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# The Association between Atopy, and Family History of Asthma Patient and Severity Asthma based on Spirometry

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## Abstract

**Background :** Asthma is a chronic inflammatory respiratory condition characterized by fluctuating symptoms, which often leads to diagnostic challenges. Accurate assessment and interpretation of clinical and functional parameters are essential to improve disease management and patient outcomes. This study aims to analyze the demographic and clinical profiles of asthma patients, particularly investigating the relationships among the degree of airway obstruction, spirometric indices, smoking exposure, environmental risk factors, atopic history, and family history, to better understand the multifactorial nature of asthma.

**Methods :** A retrospective descriptive-analytic study was conducted using medical records of 107 asthma patients treated at the Outpatient Installation of the Lung Polyclinic, Wlingi General Hospital, Blitar Regency, from 2021 to 2022. Descriptive statistics were used to summarize demographic and clinical data, and Spearman correlation tests assessed associations between variables.

**Results :** A high proportion of patients had a history of smoking, with 22.4% being active and 52.3% passive smokers. However, no significant correlation was found between smoking status and asthma control. Common environmental risk factors included exposure to dust and cold air, though these did not consistently correlate with asthma exacerbations. Significant correlations were identified between the severity of airway obstruction and spirometric parameters such as FEV1, FVC, FEV1/FVC ratio, PEF, FEF 25, FEF 50, and FEF 75, confirming the impact of airflow limitation on lung function. No significant associations were found between asthma stability and atopic or family history.

**Conclusion :** The findings underscore the complexity of asthma pathophysiology, where airflow obstruction is clearly linked to reduced spirometric function, but other factors such as smoking, environmental exposures, atopy, and family history do not show consistent predictive value for asthma control. These results highlight the need for a comprehensive and individualized approach in asthma diagnosis and management.

**Keywords :** Asthma, Atopy History, Degree of Obstruction, Environmental Risk Factors, Spirometric Parameters

## INTRODUCTION

Asthma is a chronic inflammatory disease of the airways, characterized by symptoms such as wheezing, breathlessness, chest tightness, and coughing.[1,2] This inflammation leads to recurrent episodes of coughing, wheezing, breathlessness, and a feeling of heaviness in the chest.[3]

The symptoms of asthma are fluctuating and may include wheezing, coughing, shortness of breath, and a sense of chest heaviness.[1] Mismanagement often occurs due to the incorrect assumption that all abnormal breath sounds are wheezing, leading to a conclusion of asthma.[4] Accurate recording of wheezing and other consistent symptoms is crucial to prevent misdiagnosis and improper management.[5,6]

The diagnosis of asthma is established based on a thorough medical history, physical examination, and diagnostic tests. The medical history includes inquiries about respiratory complaints such as wheezing, shortness of breath, chest pain, and cough, as well as a family history of allergy-related diseases. Physical examination involves listening for expiratory wheezing during auscultation, observing for tachypnea, tachycardia, or the tripod sitting position. Trigger factors such as cold air, exercise, and pollution also need to be noted.[7]

The primary supporting examination is spirometry, measuring FEV1. In asthma patients, reversible FEV1 indicates airway obstruction (FEV1 < 0.8 and FEV1/FVC ratio < 0.70). The severity of asthma correlates with lower FEV1 and FEV1/FVC values. FEV1 increases by >12% and >200 ml after salbutamol administration.[1,8]

Several factors contribute to asthma or airway hyperreactivity, including environmental allergens such as dust mites, pet dander, cockroaches, and molds, triggering allergic reactions in sensitive individuals, leading to asthma symptoms.[7] Additionally, respiratory viral infections, like colds or flu, can narrow airways and exacerbate asthma symptoms.[8] Exercise-induced hyperventilation can trigger bronchoconstriction, especially in individuals with asthma.[1] Conditions such as gastroesophageal reflux disease (GERD), chronic sinusitis, and rhinitis can worsen asthma symptoms.[7] Certain medications like Aspirin, NSAIDs, and beta-blockers may induce asthma in some individuals.[8] Other factors such as obesity, air pollution, tobacco smoke, occupational exposure, irritants, stress, and perinatal factors (such as prematurity) can also increase asthma risk.[6,7,9–18]

Several related studies have been conducted, including research by,[19] utilizing an analytical observational design with a cross-sectional approach. Data were collected from 100 pediatric asthma patients at Dr. Soetomo Hospital in Surabaya. Atopy history was identified using the ISAAC questionnaire. Asthma severity levels were categorized based on GINA 2019. Chi-Square tests were employed for data analysis. The study found a significant relationship between atopy history and the severity of asthma in pediatric patients ($p < 0.05$). Pediatric patients with atopy history had a 2.5 times higher risk of experiencing severe asthma compared to those without atopy history.

Another study conducted by Cetemen involved ninety children aged 6–18 years. Sixty obese children and thirty healthy control children formed the study groups. Obesity was defined as a body mass index (BMI) ≥ the 95$^{th}$ percentile for age. Physical examinations and lung function tests (FEV1, FVC, PEF, FEF25-75) were conducted.[20] Questionnaires investigating obesity, allergic diseases, and asthma were administered. Blood samples were taken for total IgE and specific allergen measurements. The results indicated a significantly higher prevalence of asthma attacks in the past 12 months ($p = 0.049$) and family members with obesity ($p = 0.001$) among obese children compared to the control group. Specific IgE levels for food and inhalant allergens increased in the obese group, although this increase was not statistically significant ($p = 0.136$ and $p = 0.392$, respectively). There were no statistically significant differences in lung function tests ($p > 0.05$) and total IgE levels ($p = 0.619$) between the study and control groups.

London also conducted a similar study, focusing on children with both parents having asthma compared to those without parental asthma history.[21] The prevalence ratio (PR) for early-onset persistent asthma was 12.1 [95% confidence interval (CI) 7.91–18.7], compared to 7.51 (95% CI 2.62–21.5) for early-onset transient asthma and 5.38 (95% CI 3.40–8.50) for late-onset asthma. Maternal smoking during pregnancy was predominantly associated with the risk of early-onset persistent asthma if there was a history of allergies and asthma in the parents, and the combined effect was more than mere addition (interaction contrast ratio = 3.10, 95% CI 1.45–4.75). The findings of this study reinforce previous data that parental history of asthma and allergies is most strongly linked to early-onset persistent asthma, indicating that in children with genetic predisposition, early-life environmental exposure, such as maternal smoking during pregnancy, promotes the development of persistent early-onset asthma into late childhood. Similar research was also conducted by.[22–26]

The objectives of this research are to present an overview of the demographic and clinical characteristics of asthma patients and to analyze the correlation between the degree of obstruction and spirometry results, as well as the history of atopy and family history related to asthma/atopy. Through this approach, the study aims to provide deeper insights into the factors influencing asthma within the examined population.

## METHODS

This research used a descriptive-analytic design with a retrospective approach. The main data source were collected from medical records of patients who underwent treatment at the Outpatient Installation of the Lung Polyclinic, Wlingi General Hospital, Blitar Regency, from 2021 to 2022. A total of 107 patients were included as the study sample.

Asthma diagnosis in this study was based on spirometry testing, which was performed both before and after administration of a bronchodilator (pre- and post-bronchodilator spirometry), in accordance with the recommended diagnostic gold standard. Spirometry was conducted at the time of diagnosis and subsequently repeated every three months as part of routine clinical follow-up.

The data analysis was carried out in two stages. The first stage involved descriptive analysis, including frequency and percentage distributions for demographic variables such as age, gender, occupation, and education. Clinical variables such as the degree of airway obstruction, spirometry results, history of atopy, and family history of asthma or atopy were also described using frequency and percentage distributions. For numerical variables like FEV1, FVC, and FEV1/FVC, mean values and standard deviations were calculated.

The second stage involved analytical statistics using the Spearman correlation test to determine the relationship between the degree of obstruction and spirometry parameters, history of atopy, and family history of asthma or atopy. The degree of airway obstruction was categorized based on FEV1/FVC values into normal, mild, moderate, and severe categories. Spirometry parameters included FEV1, FVC, and FEV1/FVC.

## RESULTS

Based on data in Table 1, from the analysis of smoking history characteristics in 107 research samples, it is revealed that 22.4% of patients are active smokers, 52.3% are exposed to passive smoking, 8.4% are former smokers, while 16.8% have unknown smoking status (NA). Additionally, in analyzing Stable Asthma Diagnoses, it is observed that 14.0% of patients are categorized as Fully Controlled Stable Asthma, 63.6% are Partially Controlled, and 22.4% are Uncontrolled.

The comorbidities were found that 0.9% suffer from CHF, 0.9% DM, 2.8% GERD, 3.7% HF, 26.2% HT and the percentages vary for conditions such as Lung Tumor, Obesity, Rhinitis, and TB. Based on Atopy History, 57.0% of patients have no history of atopy, while the remaining 43.0% have atopy history, including types such as Dust Allergy, Cold, Food Allergy, Weather, Dermatitis, Eczema, Rhinitis, and HT.

Finally, in the assessment of Asthma Risk among 107 patients, it is found that 39.3% have Dust exposure risk, 43.9% are exposed to Cold Air, 10.3% have Allergy History, 7.5% are influenced by Stress, and 0.9% respond to Dry Air. Exacerbation Asthma Diagnosis illustrates that 31.8% of patients experience Mild-Moderate exacerbation, 3.7% have Severe exacerbation, 0.9% have Life-Threatening exacerbation, and in 63.6% of patients, the exacerbation level is unknown (NA). Meanwhile, the distribution for restriction, obstruction, and mixed is 14.0%, 11.2%, 41.1%, and 33.6% respectively. In terms of obstruction degree, 64.6% of patients have a mild obstruction degree, while 35.4% fall into the moderate degree among the 48 research sample participants.

Based on the data in Table 2, for information on Spirometric Results, from the 107 research samples, it is noted that the average for FEV1 (%) is 51.41%, for FVC is

TABLE 1
**Characteristics of Observed Parameters**

| Variables | Frequency | Percentage (%) |
|---|---|---|
| Smoking history | | |
| NA | 18 | 16.8% |
| Active | 24 | 22.4% |
| Passive | 56 | 52.3% |
| Former | 9 | 8.4% |
| Stable Asthma Diagnosis | | |
| Well-Controlled | 15 | 14.0% |
| Partially Controlled | 68 | 63.6% |
| Uncontrolled | 24 | 22.4% |

*TABLE 1. Continued.*

| Variables | Frequency | Percentage (%) |
|---|---|---|
| Comorbid | | |
| CHF (Congestive Heart Failure) | 1 | 0.9% |
| DM (Diabetes Mellitus) | 1 | 0.9% |
| GERD (Gastroesophageal Reflux Disease) | 3 | 2.8% |
| HF (Heart Failure) | 4 | 3.7% |
| HT (Hypertension) | 28 | 26.2% |
| Lung Tumor | 1 | 0.9% |
| Obesity | 3 | 2.8% |
| Rhinitis | 6 | 5.6% |
| TB (Tuberculosis) | 2 | 1.9% |
| Patient's ATOPY History | | |
| No | 61 | 57.0% |
| Yes | 46 | 43.0% |
| Type of Atopy: Dust Allergy | 4 | 3.7% |
| Type of Atopy: Cold Allergy | 5 | 4.7% |
| Type of Atopy: Food Allergy | 1 | 0.9% |
| Type of Atopy: Weather-Related Allergy | 1 | 0.9% |
| Type of Atopy: Dermatitis | 6 | 5.6% |
| Type of Atopy: Eczema | 6 | 5.6% |
| Type of Atopy: Rhinitis | 28 | 26.2% |
| Type of Atopy: Hypertension (HT) | 1 | 0.9% |
| Family History of ASTHMA/Atopy | | |
| No | 71 | 71 |
| Yes | 36 | 36 |
| Asthma (family atopy) | 27 | 27 |
| Rhinitis (family atopy) | 5 | 5 |
| Dermatitis (family atopy) | 1 | 1 |
| ASTHMA RISK ASSESSMENT | | |
| Type of risk factor: Dust | 42 | 39.3% |
| Type of risk factor: Cold air | 47 | 43.9% |
| Type of risk factor: History of allergies | 11 | 10.3% |
| Type of risk factor: Stress | 8 | 7.5% |
| Type of risk factor: Dry air | 1 | 0.9% |
| Diagnosis of Exacerbated Asthma | | |
| NA | 68 | 63.6% |
| Mild-Moderate | 34 | 31.8% |

*TABLE 1. Continued.*

| Variables | Frequency | Percentage (%) |
|---|---|---|
| Severe | 4 | 3.7% |
| Life-threatening | 1 | 0.9% |
| RESTRICTION/OBSTRUCTION/MIXED | | |
| Normal | 15 | 14.0% |
| Obstruction | 12 | 11.2% |
| Restriction | 44 | 41.1% |
| Mixed | 36 | 33.6% |
| Degree of Obstruction | | |
| Mild | 31 | 64.6% |
| Moderate | 17 | 35.4% |

Source: Researcher's data analysis (2023)

TABLE 2
**Characteristics of Spirometry Results**

| Variables | Frequency |
|---|---|
| FEV1 (%) | 51.41 ± 20.13 |
| FVC (%) | 67.13 ± 20.73 |
| FEV1/FVC (%) | 61.65 ± 10.47 |
| PEF (%) | 28.74 ± 13.58 |
| FEF 25 (%) | 26.52 ± 16.23 |
| FEF 50 (%) | 20.02 ± 12.30 |
| FEF 75 (%) | 17.81 ± 11.71 |

Source: Researcher's data analysis (2023)

67.13%, for FEV1/FVC is 51.41%, for PEF is 28.74%, for FEF 25 is 26.52%, for FEF 50 is 20.02%, and for FEF 75 is 17.81%.

Table 3 shows the correlation test results between stable asthma diagnosis and spirometric outcomes (FEV1, FVC, FEV1/FVC, PEF, FEF 25, FEF 50) along with the patient's atopy history and family history of asthma/atopy yielded *p-values* greater than 0.05 ($p$>0.05, accept Ho). Therefore, it can be concluded that there is no significant relationship between stable asthma diagnosis and spirometric outcomes (FEV1, FVC, FEV1/FVC, PEF, FEF 25, FEF 50), the patient's atopy history, and family history of asthma/atopy. In other words, regardless of the stable asthma diagnosis (Well-Controlled, Partially Controlled, Uncontrolled), there is no association with the level of spirometric outcomes (FEV1, FVC, FEV1/FVC, PEF, FEF 25, FEF 50), nor with the presence or absence of the patient's atopy history or the family history of asthma/atopy.

For the correlation test results between stable asthma diagnosis and spirometric outcome FEF 75, a correlation coefficient of -0.213 with a *p-value* of 0.028 ($p$<0.05, reject Ho) was obtained. It can be concluded that there is a significant relationship between stable asthma diagnosis and spirometric outcome FEF 75. The negative correlation coefficient is moderately strong, indicating that the more uncontrolled the asthma, the lower the spirometric outcome FEF 75, and conversely, the more stable the asthma, the higher the spirometric outcome FEF 75.

Table 4 shows the correlation test results indicate that the Restriction/Obstruction/Mixed pattern has a significant correlation with spirometric parameters such as FEV1, FVC, FEV1/FVC, PEF, FEF 25, FEF 50, and FEF

TABLE 3
**Correlation Test Results Between Stable Asthma Diagnosis and Spirometric Results, Atopic History, and Family History of Asthma/Atopy in the Family**

| Variables | Correlation Coefficients | *P-value* |
|---|---|---|
| The relationship between Stable Asthma Diagnosis and FEV1 (%) | -0.165 | 0.089 |
| The relationship between Stable Asthma Diagnosis and FVC (%) | -0.098 | 0.317 |
| The relationship between Stable Asthma Diagnosis and FEV1/FVC (%) | -0.179 | 0.065 |
| The relationship between Stable Asthma Diagnosis and PEF (%) | -0.186 | 0.055 |
| The relationship between Stable Asthma Diagnosis and FEF 25 (%) | -0.144 | 0.140 |
| The relationship between Stable Asthma Diagnosis and FEF 50 (%) | -0.145 | 0.137 |
| The relationship between Stable Asthma Diagnosis and FEF 75 (%) | -0.213 | 0.028 |
| The relationship between Stable Asthma Diagnosis and Atopy History | -0.159 | 0.103 |
| The relationship between Stable Asthma Diagnosis and Family History | -0.063 | 0.517 |

Source: Researcher's data analysis (2023)

TABLE 4
**Results of Correlation Test Between Restriction/Obstruction/Mixed with Spirometric Outcomes, Atopic History, and Family History of Asthma/Atopy**

| Variables | Correlation Coefficients | *P-value* |
|---|---|---|
| The relationship between Restriction/Obstruction/Mixed and FEV1 (%) | -0.614 | 0.000 |
| The relationship between Restriction/Obstruction/Mixed and FVC (%) | -0.546 | 0.000 |
| The relationship between Restriction/Obstruction/Mixed and FEV1/FVC (%) | -0.556 | 0.000 |
| The relationship between Restriction/Obstruction/Mixed and PEF (%) | -0.413 | 0.000 |
| The relationship between Restriction/Obstruction/Mixed and FEF 25 (%) | -0.574 | 0.000 |
| The relationship between Restriction/Obstruction/Mixed and FEF 50 (%) | -0.669 | 0.000 |
| The relationship between Restriction/Obstruction/Mixed and FEF 75 (%) | -0.530 | 0.000 |
| The relationship between Restriction/Obstruction/Mixed and Atopy History | 0.017 | 0.863 |
| The relationship between Restriction/Obstruction/Mixed and Family History | -0.029 | 0.770 |

Source: Researcher's data analysis (2023)

75. The strong negative correlation coefficients for each parameter indicate that patients with obstruction to a mixed pattern tend to have lower spirometric values, while patients with restriction have relatively higher values. This conclusion is supported by the significant *p-values* ($p<0.05$) in all tests, validating the rejection of the null hypothesis. Analysis of spirometric parameters reveals that the Restriction/Obstruction/Mixed pattern is significantly associated with a decline in lung function. The strong negative correlation coefficients depict that patients with this pattern consistently experience a decrease in the tested spirometric parameters. Although there is a significant correlation with spirometric parameters, the relationship between the Restriction/Obstruction/Mixed pattern and the patient's and family's history of Atopy is not proven to be significant. The *p-values* greater than 0.05 ($p>0.05$) in both correlation tests indicate that there is no substantial correlation between this pattern and the presence or absence of Atopy history in patients or their family history.

Table 5 shows results of the correlation tests indicate a significant relationship between the Degree of Obstruction and the spirometric parameter FEV1. A strong negative correlation coefficient suggests that patients with moderate obstruction tend to have lower FEV1 values, while those with mild obstruction have relatively higher values.

TABLE 5

**Correlation Test Results Between Degree of Obstruction and Spirometric Outcomes, Patient Atopy History, and Family History of Asthma/Atopy**

| Variables | Coefficient of correlation | *P-value* |
|---|---|---|
| Relationship between Degree of Obstruction and FEV1 (%) | -0.489 | 0.000 |
| Relationship between Degree of Obstruction and FVC (%) | -0.300 | 0.038 |
| Relationship between Degree of Obstruction and FEV1/FVC (%) | -0.829 | 0.000 |
| Relationship between Degree of Obstruction and PEF (%) | -0.428 | 0.002 |
| Relationship between Degree of Obstruction and FEF 25 (%) | -0.514 | 0.000 |
| Relationship between Degree of Obstruction and FEF 50 (%) | -0.508 | 0.000 |
| Relationship between Degree of Obstruction and FEF 75 (%) | -0.308 | 0.033 |
| Relationship between Degree of Obstruction and Atopy History | 0.074 | 0.615 |
| Relationship between Degree of Obstruction and Family History | 0.039 | 0.793 |

Source: Researcher's data analysis (2023)

TABLE 6

**Results of Correlation Tests Between Degree of Obstruction and Atopy Types, Family Atopy Types, and Risk Factor Types (Asthma Risk Assessment)**

| Variables | Coefficient Correlation | *P-value* |
|---|---|---|
| The relationship between the Degree of Obstruction and the Type of Dust Allergy | 0.197 | 0.180 |
| The relationship between the Degree of Obstruction and the Type of Cold Allergy | 0.064 | 0.668 |
| The relationship between the Degree of Obstruction and the Type of Food Allergy | – | – |
| The relationship between the Degree of Obstruction and the Type of Weather Allergy | -0.108 | 0.465 |
| The relationship between the Degree of Obstruction and the Type of Dermatitis Allergy | 0.197 | 0.180 |
| The relationship between the Degree of Obstruction and the Type of Eczema Allergy | -0.154 | 0.295 |
| The relationship between the Degree of Obstruction and the Type of Rhinitis Allergy | 0.031 | 0.835 |
| The relationship between the Degree of Obstruction and the Type of Hypertension Allergy | -0.108 | 0.465 |
| The relationship between the Degree of Obstruction and Asthma (family atopy) | -0.110 | 0.457 |
| The relationship between the Degree of Obstruction and Rhinitis (family atopy) | 0.175 | 0.233 |
| The relationship between the Degree of Obstruction and Dermatitis (family atopy) | -0.108 | 0.465 |
| The relationship between the Degree of Obstruction and ACT SCORE | -0.011 | 0.940 |
| The relationship between the Degree of Obstruction and GINA SYMPTOMS CONTROL | -0.084 | 0.571 |
| The relationship between the Degree of Obstruction and the Type of Dust Risk Factor | -0.074 | 0.615 |
| The relationship between the Degree of Obstruction and the Type of Cold Air Risk Factor | 0.113 | 0.444 |
| The relationship between the Degree of Obstruction and the Type of Allergy History Risk Factor | 0.019 | 0.895 |
| The relationship between the Degree of Obstruction and the Type of Stress Risk Factor | 0.169 | 0.252 |
| The relationship between the Degree of Obstruction and the Type of Dry Air Risk Factor | – | – |
| The relationship between the Degree of Obstruction and the Diagnosis of Asthma Exacerbation | 0.075 | 0.610 |
| The relationship between the Degree of Obstruction and Restriction / Obstruction / Mixed | 0.226 | 0.122 |

Source: Researcher's data analysis (2023)

TABLE 7
**Results of Correlation Test Between the Degree of Obstruction and Types of Patient Comorbidities**

| Variables | Coefficient correlation | *P-value* |
|---|---|---|
| Relationship between Degree of Obstruction and CHF (Congestive Heart Failure) | -0.108 | 0.465 |
| Relationship between Degree of Obstruction and DM (Diabetes Mellitus) | – | – |
| Relationship between Degree of Obstruction and GERD | -0.011 | 0.940 |
| Relationship between Degree of Obstruction and HF (Heart Failure) | – | – |
| Relationship between Degree of Obstruction and HT (Hypertension) | -0.092 | 0.535 |
| Relationship between Degree of Obstruction and Lung Tumor | – | – |
| Relationship between Degree of Obstruction and Obesity | 0.064 | 0.668 |
| Relationship between Degree of Obstruction and Rhinitis | 0.092 | 0.534 |
| Relationship between Degree of Obstruction and TB (Tuberculosis) | – | – |

Source: Researcher's data analysis (2023)

TABLE 8
**Results of Correlation Test Between Stable Asthma Diagnosis and Types of Patient Comorbidities**

| Variables | Coefficient of correlation | *P-value* |
|---|---|---|
| Relationship between Stable Asthma Diagnosis and CHF | 0.153 | 0.116 |
| Relationship between Stable Asthma Diagnosis and DM | 0.153 | 0.116 |
| Relationship between Stable Asthma Diagnosis and GERD | 0.070 | 0.475 |
| Relationship between Stable Asthma Diagnosis and HF | 0.138 | 0.156 |
| Relationship between Stable Asthma Diagnosis and HT | 0.054 | 0.581 |
| Relationship between Stable Asthma Diagnosis and Lung Tumor | 0.153 | 0.116 |
| Relationship between Stable Asthma Diagnosis and Obesity | -0.019 | 0.843 |
| Relationship between Stable Asthma Diagnosis and Rhinitis | -0.042 | 0.671 |
| Relationship between Stable Asthma Diagnosis and TB | 0.097 | 0.321 |

Source: Researcher's data analysis (2023)

The correlation test between the Degree of Obstruction and FVC spirometric results shows a significant relationship, with a moderately strong negative correlation coefficient. Patients with moderate obstruction have lower FVC spirometric values compared to those with mild obstruction.

Furthermore, the correlation test between the Degree of Obstruction and the spirometric parameter FEV1/FVC reveals a highly significant relationship, with a very strong negative correlation coefficient. Patients with moderate obstruction have lower FEV1/FVC spirometric values compared to those with mild obstruction.

Similarly, there is a significant relationship between the Degree of Obstruction and other spirometric parameters such as PEF, FEF 25, FEF 50, and FEF 75. Strong negative correlation coefficients for each parameter indicate that patients with moderate obstruction tend to have lower spirometric values, while those with mild obstruction have relatively higher values.

Table 6 shows the correlation test results indicate that there is no significant relationship between the Degree of Obstruction and Allergy Types such as Dust, Cold, Food, Weather, Dermatitis, Eczema, Rhinitis, and Hypertension (HT). The obtained results show a p-value greater than 0.05 ($p$>0.05, accept Ho), indicating that mild or moderate Obstruction is not significantly associated with the presence or types of allergic atopy.

In the correlation test with Family Atopy Types, such as Asthma, Rhinitis, and Dermatitis, it also shows that there is no significant relationship with the Degree of Obstruction. The *p-value* greater than 0.05 ($p$>0.05, accept Ho) confirms that the Degree of Obstruction in patients

TABLE 9
**Results of Correlation Test Between Restriction/Obstruction/Mixture and Types of Patient Comorbidities**

| Variables | Coefficient of correlation | *P-value* |
|---|---|---|
| Relationship between Restriction/Obstruction/Mixture and CHF | 0.118 | 0.224 |
| Relationship between Restriction/Obstruction/Mixture and DM | -0.015 | 0.878 |
| Relationship between Restriction/Obstruction/Mixture and GERD | 0.075 | 0.443 |
| Relationship between Restriction/Obstruction/Mixture and HF | -0.101 | 0.302 |
| Relationship between Restriction/Obstruction/Mixture and HT | 0.146 | 0.133 |
| Relationship between Restriction/Obstruction/Mixture and Lung Tumor | -0.015 | 0.878 |
| Relationship between Restriction/Obstruction/Mixture and Obesity | 0.129 | 0.184 |
| Relationship between Restriction/Obstruction/Mixture and Rhinitis | -0.062 | 0.525 |
| Relationship between Restriction/Obstruction/Mixture and TB | -0.021 | 0.827 |

Source: Researcher's data analysis (2023)

does not have a significant correlation with the types of atopy that may exist in the patient's family.

Furthermore, the correlation test with Asthma Control Test (ACT) Score and Gina Symptoms Control indicates that there is no significant relationship between the Degree of Obstruction and the high or low ACT score or the presence or absence of symptom control according to Gina Symptoms Control. The *p-value* greater than 0.05 ($p$>0.05, accept Ho) indicates that the level of asthma control in patients is not dependent on the Degree of Obstruction.

Correlation tests for Asthma Risk Assessment, including risk factors such as Dust, Cold Air, Allergy History, Stress, and Dry Air, show that there is no significant relationship with the Degree of Obstruction. The *p-value* greater than 0.05 ($p$>0.05, accept Ho) confirms that the Degree of Obstruction in patients does not have a significant correlation with the measured asthma risk factors in the study.

Finally, correlation tests with the Diagnosis of Asthma Exacerbation and the Restriction/Obstruction/Mixed category also show that there is no significant relationship with the Degree of Obstruction. The *p-value* greater than 0.05 ($p$>0.05, accept Ho) confirms that mild or moderate Obstruction is not significantly associated with the Diagnosis of Asthma Exacerbation or the Restriction/Obstruction/Mixed category in patients.

Table 7 shows the results of the correlation test between the Degree of Obstruction and comorbidities, including CHF, DM, GERD, HF, HT, lung tumor, Obesity, Rhinitis, and TB, it was found that the *p-values* were greater than 0.05 ($p$>0.05, accept Ho). Therefore, it can be concluded that there is no significant relationship between the Degree of Obstruction and the mentioned comorbidities, namely CHF, DM, GERD, HF, HT, lung tumor, Obesity, Rhinitis, and TB. In other words, patients with mild or moderate obstruction do not show a significant association with the presence or absence of these comorbidities.

Table 8 shows the correlation test results between Stable Asthma Diagnosis and comorbidities such as CHF, DM, GERD, HF, HT, lung tumor, obesity, rhinitis, and TB obtained a *p-value* greater than 0.05 ($p$>0.05, accept Ho). Therefore, it can be concluded that there is no significant relationship between Stable Asthma Diagnosis and comorbidities, namely CHF, DM, GERD, HF, HT, lung tumor, obesity, rhinitis, and TB. In other words, patients with a Stable Asthma Diagnosis, whether Fully Controlled, Partially Controlled, or Uncontrolled, do not have a significant correlation with the presence or absence of comorbidities such as CHF, DM, GERD, HF, HT, lung tumor, obesity, rhinitis, and TB.

Table 9 shows for the correlation test results between Restriction/Obstruction/Mixed patterns and patient comorbidities, including CHF, DM, GERD, HF, HT, lung tumor, Obesity, Rhinitis, and TB, the obtained *p-values* are greater than 0.05 ($p$>0.05, accept Ho). Therefore, it can be concluded that there is no significant relationship between Restriction/Obstruction/Mixed patterns and the mentioned patient comorbidities, namely CHF, DM, GERD, HF, HT, lung tumor, Obesity, Rhinitis, and TB. In other words, patients with Restriction/Obstruction/Mixed patterns are not associated with the presence or absence of these specific comorbidities.

## DISCUSSION

This study offers a thorough analysis of the features of asthma patients and how they relate to risk factors, atopic history, family history, and spirometry parameters. According to the findings regarding smoking history and stable asthma diagnosis, a sizable percentage of patients had smoked in the past, either actively (22.4%) or passively (52.3%). This study found no significant association between smoking history and asthma control levels, despite the fact that smoking history can have an impact on lung health. Given that active and passive smokers may have varying degrees of asthma control, this could point to the complexity of the factors affecting asthma management. These findings align with the research by Soraya,[19] confirming a significant correlation between atopic history and the severity of asthma in pediatric patients. Further identification and understanding of atopic history in children can be a crucial factor in determining appropriate management. Additionally, Cetemen found that obese children have a higher prevalence of asthma attacks.[20] Although this study did not find a significant correlation between smoking history (especially passive and active smoking) and asthma control, attention to the obesity risk factor remains relevant in evaluating asthma causative factors. The results from this study support previous findings by London,[21] indicating that a family history of asthma and allergies contributes to early-onset asthma in children. This study provides additional focus on the influence of maternal smoking during pregnancy, emphasizing that early-life environmental exposure can play a crucial role in the development of asthma at a young age. The lack of a significant association between smoking history and asthma control may be due to the heterogeneity of asthma phenotypes and biological adaptation. Asthma varies by endotype––such as allergic (Th2-high), non-allergic, or obesity-related forms––and smoking may impact some types more than others, with combined data potentially masking subtype-specific effects. Additionally, the age of asthma onset matters, as smoking may influence adult-onset asthma more strongly than early-onset forms. Biologically, a plateau effect may occur where further smoking doesn't worsen control beyond a certain inflammation threshold, and chronic smokers may develop antioxidant defenses that reduce oxidative damage, complicating the detection of a clear doseresponse relationship.

This study examined the diagnosis of asthma exacerbation and associated risk factors, finding that while certain triggers––such as dust and chilly air––were frequently reported, not all of them were significantly correlated with the severity of asthma flare-ups. This highlights the complexity of asthma exacerbations, where exposure alone may not predict the intensity of symptoms. The findings underscore the importance of identifying and managing specific risk factors on an individual basis, as well as the need for further research to better understand how these environmental and lifestyle triggers influence the course and severity of asthma exacerbations. These findings align with previous studies, including research by Soraya, which also found the complexity of the relationship between risk factors and the severity of asthma.[19] The study emphasizes the significant correlation between atopic history and the severity of asthma in children, while this research focuses on environmental risk factors. While this study shows inconsistency with some previous research indicating a correlation between specific risk factors and asthma exacerbation, such as the study by Yavuzyilmaz investigating the prevalence of asthma attacks in obese children, these findings highlight the complexity of understanding the impact of risk factors on asthma exacerbation.[22]

The spirometry results reveal that most patients exhibit reduced values, indicative of airflow obstruction or restriction. This pattern aligns with what is typically seen in asthma, where decreased spirometric measurements reflect impaired lung function. Overall, these findings corroborate existing literature demonstrating a clear association between asthma and diminished respiratory capacity. The spirometry analysis results, showing that most patients have low spirometry values, align with the findings of previous studies, including research by Soraya and Yavuzyilmaz.[19,22] Soraya found a relationship between the severity of asthma in children and low spirometry values, while Yavuzyilmaz found a higher prevalence of asthma attacks in obese children, which may also reflect impaired lung function.[19,22] Airflow obstruction and reduced spirometric values in asthma arise primarily from chronic airway inflammation, bronchial hyperresponsiveness, and smooth muscle constriction. Inflammatory cells––especially eosinophils and mast cells––release mediators that cause edema of the bronchial mucosa and increased mucus production, narrowing the airways and reducing $FEV_1$ and $FEV_1$/FVC ratios. During an exacerbation, smooth muscle contraction further limits airflow, while over time structural changes such as subepithelial fibrosis and airway wall thickening (airway remodeling) can lead to a more fixed component of obstruction. Together, these mechanisms explain why asthmatic patients consistently demonstrate lower spirometry values and reinforce the link between the pathophysiology of asthma and impaired lung function.

Correlation Between Degree of Obstruction and Spirometric Parameters: There is a significant correlation between the degree of obstruction and spirometric parameters, such as FEV1, FVC, FEV1/FVC, PEF, FEF 25, FEF 50, and FEF 75. This is in line with expectations because airway obstruction generally correlates with a decrease in lung function. Particularly, the strong relationship with FEV1/FVC indicates the presence of relevant airway obstruction in this study's population. The correlation results between the degree of obstruction and spirometric parameters, such as FEV1, FVC, and FEV1/FVC, consistently align with previous research, especially conducted by Soraya and Yavuzyilmaz.[19,22]

They found that the severity of asthma correlates with changes in spirometric values. This provides additional confirmation of the relationship between airway obstruction and lung function in asthma patients. The strong relationship with FEV1/FVC highlights the success of using spirometry as the primary diagnostic tool for assessing airway obstruction. These findings are in line with the GINA diagnostic guidelines (2021), emphasizing the importance of measuring FEV1/FVC in confirming an asthma diagnosis.

Relationship with Atopy History and Family History: There is no significant correlation between stable asthma diagnosis and the patient's atopic history or family history. This indicates that asthma control levels are not directly correlated with atopic history. This could be attributed to other factors influencing asthma control beyond atopic history. Correlation with Comorbidity Types: There is no significant relationship between the degree of obstruction or stable asthma diagnosis and comorbidities such as CHF, DM, GERD, HF, HT, lung tumor, obesity, rhinitis, and TB. This suggests the complexity of managing asthma patients with comorbidities, where these factors might require different management approaches.

## CONCLUSION

Smoking history showed no significant association with asthma control levels, although a large proportion of patients reported both active and passive smoking exposure. Environmental triggers such as dust and cold air were common but only some––particularly dust––were linked to exacerbation severity, underscoring the need for targeted avoidance strategies. Spirometric analysis demonstrated that lower values across FEV□, FVC, FEV□/FVC, PEF, and FEF indices closely tracked with the clinician□graded degree of airway obstruction, confirming their utility in assessing airflow limitation.

Conversely, neither a personal nor family history of atopy correlated significantly with stable asthma diagnosis or with the pattern and severity of obstruction, nor did comorbidities or the broad categories of risk factors. Taken together, these findings directly address the study's objective by highlighting that while lung function indices reliably reflect obstruction, atopic predisposition and smoking exposure do not predict control or severity in this cohort. Clinically, this supports a multifactorial, personalized approach––prioritizing spirometric monitoring and individualized risk□factor management––while advocating further research into the mechanisms by which non□atopic, non□smoking factors drive asthma heterogeneity.

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