

Risk Factors for Acute Asthma with The Severity of Acute Asthma in Hospitalized Patients

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Abstract

Introduction: Asthma is a chronic respiratory condition with a prevalence of 1–29% of the population globally in many countries. According to the Ministry of Health in 2020, asthma is included in the category of diseases with the highest number of sufferers among Indonesians. The prevalence of asthma in Indonesia showed a figure of 4.5% of the population, which is equivalent to approximately 12 million individuals. Asthma associated with hospitalization can indicate uncontrolled asthma and a marker of the risk of asthma exacerbations in the future. Complications if acute asthma is not immediately treated properly will complicate heart failure, respiratory failure or respiratory arrest, pneumothorax, pneumonia, COPD, etc.

Metode: This study is a descriptive observational study with a quantitative approach. The sample in this study were adult acute asthma inpatients at RSIJ Sukapura from January 2021 – July 2025, totaling 83 patients. The number of adult acute asthma patients studied was 83.

Result: Of the 83 patients, most were aged 46–55 years, female, had mild to moderate acute asthma, and the most common triggering factor was respiratory tract infection.

Conclusion: The most common triggering factor for acute asthma in mild to moderate acute asthma is respiratory tract infection.

Keywords: Acute Asthma, Risk Factors, Severity of Acute Asthma, Hospitalization.

Faktor Risiko Asma Akut dan Berat Derajat Asma Akut pada Pasien Rawat Inap

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Abstrak

Pendahuluan: Asma merupakan kondisi respiratorik kronis yang prevalensinya mencapai 1–29% dari populasi dalam skala global di banyak negara. Kementerian Kesehatan tahun 2020, asma termasuk dalam kategori penyakit dengan jumlah penderita terbanyak di kalangan masyarakat Indonesia. Prevalensi asma di Indonesia menunjukkan angka 4,5% dari jumlah populasi, yang setara dengan kurang lebih 12 juta individu. Asma terkait rawat inap dapat menunjukkan asma yang tidak terkontrol dan penanda risiko eksaserbasi asma pada masa mendatang. Komplikasi jika asma akut tidak segera ditangani dengan baik akan berkomplikasi gagal jantung, gagal napas atau henti napas, pneumotoraks, pneumonia, PPOK, dll.

Metode: Penelitian ini adalah deskriptif observasional dengan pendekatan kuantitatif. Sampel dalam penelitian ini adalah pasien rawat inap asma akut dewasa di RSIJ Sukapura dari Januari 2021 – Juli 2025 yang berjumlah 83 pasien. Jumlah pasien asma akut dewasa yang diteliti sebanyak 83 pasien.

Hasil: Dari 83 pasien, terbanyak berusia 46–55 tahun, berjenis kelamin perempuan, derajat asma akut ringan - sedang, dan faktor pencetus terbanyak adalah infeksi saluran napas.

Kesimpulan: Faktor pencetus asma akut terbanyak infeksi saluran pernapasan yang terdapat pada asma akut derajat ringan – sedang.

Kata kunci: Asma Akut, Faktor Pencetus, Berat Derajat Asma Akut, Rawat Inap

Introduction

According to GINA (Global Initiative for Asthma), asthma is a chronic respiratory condition with a prevalence of 1–29% of the global population in many countries. Clinical manifestations include wheezing, dyspnea, a sensation of thoracic constriction, and/or coughing, accompanied by variable airflow limitation during exhalation. These symptoms and airflow limitation fluctuate in both temporal and severity. These fluctuations are often triggered by various factors, including physical activity, exposure to allergens or irritants, meteorological variations, and infections caused by respiratory viruses.¹

Meanwhile, acute asthma is defined as an episode of an asthma attack manifested by the progression of symptoms such as dyspnea, cough, wheezing, or a sensation of pressure/heaviness in the chest, as well as progressive

deterioration of pulmonary function.² Exacerbations can appear as the initial clinical presentation in individuals who have not yet been diagnosed with asthma, given that this condition is often triggered by exposure to substances such as pollen, air pollutants, and strong odors, or can also be caused by non-adherence to controller medications. High-severity exacerbations can manifest even in asthmatics with partial or optimal control.²

Asthma is considered the most prevalent chronic condition globally because it affects individuals of all ages worldwide. The disease affected approximately 262 million people in 2019 and contributed to 455,000 deaths.³ Data on the prevalence of asthma in the United States in 2021, categorized by age, sex, and race/ethnicity, showed that, in terms of age, children under 18 had a prevalence of 6.5%, while adults had a prevalence of 8.0%. In terms of gender, the prevalence rate for

men was 6.5%, while for women it was 8.9%. From a racial perspective, the prevalence rate for whites was 7.7%, blacks 11.0%, and Hispanics 5.7%. According to 2020 data from the Ministry of Health, asthma is included in the category of diseases with the highest number of sufferers among the Indonesian people. At the end of 2020, the prevalence of asthma in Indonesia showed a figure of 4.5% of the population, which is equivalent to approximately 12 million individuals.⁴

The main risk factors that can trigger asthma symptoms according to Putri et al, are cold air, fatigue, cigarette smoke, infections, irritants (e.g. mites, pollution, pet dander, dust, mold, and pollen) and a genetic history of asthma.⁵ According to Josua et al., exercise is a common trigger for asthma, and high-intensity exercise is particularly important. Because exercise can often trigger asthma symptoms, some individuals with asthma begin to avoid physical activity. Paradoxically, this avoidance exacerbates their health problems, perpetuating a cycle of decreased fitness and skeletal muscle deconditioning. Swimming and certain sports pose a higher risk of EIB, with exposure to chlorine in swimming pools being a significant factor.⁶ Gastroduodenal reflux (acid, pepsin, bile acids, and pancreatic enzymes) enter the esophagus and subsequently leads to microaspiration into the lungs and other parts of the pulmonary tree. The aspiration of these contents can result in stimulation of the pharynx or larynx, consequently resulting in extraesophageal symptoms such as tracheal or bronchial cough reflex. The chronic inflammation of lung tissue may lead to airway obstruction, poor gas exchange, acute lung injury, and severe acute respiratory distress syndrome. These mechanisms consequently induce the liberation of proinflammatory cytokines from T-helper Type 2 cells, leading to an increase in airflow resistance and inflammation.⁷

The most common triggers for an exacerbation are viral respiratory infections with human rhinovirus (RV), particularly subtypes A and C, most frequent. Bacterial infections may impair mucociliary clearance and increase mucus production in the lung and may cause chronic lower airway inflammation. Evidence linking bacterial infections to acute asthma exacerbations has been limited. However, respiratory viruses may impair the antibacterial defenses by human alveolar macrophages and thereby facilitate emergence of bacterial infections or change in the microbiome. How these interrelationships contribute to exacerbations is not established, but they

may be of potential therapeutic importance to prevent acute asthma.⁸

Asthma severity is classified based on the frequency of attacks and daily medication use. GINA classifies acute asthma attacks using clinical manifestations and signs, pulmonary function tests, and laboratory findings. This classification divides attacks into mild, moderate, severe, and life-threatening. Asthma attacks are classified as mild-moderate, severe, and life-threatening. In a mild-moderate attack, the patient is still able to speak in phrases, is sitting, is conscious without agitation, with a respiratory rate of <30 breaths/minute, a pulse of 100–120 breaths/minute, and a saturation of 90–95%. A severe asthma attack is characterized by the ability to speak in single words, a hunched sitting position, agitation, a respiratory rate of >30 breaths/minute, a pulse of >120 breaths/minute, and a saturation of <90%. Life-threatening asthma is characterized by decreased consciousness, a silent chest, and paradoxical breathing.¹

Referring to the above description, this research was conducted to determine the risk factors for acute asthma in inpatients at Jakarta Sukapura Islamic Hospital. The aim of this study was to identify various risk factors that can induce acute asthma attacks in patients undergoing inpatient care at Jakarta Sukapura Islamic Hospital.

Methods

Study Design

This study employs a quantitative approach through observational descriptive study. The design implementation in this study involved the utilization of secondary data sourced from medical record documentation, where data samples were taken retrospectively from a past time period, specifically from January 1, 2021, to July 30, 2025. The target population in this study included all patients diagnosed with acute asthma and currently undergoing inpatient treatment at Jakarta Sukapura Islamic Hospital.

The sample size was calculated using the Slovin formula with a 5% error rate, resulting in 83 samples. The sample selection parameters used in this study met the inclusion and exclusion criteria. Study subjects who met the inclusion criteria were patients diagnosed with acute asthma by a pulmonologist, aged ≥ 18 years, and undergoing inpatient treatment. The exclusion criteria for this study were patients with controlled asthma.

Statistical Analysis

Univariate analysis was conducted to describe the percentage distribution of each characteristic variable of acute asthma patients who were hospitalized, namely age, gender, risk factors and severity of acute asthma.

Ethics

This study was approved by the Ethics Committee of the Faculty of Medicine and Health, Universitas Muhammadiyah Jakarta (Approval No. 89/PE/KE/FKK-UMJ/VII/2025; Date: July 15, 2025). All participants or their parents/guardians provided informed consent, and the study was approved by the review boards of the participating institutions.

Result

For the frequency and percentage of age, there are 9 respondents (10.8%) in the 18–25 age category. The next age group is 15 respondents (18.1%) in the 26–35 age group, followed by 12 respondents (14.5%) in the

36–45 age group, followed by 24 respondents (28.9%) in the 46–55 age group, and 23 respondents (27.7%) in the >55 age group. The age composition of respondents is dominated by two groups: late adulthood/early elderly (46–55 years) and elderly (>55 years).

For distribution by gender of a total of 83 people. Of these, there were 22 male respondents (M), which constitutes 26.5% of the total, and 61 female respondents (F), which covers 73.5% of the total.

The analysis showed that the most dominant risk factors was respiratory tract infection, which was the cause in the majority of cases, amounting to 76 respondents (91.6%). Other triggering factors included GERD (6 respondents) (7.2%), and food allergy (1 respondent) (1.2%).

The distribution of acute asthma severity was as follows: 73 people (88.2%) experienced mild to moderate acute asthma. Nine respondents (10.8%) experienced the higher severity category, Severe. Meanwhile, the least common case was Life-Threatening, which was found in only one respondent (1.2%).

Tabel 1. Presents the Frequency and Percentage Distribution of Acute Asthma Patients Hospitalized at Jakarta Sukapura Islamic Hospital.

Characteristics	Frequency	%
Age		
18 – 25	9	10.8%
26 – 35	15	18.1%
36 – 45	12	14.5%
46 – 55	24	28.9%
> 55	23	27.7%
Gender		
Male	22	26.5%
Female	61	73.5%
Risk factors of acute asthma		
Food Allergies	1	1.2%
GERD	6	7.2%
Respiratory tract infections	76	91.6%
Severity of acute asthma		
mild – moderate	73	88.2%
Severe	9	10.8%
Life-Threatening	1	1.2%

Discussion

This study found that the most acute asthma patients were in the 46–55 year age group, with 24 respondents (28.9%). This study aligns with Rizky Pratiwi's research, which found the most cases of acute asthma in the 45–54 year age group, with 11 people (31%).⁹ It also aligns with Nur Akbar's research, which found that the age composition of respondents was concentrated in the 45–60 year age range, encompassing both early and late elderly phases.¹⁰

As we age, various changes occur in the respiratory system, including reduced alveolar elasticity, bronchial gland hypertrophy, reduced pulmonary capacity, and dead space expansion. This condition is a consequence of the aging process in the elderly, characterized by progressive degeneration of cellular structure and function, tissues, and organ systems.¹⁰ This study differs from that of Muhammad Ikhsan et al., where respondents were predominantly late adults (36–45 years old), with 20 people representing 29.9%.¹¹

Gender in this study also found that the proportion of acute asthma cases was greater in female respondents, namely 61, which covered 73.5% of the total. In accordance with the research of Fachri, M., Afifah, F., where asthma attacks often occur in women with a total of 22 respondents (62.9%).¹² This study also aligns with Rizky Pratiwi's research, the majority of respondents were female with a total of 71 people (70.3%).⁹ In Nur Akbar's research, the distribution of asthma patients also found a dominance of women over men, with details at RSUA as many as 29 female respondents (74.4%) and at RSU Haji as many as 27 female respondents (69.2%).¹⁰

Women are at higher risk of developing asthma than men. Nonspecific bronchial hyperreactivity is more common in women than in men. Women also have smaller airway calibers. Men have superior inspiratory volume due to stronger muscle mass, including respiratory muscles. Furthermore, women experience increased levels of ovarian hormones, namely estrogen and progesterone, while androgen hormones, including testosterone and 5-alpha-dihydrotestosterone (5α-DHT), have an inhibitory effect on the natural and adaptive immune responses, triggering inflammation in the airways of asthma sufferers.¹⁰

Furthermore, regarding risk factors, in this study, the most common risk factors for acute asthma was respiratory tract infections, with a total of 76 respondents (91.6%). This

is in line with Rizky Pratiwi's research, where respiratory infections were the most common triggering factor, with 21 people (60%) of the 35 people who were included in the research criteria.⁹ This is also in line with the research of Fachri and Afifah, F., the dominant risk factor causing acute asthma exacerbations at RSIJ Pondok Kopi was respiratory infections, with a total of 12 cases.¹² Mercey Manes et al. stated that infections in the respiratory tract can trigger asthma attacks. Symptoms such as coughing, rhinorrhea, and fever can trigger an inflammatory process that increases bronchial hyperresponsiveness.¹³ This is in contrast to the research of Muhammad Ikhsan et al., where the least common risk factors for acute asthma was upper respiratory tract infections, with 1 person (1.5%).¹¹

In addition, in the study by Iqbal et al., a total of 190 patients were registered, with an average age of 33.7±13.3 years and 55.8% of them were women. The prevalence of GERD was (136) 71.6%.¹⁴

Furthermore, food allergies were the trigger for 1 respondent (1.2%). This is in line with research by Fachri and Afifah, F., which found that 2 people (5.7%) had food triggers, namely seafood.¹² These results are in line with Rizky Pratiwi's study, which found risk factors in 1 subject (2.9%).⁹

The limitations of this study are that the data obtained is based on secondary data in the form of medical records so that the quality of the data is very dependent on the completeness of the medical record data, the very short time for sampling and the place used for sampling is only in one place so that the triggering factors are less varied. Therefore, it is hoped that improvements can be made to the completeness and quality of each patient's medical record documentation in the future, thereby making future research more effective and efficient. Further research is expected to be conducted with a longer sampling period and involving more than one research site, thus achieving more diverse results.

Conclusion

Among inpatients at Jakarta Sukapura Islamic Hospital, the majority of patients experiencing acute asthma were mild to moderate, at 88.1%. This finding indicates that the majority of inpatients still have relatively mild to moderate degrees of acute asthma, although they still require hospitalization. The most common risk factors for acute asthma in inpatients at Jakarta Sukapura Islamic Hospital

was respiratory tract infection, with a proportion of 90.5%. Furthermore, respiratory tract infection was also the most common triggering factor in patients with mild to moderate acute asthma.

Data Availability Statement

The data that support the findings of this study are available upon request from the corresponding author.

Ethics Committee Approval

Ethics committee approval was received from the Ethics Committee of the Faculty of Medicine and Health, Universitas Muhammadiyah of Jakarta, Indonesia (Approval No. 89/PE/KE/FKK-UMJ/VII/2025; Date: July 15, 2025).

Informed consent

This study has obtained data collection permit approval from the Research Ethics Committee of the Jakarta Sukapura Islamic Hospital with number 564/XVI/E.8/202. The study uses secondary data from patient medical records retrospectively so that individual informed consent is not required. The confidentiality of patient identity is maintained.

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Research Conflict Declaration

The authors have no conflicts of interest to declare.

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