A Cross-Sectional Study Assessing Physical Activity and Exercise Tolerance Using the 6-Minute Walk Test in Patients with Bronchial Asthma and Its Correlation with Spirometry, Asthma Control Test, and Asthma Quality of Life Questionnaire

ENDORSEMENT LETTER

UNDERTAKING

PLAGIARISM ACCEPTED LETTER

ETHICAL CLEARANCE

LIST OF ABBREVIATIONS

- 6MWT – Six-Minute Walk Test
- 6MWD – Six-Minute Walk Distance
- ACT – Asthma Control Test
- AQLQ – Asthma Quality of Life Questionnaire
- ATS – American Thoracic Society
- ERS – European Respiratory Society
- BMI – Body Mass Index
- BPH – Benign Prostatic Hyperplasia
- bpm – Beats Per Minute
- COPD – Chronic Obstructive Pulmonary Disease
- F (5,94) – F-statistic with degrees of freedom (5,94)
- FEV_1 – Forced Expiratory Volume in 1 Second
- FVC – Forced Vital Capacity
- FEV_1/FVC – Ratio of Forced Expiratory Volume in 1 Second to Forced Vital Capacity
- GOLD – Global Initiative for Chronic Obstructive Lung Disease
- GINA – Global Initiative for Asthma
- GOAL – Gaining Optimal Asthma ControL study

- HR – Heart Rate
- HTN – Hypertension
- IHD – Ischemic Heart Disease
- ICS – Inhaled Corticosteroid
- ILD – Interstitial Lung Disease
- IT – Information Technology
- LABA – Long-Acting $Beta_2$-Agonist
- LAMA – Long-Acting Muscarinic Antagonist
- LMIC – Low- and Middle-Income Countries
- MCID – Minimal Clinically Important Difference
- NPJ – Nature Partner Journals
- PTB – Pulmonary Tuberculosis
- RCT – Randomized Controlled Trial
- RRULE – Recurrence Rule (appears in guideline/tool contexts; not a clinical term)
- SpO_2 – Peripheral Oxygen Saturation
- Std.Dev. – Standard Deviation
- Std.Err. – Standard Error
- T2DM – Type 2 Diabetes Mellitus

- UW – Underweight
- OW – Overweight
- WHO – World Health Organization

ABSTRACT

Background: Bronchial asthma is a chronic inflammatory airway disease that may lead to activity limitation and reduced exercise tolerance, even when routine lung function parameters appear relatively preserved. Functional assessment using the Six-Minute Walk Test (6MWT), along with patient-reported outcome measures such as the Asthma Control Test (ACT) and Asthma Quality of Life Questionnaire (AQLQ), provides a comprehensive evaluation of disease impact.

Objectives: [redacted]

Methods: [redacted]

Results: [redacted]

[redacted]

Conclusion: [redacted]

Keywords: Bronchial asthma; Six-Minute Walk Test (6MWT); Six-Minute Walk Distance (6MWD); Spirometry; Asthma Control Test (ACT); Asthma Quality of Life Questionnaire (AQLQ); Exercise tolerance; Functional exercise capacity; Dyspnea; Asthma control.

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INTRODUCTION

INTRODUCTION

Bronchial asthma is a common chronic inflammatory disorder of the airways characterized by airway hyperresponsiveness, variable and often reversible airflow obstruction, and chronic respiratory symptoms such as wheezing, shortness of breath, chest tightness, and coughing. [redacted]

[redacted]

[redacted]

It also underscores the importance of a multidimensional approach to asthma assessment, advocating for the incorporation of exercise testing in the routine evaluation of asthma patients, especially those with reported activity limitation [15] .

Need of the Study

Despite the availability of effective pharmacotherapy, asthma continues to significantly impact patients' quality of life, physical activity, and overall functional capacity. [redacted]

[redacted]

Hence, the present study is undertaken to assess physical activity and exercise tolerance in patients with bronchial asthma using the 6-minute walk test and to correlate the findings with spirometry results, asthma control status (ACT), and quality of life (AQLQ), thereby providing a more comprehensive approach to asthma evaluation and management.

AIMS AND OBJECTIVES

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Objective of the study:

[redacted]

REVIEW OF LITERATURE

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Global Prevalence

Bronchial asthma is one of the most common chronic non-communicable diseases globally. [redacted] Environmental pollution, occupational exposures, allergens, and lifestyle changes continue to contribute to the rising incidence of asthma globally [18] .

Prevalence in India

India bears a substantial share of the global asthma burden. [redacted] Indian patients often present late or with poorly controlled disease, and inhaled corticosteroid (ICS) use remains suboptimal due to lack of awareness, stigma, and economic constraints [21] .

Prevalence in Karnataka

Karnataka, one of the southern states of India, reflects national patterns of asthma prevalence, with notable regional and urban-rural differences. [redacted]

[redacted]

Studies from coastal Karnataka and districts like Dakshina Kannada and Udupi also report asthma prevalence ranging from 2% to 4% in adults and 8% to 10% in children, with seasonal exacerbations being a common pattern due to climatic changes and allergen exposure [23] .

[redacted]

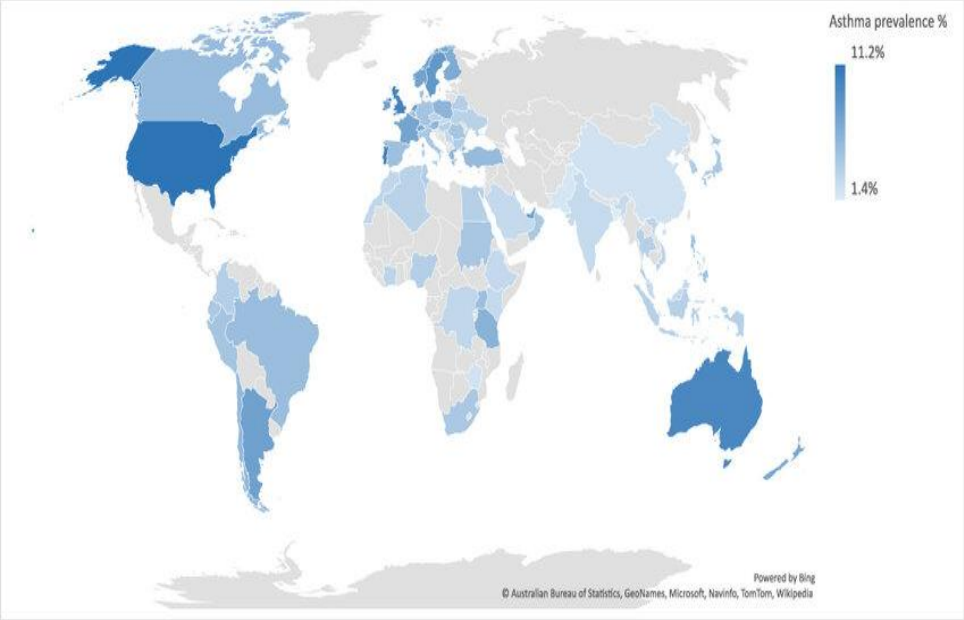


Figure 1: Global prevalence

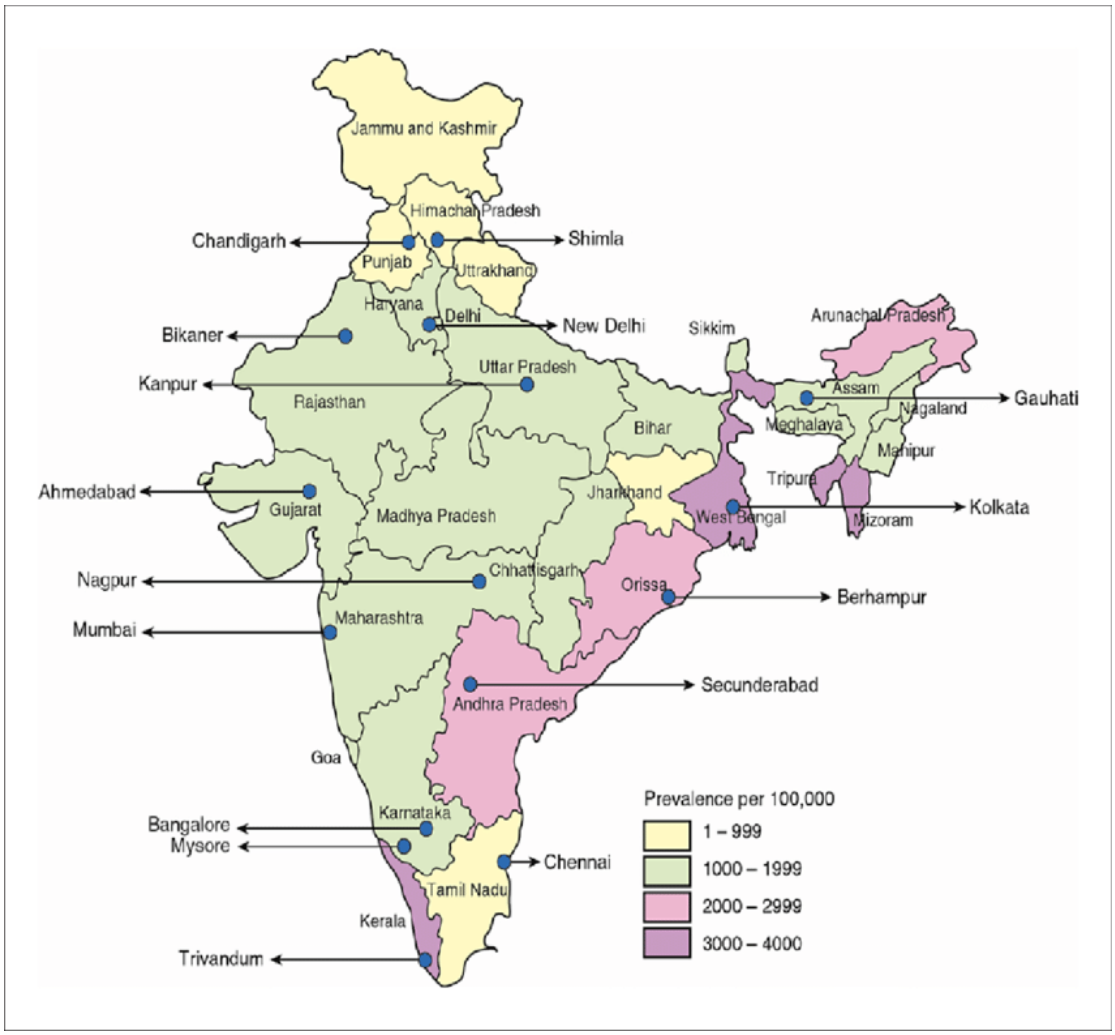


Figure 2: Indian and regional Prevalence

Exercise Intolerance in Asthma

Bronchial asthma is a chronic inflammatory airway disorder characterized by reversible airflow obstruction and bronchial hyperresponsiveness. [redacted]

[redacted]

[redacted] Moreover, anticipatory fear of triggering an asthma attack may cause patients to avoid activities that increase their heart or breathing rate, leading to sedentary behaviour [31] .

[redacted]

[redacted]

[redacted]

[redacted]Routine assessment and targeted interventions addressing exercise tolerance should be integral components of asthma management plans to enhance patient outcomes and quality of life [35-37] .

Importance of Functional Assessment

While spirometry and peak expiratory flow rate (PEFR) remain cornerstones in the diagnosis and monitoring of asthma, these physiological metrics alone do not capture the full impact of the disease on a patient's daily life. [redacted]

[redacted]

Unlike spirometry, which reflects static airway mechanics, these tests provide dynamic insights into ventilatory reserve, cardiovascular adaptation, and musculoskeletal efficiency [44] .

[redacted]

[redacted]

Integrating functional testing into routine asthma evaluation aligns with the shift toward value-based, individualized health care and enhances the ability of clinicians to improve long-term outcomes [48].

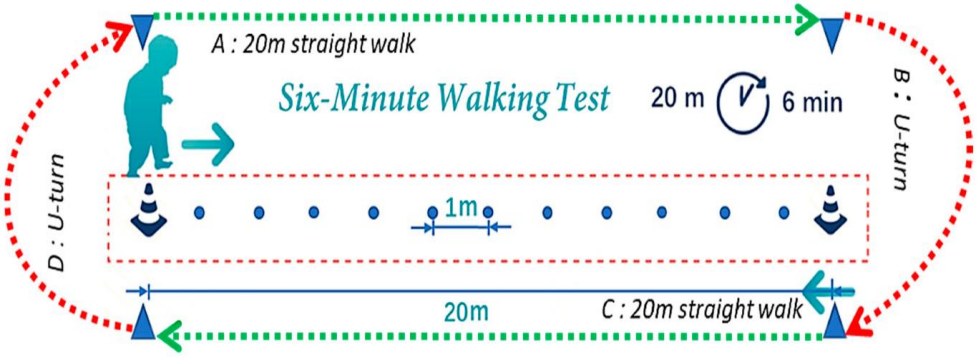
Role of '6-Minute Walk Test' (6MWT)

The '6-Minute Walk Test' (6MWT) is a widely used, standardized, and practical tool for assessing submaximal exercise capacity and functional status in patients with various chronic diseases, including respiratory and cardiovascular conditions. [redacted]

[redacted]

Thirdly, it may help identify patients at risk of exacerbation, poor adherence, or declining quality of life, prompting timely clinical intervention [53-56].

[redacted]



Its integration into asthma assessment protocols can enhance disease monitoring, facilitate individualized management, and improve long-term outcomes through timely functional evaluation [44,59].

Relevance of ACT and AQLQ

In the management of bronchial asthma, a comprehensive assessment of disease

control and patient well-being is essential to ensure optimal outcomes. [redacted]

[redacted]

It is particularly useful in identifying patients with discordance between symptom perception and lung function, such as those with poor symptom perception or emotional comorbidities [redacted]

[redacted]

Together, they offer a holistic picture of asthma management outcomes.[64]

[redacted]

The integration of these tools ensures a more accurate, personalized, and responsive approach to asthma management, ultimately leading to improved patient outcomes and satisfaction.

Rationale for the Present Study

Asthma is a chronic inflammatory airway disease that affects over 300 million individuals globally, including a substantial burden in low- and middle-income countries like India. [redacted]

[redacted]

Pathophysiology of Exercise Intolerance in Asthma

Exercise intolerance in asthma is a multifactorial phenomenon resulting from airway inflammation, bronchial hyperresponsiveness, mechanical limitations, neural influences, and systemic effects that impair physical performance. [redacted]

[redacted]

The severity of limitation varies with asthma control and environmental factors, highlighting the importance of multidimensional assessment including functional tests like the 6MWT [83,5].

Use of '6-Minute Walk Test' (6MWT) in respiratory diseases

The 6-Minute Walk Test (6MWT) is a simple and widely used test for assessing functional exercise capacity in patients with respiratory diseases. [redacted]

[redacted]

Its simplicity, safety, and clinical relevance make it useful for evaluating exercise tolerance across respiratory diseases, and its growing use in asthma may improve disease monitoring and individualized management [35].

Role of Spirometry in Asthma Control

Spirometry remains the cornerstone of asthma diagnosis, monitoring, and management, providing objective measures of lung function that help clinicians assess

the degree of airway obstruction, reversibility, and response to treatment.

[redacted]

[redacted]

Proper coaching and repeatability criteria are essential to obtain valid results. Additionally, access to spirometry may be limited in primary care or resource-constrained settings [28] .

[redacted]

When integrated with functional assessments like the 6MWT and patient-centered tools such as the ACT and AQLQ, spirometry contributes to a comprehensive strategy for optimizing asthma control and improving patient outcomes [78].

ACT: Structure, Validation, and Interpretation

The Asthma Control Test (ACT) is a validated, patient-completed questionnaire designed to assess asthma control over the preceding four weeks.

Structure of the ACT

The ACT consists of five items assessing core dimensions of asthma control: frequency of shortness of breath, daytime symptoms, nocturnal symptoms, use of rescue medication, and the impact of asthma on daily activities.

Validation of the ACT

Since its introduction in the early 2000s, the ACT has undergone extensive psychometric evaluation. [redacted] A variation of 3 points or more is generally regarded as clinically meaningful, enabling clinicians to monitor treatment response and detect deterioration over time.

Interpretation of ACT Scores

ACT scores are categorized to guide clinical interpretation:

[redacted]**Well-controlled asthma:** [redacted]

- **Not well-controlled asthma:** [redacted]

[redacted]**Poorly controlled asthma:** [redacted]

[redacted]

Advantages of the ACT

The ACT has several advantages as a control assessment tool. [redacted] Additionally, it is useful for telemedicine, as it can be completed remotely or electronically, facilitating asthma care outside traditional clinics.

Limitations and Considerations

Despite its strengths, the ACT has limitations. [redacted] Therefore, it should be used alongside clinical evaluation, spirometry, and exacerbation history for comprehensive asthma assessment [84].

Integration with Other Measures

The ACT complements tools such as the Asthma Quality of Life Questionnaire (AQLQ), which evaluates the broader impact of asthma on physical, emotional, and social well-being. [redacted]

Clinical and Research Applications

In clinical practice, the ACT aids routine monitoring and guides stepwise

treatment adjustments. [redacted]

Correct interpretation of ACT scores helps clinicians optimize therapy and improve patient outcomes [86].

AQLQ: Domains, Use in Clinical Research

'The Asthma Quality of Life Questionnaire' (AQLQ). [redacted] Its detailed assessment of quality of life (QoL) makes it a crucial complement to clinical and physiological measures like spirometry and 'The Asthma Control Test' (ACT) in both clinical practice and research [87].

Structure and Domains of the AQLQ

[redacted]

Activity Limitations (11 items): [redacted]

Symptoms (12 items): [redacted]

[redacted]

Emotional Function (5 items): [redacted]

Environmental Stimuli (4 items): [redacted]

Validation and Reliability

The AQLQ has undergone rigorous psychometric testing, demonstrating high internal consistency, test-retest reliability, and construct validity. [redacted]

Versions and Adaptations

Standardized AQLQ (AQLQ(S)):

Pediatric AQLQ (PAQLQ):

Mini-AQLQ:

Use in Clinical Research

The AQLQ is extensively employed as an outcome measure in clinical trials evaluating the efficacy of pharmacological and non-pharmacological interventions in asthma.

The AQLQ is also used in epidemiological studies to assess the burden of asthma in different populations and to identify factors associated with poor quality of life, such as comorbidities, socioeconomic status, and environmental exposures [92] .

Clinical Utility

[redacted]

- Tailor individualized treatment plans by targeting domains most impaired, such as addressing emotional distress or environmental triggers.
- Monitor long-term patient progress and response to therapy beyond spirometry or symptom checklists.

Limitations

While the AQLQ provides comprehensive insight into asthma's impact, it is somewhat time-consuming to complete compared to shorter questionnaires like the ACT, which may limit its use in busy clinical settings. [redacted]

Integration with Other Measures

Using the AQLQ alongside spirometry, the ACT, and the 6-Minute Walk Test (6MWT) enables a multidimensional assessment of asthma. [redacted] The AQLQ complements these tools by capturing the patient's perceived impact of asthma on daily activities and emotional well-being, providing a holistic evaluation of disease burden [(94)].

Existing Literature Correlating 6MWT with Spirometry and Patient-Reported Outcomes

The 6MWT is increasingly recognized as a practical tool for assessing functional capacity in asthma. Studies have explored its relationship with spirometry

and patient-reported outcomes such as the ACT and AQLQ [95].

Correlation Between 6MWT and Spirometry

Forced expiratory volume in one second (FEV_1) remains the gold standard for assessing airway obstruction, but it may not fully reflect exercise performance.

Correlation Between 6MWT and Patient-Reported Outcomes

Lower 6MWD has been associated with poorer asthma control (lower ACT scores) and reduced quality of life (lower AQLQ scores).(99,100)

6MWT as a Complementary Tool

Overall, the literature supports the 6MWT as a valuable adjunct to spirometry and patient-reported measures.

Limitations and Challenges in Existing Studies

Despite encouraging findings, existing literature presents several limitations:

- **Heterogeneity in study populations:**
- **Variable 6MWT protocols:**

- **Cross-sectional design predominance:**
- **Limited sample sizes:**

Emerging Research Directions

Emerging studies are investigating the role of 6MWT in predicting asthma exacerbations, healthcare utilization, and response to rehabilitation or biologic therapies.

In one the study done by Lombardi et al. assessed the clinical utility of the 6MWT in evaluating responses to biologic therapy (mepolizumab) and conventional treatment in patients with severe eosinophilic asthma.

In one the study done by McLoughlin et al. reviewed randomized controlled trials examining the effects of physical activity interventions in severe asthma.

In one the study done by Evaristo KB et al. highlighted the importance of physical activity as a complementary therapeutic approach in asthma management, supporting guideline recommendations that encourage regular aerobic exercise.

In one the study done by Cordova-Rivera et al. explored the clinical factors associated with physical activity levels and exercise capacity in patients with severe asthma. [redacted]

[redacted]

Conversely, increased waist circumference, an indicator of central obesity, was negatively correlated with HRQoL, highlighting the detrimental effects of excess adiposity even in childhood.

[redacted]

In one the study done by Carson KV et al. conducted a systematic review and meta-analysis published in the Cochrane Database to evaluate the effects of physical training on patients with asthma.

In one the study done by Heikkinen SAM et al. conducted a comprehensive epidemiological study examining the impact of regular physical exercise on adults with asthma.

In one the study done by Müller-Riemenschneider F et al. conducted a systematic review categorized interventions into individual-level strategies such as counselling and education, community-based programs, and environmental modifications.

[redacted]

This pivotal study has highlighted the importance of asthma guidelines worldwide and underscores the importance of regular assessment of asthma control using standardized tools in both research and clinical settings [52].

MATERIALS AND METHODS

MATERIALS AND METHODS

Source of Data: [redacted]

Study Design: [redacted]

Study Period: [redacted]

Sample Size: [redacted]

Sampling technique: [redacted]

Inclusion Criteria: [redacted]

Exclusion Criteria:

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Study protocol : [redacted]

Methodology: [redacted]

[redacted]

The data of each patient was collected on a performa which includes the following:

- **Name**:
- **Age**:
- **Gender**:
- **Body Mass Index (BMI)**:

- **6-Minute Walk Test (6MWT)**:

- **Pulmonary Function Test (PFT) Values**:

- **Asthma Control Test (ACT)**:

- **Asthma Quality of Life Questionnaire (AQLQ)**:

Data processing and analysis/statistical analysis:

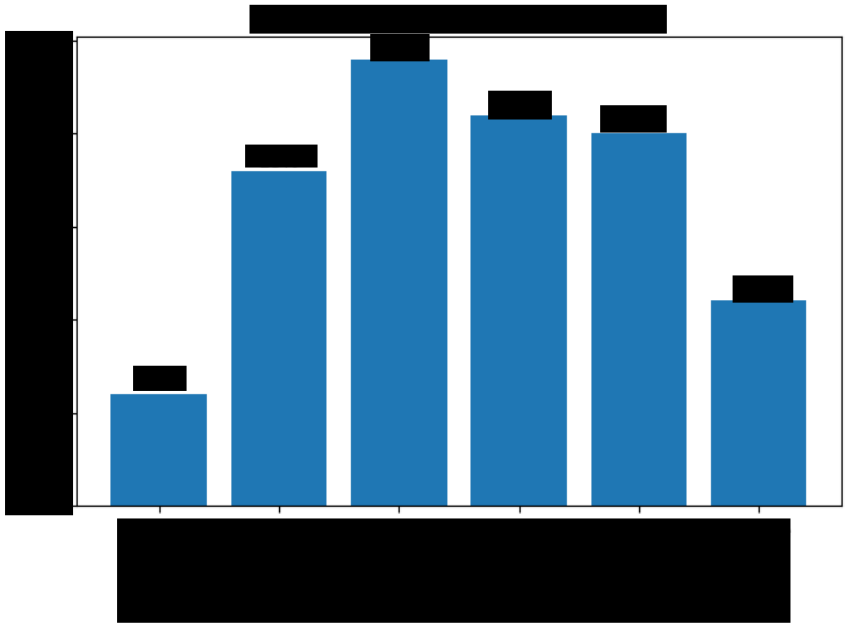
RESULTS

RESULTS

Table 1: Distribution of Study Participants According to Age Groups

Demographic characteristics	n	%
Age groups		
<=20yrs	[redacted]	[redacted]
21-30yrs	[redacted]	[redacted]
31-40yrs	[redacted]	[redacted]
41-50yrs	[redacted]	[redacted]
51-60yrs	[redacted]	[redacted]
>=61yrs	[redacted]	[redacted]
Total	[redacted]	[redacted]

Graph 1: Distribution of Study Participants According to Age Groups

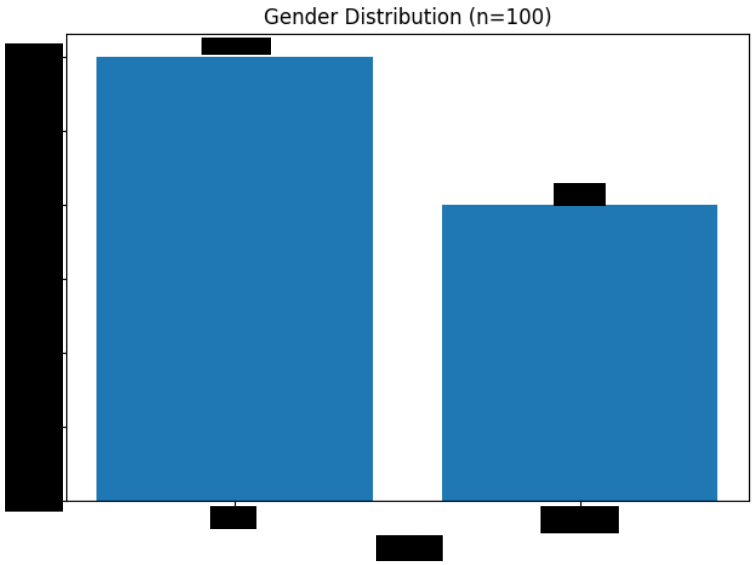


[redacted]

Table 2: Distribution of Study Participants According to Gender

Demographic characteristics	n	%
Gender		
Male		
Female		
Total		

Graph 2: Distribution of Study Participants According to Gender

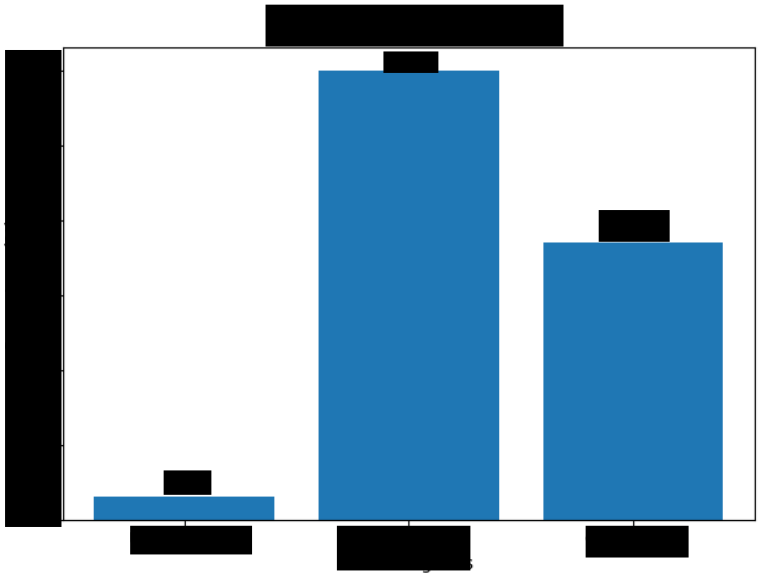


In the present study, out of 100 patients, [redacted] were males and [redacted] were females. [redacted] However, the presence of a considerable proportion of females [redacted] in the present study highlights that bronchial asthma affects both genders significantly, warranting equal attention in terms of disease assessment, physical activity evaluation, and quality-of-life measures.

Table 3: Distribution of Study Participants According to Body Mass Index (BMI)

Demographic characteristics	n	%
BMI		
Underweight	[redacted]	[redacted]
Normal	[redacted]	[redacted]
Overweight	[redacted]	[redacted]
Total	[redacted]	[redacted]

Graph 3: Distribution of Study Participants According to Body Mass Index (BMI)

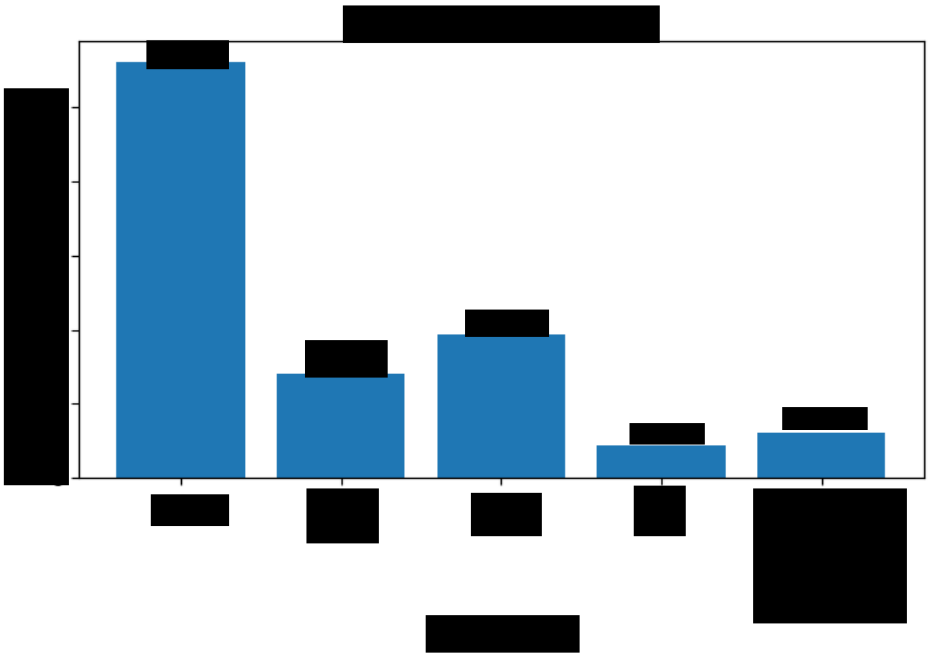


In the present study, out of [redacted] patients with bronchial asthma, [redacted] were underweight (UW), [redacted] had a normal BMI, and [redacted] were categorized as overweight (OW). [redacted] These findings provide a useful baseline for further analysis of the relationship between BMI, six-minute walk test performance, and asthma control indices.

Table 4: Distribution of Study Participants According to Comorbidities

Status of Comorbidities	n	%
Nil	[redacted]	[redacted]
T2DM	[redacted]	[redacted]
HTN	[redacted]	[redacted]
IHD	[redacted]	[redacted]
Hypothyroidism	[redacted]	[redacted]

Graph 4: Distribution of Study Participants According to Comorbidities

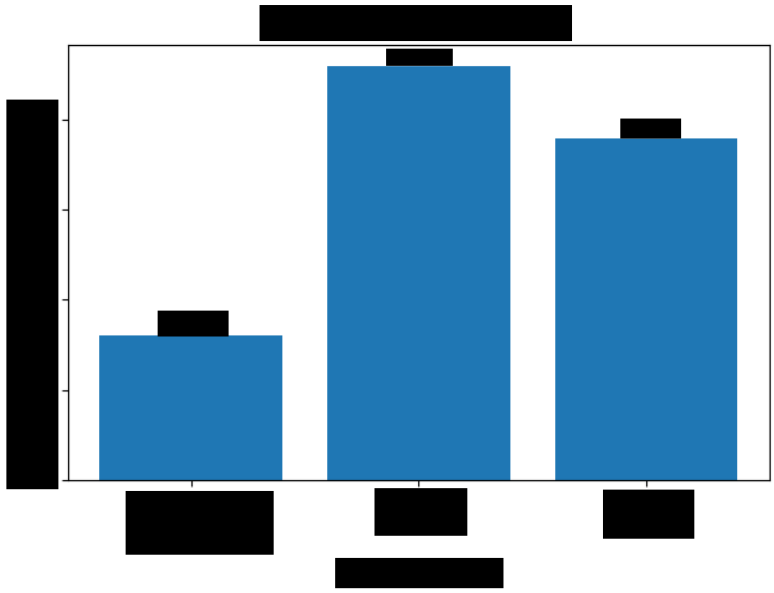


In the present study, the status of comorbidities among the participants was assessed. [redacted] Overall, these findings suggest that while a significant proportion of patients did not have additional systemic illnesses, a considerable number exhibited cardiovascular and metabolic comorbidities, which may influence asthma severity, management, and functional outcomes.

Table 5: Distribution of Study Participants According to Treatment Pattern

Status of Treatment	n	%
LABA/LAMA/ICS	[redacted]	[redacted]
LABA/ICS	[redacted]	[redacted]
Irregular	[redacted]	[redacted]
Total	[redacted]	[redacted]

Graph 5: Distribution of Study Participants According to Treatment Pattern



In the present study, among [redacted] patients with bronchial asthma, [redacted] were on a regular combination therapy of long-acting beta-agonist (LABA) and inhaled corticosteroid (ICS), [redacted] were receiving triple therapy consisting of long-acting beta-agonist, long-acting muscarinic antagonist, and inhaled corticosteroid (LABA/LAMA/ICS), while [redacted] were on irregular treatment. [redacted]

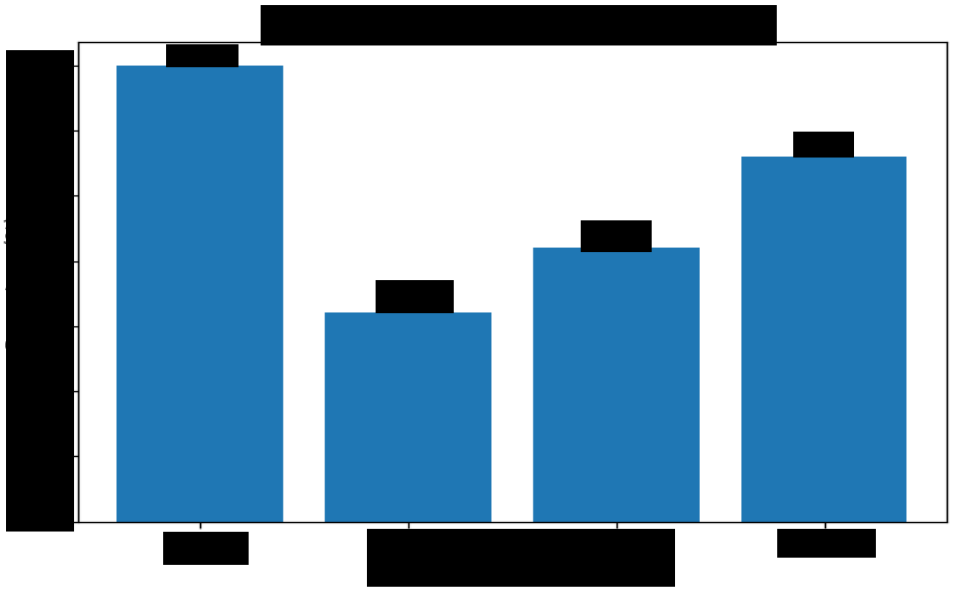
[redacted]

[redacted]These findings help contextualize the observed variations in spirometry, Asthma Control Test (ACT) scores, and six-minute walk test performance in the study population.

Table 6: Distribution of Study Participants According to Duration of Asthma (in Years)

Status of Duration of Asthma (years)	n	%
1-5yrs		
6-10yrs		
11-15yrs		
>=16yrs		
Total		

Graph 6: Distribution of Study Participants According to Duration of Asthma (in Years)

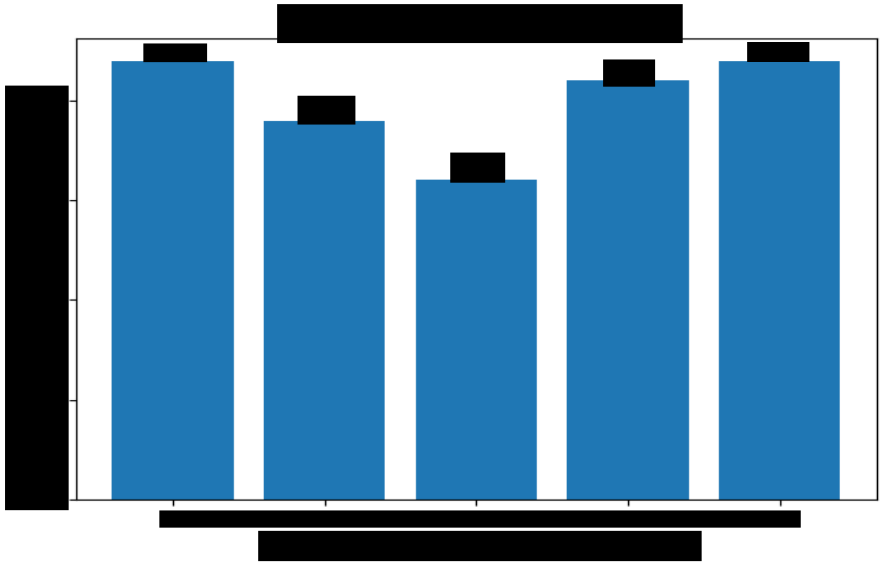


In the present study, out of patients with bronchial asthma, had a disease duration between had asthma for had asthma for , and had asthma for or more. These figures represent the chronic nature of bronchial asthma, with a significant number of patients having long-standing disease history.

Table 7: Distribution of Study Participants According to Number of Exacerbations in the Last 1 year

Status of no. of Exacerbations (last 12 months)	n	%
0		
1		
2		
3		
4		
Total		

Graph 7: Distribution of Study Participants According to Number of Exacerbations in the Last 1 year

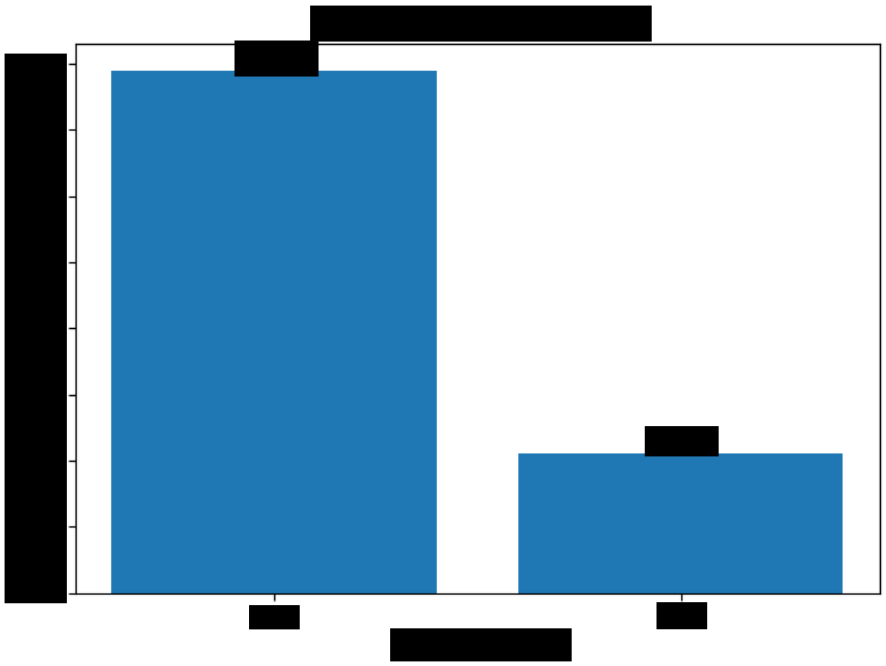


In the present study, out of patients with bronchial asthma, had no exacerbations in the last months, experienced one exacerbation, reported two exacerbations, had three exacerbations, and had four exacerbations during the same period. This complete distribution reflects a varied frequency of acute worsening episodes among the study participants over the past year, with nearly half of the individuals experiencing two or more exacerbations, while remained stable without any such events.

Table 8: Distribution of Study Participants According to Smoking Status

Status of Smoking Status	n	%
No	[redacted]	[redacted]
Yes	[redacted]	[redacted]
Total	[redacted]	[redacted]

Graph 8: Distribution of Study Participants According to Smoking Status



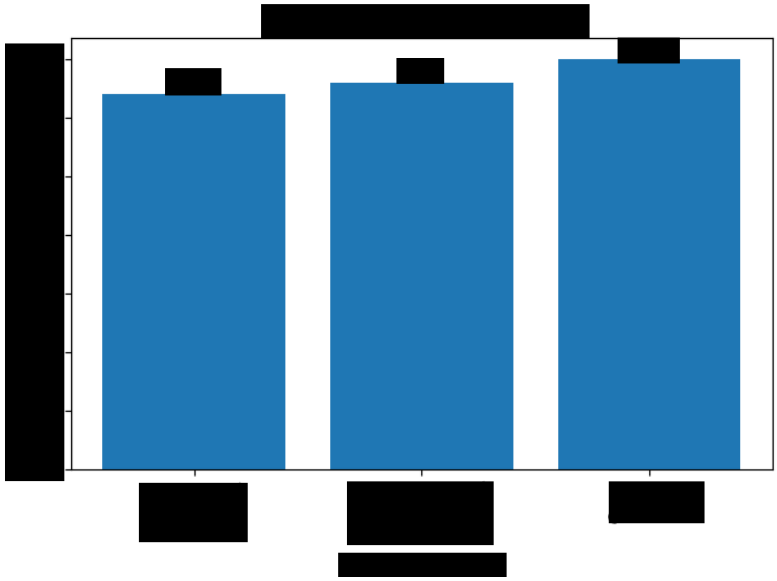
[redacted]

[redacted]

Table 9: Distribution of Study Participants According to Asthma Control Test (ACT) Levels

Levels of ACT Control Level	n	%
Uncontrolled		
Partly Controlled		
Controlled		
Total		

Graph 9: Distribution of Study Participants According to Asthma Control Test (ACT)Levels

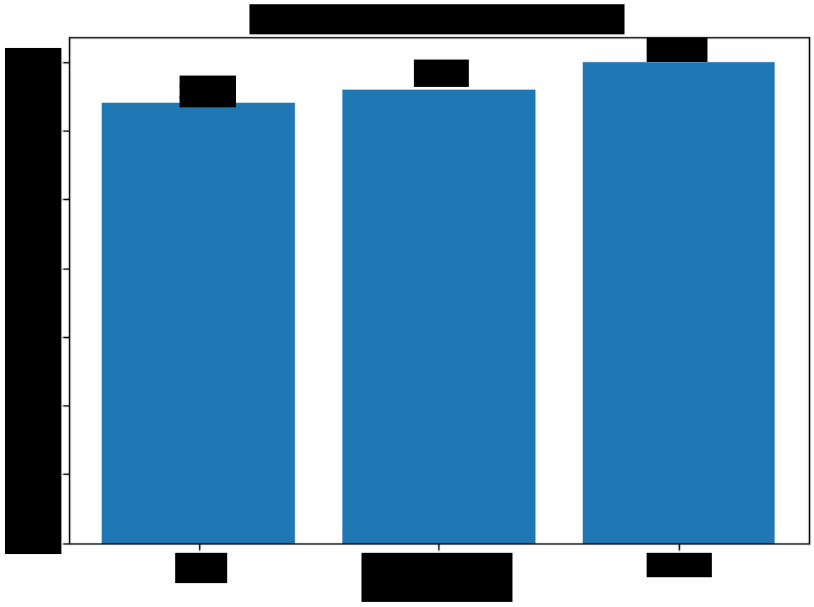


In the present study, out of patients with bronchial asthma, had uncontrolled asthma, had partly controlled asthma, and had well-controlled asthma as assessed by the Asthma Control Test (ACT). This classification based on ACT scores reflects the varying degrees of asthma management outcomes within the study population.

Table 10: Distribution of Study Participants According to Asthma Quality of Life Questionnaire (AQLQ) Categories

Levels of AQLQ Category	n	%
Poor	[redacted]	[redacted]
Moderate	[redacted]	[redacted]
Good	[redacted]	[redacted]
Total	[redacted]	[redacted]

Graph 10: Distribution of Study Participants According to Asthma Quality of Life Questionnaire (AQLQ) Categories



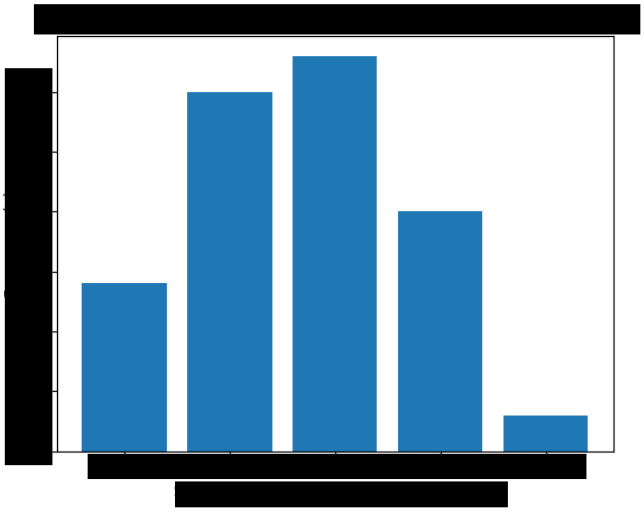
In the present study, out of [redacted] patients with bronchial asthma, [redacted] were classified in the poor AQLQ category, [redacted] in the moderate category, and [redacted] in the good category. [redacted]

[redacted]The complete data indicates that two-thirds of the study population [redacted] reported either moderate or good quality of life, whereas nearly one-third [redacted] experienced poor quality of life related to asthma.

Table 11: Distribution of Participants According to Six-Minute Walk Distance (6MWD)

Six-Minute Walk Distance (meters)	Frequency (n)	Percentage (%)
330–379	[redacted]	[redacted]
380–429	[redacted]	[redacted]
430–479	[redacted]	[redacted]
480–529	[redacted]	[redacted]
530–579	[redacted]	[redacted]
Total	[redacted]	[redacted]

Graph 11: Distribution of Participants According to Six-Minute Walk Distance (6MWD)



[redacted] This distribution indicates that most patients with bronchial asthma demonstrated a moderate level of exercise tolerance based on the six-minute walk test.

Table 12: Distribution of Study Participants According to Limiting Factors During Six-Minute Walk Test (6MWT)

Levels of Limiting Factor During 6MWT	n	%
Fatigue		
Dyspnea		
Leg Pain		
None		
Total		

Graph 12: Distribution of Study Participants According to Limiting Factors During Six-Minute Walk Test (6MWT)

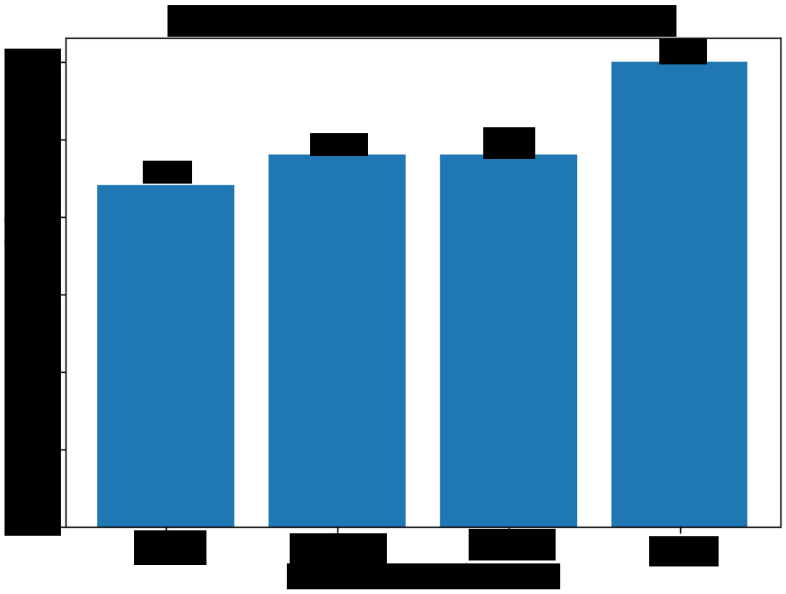
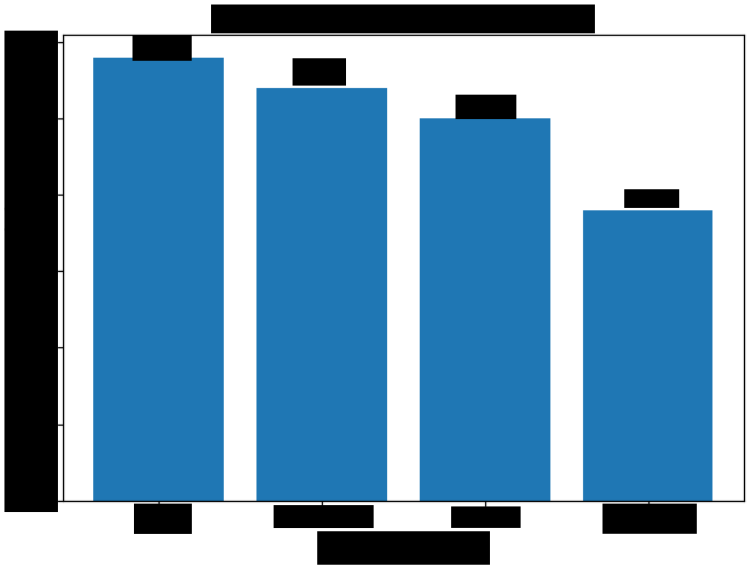


Table 13: Distribution of Study Participants According to Spirometry Pattern

Levels of Spirometry Pattern	n	%
Mixed	[redacted]	[redacted]
Obstructive	[redacted]	[redacted]
Normal	[redacted]	[redacted]
Restrictive	[redacted]	[redacted]
Total	[redacted]	[redacted]

Graph 13: Distribution of Study Participants According to Spirometry Pattern

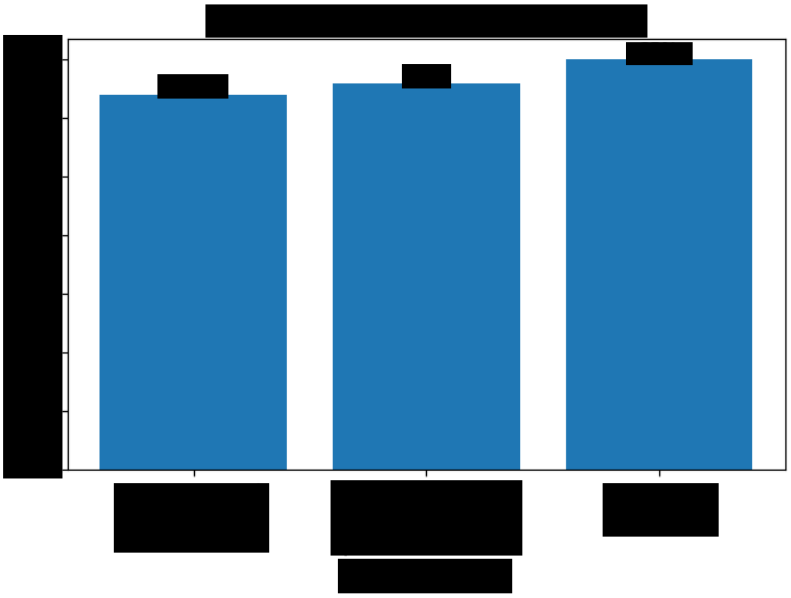


In the present study, among [redacted] patients with bronchial asthma, [redacted] exhibited a mixed spirometry pattern, [redacted] showed an obstructive pattern, [redacted] had normal spirometry values, and [redacted] demonstrated a restrictive pattern. [redacted] This distribution represents varying degrees of airway involvement and lung function impairment among the study population.

Table 14: Distribution of Study Participants According to Asthma Severity

Asthma Severity / Notes	Number	%
Severe Persistent	[redacted]	[redacted]
Moderate Persistent	[redacted]	[redacted]
Mild Asthma	[redacted]	[redacted]
Total	[redacted]	[redacted]

Graph 14: Distribution of Study Participants According to Asthma Severity



In the present study, out of [redacted] patients with bronchial asthma, [redacted] were categorized as having severe persistent asthma, [redacted] as moderate persistent asthma, and [redacted] as mild asthma. [redacted]

[redacted]This classification summarizes the asthma severity among the participants.

Table 15: Descriptive Statistics of Continuous Variables Among Study Participants

Variables	Min	Max	Range	Mean	Std.Dev.	Median
Age (years)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Weight (kg)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
BMI (kg/m²)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Duration of Asthma (years)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted] This detailed statistical distribution provides a clear overview of the demographic and clinical variability among the 100 study participants.

Table 16: Descriptive Statistics of ACT Score, AQLQ Total Score, and Six-Minute Walk Distance (6MWD)

Variables	Min	Max	Range	Mean	Std.Dev.	Median
ACT Score	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
AQLQ Total Score	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
6-Minute Walk Distance (meters)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted] These values comprehensively describe the distribution and central tendencies of asthma control, quality of life, and exercise tolerance among the study participants.

Table 17: Comparison of Physiological Parameters Before and After the Six-Minute Walk Test (6MWT)

Variable	Time Point	Mean ± SD	Min–Max	Median	Mean Difference	% Effect Change	Z-value	p-value
SpO_2 (%)	Before 6MWT	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	After 6MWT	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Heart Rate (bpm)	Before 6MWT	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	After 6MWT	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Borg Dyspnea Score	Pre-Test	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Post-Test	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

Similarly, heart rate demonstrated a marked increase following the test. Baseline heart rate ranged from [redacted] bpm, with a mean of [redacted] bpm and a median of [redacted] bpm. Post-test heart rate increased substantially, ranging from [redacted] bpm, with a mean of [redacted] bpm and a median of [redacted] bpm. [redacted]

[redacted]

[redacted]

Table 18: Descriptive Statistics of Spirometric Parameters (FEV_1, FVC, and FEV_1/FVC Ratio)

Variable	Min	Max	Range	Mean	Std.Dev.	Median
FEV_1 (L)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
FEV_1 (% predicted)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
FVC (L)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
FVC (% predicted)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
FEV_1/FVC Ratio (%)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted] The FVC percentage of predicted values ranged between [redacted] and [redacted], with a range of [redacted], a mean of [redacted], standard deviation of [redacted], and a median of [redacted].

[redacted]

Table 19: Correlation of Six-Minute Walk Distance with Clinical, Physiological, and Spirometric Parameters (Spearman's Correlation Test)

		n	Spearman R	t-value	p-value
ACT Score		[redacted]	[redacted]	[redacted]	[redacted]
AQLQ Total Score		[redacted]	[redacted]	[redacted]	[redacted]
SpO2	Before 6MWT (%)	[redacted]	[redacted]	[redacted]	[redacted]
	After 6MWT (%)	[redacted]	[redacted]	[redacted]	[redacted]
	Difference	[redacted]	[redacted]	[redacted]	[redacted]
Heart Rate	Before 6MWT (bpm)	[redacted]	[redacted]	[redacted]	[redacted]
	After 6MWT (bpm)	[redacted]	[redacted]	[redacted]	[redacted]
	Difference	[redacted]	[redacted]	[redacted]	[redacted]
Borg Dyspnea	Pre-Test	[redacted]	[redacted]	[redacted]	[redacted]
	Post-Test	[redacted]	[redacted]	[redacted]	[redacted]
	Difference	[redacted]	[redacted]	[redacted]	[redacted]
FEV_1 (L)		[redacted]	[redacted]	[redacted]	[redacted]
FEV_1 (% predicted)		[redacted]	[redacted]	[redacted]	[redacted]
FVC (L)		[redacted]	[redacted]	[redacted]	[redacted]
FVC (% predicted)		[redacted]	[redacted]	[redacted]	[redacted]
FEV_1/FVC Ratio (%)		[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

Oxygen saturation (SpO_2) before the [redacted] showed [redacted], [redacted], [redacted], and after the test, [redacted], [redacted], [redacted]. [redacted]

[redacted]

Table 20: Association of Asthma Quality of Life Questionnaire (AQLQ) Levels with ACT Control Level, Limiting Factor During 6MWT, Spirometry Pattern, and Asthma Severity

Factors	AQLQ levels						Total	Chi-square	p-value
	Poor		Moderate		Good				
	n	%	n	%	n	%			
ACT Control Level									
Uncontrolled	[redacted]								
Partly Controlled									
Controlled									
Limiting factor during 6MWT									
Fatigue									
Dyspnea									
Leg Pain									
None									
Spirometry Pattern									
Mixed									
Obstructive									
Normal									
Restrictive									
Final Clinical Impression / Notes									
Severe Persistent									
Moderate Persistent									
Mild Asthma									
Total									

[redacted]

[redacted]

For the spirometry pattern, participants with mixed pattern had [redacted] poor, [redacted] moderate, and [redacted] good AQLQ scores. [redacted]

Table 21: Multiple Linear Regression Analysis for Prediction of Six-Minute Walk Distance (6MWD)

Independent variables	Regression coefficient	Std.Err.	t-value	p-value
Intercept	[redacted]	[redacted]	[redacted]	[redacted]
ACT Score	[redacted]	[redacted]	[redacted]	[redacted]
AQLQ Total Score	[redacted]	[redacted]	[redacted]	[redacted]
FEV_1 (%)	[redacted]	[redacted]	[redacted]	[redacted]
FVC (%)	[redacted]	[redacted]	[redacted]	[redacted]
FEV_1/FVC Ratio (%)	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

For spirometric parameters, FEV_1 (% predicted) had a regression coefficient of [redacted] with a standard error of [redacted], t-value of [redacted], and p-value of [redacted], suggesting a [redacted] contribution. [redacted]

[redacted]

DISCUSSION

DISCUSSION

Age distribution

In the present study [redacted] bronchial asthma patients were predominantly middle-aged adults, with the maximum participants in the [redacted] years age group [redacted] followed by [redacted] and [redacted]

A similar emphasis on adult asthma burden has been described by [redacted] The predominance of working-age adults in our study also aligns with the observations of [redacted]

Further, the relationship between asthma control and patient-reported outcomes across adult age groups has been demonstrated in large surveys such as Thomas et al.,

reinforcing that adult asthma populations show wide variability in control status and quality of life [49].

Gender distribution

In the present study, male participants [redacted] outnumbered female participants [redacted] indicating a male predominance among adult bronchial asthma patients attending our clinical setting. [redacted]

[redacted] emphasized extrapulmonary associations affecting functional outcomes in severe asthma, reinforcing the importance of considering gender-related differences while interpreting exercise tolerance and activity capacity [27].

BMI distribution

In the present study, the majority of bronchial asthma patients had normal BMI [redacted] while a substantial proportion were overweight [redacted] and only [redacted] were underweight. [redacted]

[redacted]

Finally, the importance of physical inactivity and obesity as treatable traits in adult asthma has been emphasized by McDonald and McDonald, reinforcing that BMI assessment provides crucial context when interpreting exercise tolerance and quality of life results in asthma cohorts [29].

Occupation distribution

In the present study, participants represented a broad occupational mix, with the largest groups being farmers [redacted] students [redacted] and housewives [redacted] followed by employed [redacted] and self-employed [redacted]

[redacted]

[redacted] also highlighted the importance of environmental issues in asthma management, supporting the interpretation that occupations involving outdoor work or dust exposure [redacted]

[redacted]

[redacted] discussed activity limitation and exertional dyspnea in adult asthma, supporting the need to interpret exercise tolerance in the context of occupational activity demands [7].

Comorbidities

In the present study, [redacted] of bronchial asthma patients had no comorbidities, while [redacted] had at least one associated condition. [redacted]

Further, the relationship between asthma control and overall health status has been demonstrated in clinical studies such as [redacted] This aligns with our rationale that comorbidities may contribute to poorer control categories and reduced exercise tolerance.

Treatment pattern

In the present study, the most common treatment preferred was LABA/ICS [redacted] of the patients preferred irregular treatment, while LABA/LAMA/ICS was used by [redacted] participants. [redacted]

Comparatively, the GINA strategy [redacted] and the updated key primary care recommendations [redacted]

[redacted] Therefore, irregular treatment pattern in the present study that is [redacted] provides essential data for interpreting correlations between medication regularity, spirometric indices, asthma control status, quality of life, and functional exercise capacity.

Asthma-related complications: osteoporosis, cataract

In the present study, [redacted] of patients reported asthma-related complications, including osteoporosis [redacted] and cataract [redacted] while [redacted] of participants reported no complications. [redacted]

[redacted]

[redacted] Older age further increases vulnerability to such complications and may compound their impact on physical activity.

Duration of asthma

In the present study, among 100 patients with bronchial asthma, only [redacted] had a positive history of either PTB or ILD. [redacted]

[redacted]

The importance of asthma's chronic nature and its evolution over time has been emphasized by [redacted]

From the perspective of clinical control and health status, the relationship between symptom control and patient well-being has been established in the GOAL study by [redacted]

Furthermore, activity limitation and exertional dyspnea in adult asthma have been described by [redacted] supporting that chronic asthma can lead to reduced participation in physical activity over time [7].

Exacerbations in last 12 months

In the present study, exacerbation burden in the previous [redacted] months was substantial. [redacted]

[redacted]

Environmental and inhalational exposures are central to asthma management emphasizes environmental factors in asthma care, supporting that exposure reduction (including tobacco smoke) is a key component of improving outcomes. [redacted]

[redacted]

The coexistence of asthma with other chronic respiratory conditions can complicate diagnosis and interpretation of airflow limitation.

[redacted]

[redacted]

A prior PTB/ILD history may represent an important trait contributing to reduced functional capacity and poorer quality of life.

ACT levels

In the present study, asthma control assessed by the Asthma Control Test (ACT) showed that [redacted] of participants were controlled, [redacted] were partly controlled, and [redacted] were uncontrolled. [redacted]

The ACT was originally developed as a patient-reported tool to assess asthma control by Nathan et al., and its reliability, validity, and responsiveness were demonstrated by Schatz et al. [91,102].

[redacted]

[redacted] The presence of [redacted] uncontrolled asthma in our cohort may reflect gaps in adherence, trigger avoidance, or treatment optimization, which can contribute to reduced functional exercise capacity and poorer quality of life outcomes.

AQLQ categories

In the present study, asthma-related quality of life assessed by the Asthma Quality of Life Questionnaire (AQLQ) showed that [redacted] of participants had good quality of life, [redacted] had moderate, and 32% had poor quality of life. [redacted]

[redacted] Similarly, the relationship between asthma control and health status was demonstrated in the GOAL study by Bateman et al., reinforcing that better control is associated with improved patient-reported health status, which is comparable to the expectation that patients with better ACT control in this study have shown better AQLQ outcomes [95].

[redacted]

Furthermore, the relationship between lung function, daily symptoms, and quality of life was examined by [redacted] showing that quality of life may not always correlating with spirometric values, which is relevant to our objective of correlating AQLQ with spirometry and 6MWT [92].

Limiting factors during 6MWT

In the present study, limiting factors during the 6-minute walk test (6MWT) were reported as dyspnea [redacted] leg pain [redacted] and fatigue [redacted]. [redacted]

The 6MWT is widely recognized as a practical measure of functional exercise capacity, and its clinical role, technique, and interpretation have been comprehensively described by Agarwala and Salzman.

McDonald highlighted physical inactivity and comorbid traits as important determinants of functional limitation in adult asthma, which may explain non-respiratory limiting factors such as fatigue and leg pain during 6MWT [29].

Spirometry pattern

In the present study, spirometry showed a heterogeneous distribution: mixed pattern [redacted] was most common, followed by obstructive [redacted] normal [redacted] and restrictive [redacted]

[redacted]

In the present study, the patients of mild asthma [redacted], moderate persistent asthma [redacted], and severe persistent asthma [redacted]. [redacted]

[redacted]

The mean asthma duration of [redacted] years in this cohort aligns with adult persistent asthma and suggests that long-term disease burden may contribute to functional limitation even when spirometry is not severely reduced.

[redacted]

Finally, the concept that functional limitation in asthma may not be explained by spirometry alone is supported by Vermeulen et al., who described activity limitation and exertional dyspnea in adult asthma [7].

ACT score, AQLQ total score, and 6MWD

In the present study, the mean ACT score was [redacted] indicating that, on average, participants were closer to the partly controlled range, with a wide spread [redacted]

[redacted] Vermeulen et al. described exertional dyspnea and activity limitation in adult asthma, supporting why a wide range of 6MWD may occur in asthma populations with varying symptom control and quality of life [7] .

SpO_2, heart rate, Borg dyspnea pre/post 6MWT

In the present study, physiological responses to the 6-minute walk test [redacted] showed clear exertional changes. [redacted]

[redacted]

[redacted] described barriers to healthy physical activity in asthma, including fear of symptoms and discomfort during exertion, which is consistent with the rise in Borg dyspnea observed in our cohort [60] .

Spirometric parameters: FEV_1, FVC, FEV_1/FVC

In the present study, spirometry showed mean FEV[redacted] and mean [redacted] predicted [redacted] suggesting overall mild-to-moderate reduction in expiratory flow at the population level. [redacted]

The relationship between lung function, symptoms, and quality of life has been examined by Carranza Rosenzweig et al., showing that daily symptoms and health-related quality of life do not always track closely with spirometric indices comparable to our expectation that some patients with relatively preserved FEV_1 may still report poor ACT/AQLQ and reduced 6MWD [92].

Correlation of 6MWD with clinical, physiological, and spirometric parameters

In the present study, 6-minute walk distance (6MWD) showed a very strong positive correlation with both ACT score and AQLQ total score ( ).

[redacted]

Likewise, Kwon et al. found correlation between ACT and health-related quality of life, reinforcing that patient-reported control status reflects broader functional well-being [51].

Pre–post 6MWT changes in SpO_2, heart rate, Borg dyspnea

In the present study, the 6-minute walk test (6MWT) produced statistically significant physiological and symptom changes. [redacted]

[redacted] Current guideline-based approaches, including the GINA 2022 update, emphasize assessing both symptom control and functional limitation to ensure comprehensive asthma evaluation [1] .

Association of AQLQ with ACT, 6MWT limiting factors, spirometry pattern, and clinical severity

In the present study, AQLQ levels showed a highly significant association with ACT control level ([redacted]). [redacted]

[redacted] Carranza Rosenzweig et al. (2004) demonstrated that lung function does not fully explain daily symptoms and health-related quality of life in persistent asthma, supporting our finding that spirometry pattern alone did not determine AQLQ category [92] .

Multiple linear regression predicting 6MWD

In the present study, multiple linear regression analysis identified ACT score and AQLQ total score as significant independent predictors of 6-minute walk distance (6MWD). [redacted]

The clinical role of the 6MWT as a functional assessment tool has been emphasized by Agarwala and Salzman, supporting the relevance of identifying predictors of 6MWD that reflect real-world functional limitations [9].

STRENGTHS AND LIMITATIONS

STRENGTHS OF THE STUDY

1. Use of objective functional assessment (6-minute walk test) to evaluate real-world exercise tolerance in bronchial asthma.

[redacted]

8. Regression analysis performed, allowing identification of independent predictors of functional capacity (6MWD).

LIMITATIONS OF THE STUDY

1. Cross-sectional design cannot establish cause–effect relationship between 6MWD and ACT/AQLQ/spirometry.

[redacted]

10. No follow-up data, so change in 6MWD after treatment optimization or rehabilitation could not be studied.

CONCLUSION

CONCLUSION

This cross-sectional study assessed physical activity and exercise tolerance in 100 patients with bronchial asthma using the Six-Minute Walk Test (6MWT) and correlated functional capacity with spirometry, Asthma Control Test (ACT), and Asthma Quality of Life Questionnaire (AQLQ). [redacted]

[redacted]

[redacted] Incorporating 6MWT alongside ACT, AQLQ, and spirometry can improve comprehensive assessment of asthma patients by identifying functional limitation and guiding patient-centered management aimed at improving daily activity and overall well-being.

SUMMARY

SUMMARY

This cross-sectional study evaluated physical activity and exercise tolerance in 100 patients with bronchial asthma using the Six-Minute Walk Test (6MWT) and correlated functional capacity with spirometry, Asthma Control Test (ACT), and Asthma Quality of Life Questionnaire (AQLQ). [redacted]

Multiple linear regression confirmed that ACT and AQLQ were significant independent predictors of 6MWD, whereas spirometric indices were not significant predictors, highlighting the importance of combining functional testing with patient-reported outcomes in asthma assessment.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Levy ML, Bacharier LB, Bateman E, Boulet LP, Brightling C et. al., Key recommendations for primary care from the 2022 Global Initiative for Asthma (GINA) update. NPJ Prim Care Respir Med. 2023 Feb 8;33(1):7.

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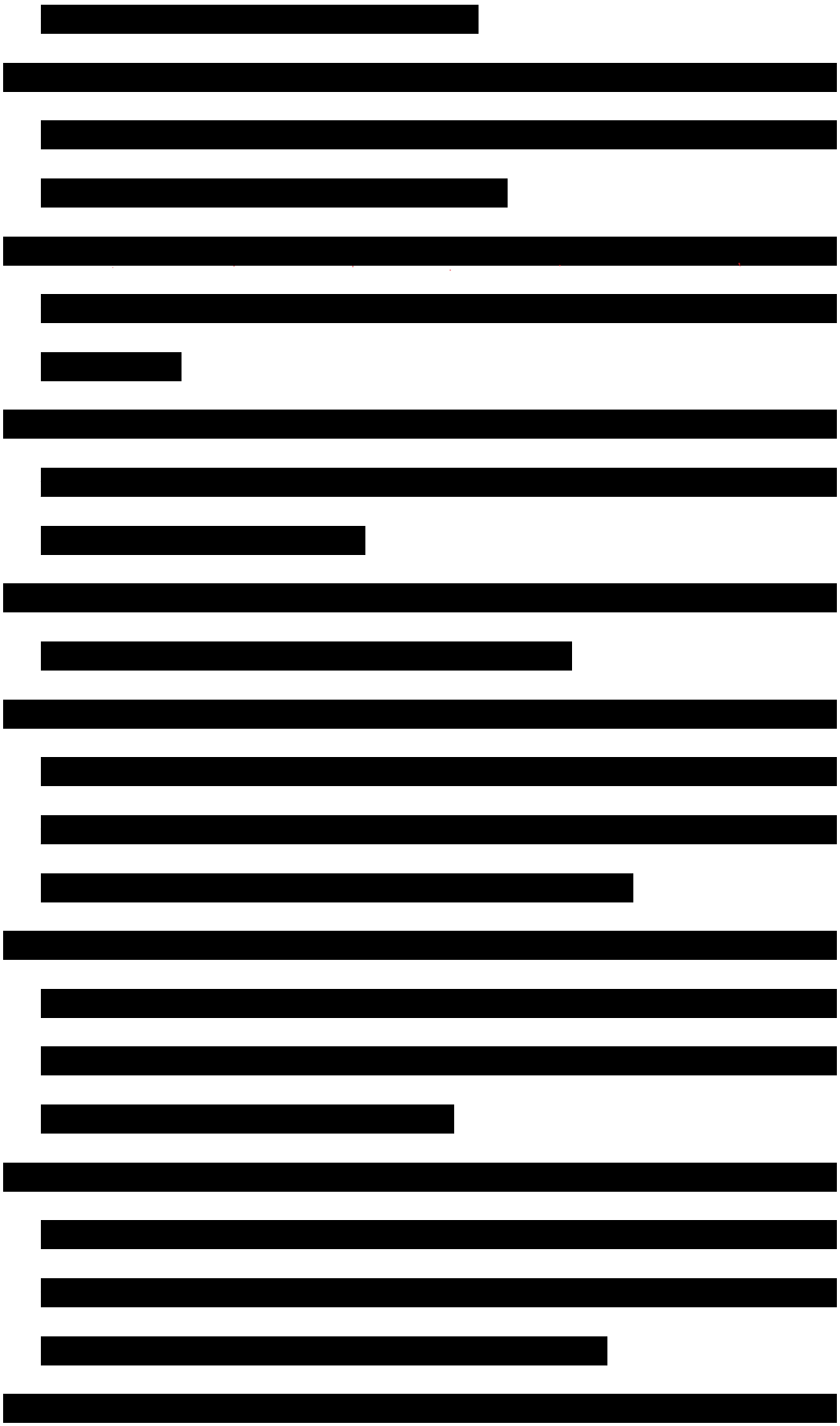

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[redacted]

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104. **Global Initiative for Asthma.** *Global Strategy for Asthma Management and Prevention, 2025.* Updated May 2025.

ANNEXURES

ANNEXURE I – INFORMED CONSENT

CONSENT STATEMENT

ANNEXURE II – CASE RECORD PROFORMA

MASTER CHART

Sl. No.	Age (years)	Gender	Weight (kg)	BMI (kg/m²)	Duration of Asthma (years)	No. of Exacerbations	Smoking Status (Yes/No)	History of PTB/ILD (Yes/No)	ACT Score	ACT Control Level (Controlled / Partly Controlled / Uncontrolled)	AQLQ Total Score	AQLQ Category (Good / Moderate / Poor)	6-Minute Walk Distance (meters)	SpO_2 Before 6MWT (%)	SpO_2 After 6MWT (%)	Heart Rate Before 6MWT (bpm)	Heart Rate After 6MWT (bpm)	Borg Dyspnea Score –	Borg Dyspnea Score –	Limiting Factor During 6MWT	FEV_1 (L)	FEV_1 (% predicted)	FVC (L)	FVC (% predicted)	FEV_1/FVC Ratio (%)	Spirometry Pattern (Normal / Obstructive / Restrictive / Mixed)	Final Clinical Impression / Notes	Sl. No.	Age (years)	Occupation	Treatment	Complications
[redacted]	56	Female	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	46	Male	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	32	Male	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	60	Female	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	25	Female	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	38	Male	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	56	Female	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	36	Female	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	40	Female	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	28	Male	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	28	Male	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
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