

The relationship between temperature and individual characteristics of asthma in the working area of the Mojo health center, Surabaya City

Ichma Fabiola * and Kusuma Scorpia Lestari

Department of Environmental Health, Faculty of Public Health, Airlangga University, Surabaya, Indonesia.

World Journal of Advanced Research and Reviews, 2023, 19(02), 939-943

Publication history: Received on 14 June 2023; revised on 17 August 2023; accepted on 19 August 2023

Article DOI: <https://doi.org/10.30574/wjarr.2023.19.2.1669>

Abstract

Asthma is a chronic inflammatory disease of the airways characterized by episodic wheezing, coughing and tightness in the chest and a disease that causes 15% of deaths worldwide. An increase in temperature can increase pollutants in the air, and with age, there is an increase in asthma. A family history of the disease has risk factors that can cause asthma. This study aims to determine the relationship between temperature and asthma and between individual characteristics (age and family history) and asthma in the working area of the Mojo Community Health Center, Surabaya City. This research method is analytic observational with cross-sectional, and the number of samples is 59, analyzed using the chi-square test. The results showed a relationship between individual characteristics (age and family history) and asthma in the Mojo Health Center, Surabaya City, working area. At the same time, there was no relationship between temperature and asthma in the Mojo Health Center, Surabaya City working area.

Keywords: Asthma; Temperature; Family history; Age; Air pollution

1. Introduction

Asthma is a chronic inflammatory airway disease characterized by episodic wheezing, coughing and tightness in the chest caused by airway obstruction. It is included in the chronic respiratory tract disease group [1]. In general, asthma often appears in childhood and at a young age, causing loss of productivity, causing disruption to social activities, and potentially disrupting children's growth and development. Asthma is a cause of a substantial burden of disease, including premature death and reduced quality of life in all age groups worldwide.

According to estimates by the World Health Organization (WHO), in December 2016, there were 383,000 deaths from asthma in 2015. According to the 2018 Global Asthma Report, forty million deaths, or 70% of all deaths worldwide, are caused by non-communicable diseases, with 80 % occurring in developing countries. Asthma is a chronic respiratory disease that causes 15% of deaths worldwide [2].

According to the RI Ministry of Health Info Datin, risk factors for asthma are a combination of genetic predisposition and environmental exposure to inhaled substances and particles that can cause allergic reactions and respiratory irritation, such as indoor allergens (for example, house dust, pollution, animal dander), outdoor allergens, cigarette smoke, chemical irritants in the workplace, and air pollution [2]. *Air pollution* is a complex environmental pollutant comprising indoor and outdoor particulate matter (PM), gases, organic compounds, and metals. PM is a pollutant consisting of a complex mixture of particles such as smoke, dust, dirt, soot, and relatively small droplets in the air [3].

According to Istantinova (2012), the level of pollutant concentrations in the air can be affected by wind, humidity and air temperature. Research conducted by Qian et al. (2008) shows that a high air temperature of 33.1°C can increase the concentration of particles in the air [4]. According to the results of research conducted by Goodman et al. (2004), an

* Corresponding author: Ichma Fabiola

increase in air temperature of 1°C will increase 0.4% of deaths due to respiratory disorders in humans. A 1°C decrease in temperature increases 2.6% of deaths from respiratory disorders in humans [5].

According to the 2018 Riskesdas results, the prevalence of asthma increases with age, where the age group <1 year has the lowest prevalence and the age group 75+ has the highest prevalence. The prevalence of inpatients based on age group from 2015 to 2017 was the highest in the 45-64 year age group, between 27.6% and 29.3%. The lowest prevalence of asthma is in the age group of 7-28 days, with a prevalence of 0.3% [2].

Family history has risk factors that can cause asthma and trigger asthma attacks. According to the results of research from Suherwin (2020), in the Emergency Room at the Palembang Bari Regional General Hospital in 2020, it was found that there were 15 people with a family history, with respondents in this study having a family history of asthma with a total of 10 people or 66.7% and no history of asthma amounted to 5 people or 33.3% [6].

Based on the 2019 Mojo Health Center Profile, the Mojo Health Center is one of the health centres located in the East Surabaya area. The Mojo Health Center is located on Jalan Mojo Klanggru Wetan II No.11, Mojo, Gubeng District, Surabaya City [7]. Based on data from the Surabaya City Health Office, this health center has the highest cases of asthma out of 63 health center in Surabaya. Therefore, the authors wanted to examine the relationship between temperature and individual asthma characteristics in the Mojo Public Health Center, Surabaya City, working area.

2. Material and Methods

This type of research design is analytic observational research, namely research conducted by each research subject when observing only once and taking measurements. This research design is cross-sectional because the researcher collects data at one time to describe the situation at that time. The population in this study were residents aged 17-65 years who had asthma in the working area of the Mojo Community Health Center, Surabaya City, totalling 154 cases and determining the number of samples and taking the size of the sample in this study using probability sampling with simple random sampling technique. The sample that will be taken in this study is as many as 59 respondents.

The location of this study was a population of sufferers and non-sufferers of asthma in the work area of the Mojo Public Health Center, Surabaya City. While the time of the research was carried out, starting from research preparation to research, namely from February 2023 to June 2023. Data collection and research implementation were done using questionnaires and informed consent. They measured the room temperature of the respondent's house using a thermohygrometer.

Data analysis was used to link the dependent variable, namely asthma and the independent variable (individual characteristics such as age and family history). As well as to determine the relationship between the two variables using the chi-square test.

3. Results and Discussion

3.1. Distribution of respondents

Table 1 Distribution of respondents

Variable	Number of Respondents (n)	Percentage (%)
Asthma		
No	18	30,5
Yes	41	69,5
Age		
15-24 years	3	5,1
25-34 years	15	25,4
35-44 years	14	23,7
45-54 years	17	28,8

55-64 years	9	15;3
>65 years	1	1;7
Family History		
No	29	49;2
Yes	30	50;8
Temperature		
Not meet requirements	52	88;1
Meet requirements	7	11;9

Based on Table 1, it is known that the distribution of respondents is based on asthma variables. Most respondents had asthma, namely 41 people (69.5%), while the respondents who did not have asthma were as many as 18 people (45.3%). Distribution of respondents based on age variable, some respondents aged 15-24 years were three people (5.1%), respondents aged 25-34 years were 15 people (25.4%), respondents aged 35-44 years were 14 people (23.7%), respondents aged 45-54 years were 17 people (28.8%), respondents aged 55-64 years were nine people (15.3), and respondents aged >65 years were one person (1.7%). The distribution of respondents was based on family history of disease variables. Some of the respondents with a family history of disease were 30 people (50.8%), while respondents did not have a family history of disease were 29 people (49.2%). The distribution of respondents was based on the temperature variable. Some of the respondents whose room temperature did not meet the requirements were 52 people (88.1%). Respondents whose room temperature met the requirements were seven people (11.9%).

4. Results and Discussion

4.1. The relationship between temperature and asthma

Based on Table 2, it is known that the number of houses with a room temperature that does not meet the requirements and suffer from asthma is 38 people (64%), and the number of houses with a room temperature that meets the requirements with asthma is three people (5%). Based on the statistical test results, it shows a value of $p = 0.103$. So there is no significant relationship between temperature and asthma. There is no significant relationship because most of the room temperature in the respondent's house does not meet the predetermined requirements. Hot air temperatures can cause the airways to narrow, which causes shortness of breath and exposure to allergens in the air. The test results are the same as the research by Nurmala et al. (2018), that there is no relationship between air temperature and the incidence of asthma aged 45-65 years with a p -value = 0.323. This study is the same as the research of Rani Novianis (2016) in Semarang City, where there is no relationship between air temperature and the incidence of asthma. It has a weak negative correlation $p=0.251$ [8].

4.2. Relationship between age and asthma

Based on Table 2, it is known that the number of respondents aged 15-24 years with asthma is three people (5%), the number of respondents aged 25-34 years with asthma is nine people (15%), the number of respondents who aged 35-44 years with asthma as many as five people (8%), the number of respondents aged 45-54 years with asthma as many as 14 people (24%), the number aged 55-64 years with asthma as many as nine people (15%), and the number of respondents aged >65 years with asthma was one person (2%). Based on the statistical test results, it shows a value of $p = 0.010$. So there is a significant relationship between age and asthma. There is a significant relationship due to increasing age and asthma. The prevalence of inpatients based on age group from 2015 to 2017 was the highest in the 45-64 year age group, between 27.6% and 29.3%. This research is in line with the research of Andi Khaidir (2019), that the results of the chi-square test obtained a value of $p = 0.000$, which can be concluded that there is a relationship between age and the degree of asthma carried out at Andi Makkasau General Hospital, Parepare City [9].

According to the results of Mirabelli's study (2013), 42% of adults with asthma reported a recurrence of asthma before the age of 16 years. In this group, asthma attacks occurred at an average age of 7 years (SE: 0.2). Onset at age 16 years or more, asthma onset occurred at age 38 years (SE: 0.3), and 87% of adults with asthma reported that asthma attacks occurred more than five years ago. This study demonstrated that among adults with asthma, the age at which asthma began was associated with subsequent asthma exacerbations [10]. Chen's research (2003) shows that under the age of 15, more boys are treated for asthma. Moreover, the incidence ratio between women and men increases with age and peaks between the ages of 25 and 34 years [11].

4.3. Relationship between family history and asthma

Based on Table 2, it is known that the number of respondents who did not have a family history of disease and had asthma was 11 people (19%). The number of respondents who had a family history of disease and asthma was 30 people (51%). Based on the statistical test results, it shows a value of $p = 0.000$ ($2.2615E-7$). So a significant relationship exists between a family history of disease and asthma. This research is in line with Adhar Arifuddin's research (2019), which showed that 34 respondents had a history of asthma and 23 respondents had no history of asthma. Based on the chi-square test results, the results obtained were $p = 0.006$, which can be concluded that there is a significant relationship with the incidence of asthma in the working area of the Singgani Health Center, Palu City. Seta, the results of this study are in line with Manguang (2016), with a value of $p = 0.000$, where there is a relationship with a family history of asthma which will increase the risk of asthma in children. Parents with a history of asthma increase the risk of asthma in children 8.2 times, while one with a history of asthma increases the risk by 4.24 times compared to children whose parents do not have a history of asthma [12].

According to Ewald's research (2013), if one of the parents has asthma, the risk of the child developing asthma increases significantly. If you have a history of asthma, the risk of someone getting asthma is highest when your siblings and parents have asthma. The influence of medical history also considers allergens and other causes of asthma. As children get older, they may be exposed to allergens and other exposures, and the high heredity risk increases the risk of asthma at older ages [13]. According to Wylie's (2003) study, the OR for a family history of wheezing or asthma in one of three Southeast Asian countries was higher than the risk identified in other studies. Family history is a significant risk predictor. Two small studies show that children with a family history of asthma are more likely. In most of these studies, the OR was between 2 and 4 when the first-degree relative had asthma. A family history of atopic disease is also a risk factor for asthma—atopic diseases such as allergic rhinitis [14].

Table 2 Results

Variable	Asthma		<i>p-value</i>
	No	Yes	
Temperature			
Not meet requirements	14 (24%)	38 (64%)	0;103
Meet requirements	4 (7 %)	3 (5%)	
Age			
15-24 years	0 (0%)	3 (5%)	0;010
25-34 years	6 (10%)	9 (15%)	
35-44 years	9 (15%)	5 (8%)	
45-54 years	3 (5%)	14 (24%)	
55-64 years	0 (0%)	9 (15%)	
>65 years	0 (0%)	1 (2%)	
Family history			
No	18 (31%)	11 (19%)	0;000 ($2;2615E-7$)
Yes	0 (0%)	30 (51%)	

5. Conclusion

Based on the study results, it can be concluded that there is a relationship between individual characteristics (age and family history) and asthma in the working area of the Mojo Health Center, Surabaya City. At the same time, there is no relationship between temperature and asthma in the working area of the Mojo Health Center, Surabaya City.

Compliance with ethical standards

Acknowledgements

The Author would like to thank Airlangga University, Surabaya City Health Office, Mojo Public Health Care, Public Health Faculty Laboratory Assistant for supporting this research.

Disclosure of Conflict of interest

The Autor proclaim no conflict of interest.

Statement of informed consent

All informants/respondents involved in this study have stated their consent to provide information/data according to the research needs.

References

- [1] Ministry of Health of the Republic of Indonesia. Decree of the Minister of Health of the Republic of Indonesia 1023/MENKES/SK/XI/2008 Concerning Asthma Control Guidelines. 2008.
- [2] Ministry of Health of the Republic of Indonesia. <https://d3v.kemkes.go.id/storage/download/pusdatin/infodatin/infodatin%20asthma%202019.pdf>. 2019. InfoDatin Asthma Sufferers in Indonesia. Available from: <https://emedicine.medscape.com>
- [3] Rahmaningsih G, Haryanto B. Relationship of PM2.5 Exposure to Impaired Lung Function in Adults in Ciwandan District, Cilegon City in 2022. *Indonesian Scientific Journal*. 2022;7(6):8472–80.
- [4] Nirmala DS, Prasasti CI. PM2.5 Concentration and Analysis of Worker Characteristics of Health Complaints of Smoked Fish Worked in Tambak Wedi Village, Surabaya. *Environmental Health Journal*. 2015;8(1):57–68.
- [5] Putri EPD. PM2.5 Concentrations in Indoor Air and Decreased Lung Function in Adults Around the Pulo Gadung Industrial Area, East Jakarta. 2012.
- [6] Suherwin. Characteristics of Patients with Ashtma Events in the Emergency Department of the Palembang Bari Regional General Hospital. *Scientific Journal of Health Multi Science*. 2020;12(1):233–43
- [7] Surabaya City Health Office. Profile of the Mojo Health Center in 2019. 2019.
- [8] Nurmala E, Budiyo, Suhartono. Realtionship between Ambient Air Suspended Particulate Matter (SPM) Concentration and Weather Conditions with Asthma Incidence Rates in West Semarang District in 2015-2017. *Journal of Public Health [Internet]*. 2018;6(6):2356–3346. Available from: <http://ejournal3.undip.ac.id/index.php/jkm>
- [9] Khaidir A, Usman, Hengky HK. Correlation between Patient Characteristics and Degree of Bronchial Asthma at Andi Makkasau Regional General Hospital, Parepare City. *Scientific Journal of Human and Health [Internet]*. 2019;2(2):2614–3151. Available from: <http://jurnal.umpar.ac.id/index.php/makes>
- [10] Mirabelli MC, Beavers SF, Chatterjee AB, Moorman JE. Age at asthma onset and subsequent asthma outcomes among adults with active asthma. *Respir Med*. 2013 Dec;107:1829–36.
- [11] Chen Y, Stewart P, Johansen H, McRae L, Taylor G. Sex difference in hospitalization due to asthma in relation to age. *J Clin Epidemiol*. 2003 Feb 1;56(2):180–7.
- [12] Arifuddin A, Rau MuhJ, Hardiyanti N. Faktor-faktor yang Berhubungan dengan Kejadian Asma di Wilayah Kerja Puskesmas Singgani Kota Palu. *Jurnal Kesehatan Tadulako*. 2019;5(1):13–8.
- [13] Weibel ER. The Importance of Family History in Asthma during the First 27 Years of Life. *Am J Respir Crit Care Med [Internet]*. 2013;188:624–6. Available from: www.atsjournals.org.
- [14] Burke W, Fesinmeyer M, Reed K, Hampson L, Carlsten C. Family history as a predictor of asthma risk. *Am J Prev Med*. 2003;24(2):160–9.