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Factors associated with asthma recurrence: a narative review

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ABSTRACT

Background: Asthma is a chronic, heterogeneous airway disease characterized by bronchial hyperresponsiveness and inflammation, affecting children, adults, and the elderly. There are multiple factors that caused the recurrence, including: air pollution, exercise, emotional, stress, medication, etc. Further research is needed to fully understand the complex interplay of these factors and to develop more effective strategies for preventing and managing asthma recurrence.

Objective: To explore and analyze more deeply the factors that influence and are associated with the history of asthma attacks in asthmatic patients.

Method: This paper was written using the literature review method with the keywords "Asthma," "Asthma Attack," and "Asthma Risk Factors." The scientific articles reviewed in this study consist of five articles related to the factors contributing to the history of attacks in asthmatic patients. Five articles were selected from 19 relevant open-access, full-text studies, focusing on factors contributing to asthma attack history. Articles with incomplete structures or in review format were excluded.

Results: Factors associated to the history of asthma attacks in asthmatic patients include gender, body mass index (BMI), genetics or family history, childhood asthma history, respiratory tract infections, stress, anxiety, depression, physical activity level, exposure to cigarette smoke, environment, weather changes, and allergen factors.

Conclusion: This literature review identifies gender, BMI, genetics, childhood asthma history, respiratory infections, stress, anxiety, depression, physical activity, cigarette smoke exposure, environmental factors, weather changes, and allergens as potential triggers for asthma attacks. Analyzing these factors is crucial for preventing asthma and its recurrence.

Keywords: asthma, chronic disease, risk factors, respiratory, review article

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Introduction

Asthma is a chronic obstructive disease of the respiratory tract that is often suffered by children, adults, or the elderly. Asthma is characterized by bronchial hyperresponsiveness and inflammation of the respiratory tract that causes a variety of recurrent episodic symptoms, such as shortness of breath, wheezing, chest tightness, and coughing that vary from time to time, especially at night or early morning. Asthma is a disease that can be controlled but cannot be cured and is recurrent.[1] The World Health Organization (WHO) states that in 2019 the number of asthma patients in the world is estimated to reach 262 million people and the number of patients who died reached 455,000.[2] In Indonesia, until the end of 2020, the percentage of asthma sufferers was 4.5% or around 12 million people.[3] In the Survei Kesehatan Rumah Tangga (SKRT), most provinces in Indonesia demonstrated that asthma is among the top ten diseases contributing to morbidity and mortality in the country.[4] The prognosis of asthma is good for the life process, body function, and total recovery for asthma sufferers.[5]

The occurrence of asthma in a person is caused by various factors, such as internal and external factors. Internal factors, namely gender, age, body mass index (BMI), genetics, stress, physical activity and respiratory tract infections. While external factors, such as environmental conditions, exposure to dust, allergens, smoking, work-related factors, and weather conditions.[1,6] These factors not only cause an increase in the prevalence of asthma, but also become triggers for asthma that is recurrent. Recurrence is the reappearance of previously occurring symptoms supported by the triggers for the recurrence. Recurrence or history of attacks is identical to repeated events in sufferers of certain diseases which are usually felt more than 3 times and are unpleasant.[7] Recurrence can be felt by children, adults and the elderly. Recurrence and asthma attacks will be felt by asthma sufferers if there are triggering factors that cause the

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recurrence to occur, predominantly caused by external factors.

History of asthma attacks and recurrences will cause the risk of asthma exacerbations that can worsen the condition of asthma sufferers.[8] These factors need to be explored further as an effort to prevent the occurrence of asthma and a history of asthma attacks or recurrences. Based on this description, the writing of this literature review aims to explore and analyze more deeply the factors related to the history of attacks in asthmatic patients.

Methods

This study used the literature review method. The research articles were obtained from the Google Search, Google Scholar, PubMed, ResearchGate, and ScienceDirect database pages. The information obtained was secondary data compiled based on articles published between 2019 and 2024. Article searches were conducted using the keywords "Asthma," "Asthma Attacks," and "Asthma Risk Factor," which were illustrated with a flowchart of the literature study search flow. The article inclusion criteria were open access and full text. The article exclusion criteria were incomplete structure and articles in the form of reviews. The data obtained were then collected and compiled according to the topic of the problem discussed (Figure 1).

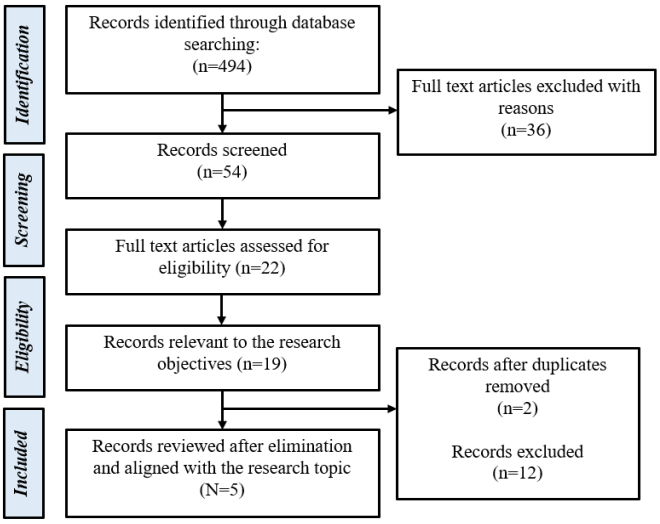

Figure 1. Flow chart literature study search flow

Results

Based on the results of the literature search, there are four literatures related to the title of the research that has been written. The results of table 1 are as follows:

The study by Alem, K., et al. (2020), using an observational quantitative design with a cross-sectional survey involving 442 asthma patients from the chronic disease clinic, treatment, and outpatient clinic at Gondar University Teaching Hospital, found that asthma attacks and increased asthma severity are influenced by several risk factors. These include gender (women are 1.68 times more at risk than men), environment (patients living in rural areas are 1.76 times more at risk than those in urban areas), weather conditions (the dry season has a 45% lower risk compared to the rainy season), physical activity (patients who engage in physical activity are 2.39 times more at risk), allergies to animals (patients living with pets are 3.17 times more at risk), depression (depressed patients are 2.31 times more at risk), childhood asthma history (patients with a childhood asthma history are 2.27 times more at risk), and family history (patients with a family history of asthma are at higher risk). Data analysis was conducted using logistic regression tests to determine the relationship between these factors and the occurrence of asthma attacks and increased asthma severity.

The study by Djamil, A., et al. (2020), using an observational quantitative design with a cross-sectional survey involving 42 asthma patients aged 20-44 years, examined factors related to asthma recurrence. The independent variables analyzed included dust factors, exposure to cigarette smoke, exercise, stress, weather changes, and respiratory tract infections. The data were analyzed univariately and bivariately using the Chi-square statistical test. The results showed significant relationships between asthma recurrence and dust factors (p-value = 0.001), cigarette smoke exposure (p-value = 0.013), respiratory tract infections (p-value = 0.016), and weather changes (p-value = 0.035), as all were below the significance level of $\alpha = 0.05$. However, there was no significant relationship between stress (p-value = 1.000) and exercise (p-value = 0.798) and asthma recurrence.

The study by Lampalo, M., et al. (2019) used a quantitative analytical observational design with descriptive statistics methods to investigate gender differences in the relationship between Body Mass Index (BMI) and asthma. The study involved 149 asthma patients in the experimental group and 153 healthy blood donors in the control group, with data obtained from medical records. The independent variables were gender and BMI, while the dependent variable was asthma. Data analysis was conducted using the Kolmogorov-Smirnov test and the Mann-Whitney U test. Results showed that asthma patients had a significantly higher mean BMI compared to the control group (p-value = 0.035). The correlation between BMI and asthma was stronger in women (p-value = 0.002) than in men (p-value = 0.898). Increased BMI was not associated with non-allergic asthma overall (p-value = 0.085); however, when analyzed by gender, there was a strong association between increased BMI and non-allergic asthma in women (p-value < 0.001).

The study by Embuai (2020), which used a descriptive analytical design with a cross-sectional approach, involved 65 asthma patients at the Class II Prof. Dr. JA Latumeten Hospital to examine factors related to asthma attacks. The independent variables studied were genetic history, stress, presence of dust, and exposure to cigarette smoke, while the dependent variable was asthma attacks. Data analysis was conducted using univariate and bivariate methods, including the Fisher exact test and multivariate logistic regression. The results showed significant relationships between genetic history (p-value = 0.000),

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exposure to cigarette smoke (p-value = 0.017), presence of dust (p-value = 0.037), and stress (p-value = 0.020) with the occurrence and recurrence of asthma attacks in patients, all of which were below the significance threshold of $\alpha = 0.05$

The study by Nurhalisa, S. Y. P., et al. (2022) used a correlational research design with a total sampling technique, involving 37 asthma patients treated at the Sukabumi Health Center (UPTD). The study aimed to examine the relationship between stress and anxiety (independent variables) and the recurrence of shortness of breath in asthma sufferers (dependent variable). Data analysis was conducted using univariate analysis with a frequency distribution formula and bivariate analysis with the Somers' D statistical test. The results indicated a significant relationship between stress (p-value = 0.005) and anxiety (p-value = 0.018) with the recurrence of shortness of breath in asthma patients, as both p-values were below the significance level of $\alpha = 0.05$.

Discussion

Asthma is a chronic obstructive disease of the respiratory tract that is often suffered by children, adults, and the elderly which is heterogeneous in nature and is characterized by bronchial hyperresponsiveness and inflammation of the respiratory tract which causes various recurrent episodic symptoms, such as shortness of breath, wheezing, and chest tightness, as well as coughing that varies from time to time which is felt at night or early morning.[1]

According to The Ministry of Health of the Republic of Indonesia, the onset of asthma can be triggered by several factors, namely genetics, respiratory tract infections, stress, allergens, exposure to cigarette smoke, exposure to chemicals, air pollution, extreme weather conditions, humid room conditions, excessive emotions, intense physical activity, consuming drugs such as aspirin or nonsteroidal anti-inflammatory drugs (NSAIDs), food and drinks containing addictive substances, and suffering from gastroesophageal reflux disease (GERD).[3,12] Based on the analysis of studies that have been conducted from the five articles above, it was found that the history of asthma attacks in asthma patients can be influenced by gender, body mass index (BMI), genetics or family history, history of childhood asthma, respiratory tract infections, stress, anxiety, depression, level of physical activity, exposure to cigarette smoke, environment, weather changes, and allergen factors.

Research by Alem, K., et al and Lampalo, M., et al. stated that there is a significant relationship between gender and history of asthma attacks or recurrences. Both studies showed results that women are more at risk of asthma attacks. Generally, asthma will occur in men who have not experienced puberty or are under 14 years old. This is because the lungs in men are smaller than those in women. Conversely, women who have experienced puberty will be at greater risk of experiencing asthma attacks, this is because sex hormones in women, namely estrogen and progesterone, cannot inhibit the production of ILC2 lymphoid cells. Excess ILC2 lymphoid cells will release pro-inflammatory cytokines that cause inflammation in the respiratory tract, triggering asthma.[1,9,15,16]

In addition, triggering factors that can cause asthma recurrence are body mass index (BMI). Research by Lampalo, et al. stated that someone with a body mass index (BMI) in the obesity category is at higher risk of experiencing asthma recurrence. Someone who is overweight shows changes in the respiratory mechanical system which is characterized by the emergence of adipose tissue on the thoracic wall and causes penetration and pressure of fat tissue on the chest muscles. This will cause decreased lung function and affect the VEP1, KVP, and VEP1/KVP values and can trigger asthma recurrence. Another study by Ayuningrum, et al. someone with a body mass index (BMI) in the underweight category is at higher risk of asthma relapse compared to individuals with a normal body mass index (BMI). This is related to the malnutrition experienced so that it can have a negative effect on shape, capacity, muscle strength, flexibility, immune system, and breath control.[9,17,18]

Based on research by Alem, K., et al., it shows that someone whose family suffers from asthma (genetic factors, such as a family history of atopic disease) and has a history of asthma during childhood is at high risk for asthma recurrence. This is also in line with research conducted by Embuai and Tjitradinata, C., et al. Asthma has heterogeneous characteristics related to an area containing ORMDL3 on chromosome 17q21 so that it is closely related to childhood onset asthma which can gradually cause chronic asthma and increase the risk of asthma attacks.[1,10,19,20]

Asthma recurrence can also be caused by respiratory tract infections. Based on research by Djamil, A., et al., it is said that respiratory tract infections are one of the factors that can trigger asthma attacks or recurrences. The results of this study are in line with research by Dwi, HR, et al., Silvah, et al. and Manese, M., et al. Respiratory tract infections, such as acute respiratory infections (ARI) are caused by microorganisms that can cause inflammation in the tracheobronchial system, causing hypersensitivity or hyperresponsiveness in the bronchial organs where the microorganisms attack the nose, alveoli, sinuses, adnexa, pleura and middle ear cavity. In addition, Human Rhinovirus A Minor (HRV-A minor) which causes respiratory tract infections also has a significant relationship to the occurrence of asthma recurrences.[8,13,21-23]

Stress, anxiety, and depression are also triggers for recurrent attacks in asthma patients. The results of research from three literatures by Alem, K., et al., Embuai and Nurhalisa, SYP, et al. stated that stress and anxiety affect the recurrence of shortness of breath in asthma patients. High stress can stimulate the release of the hormone cortisol and cause inflammation, thereby increasing the risk of exacerbation. Stress also causes the release of IL-6 which makes the respiratory tract full of mucus and causes obstruction (blockage) of the airways. In addition, depression factors also affect asthma recurrence. Depressive disorders can increase Th2 regulation which will worsen lung function and increase the severity of asthma patients by triggering

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asthma recurrence. Anxiety factors can trigger the release of histamine which causes smooth muscle contractions resulting in bronchoconstriction (narrowing of the airways) and increased mucus.[1,10,11,24]

The level of physical activity also affects the severity and recurrence of asthma. Based on research by Alem, K., et al. showed that patients who do exercise and physical activities regularly are at higher risk of experiencing an increase in asthma and triggering asthma recurrence. If a patient does physical activity with high intensity, it will cause an increase in the respiratory rate and narrowing of the airways. In addition, inhaling dry and cold air will irritate and trigger asthma attacks.[1] In the literature review results table, two studies prove that exposure to cigarette smoke is a crucial factor that triggers a history of attacks and recurrences in asthma patients, such as in the studies of Djamil, A., et al., and Embuai. Cigarette smoke contains various hazardous chemicals that can penetrate the alveoli and cause asthma attacks. Cigarette smoke also triggers increased mucus production in the epithelial cells of the airways and reduces fluid in the mucosa, irritating. Cigarette smoke stimulates the fine hairs in the nose (cilia) so that mucus secretion increases by around 30-50% and reduces lung ventilation function. Inflammation and increased epithelial permeability can also occur due to exposure to cigarette smoke.[8,10,13,14,20]

Environmental factors are associated with the history of asthma attacks and recurrences. Research conducted by Alem, K., et al. stated that rural areas are at greater risk of increasing the severity and history of asthma attacks than urban areas. This can happen because rural areas still have a cool atmosphere and have cold temperatures that can trigger asthma recurrences. Another study by Silvah, et al. stated that urban environments are at greater risk of triggering asthma attacks. This is because urban areas tend to be polluted by air pollution, such as vehicle pollution, factory pollution, and excessive carbon emissions.[1,22] In addition, weather changes are also a trigger for asthma recurrences. Research conducted by Alem, K., et al. is in line with research by Djamil, A., et al., and Dwi, HR, et al., which states that weather (environmental factors), especially the rainy season, is at greater risk of causing a history of attacks than the dry season. Asthma recurrences are caused by cold temperatures and high humidity levels causing an increase in the concentration of allergenic particles (pollen) carried by water and air.[1,8,13,25]

Other external factors that can trigger asthma attacks and recurrences are allergic factors (allergens). The results of research by Djamil, A., et al., and Alem, et al. and other research by Silvah, et al. and Manese, M., et al. stated that allergic factors (allergens) can trigger asthma recurrences. Allergic factors (allergens) can be, dust allergies, pollution allergies, allergies to animals, allergies to flower pollen and allergies to certain foods. Asthma patients who live with pets are at higher risk of worsening the degree and asthma attacks than those who do not have pets. This is because asthma sufferers are sensitive to dead animal skin flakes (dander), saliva and urine of furry animals, such as dogs and cats. In addition, types of food that can be associated with asthma recurrences, such as seafood, eggs, milk, nuts, and foods or drinks that contain addictive substances.[1,8,22,23]

The limitations of the study are the reliance on patient self-reporting for factors such as history of asthma attacks, smoking habits, or environmental exposures might introduce recall bias, leading to inaccurate or incomplete data. If the study was conducted in a specific geographic region or healthcare setting, the findings may not be applicable to asthmatic patients in other regions or healthcare contexts, limiting external validity.

Conclusions

Based on this literature review, the probability of gender, body mass index (BMI), genetics or family history, childhood asthma history, respiratory tract infections, stress, anxiety, depression, physical activity levels, exposure to cigarette smoke, environment, weather changes, and allergen factors can be related and risky as triggers for history of attacks in asthma patients. Analysis factors that influence and relate to the history of attacks in asthma patients are important steps as an effort to prevent the occurrence of asthma and a history of asthma attacks. Due to limitations in the preparation of this literature review, it is hoped that further writing can be done more systematically and developed according to the topic of the problem.

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Conflict of interest

According to the author, there isn't any possible conflict of interest related to this paper's study, writing, or distribution.

Author contributions

CITD conceived the study design and data collection and drafted the manuscript; AW and IPGSA collected and revised the data.

Ethical consideration

This review study used published articles that are accessible. Thus, this study did not require any informed consent or ethical consideration.

References

1. Alem K, Gebeyehu S, Arega Y. Risk factors and treatment types for asthma severity among adult patients. Journal of asthma and allergy. 2020 May 7:167-77.
2. Bousquet J, Mantzouranis E, Cruz AA, Aït-Khaled N, Baena-Cagnani CE, Bleecker ER, Brightling CE, Burney P, Bush A, Busse WW, Casale TB. Uniform definition of asthma severity, control, and exacerbations: document presented for the World Health Organization Consultation on Severe Asthma. Journal of Allergy and Clinical Immunology. 2010 Nov 1;126(5):926-38.
3. Pramesthi ZL, Wolayan GA, Ramadhan MF, Rahman A, Satriadi ZP, Wulandari L. Penyuluhan penatalaksana asma secara holistik. jurnal perak malahayati: pengabdian kepada masyarakat (pkm). 2022 Nov; 4(2):118-27.

P-ISSN: 2830-6317
E-ISSN: 2962-5491

4. Putra YA, Udiyono A, Yuliawati S. Gambaran tingkat kecemasan dan derajat serangan asma pada penderita dewasa asma bronkial (Studi di wilayahkerja Puskesmas Gunungpati, Kota Semarang Tahun 2016). Jurnal Kesehatan Masyarakat. 2018 Jan 2;6(1):357-64.
5. Indonesia PD. Panduan umum praktik klinis penyakit paru dan pernapasan. Jakarta: Perhimpunan Dokter Paru Indonesia. 2021;4(2):1-9.
6. Sio YY, Chew FT. Risk factors of asthma in the asian population: a systematic review and meta-analysis. journal of physiological anthropology. 2021 Dec 9;40(1):22.
7. Sihombing M, Alwi Q, Nainggolan O. Faktor faktor yang berhubungan dengan penyakit asma pada usia≥ 10 tahun di indonesia (Analisis Data Riskesdas 2007). Jurnal Respirologi Indonesia. 2010 Apr;30(2):85-91.
8. Djamil A, Hermawan NS, Febriani F, Arisandi W. Faktor yang berhubungan dengan kekambuhan asma pada pasien dewasa. Wellness And Healthy Magazine. 2020 Feb 5;2(1):29-40.
9. Lampalo M, Majer M, Ferara N, Milošević M, Barišić Kutija M, Jukić I. Gender differences in relationship between body mass index and asthma. Psychiatria Danubina. 2019 Dec 21;31(suppl 5):786-91.
10. Khaira U, Santi TD, Ariscasari P. Faktor risiko dengan pengontrolan asma bronchial pada penderita asma bronchial di wilayah kerja puskesmas meuraxa. Jurnal Kesehatan Tambusai. 2023 Dec 23;4(4):6324-34.
11. Nurhalisa SY, Tresnawan T, Budhiana J. Hubungan stress dan kecemasan dengan kekambuhan sesak napas pada penderita asma di wilayah kerja uptd puskesmas sukabumi kota sukabumi. Jurnal Health Society. 2022 Oct 1;11(2).
12. Indrawati I. Asuhan keperawatan pada tn. a dengan asma bronkial di ruang ali rsud bangkinang tahun 2024. Excellent Health Journal. 2024 Dec 9;3(1):321-6.
13. Dwi HR, Nurhayani Y. Faktor-faktor yang mempengaruhi kekambuhan asma bronchial pada penderita asma bronchial di wilayah kerja puskesmas rimbo tengah tahun 2021. Journal of Nursing Practice and Education. 2023 Jun 1;3(2):101-11.
14. Herawati N, Nurhasanah S. Faktor resiko yang berhubungan dengan kekambuhan asma bronkial pada pasien asma bronkial. Jurnal Pustaka Keperawatan (Pusat Akses kajian Keperawatan). 2022 Dec 31;1(2):121-5.
15. Litanto A, Kartini K. Kekambuhan asma pada perempuan dan berbagai faktor yang memengaruhinya. Jurnal Biomedika Dan Kesehatan. 2021;4(2):79-86.
16. Jenkins CR, Boulet LP, Lavoie KL, Raherison-Semjen C, Singh D. Personalized treatment of asthma: the importance of sex and gender differences. The Journal of Allergy and Clinical Immunology: In Practice. 2022 Apr 1;10(4):963-71
17. Guerra S, Sherrill DL, Bobadilla A, Martinez FD, Barbee RA. The relation of body mass index to asthma, chronic bronchitis, and emphysema. Chest. 2002 Oct 1;122(4):1256-63.
18. Firmansyah PA, Irawan R, Rahadianti D, Hanafi F. Hubungan indeks massa tubuh (imt) dengan rasio volume ekspirasi paksa satu detik pertama per kapasitas vital paksa (vep1/kvp) pada pasien asma stabil di rsud kota mataram 2019. Jurnal Kedokteran. 2021 May 27;6(2):152-64.
19. Tjitradinata C, Hardimarta FP, Abhisa GM. Analisis faktor resiko terhadap pengendalian kejadian asma bronkial. Jurnal Pranata Biomedika. 2023;2(2):123-30.
20. Yudhawati R, Krisdanti DP. Imunopatogenesis asma. Jurnal Respirasi. 2019 Apr;3(1):26.
21. Dandan JG, Frethernety A, Parhusip MB. Literature review: gambaran faktor-faktor pencetus asma pada pasien asma. Jurnal Kedokteran Universitas Palangka Raya. 2022 Oct 10;10(2):1-5.
22. Wahyu C, Pepin N, Hexawan T. Analisa faktor-faktor pencetus derajat serangan asma pada penderita asma di puskesmas perak kabupaten jombang tahun 2013. Jurnal Metabolisme. 2013 Apr 21;2(3):1-7.
23. Manese M, Bidjuni H, Rompas S. Faktor resiko yang berhubungan dengan riwayat serangan pada penderita asma di kabupaten minahasa selatan. Jurnal Keperawatan. 2021 Nov 3;9(2):33-9.
24. Nugraha IGMN, Winaya IMN, Negara AAGAPN, Andayani NLN. The relationship between leg muscle strength and functional mobility in the elderly. Physical Therapy Journal of Indonesia. 2024;5(1):25-28.
25. Warmadewi NKU, Adhitya IPGS, Griadhi IPA, Sutadarma IWG. Hubungan indeks massa tubuh dan lingkar perut terhadap foot hyperpronation pada perempuan dewasa di desa batuan, sukawati, gianyar. Majalah Ilmiah Fisioterapi Indonesia.2018; 3(1):36-40

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Table 1. Analysis of factors associated with the history of asthma attacks in asthma patients

Author	Research Title	Method	Results
Alem, K., et al (2020) [1]	Risk Factors and Treatment Types for Asthma Severity Among Adult Patients	**Study design:** Observational quantitative research using cross-sectional survey. **Participants:** A total of 442 asthma patients were treated at the chronic disease clinic, treatment, and outpatient clinic of Gondar University Teaching Hospital. **Independent variables:** Gender, environment, weather conditions, physical activity, allergies to animals, depression, childhood asthma, and family history. **Dependent variables:** Asthma attacks and increased asthma severity **Data analysis:** Data were analyzed using logistic regression test.	This study shows that the occurrence of asthma attacks and increased severity of asthma occurs due to factors such as gender (women are 1.68 times more at risk than men), environmental conditions (rural environments are 1.76 times more at risk than urban areas), weather conditions (dry season 45% lower than rainy season), physical activity (patients who do physical activity are 2.39 times more at risk than those who do not), allergies to animals (patients who live with pets are 3.17 times more at risk than those who do not), depression (depressed patients are 2.31 times more at risk than those who are not depressed), childhood asthma (patients who have a history of childhood asthma are 2.27 times more at risk than those who do not), and family history (patients who have a family with a history of asthma are at greater risk than those who do not).
Djamil, A., et al. (2020) [8]	*Faktor yang Berhubungan dengan Kekambuhan Asma pada Pasien Dewasa*	**Study design:** Observational quantitative research with a cross-sectional survey design. **Participants:** A total of 42 asthma patients aged 20-44 years. **Independent variables:** Dust factors, exposure to cigarette smoke, exercise, stress, weather changes, and respiratory tract infections. **Dependent variable:** Asthma recurrence. **Data analysis:** Analyzed univariately and bivariately and using the Chi-square statistical test.	There is a significant relationship between dust factors (p-value = 0.001 <α = 0.05), cigarette smoke exposure (p-value = 0.013 <α = 0.05), respiratory tract infections (p-value = 0.016 <α = 0.05), and weather changes (p-value = 0.035 <α = 0.05) and relapse in asthma patients. There is no significant relationship between stress (p-value = 1.000 >α = 0.05) and exercise (p-value = 0.798 >α = 0.05) and recurrence in asthma patients.
Lampalo, M., et al. (2019) [9]	Gender Differences In Relationship Between Body Mass Index And Asthma	**Study design:** Quantitative analytical observational research with descriptive statistics methods design.	Comparison of the mean BMI of the two groups showed that the group of patients examined with asthma had a significantly higher mean BMI compared to the control

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		Participants: A total of 149 patients with asthma (experimental group and 153 healthy blood donor patients (control group) were obtained from medical record data. **Independent variables:** Gender and Body Mass Index (BMI). **Dependent variable:** Asthma. **Data analysis:** Data were analyzed using the Kolmogorov-Smirnov test and the Mann-Whitney U test.	group (P = 0.035). The correlation was stronger in women than in men (P = 0.002 and P = 0.898). Increased BMI of the group of patients examined with asthma was not associated with non-allergic asthma (P = 0.085). However, when stratified by gender, there was a strong association of increased BMI with non-allergic asthma in women (P < 0.001).
Embuai (2020) [6]	*Riwayat Genetik, Asap Rokok, Keberadaan Debu dan Stres Berhubungan dengan Kejadian Asma Bronkial*	**Study design:** Descriptive analytical research using cross-sectional study design. **Participants:** A total of 65 asthma patients at the Class II Prof. Dr. JA Latumeten Hospital. **Independent variables:** Genetic history, stress, presence of dust, and exposure to cigarette smoke. **Dependent variable:** Asthma attacks. **Data analysis:** Analyzed using univariate & bivariate as well as alternative tests (Fisher exact test and multivariate test with logistic regression test.	There is a significant relationship between genetic history (p-value = 0.000 <α = 0.05), exposure to cigarette smoke (p-value = 0.017 <α = 0.05), presence of dust (p-value = 0.037 <α = 0.05), and stress (p-value = 0.020 <α = 0.05) on the occurrence and recurrence in asthma patients.
Nurhalisa, S. Y. P., et al. (2022) [11]	*Hubungan Stres dan Kecemasan dengan Kekambuhan Sesak Napas pada Penderita Asma di Wilayah Kerja UPTD Puskesmas Sukabumi Kota Sukabumi*	**Study design:** Correlational research with total sampling technique. **Participants:** Researchers involved 37 asthma patients who received treatment at the Sukabumi Health Center (UPTD). **Independent variables:** Stress and anxiety **Dependent variable:** Recurrence of shortness of breath in asthma sufferers. **Data analysis:** Analyzed using univariate (frequency distribution formula) and bivariate (Somers' D statistical test).	There is a significant relationship between stress (p-value = 0.005 <α = 0.05), and anxiety (p-value = 0.018 <α = 0.05) and recurrence of shortness of breath in asthma sufferers.