Environmental-Related Trigger for Asthma in East Java: An Advance Analysis of the Risk Factor

Shahira Putriprimarani Purwono[1]✉), Hario Megatsari[2]), Ira Nurmala[3])

[1-3] Department Health Promotion and Behavior, Faculty of Public Health, Universitas Airlangga Surabaya

✉Email: erinka.pricornia.mudaharimbi-2017@fkm.unair.ac.id

ABSTRACT

Background: According to the Indonesian Ministry of Data and Information Center (2019), the main cause of asthma is not yet known. The national prevalence of asthma is 4.0%. Meanwhile, according to Basic Health Research in 2019, the incidence of asthma in Indonesia was 2.4%, and in East Java, it was 2.5%. Several risk factors for the prevalence of asthma due to unhealthy behaviours, namely smoking consumption habits, physical activities, triggers for depression, and processed chicken/meat/fish foods that are given preservatives. ***Methods:*** The design of this study is the advanced analytical method. An approach of utilizing secondary data from the 2019 National Riskesdas (Basic Health Research) report. This study looked at the relationship between asthma prevalence and smoking habits, physical activity, triggers for depression, and consumption of processed chicken/meat/fish food with preservatives. ***Results:*** Based on the results, cigarette consumption habits and triggers of depression had a relationship with risk factors for asthma prevalence. Meanwhile, physical activity and consumption of processed meat/chicken/fish foods with preservatives did not have a relationship with the incidence of asthma. ***Conclusion:*** The increasing prevalence of asthma was closely related to smoking habits and a trigger for depressive disorders. However, based on the cross-tabulation results, there was no relationship between physical activity and consumption of processed meat/chicken/fish foods with preservatives and the prevalence of asthma. It is hoped that with this research, and seeing that there were still exposure factors from smoking habits and depression triggers, prevention efforts can be made, starting with education about asthma recurrence by avoiding smoking or air pollution, allergens, stress, and emotions. In addition, reducing asthma can be done by asking for support from the closest people to minimize these behaviors and changing smoking behavior with other positive habits such as getting used to replacing nicotine with candy.

Keywords: *Trigger for asthma, Risk factor, environmental, Riskesdas*

INTRODUCTION

Asthma is a disorder in the form of chronic inflammation of the airways that causes airway constriction (bronchial hyperactivity), leading to repeated episodic symptoms in the form of wheezing, shortness of breath, chest tightness, and coughing, especially at night or early morning (Kementerian kesehatan, 2018). Asthma is a health problem commonly found in the community and with a high morbidity and mortality rate. Asthma attacks not only children but all age groups. It is currently estimated that as many as 235 million people have asthma in the world (World Health Organization, 2017).

The World Health Organization report in December 2016 recorded that as many as 383,000 people died of asthma in 2015. Based on the National Basic Health Research report in 2018, the number of asthma patients in Indonesia was 2.4% (Badan Penelitian dan Pengembangan Kesehatan, 2018).

Based on the Household Health Survey results, asthma is the fourth leading cause of death (mortality) in Indonesia or 5.6%. It is reported that the prevalence of asthma throughout Indonesia is 13 per 1,000 population (Kementerian Kesehatan, 2017). According to the Ministry of Health, the incidence of asthma in children and infants is around 10-85%. In East Java

Received: 27-10-2021, Accepted: 14-03-2022, Published Online: 30-09-2022

Province, 4.45% suffer from bronchial asthma with breathing pattern ineffectiveness (Indonesian Health Profile, 2018); and ineffective breathing patterns 2.7% (MOH 2018).

The national prevalence of asthma is 4.0%. Meanwhile, according to Riskesdas, in 2019, the incidence of asthma in Indonesia was 2.4%, and in East Java, it was 2.5% (Basic Health Research, 2019). East Java province had the largest number of cases (1,942 cases), and Papua had the lowest hospitalization (15 cases). Asthma data sourced from the *Sistem Informasi Rumah Sakit* (SIRS) or Hospital Information System includes categories of asthma and asthmaticus (Hr. et al., 2019). Meanwhile, the Pasuruan region is ranked 2nd in East Java, estimated at 172 per 1000 population who suffer from asthma (East Java Health Profile, 2019).

According to the Indonesians, the main cause of asthma is not yet known. The main risk factor for triggering asthma is a combination of genetic predisposition and environmental exposure to inhaled substances and particles that can trigger allergic reactions or irritate the airways, such as indoor allergens (e.g., mites, house dust, pollution, and pet dander) (Ministry of Data and Information Center (2019). Outdoor allergens (e.g., pollen and mold) of cigarette smoke are chemical irritants in the workplace pollution (RI, 2019). A number of these risk factors are considered to increase the chance of developing asthma, developing other allergies, such as atopic dermatitis or allergic rhinitis (hay fever), second-hand smoke, and exposure to chemicals used in agriculture, hairdressing, and manufacturing (M. Faisal, 2019).

The Global Initiative for Asthma (GINA) defines asthma control as controlling the clinical manifestations of asthma. Many factors affect asthma control, including excessive emotions, namely anxiety. The anxiety that asthma patients tend to have influences their asthma control and quality of life. Trigger factors for asthma also vary, such as smoking consumption, allergies to certain substances, strenuous exercise or activity, weather factors such as cold air, air pollution, and environmental and even mental or psychological stress (The Global Initiative for Asthma, 2018).

Based on this description, the background explains that the prevalence of asthma in East Java is still around 2.5%. Therefore, this study aims to examine the relationship between risk factors and the prevalence of asthma in districts/cities in East Java Province.

METHODS

This research design used advanced analytical methods. The research was conducted by utilizing secondary data from the 2019 National Riskesdas (Basic Health Research) report. Riskesdas is community-based health research whose indicators can describe the national level to the district/city level (Health Research and Development Agency, 2018). Riskesdas was officially issued by the Ministry of Health of the Republic of Indonesia. The unit of analysis in this study was the Regency/City in East Java Province. Overall, 38 districts/cities were analyzed.

Table 1. Sources of advanced data analysis from the prevalence of asthma diagnosed by doctors (2019).

Source	Variable
Riskesdas (2019)	Prevalence of asthma diagnosed by a doctor
	Consumption of smoking habits
	Sufficient physical activity
	Triggers of depression
	Consumption of processed chicken/meat/fish food with preservatives

DATA ANALYSIS

The dependent variable selected in this study was the prevalence of asthma diagnosed by doctors. In addition, there were 4 independent variables analyzed in this study, namely consumption of smoking habits, adequate physical activity, triggers for depression, and consumption of processed chicken/meat/fish foods with preservatives.

Data were analyzed univariate and bivariate. Univariate analysis was

Received: 27-10-2021, Accepted: 14-03-2022, Published Online: 30-09-2022

performed using a descriptive table on each variable. Meanwhile, bivariate analysis was carried out with cross-tabulation by connecting each independent variable with the dependent variable. The whole analysis process used SPSS 21 software. So, it didn't use a correlation regression test or any other test.

The research was conducted by utilizing secondary data from published reports. For this reason, there was no need for ethical clearance in carrying out this research.

RESULTS AND DISCUSSION

Table 2 shows the descriptive analysis results of the dependent variable of asthma prevalence with 4 other related variables based on Riskesdas (2019). The highest gap was the variable physical activity, which was sufficient at 27.70%. The lowest prevalence of Asthma diagnosed by doctors was in Kediri City at 1.40%, and the highest was in Situbondo City District at 4.80%. While the area with a fairly high variation in the percentage of physical activity with the lowest proportion was Pasuruan City at 56.13%, and the highest was Tuban City Regency at 83.83%.

Table 2. Statistical description of asthma prevalence variable with related variables

	N	Min	max	Mean
Prevalence of asthma diagnosed by a doctor	38	1,40	4,80	2,56
Consumption of smoking habits	38	18,74	29,92	23,48
Sufficient physical activity	38	56,13	83,83	73,83
Triggers of depression	38	0,57	10,21	4,25
Consumption of processed chicken/meat/fish food with preservatives	38	62,54	88,30	74,53

Source: Riskesdas 2019

Table 3 shows the cross-tabulation results of the percentage of smoking consumption habits and the prevalence of asthma diagnosed by doctors in East Java. Based on table 3, it can be seen that there was still a moderate prevalence of asthma (1.64 - 3.48) in the moderate category of cigarette consumption habits (20.62 - 26.35). The cross-tabulation results were in line with Putra et al (2020) and Thomson et al (2020) that as many as 25% of adult individuals with asthma were active smokers, indicating they had the habit of smoking in their daily lives.

Received: 27-10-2021, Accepted: 14-03-2022, Published Online: 30-09-2022

Table 3. Table of cross-tabulation of smoking habits variable with the prevalence of asthma diagnosed by a doctor variable.

Consumption of smoking habits	Prevalence of asthma diagnosed by a doctor					
	Low (<1.63)		Medium (1.63 – 3.48)		High (>3.49)	
	N	%	N	%	N	%
Low (<20.61)	0	0.0	7	25.0	0	0
Medium (20.62-26.35)	4	100	17	60.7	3	50
High (>26.36)	0	0.0	4	14.3	3	50
Total	4	100	28	100	6	100

Source: Riskesdas 2019

Table 4 shows the cross-tabulation results of the percentage of sufficient physical activity with the prevalence of asthma diagnosed by a doctor. Based on table 4, it can be seen that there is still a moderate prevalence of asthma (1.64 – 3.48) in sufficient physical activity (66.26 – 81.41).

This shows that there is no relationship between sufficient physical activity and the prevalence of asthma diagnosed by a doctor. According to research by Clark, Bronchospasm or bronchial asthma due to physical activity or Exercise-induced Bronchospasm (EIB) is a term that describes the outcome of an acute airway that occurs temporarily due to physical activity (Clark, 2013). The high prevalence of asthma is dominated by a lack or excess of physical activity.

Table 4. Table of cross-tabulation of sufficient physical activity variable with the prevalence of asthma diagnosed by a doctor variable

Sufficient physical activity	Prevalence of asthma diagnosed by a doctor					
	Low (<1,63)		Medium (1,63 - 3,48)		High (>3,49)	
	N	%	N	%	N	%
Low (<66.25)	0	0.0	4	14.3	1	16.7
Medium (66.26-81.41)	4	100	18	64.3	5	83.3
High (>81.42)	0	0.0	6	21.4	0	0.0
Total	4	100	28	100	6	100

Source: Riskesdas 2019

Table 5 shows the cross-tabulation results of depressive disorders with the prevalence of asthma diagnosed by doctors. Based on table 5, it can be seen that there was still a moderate prevalence of asthma (1.64 - 3.48) in the moderate category of triggers of depression (1.73-6.76). This shows a link between depression triggers and asthma prevalence with a doctor's diagnosis, supported by research from the Indonesian Lung Doctors Association, which proved there was a relationship between triggers of depression and asthma prevalence (Perhimpunan Dokter Paru Indonesia, 2018).

Received: 27-10-2021, Accepted: 14-03-2022, Published Online: 30-09-2022

Table 5. Table of cross-tabulation of triggers of depressive disorders variable with theprevalence of asthma diagnosed by a doctor variable

Triggers of Depression	Prevalence of asthma diagnosed by a doctor					
	Low (<1,63)		Medium (1,63 - 3,48)		High (>3,48)	
	N	%	N	%	N	%
Low (<1.72)						
Medium (1.73-6.76)	1	25	4	14.3	0	0.0
High (6.77)	3	75	20	71.4	3	50
	0	0.0	4	14.3	3	50
Total	4	100	28	100	6	100

Source: Riskesdas 2019

Table 6 shows the cross-tabulation results of the consumption of processed chicken/meat/fish food with preservatives and the prevalence of asthma diagnosed by a doctor. Based on table 6, it can be seen that there was still a moderate prevalence of asthma (1.64-3.48) in the consumption of processed chicken/meat/fish food with preservatives in the medium category (68-82.06). This shows that there was no relationship between the consumption of processed chicken/meat/fish food with preservatives and the prevalence of asthma diagnosed by a doctor.

Table 6. Table of cross-tabulation of consumption of processed meat/fish/chicken food with preservatives variable with the prevalence of asthma diagnosed by a doctor variable

Consumption of processed chicken/meat/fish food with preservatives	Prevalence of asthma diagnosed by a doctor					
	Low (<1,63)		Medium (1,63 - 3,48)		High (>3,48)	
	N	%	N	%	N	%
Low (<67)	1	25	5	17,9	0	0,0
Medium (68 - 82,06)	2	50	17	60,7	6	100
High (>82,07)	1	25	6	21,4	0	0,0
Total	4	100	28	100	6	100

Source: Riskesdas 2019

The habit of smoking is known to be one of the factors in the occurrence of asthma. Based on the cross-tabulation results, there was 1 district with the highest percentage showing habitual smoking behavior and the occurrence of asthma, namely Probolinggo in East Java. The results of this study were supported by research conducted by Putra et al and Thomson et al in 2020 that as many as 25% of adult individuals with asthma were active smokers. Research stated that health effects also affected passive smoking (Putra et al, and Thomson et al, 2020).

WHO, IARC, EPA, and various scientific and medical studies in the world have documented the adverse effects of exposure to cigarette smoke, namely respiratory, vascular, and carcinogenic disorders in adults. Children exposed to secondhand smoke were at a higher risk for sudden infant death syndrome (SIDS). Higher concentrations of nicotine were found in children who died of SIDS compared to those who died of other causes. Secondhand smoking was also associated with respiratory tract infections in children (Kosen et al, 2017).

Physical activity, according to the World Health Organization (WHO), is any body movement produced by skeletal muscles that require energy expenditure. Based on the cross-tabulation results, 3 cities/districts show the highest percentage of the relationship between moderate physical

Received: 27-10-2021, Accepted: 14-03-2022, Published Online: 30-09-2022

activity and the prevalence of asthma, namely Magetan, Ngawi, and Batu City. The high prevalence of asthma was dominated by a lack or excess of physical activity. However, in carrying out physical activities, asthmatics should also be careful because physical activity could trigger asthma attacks. A survey conducted by the Asthma and Allergy Foundation of America (AAFA) in 2017 showed that someone with asthma would experience a decrease in physical condition due to asthma symptoms that often came and became worse during activity.

Triggers of depressive disorders come from psychological factors that affect asthma, where anxiety and depression are interconnected with each other in adolescents and young adults with asthma. According to the World Health Organization (WHO), 15 million people per year experience Disability-Adjusted Life Years (DALYs) per year due to asthma, 100-150 million people worldwide have asthma. This number continues to grow by 180,000 people every year. Asthma is a chronic disease because it can arise when the patient interacts with factors that cause asthma. So, it is feared that it can cause patients to experience anxiety and depression. Based on the cross-tabulation results, there was 1 city with a percentage of triggers for depression in asthma prevalence, namely Malang City. This was supported by research from the Indonesian Lung Doctors Association, which proved that there was a relationship between triggers for depression and asthma prevalence (Ikatan Dokter Paru Indonesia, 2018).

The same result was also found in other studies. A study published in the journal International Journal of Child Health and Human Development detailed the link between asthma and emotional disorders, including major depression and anxiety disorders. In asthmatic patients, when an asthma attack occurred, they experienced a narrowing of the airway with symptoms ofshortness of breath and coughing; the patient would also experience an increase in body metabolism in the form of sweating and heart palpitations.

Consumption of processed meat/fish/chicken with preservatives is not one of the factors that can trigger asthma. There are still other factors that influence the increase in the prevalence of asthma. The results of this study were in line with what Winta in 2020 did when analyzing the factors that influence bronchial asthma, that the consumption of preserved foods proved to have no effect. These factors had an effect but the risk caused was smaller. All foods that were given preservatives had a 0.495 lower risk of being consumed by people with bronchial asthma (Winta et al, 2020).

CONCLUSION

Based on the results of the study, it can be concluded that the increased prevalence of asthma was closely related to smoking habits and a trigger for depressive disorders. However, based on the cross-tabulation results, there was no relationship between physical activity and consumption of meat/chicken/fish food processed with preservatives with the prevalence of asthma. It is hoped that with this research, and seeing that there were still exposure factors through smoking habits and depression triggers, prevention efforts can be made starting with education about asthma recurrence by avoiding smoking or air pollution, allergens, stress, and emotions. In addition, reducing asthma can be done by asking for support from the closest people to minimize these behaviors and changing smoking behavior with other positive habits such as getting used to replacing nicotine with candy.

ACKNOWLEDGEMENT

We would like to thank all those who have supported and assisted the researcher in completing this research, especially the Ministry of Health of the Republic of Indonesia, for publishing and providing access to reports

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Received: 27-10-2021, Accepted: 14-03-2022, Published Online: 30-09-2022

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Received: 27-10-2021, Accepted: 14-03-2022, Published Online: 30-09-2022