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A LITERATURE REVIEW OF FACTORS CONTRIBUTING TO ASTHMA RELAPSE

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ABSTRACT
Asthma is a chronic respiratory condition characterized by airway narrowing, inflammation, and excessive mucus production. Relapse refers to the recurrence of symptoms, which can be severe and disrupt daily activities, often necessitating additional care, either outpatient or inpatient, sometimes with a longer duration than previous episodes. The objective of this literature review is to examine the factors influencing asthma relapse. This study employed a literature review design. Articles were identified through online databases, specifically Google Scholar and PubMed, using keywords and Boolean operators such as AND, OR, NOT. The search terms included "Factors Associated with Asthma" AND "Relapse Asthma." The literature search was conducted in November 2024, focusing on articles published between 2020 and November 2024. A total of 683 articles were retrieved from Google Scholar and PubMed. Based on the review of 10 selected studies, it was concluded that asthma triggers may result from biological, environmental, or chemical factors. Factors associated with asthma exacerbations include a history of smoking, gastroesophageal reflux disease (GERD), obesity, nasal polyps, depression, and anxiety. Factors linked to severe asthma exacerbations include atopic conditions and passive smoking as primary indicators.

Keywords: asthma; asthma relapse factors; literature review

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INTRODUCTION

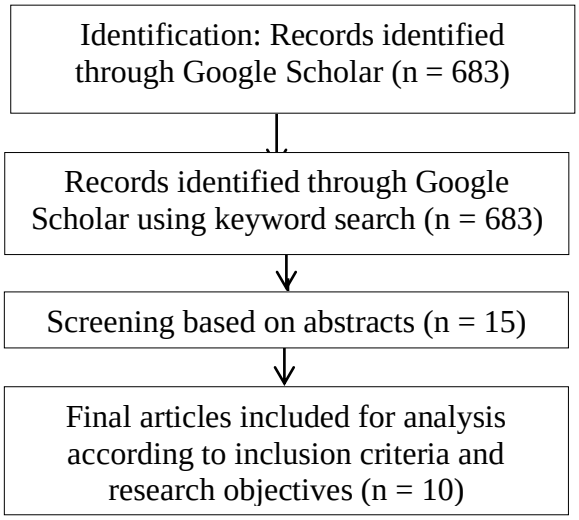
Asthma is a chronic disease that cannot be cured or eliminated. Asthma attacks may occur due to exposure to triggering factors or the failure of preventive measures (Hidayat, 2014). Relapse of asthma attacks refers to the recurrence of symptoms, which may occur with or without warning signs, ranging from mild to severe. In severe cases, relapse can become life-threatening for individuals with asthma (Puspasari, 2019). According to data from the World Health Organization (WHO, 2022), in 2019, approximately 262 million people worldwide were affected by asthma, with an estimated 455,000 deaths attributed to the disease.

According to the American Lung Association (2020), asthma triggers are conditions that can worsen the disease, often causing symptoms to escalate suddenly and without the patient's awareness. Common asthma triggers include allergens, pollutants and irritants, smoke, seasonal changes, physical exertion, gastroesophageal reflux disease (GERD), drug sensitivity, and emotional stress. Identifying these triggers is a critical step in managing recurrent asthma episodes and preventing relapses. A study by Danladi Chiroma Husaini and Kemberly Manzur (2023) found that both indoor and outdoor air pollutants can significantly contribute to asthma incidence. To date, there is a lack of literature reviews specifically focused on the factors influencing asthma relapse. Therefore, this literature review aims to explore the contributing factors associated with recurrent asthma attacks and to identify potential areas for further research. The goal is to enhance relapse prevention strategies by identifying and avoiding key asthma triggers.

METHOD

Search Strategy

This study employed a literature review methodology. The article search was conducted using specific keywords combined with Boolean operators such as AND, OR, and NOT. The primary keywords used in this study were "Factors Associated Asthma" AND "Relapse Asthma." Literature was retrieved from online databases accessible via Google Scholar and PubMed. The search was carried out in November 2024, focusing on articles published between 2020 and November 2024. A total of 683 articles were identified from Google Scholar and PubMed.



Eligible Criteria

Article Type

This literature review includes all types of study designs to ensure that the review is comprehensive.

Participants

This study focuses on the target population of asthma patients included in this literature review.

Intervention Setting

This study analyzes the factors contributing to asthma attacks in asthma patients. The article search was conducted in November 2024, focusing on publications from 2020 to November 2024. A total of 683 articles were identified through Google Scholar and PubMed. These articles were screened based on abstracts, resulting in 15 articles. Finally, 10 articles that met the eligibility criteria and the research objectives were included for analysis.

RESULTS

Table 1.
Details of Selected Articles for the Literature Review

No	Authors (year)	Title	Method	Objective	Result
1	Li Rong, et al (2022)	Exploring Genetic Association of Insomnia with Allergic Disease and Asthma: a Bidirectional Mendelian Randomization	Mendelian Randomization (MR) two-way study using summary statistics from the latest genome-wide association study (GWAS) data	Exploring the causal relationship between insomnia and allergic diseases/asthma by conducting a	Genetically predicted insomnia is associated with an increased risk of allergic diseases, asthma, moderate-to-severe asthma, and asthma in adults.

No	Authors (year)	Title	Method	Objective	Result
		Study		two-way Mendelian randomization (MR) study	
2	Christian, W. J, et al (2023)	Adult Asthma Associated with Roadway Density and Housing in Rural Appalachia: The Mountain Air Project (MAP)	A cross-sectional epidemiologic survey. (The population aged 21 years and older from two regions in Kentucky were enrolled in a community-based cross-sector study. With a population of 1,190, only 972 completed the interview to the end)	Enhancing the collection of environmental exposure data for small geographic units and obtaining individual-level data on risk factors for various respiratory disease outcomes	Residents in areas with higher road traffic density and those living in public housing units are at higher risk of developing asthma. This confirms the role of traffic-related particulate matter in generating a high risk of asthma and affecting respiratory health in the Appalachian region
3	Maeda, S, et al (2022)	Association of Comorbidities and Medications with Risk of Asthma Exacerbation in Pediatric Patients: a Retrospective Study Using Japanese Claims Data	A retrospective cohort study, using claims data from Japan, with the MediScope® database, which includes a combination of medical, dental, expenditure, and diagnostic procedure (DPC) data collected from approximately 70 health insurance associations in Japan. Approximately 7.2 million patients, representing 5.4% of the Japanese population. (This study used asthma patient data from May 2014 to April 2019)	Evaluating the risks of individual factors and combinations of factors	Living environment factors, including pets, household dust, family smoking habits, regional differences (urban or rural), obesity, and pollen, have a significant impact on asthma exacerbations. Additionally, comorbid conditions such as GERD are listed as potential risks; however, this is not sufficiently extracted from the data
4	Lindgren, H, et al (2020)	Factors Associated with Well-Controlled Asthma-a Cross-Sectional Study	A cross-sectional study. Logistic regression analysis, using a multivariate regression model (Study population: 1,199 primary and secondary care patients from 14	Investigating asthma control levels, measured using the Asthma Control Test (ACT), and the frequency of exacerbations,	Comorbid conditions, body weight, and low self-management skills are risk factors that need to be addressed for asthma control

No	Authors (year)	Title	Method	Objective	Result
			hospitals and 54 primary healthcare centers (PHCC) in Central Sweden, evaluated using the Asthma Control Test (ACT) or asthma control tests)	as well as identifying factors associated with well-controlled asthma	
5	Morillo, D, et al (2022)	Prospective Study of Factors Associated with Asthma Attack Recurrence (ATTACK) in Children from Three Ecuadorian Cities During COVID- 19: a Study Protocol	Prospective cohort study (450 children and adolescents aged 5-17 years undergoing treatment in public hospitals across three low-income cities)	Identifying factors associated with asthma relapse in children presenting to emergency departments	The prevalence of asthma in children has increased in many Lower Middle-Income Countries (LMIC) or low- and middle-income countries over the past 50 years, where asthma attacks have become an increasing burden on healthcare systems
6	Shahunja, et al (2022)	Trajectories of Asthma Symptom Presenting as Wheezing and Their Associations with Family Environmental Factors Among Children in Australia: Evidence from a National Birth Cohort Study	Secondary analysis from a cross-sequential cohort study (Data from the Longitudinal Study of Australian Children (LSAC), which included 3,846 children in the LSAC group).	Assessing asthma symptoms and their association with several family environmental factors during childhood in Australia	A poor home environment increases the risk of asthma symptoms during childhood. Improving the home environment and reducing tobacco smoke exposure can help mitigate asthma symptoms in children
7	Yang-Huang, J, et al (2020)	Sociodemographic Factors, Current Asthma and Lung Function in an Urban Child Population	A population-based cohort study (Analyzed data from 5,237 children with an average age of 10 years, from 2012 to 2016)	Evaluating sociodemographic factors associated with current asthma status and pulmonary function indicators in 10-year-old children	Among 10-year-old children, ethnic background is associated with asthma and current lung function, adjusted for various sociodemographic factors
8	Ben Ameur, S, et al (2021)	Childhood Asthma; Factors Predicting Severity and Persistence of Symptoms	A retrospective study (Asthma patients under 36 months of age, from 2007 to 2011)	Studying predictive factors of severity and persistence of symptoms in children with asthma between the ages of 3 and 6 years	Factors associated with severe asthma exacerbations in this study include atopy and passive smoking as major indicators

No	Authors (year)	Title	Method	Objective	Result
9	Yarsky, E, et al (2023)	Effects of Allergen Exposure and Environmental Risk Factors in Schools on Childhood Asthma	A Randomized Clinical Trial (RCT), within the School Inner-City Asthma Intervention Study (SICAS), (236 asthmatic students living in urban environments from 41 schools)	Assessing the prevalence of allergen exposure and environmental risk factors for asthma in school children, while examining environmental risk factors and exploring potential preventive strategies	Asthma triggers are multifactorial and can be caused by biological factors (dust mites, fungi, pet dander, rodents, and cockroaches), environmental factors (smoking), or chemical factors (pollution and high ozone levels). In school environments, asthma triggers include cockroaches, rodents, dust, fragrances, respiratory diseases caused by viruses, and cleaning agents. This exposure is often exacerbated in urban school environments with poor ventilation systems
10	Yang, F, et al (2021)	Factors Associated with sFrequent Exacerbations in the UK Severe Asthma Registry	A retrospective analysis of cross-sectional data (Study population: All subjects in the UK Severe Asthma Registry (UKSAR), aged between 18 and 80 years, with data from 2015 onwards, totaling 1,592 patients)	Identifying factors related to frequent exacerbations in the severe asthma population and determining whether these factors differ in patients treated with and without oral corticosteroids (OCS) or inhaled and oral corticosteroids	Treatment with OCS can reduce the occurrence of exacerbations. Exacerbations are significantly more frequent in patients who are not treated with OCS. Factors correlating with asthma exacerbation events include a history of smoking, GERD, obesity, nasal polyps, depression, or anxiety. Factors associated with frequent exacerbations in severe adult asthma include a history of smoking and GERD, which are comorbidities contributing to asthma exacerbations.

Study Design

The detailed characteristics included in this literature review consist of 10 studies from various countries around the world, employing different study designs. These include 2 Randomized Studies (Li Rong, et al., 2022) and (Yarsky, et al., 2023), 2 Cross-Sectional Studies (Christian, W. J., et al., 2023) and (Lindgren, H., et al., 2020), 3 Retrospective Cohort Studies (Maeda, S., et al., 2022), (Maeda, S., et al., 2022), and (Yang, F., et al., 2021), 1 Prospective Cohort Study (Morillo, D., et al., 2022), 1 Cross-Sequential Cohort Study (Shahunja, et al., 2022), and 1 Population-Based Cohort Study (Yang-Huang, J., et al., 2020).

DISCUSSION

This literature review aims to identify the factors that trigger asthma relapses. Ten studies from various countries around the world with different research designs were reviewed, including 2 Randomized Studies, 2 Cross-Sectional Studies, 3 Retrospective Cohort Studies, 1 Prospective Cohort Study, 1 Cross-Sequential Cohort Study, and 1 Population-Based Cohort Study. Several studies highlight that asthma triggers can be caused by biological factors (dust mites, fungi, pet dander, rodents, and cockroaches), environmental factors (smoking), or chemical factors (pollution and high ozone levels). In school environments, asthma triggers include cockroaches, rodents, dust, fragrances, viral respiratory diseases, and cleaning agents.

These exposures are often exacerbated in urban school environments with poor ventilation (Yarsky, E, et al., 2023). Similarly, Maeda, S, et al. (2022) state that the living environment, including pets, household dust, family smoking habits, regional differences (urban or rural), obesity, and pollen, has a significant impact on asthma exacerbations. Additionally, comorbid conditions such as GERD are listed as potential risks contributing to asthma relapses.

A poor home environment increases the risk of asthma symptoms during childhood. Improving the home environment and reducing tobacco smoke exposure can help manage asthma symptoms in children (Shahunja, et al., 2022). According to Yang-Huang, J, et al. (2020), among 10-year-old children, ethnic background is associated with asthma and current lung function, adjusted for various sociodemographic factors. This finding is consistent with the research by Morillo, D, et al. (2022), which shows that asthma prevalence in children has increased in many Lower Middle Income Countries (LMICs) over the last 50 years, where asthma attacks have become an increasing burden on health systems. In the study by Christian, W. J., et al. (2023), residents in areas with higher traffic density and those living in public housing units are at higher risk of developing asthma. This confirms the role of traffic-related particulate matter in increasing asthma risk and impacting respiratory health in the Appalachian region.

Genetically predicted insomnia is associated with an increased risk of allergic diseases, asthma, moderate-to-severe asthma, and asthma in adults (Li Rong, et al., 2022). Lindgren, H, et al. (2020) states that comorbid conditions, weight, and low self-management skills are risk factors that must be addressed for asthma control. According to Ben Ameur, S, et al. (2021), the factors related to severe asthma exacerbations in this study include atopic conditions and passive smoking as primary indicators. Factors associated with asthma exacerbations include a history of smoking, GERD, obesity, a history of nasal polyps, depression, or anxiety. Factors related to frequent exacerbations in severe adult asthma include a history of smoking and GERD, which are comorbidities contributing to asthma exacerbations (Yang, F, et al., 2021).

CONCLUSION

Asthma relapse refers to the recurrent occurrence of asthma attacks. Based on 10 articles found in searches on Google Scholar and PubMed, it is concluded that asthma triggers can be caused by biological, allergic, environmental, or chemical factors. Populations living in areas with higher traffic density, those residing in public housing units, pet ownership, household dust, poor home environments, and low- and middle-income countries are at higher risk. Factors correlated with asthma exacerbations include a history of smoking, GERD, obesity, a history of nasal polyps, depression, or anxiety. Factors associated with severe asthma exacerbations include atopy and passive smoking as primary indicators. Considering these asthma triggers, future attention is needed to prevent asthma relapses and to reduce the risk of recurrence.

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