24.3 ± 1.1	21.5 ± 2.4	17.8 ± 3.2	−0.65	<0.001
VAS Score	2.0 ± 1.4	3.5 ± 1.8	5.6 ± 2.1	0.71	<0.001
ODI Score	22.4 ± 8.6	38.7 ± 10.3	56.5 ± 12.1	0.68	<0.001
Sleep Disturbance (BNSQ composite)	18.2 ± 4.3	23.1 ± 5.2	28.4 ± 6.1	0.62	0.002

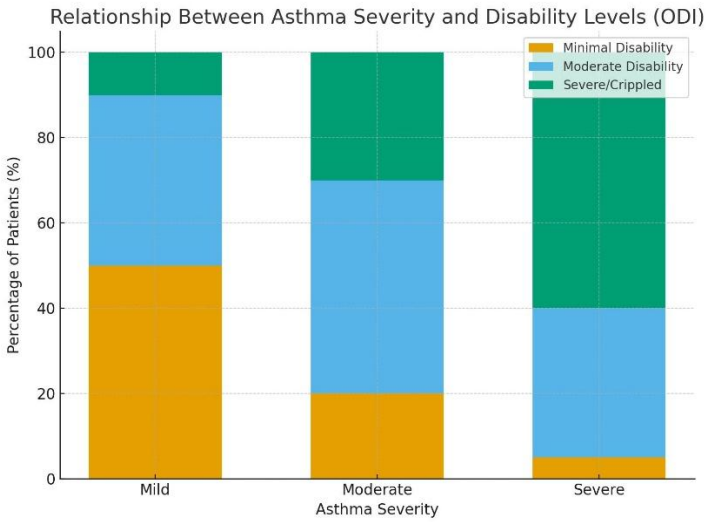

Figure 2 Relationship Between Asthma Severity and Disability Levels (ODI)

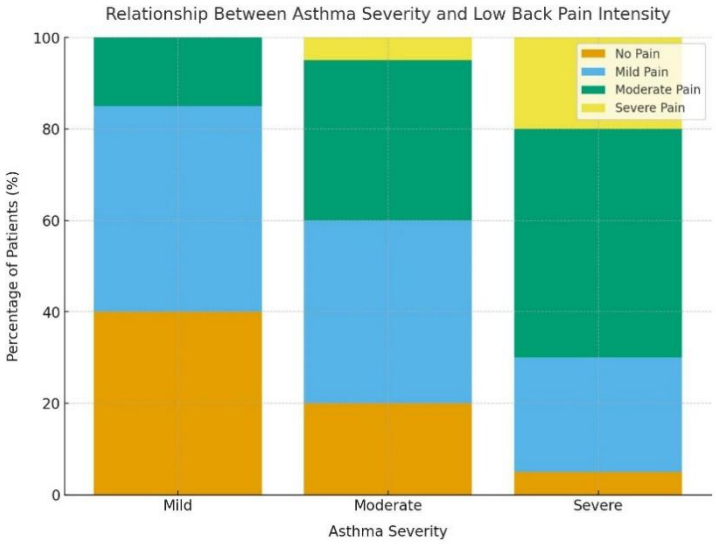

Figure 2 Relationship Between Asthma Severity and Low Back Pain Intensity

DISCUSSION

The present study explored the intricate relationship between asthma severity, low back pain (LBP), functional disability, and sleep quality among adult patients, revealing a multidimensional health burden associated with asthma. The findings demonstrated a notably high prevalence of LBP (72%) in individuals with asthma, with pain intensity and disability increasing proportionally with disease severity. This observation aligns with previous evidence suggesting that altered respiratory mechanics, particularly in individuals with poorly controlled asthma, impose excessive strain on the spinal and trunk musculature, contributing to the development or aggravation of LBP (9,10). Asthma-related physiological changes such as pulmonary hyperinflation, chronic coughing, and compensatory use of accessory respiratory muscles contribute to postural maladaptations and muscular imbalance. These changes can lead to spinal misalignment and lumbar overload, thereby increasing susceptibility to back pain (12,13). The diaphragm, which serves as both a respiratory and postural stabilizer, plays a crucial role in maintaining core balance. Its dysfunction in chronic respiratory diseases reduces trunk stability and compromises lumbar support, predisposing patients to musculoskeletal strain (14). The current findings reinforce the growing recognition that respiratory and postural systems function interdependently, and disturbances in one domain can manifest as dysfunction in the other. The study also identified a significant relationship between asthma severity and functional disability as measured by the Oswestry Disability Index (ODI). Patients with severe asthma exhibited markedly higher disability scores compared to those with mild or moderate disease (15). This association may be attributed to reduced physical activity, muscle deconditioning, and avoidance behaviors often seen in chronic respiratory conditions. Similar findings have been reported in other studies, where patients with persistent or poorly controlled asthma demonstrated progressive musculoskeletal deterioration due to inactivity and chronic fatigue.

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The observed correlation between LBP and disability underscores the role of biomechanical stress and chronic inflammation in limiting daily functioning among asthmatic individuals (16).

Sleep quality emerged as another critical factor influencing patient well-being. Approximately one-fourth of participants experienced poor sleep, with the severity of asthma and LBP serving as significant predictors of sleep disturbance. These results mirror previous research describing nocturnal asthma as a major contributor to fragmented sleep and reduced restorative rest (17,18). Sleep deprivation exacerbates airway inflammation, increases pain sensitivity, and diminishes psychological resilience, creating a self-perpetuating cycle of physiological and emotional distress. Furthermore, postural discomfort resulting from LBP may interfere with the ability to maintain comfortable sleeping positions, further compounding nocturnal symptoms and fatigue (19). This interconnectedness between respiratory, musculoskeletal, and sleep domains suggests that asthma management should not be confined to pulmonary control alone but should extend to holistic rehabilitation approaches. The findings of this study emphasize the importance of integrating musculoskeletal and sleep assessments into asthma management (20). Incorporating physiotherapy interventions targeting core stability, posture correction, and diaphragmatic strengthening, along with sleep hygiene counseling, may enhance overall quality of life and reduce symptom burden. A multidisciplinary approach involving pulmonologists, physiotherapists, and sleep specialists could foster early identification and management of comorbidities, ultimately improving functional outcomes in this population (21).

While the study provides valuable insight into the interplay between asthma severity, pain, disability, and sleep, certain methodological limitations should be acknowledged. The cross-sectional design restricts causal inference, preventing determination of temporal relationships among variables. Objective clinical assessments such as spirometry, imaging, or electromyography were not included, which may have limited the precision of the findings. Furthermore, the study relied on self-reported data, introducing potential recall or reporting bias. Other confounding factors—including physical activity level, psychological stress, occupational exposure, and ergonomic influences—were not controlled, which could have influenced the outcomes. Despite these limitations, the use of validated assessment tools and a well-defined inclusion framework strengthens the reliability and internal validity of the findings. Future research should employ longitudinal or interventional study designs incorporating objective physiological and radiological measures to better delineate causal pathways between asthma and musculoskeletal dysfunction (22). Investigations exploring the effects of rehabilitation-based interventions on pain, posture, and sleep quality among asthmatic patients would also provide valuable clinical implications. Moreover, stratified analyses based on gender, BMI, and asthma phenotype could deepen understanding of differential risk patterns. In summary, this study highlights a significant association between asthma severity, musculoskeletal dysfunction, functional disability, and poor sleep quality. These interlinked health domains suggest the need for a comprehensive, multidisciplinary management model that extends beyond pharmacologic control to include physical rehabilitation and sleep optimization strategies aimed at improving the overall quality of life for individuals with asthma.

CONCLUSION

The study concludes that asthma severity is closely linked with a higher burden of low back pain, functional disability, and poor sleep quality in adults, reflecting a multidimensional impact that extends beyond respiratory impairment. These findings highlight the importance of adopting a multidisciplinary approach in asthma management that integrates musculoskeletal rehabilitation and sleep optimization alongside conventional pharmacologic care. Addressing these interconnected domains can enhance symptom control, improve overall functional capacity, and elevate quality of life for individuals living with asthma.

AUTHOR CONTRIBUTION

Author	Contribution
Mala Zahid*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Khudija Tayyab	Substantial Contribution to study design, acquisition and interpretation of Data

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Author	Contribution
	Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Mahnoor Muzammil	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Umra Khan	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Kinza Ehsan	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published

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