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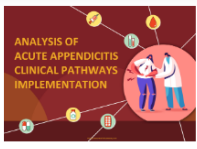
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ANALYSIS OF ACUTE APPENDICITIS CLINICAL PATHWAYS IMPLEMENTATION IN ROYAL PRIMA MEDAN GENERAL HOSPITAL YEAR 2020


Alexander Angkasa, Ermi Girsang, Ali Napiyah Nasution, Adrian Khu, Sri Lestari, Ramadhani Nasution

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THE RELATIONSHIP OF HYPERTENSION, GENETIC AND DEGREE OF SMOKING WITH THE INCIDENCE OF COPD AT HAJI PUBLIC HOSPITAL SURABAYA

Maharani Dyah Pertiwi, Santi Martini, Kurnia Dwi Artanti, Sri Widati

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 0000-0002-0166-2394

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THE RELATIONSHIP OF HYPERTENSION, GENETIC AND DEGREE OF SMOKING WITH THE INCIDENCE OF COPD AT HAJI PUBLIC HOSPITAL SURABAYA

Maharani Dyah Pertiwi¹, Santi Martini^{2*}, Kurnia Dwi Artanti², Sri Widati³

¹Public Health Faculty, Universitas Airlangga, Surabaya, Indonesia

²Department of Epidemiology, Public Health Faculty, Universitas Airlangga, Surabaya, Indonesia

³Department of Health Promotion and Behavior, Public Health Faculty, Universitas Airlangga, Surabaya, Indonesia

Correspondence Author: Santi Martini

Email: santi-m@fkm.unair.ac.id

ABSTRACT

Introduction: Chronic Obstructive Pulmonary Disease (COPD) is a limitation of the inflow and outflow of air caused by inflammation of the inhaled toxin. The incidence of COPD continues to increase every year, and is predicted to be the highest cause of death in the next 10 years. This study aimed to analyze risk factors for the history of hypertension, genetic, and smoking degree with COPD in patients at Haji Public Hospital Surabaya 2019. **Methods:** This type of research used analytic observational research with a case-control research design. The research sample used simple random sampling. Variables used include hypertension history, smoking degree, and genetic. **Result:** The results of the Chi-Square statistical analysis were male sex at risk with COPD (OR: 14.7; 95% CI: 6.28-34.5); Age > 40 years at risk with COPD (Odds Ratio (OR): 116.8; 95% CI: 15.2-898.4; history of hypertension at risk with COPD (Odds Ratio (OR): 2,512; 95% CI: 1.99-3.16; smoking degree at risk with COPD (high degree OR: 60.95; 95% CI: 7.65-470.3; moderate degree OR: 31.3; 95% CI: 3.85-254.6; low degree OR: 6.1; 95% CI: 1.45-25.6) and smoking behavior (OR: 21.9; 95% CI: 7.71-62.271). **Conclusion:** It can be concluded that the variables which are risk factors for COPD are male sex, age > 40 years, history of hypertension, smoking behavior and degree of smoking. Recommendations based on the results of this study are expected that the community can be familiarized with a clean and healthy lifestyle so that the incidence of COPD can be reduced.

Keywords : COPD, genetic, hypertension, male, smoking degree

INTRODUCTION

Chronic obstructive pulmonary disease is a chronic disease that attacks the lungs. Obstructive pulmonary disease is a limitation of the flow of air that enters through the respiratory system caused by air pollution or inflammation of the toxin that attacks the respiratory system. The prevalence of COPD according to The Burden of Lung Disease is 10.1% in the world with sufferers over 40 years of age and among them 7.6% COPD, 6.6% Chronic bronchitis, and 1.8% emphysema (Halbert, et al., 2006). According to Robert Wise, COPD is predicted to be the third leading cause of death by 2030. This is based on the number of deaths and morbidity caused by COPD. COPD can cause as many as 3.2 million deaths in the world in 2015. This chronic disease is more in countries with lower middle income. The

increase in COPD incidence is also followed by an increasing number of smokers throughout the world, especially in developing countries (Wise, 2018).

Indonesia is a developing country, based on basic health research in 2013, the prevalence of COPD in Indonesia as much as 9.2 million people or equivalent to 3.7% (Ministry of Health of the Republic of Indonesia, 2013). Based on GATS Indonesia or The Global Adult Tobacco Survey Indonesia in 2018, COPD in Indonesia is among the fifth largest causes of death caused by exposure to cigarette smoke (WHO, 2019). In addition, smokers are not only active smokers, but also passive smokers. Based on the report of The Global Adult Tobacco Survey in 2011 as many as 51.3% (14.6 million) were exposed to tobacco smoke in the workplace in adults. As many as 78.4%

(1333.33 million) were exposed to tobacco smoke at home. As many as 85.4% of adults are exposed to tobacco smoke in restaurants. Based on the report of the Data and Information Center of the Ministry of Health of the Republic of Indonesia, the number of smokers in Indonesia continues to increase, in 2015 smokers with more than 15 years of age amounted to 22.57% in urban areas and 25.05% smokers in rural areas (Ministry of Health data and information center, 2014). Several previous studies explained some of the risk factors for COPD, including the 2017 Ying Yang study, those risk factors are male sex (OR = 1,467; 95% CI: 1,097-1.96), history of respiratory disease (OR = 2,068; 95% CI: 1.466-2.918), allergy history (OR = 1.791; 1.15-2.78), respiratory infection during childhood (OR = 2,695; 95% CI: 1,504-4.8) and living around polluted areas (OR = 1,631; 95% CI: 1.2-2.2) (Yang, et al., 2017). Some previous studies also regarding the risk of COPD, namely the study of Magitta, Walker, etc. in 2018 with COPD research in Tanzania, showed that risk factors for COPD include male sex, smoking, history of TB and air pollution (Magitta, et al., 2018).

Based on WHO, the risk factors of COPD are divided into 3 namely common modifiable risk factors (unhealthy diet, physical inactivity, tobacco use, outdoor air pollution, allergens) and Intermediate risk factors (raised blood pressure, raised blood glucose and overweight). This is reinforced by the 2019 GOLD (Global Initiative for Chronic Obstructive Lung Disease) report, with an intermediate risk factor, Hypertension. Risk factors for COPD according to the Ministry of Health of the Republic of Indonesia include smoking, alpha antitrypsin deficiency, bronchial hyperactivity and a history of recurrent respiratory infections (Ministry of Health data and information center, 2014)

Researchers consider it important to examine the relationship of hypertension history, because of the lack of research on the history of hypertension with COPD.

Although genetic research and cigarette exposure have been carried out, the results of several previous studies are different. This study aimed to analyze the risk factors for history of hypertension, genetic, and smoking degree with COPD in patients at Haji Public Hospital Surabaya 2019.

METHODS

This research was analytic observational research which means research with no treatment, but only observing the subject. The research design used in this study was case control, which is a research design that seeks a relationship between exposure to disease by comparing between case and control groups. The location of the study was conducted in one of the type B hospitals belonging to the province of East Java, Indonesia, namely Haji General Hospital Surabaya, Indonesia.

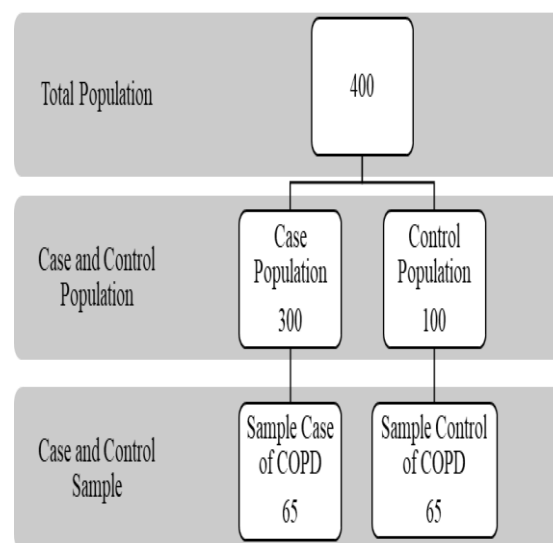


Figure 1. Case-control sampling

The research sample used simple random sampling. The case sample in this study was COPD patients who seek treatment at inpatient and outpatient installations at Surabaya Haji Hospital in 2019. The control sample in this study were visitors who had no history and were not sufferers of COPD at Haji Hospital

Surabaya in 2019. Based on the calculations using a case control hypothesis test sample, 65 respondents were obtained. This showed that the total sample of this study was 130 respondents. The variables in this study were divided into 2 namely dependent and independent. The dependent variable in this study was the incidence of COPD, the collection of data through interviews and secondary data using medical records, while the independent variables in this study were the characteristics of the respondent (age, and gender), history of hypertension, genetics, and degree of smoking. The collection of data through interviews and collection of hypertension history data through medical records. The sampling technique used in this study was simple random sampling. Data collection techniques in this study used a questionnaire instrument. The questionnaire used was a research questionnaire "Burden of Cigarette Diseases in East Java in 2019" which had passed the validation process. Primary data collection, data collection is also carried out with secondary data taken from medical records. When the research was conducted in August - September 2019. The data analysis technique used was univariable and bivariable analysis. The research protocol was submitted to the Ethical Review Committee and got approval the number of 0727 / KEPK / X / 2018.

RESULTS

Description based on Respondent Characteristics

Table 1 illustrates the variable frequency distribution of research respondents. Gender frequency distribution is more in the female category with a total of 52.3% (68 respondents), while in the male category it is 47.7% (62 respondents). The age group of research respondents was more in the > 40 years category with a total of 66.9% (87 respondents), while in the <40 years category it was 33.1% (43 respondents).

Table 1. Frequency Distribution of Respondents' Characteristics at RSU Haji Surabaya 2019

Variable	Frequency (n)	Percentage (%)
Gender		
Male	62	47.7
Female	68	52.3
Age Group		
>40	87	66.9
<40	43	33.1
Hypertension History		
Hypertension	22	16.9
Normal	108	83.1
Genetic		
Genetic	27	20.8
No Genetic	103	79.2
Smoking		
Smoking	47	36.2
No Smoking	83	63.8
Smoking Degree		
High	16	12.3
Moderate	11	8.5
Low	20	15.4
No Smoking	83	63.8
Total	130	100

Distribution of hypertension history among respondents, 16.9% (22 respondents) had a history of hypertension, and 83.1% (108 respondents) had normal blood pressure. Respondents who had a family history of COPD were 20.8% (27 respondents), while respondents who did not have a COPD family history were 79.2% (103 respondents). Respondents who smoked were 36.2% (47 respondents) while non-smokers were 63.8% (83 respondents) and had different degrees of smoking such as respondents who have a high smoking degree of 12.3% (16 respondents), respondents who have a moderate smoking degree of 8.5% (11 respondents), and respondents who have a low smoking degree of 15.4% (20 respondents).

The Relationship of Respondents Characteristic with COPD Incidence at RSU Haji Surabaya

Characteristics of respondents in this study were divided into 2 namely age

group and gender. The age group is divided into 2 namely the age group > 40 years and the age group <40 years. The sexes are divided into 2 namely women and men

Table 2. Relationship of Respondent Characteristics with COPD in Surabaya Haji Hospital 2019

Variable	COPD				p	OR	95%CI	
	Yes		No				Lower	Upper
	N	%	N	%				
Age group								
>40 years old	64	49.2	23	17.3	0.00	116.8	15.2	898.4
<40 years old	1	0.76	42	32.3				
Gender								
Male	50	38.4	12	9.2	0.00	14.7	6.281	34.5
Female	15	11.5	53	40.7				

Table 2 shows that there were 64 people (49.2%) who were in the > 40 years age group and had COPD. A total of 1 person (0.76%) included in the age group <40 years and had COPD. A total of 23 respondents (17.3%) were in the > 40 years age group and did not experience COPD, while 42 respondents (32.3%) were <40 years old and did not have COPD.

Table 2 also shows that there were 50 people (38.4%) male and had COPD, whereas as many as 15 people (11.5%) were women and had COPD. A total of 12 people (9.2%) were men and did not have COPD, while 53 were women and did not have COPD.

Based on statistical analysis using Chi-square obtained results that gender has a relationship with COPD incidence, this is evidenced by p-value = 0.00 and Odds Ratio (OR) = 14.7 and these results also indicated that age groups have a relationship with COPD incidence, this evidenced by the p-value = 0.00 and Odds Ratio (OR) = 116.8. The OR value means that the age group > 40 years has a risk of 116.8 times greater COPD than the age group <40 years. In addition, men have a 14.7 greater risk of developing COPD than women.

Relationship of Hypertension History with COPD Incident in Surabaya Haji Hospital 2019

Historical hypertension data were obtained by interview and medical record. Hypertension is often associated with several other non-communicable diseases like CVD, stroke, and COPD. The following are the results of a statistical analysis of the history of hypertension with COPD:

Table 3. Relationship History of Hypertension with the incidence of COPD in Surabaya Haji Hospital 2019

Variable	COPD				p	OR
	Yes		No			
	n	%	n	%		
Hypertension History						
Hypertensi	2	16.	0	0	0.0	2.
on	2	9			0	5
Normal	4	33	6	5		
	3		5	0		
95% CI = 1.99 -3.16						

Table 3 shows 22 people (16.9%) had a history of hypertension and had COPD. As many as 43 people (33%) did not

have a history of hypertension and had COPD. A total of 65 people (50%) did not have a history of hypertension and did not have COPD and 0% had a history of hypertension and had COPD.

Based on statistical analysis using Chi-square, the results show that the history of hypertension has a significant relationship with the incidence of COPD, this is evidenced by the p-value = 0.00 and Odds Ratio (OR) = 2.5. The OR value means that someone who has a history of hypertension has a 2.5 times greater risk of developing COPD than those who have normal blood pressure.

Relationship between Genetic and COPD in Haji Hospital Surabaya in 2019

Genetic history is often associated with COPD incidence. This is related to the lack of antitrypsin-alpha-1. In this study, family history data were obtained from questionnaire instruments. The following are the results of genetic statistical analysis with COPD:

Table 4. Relationship between Genetic and COPD in Haji Hospital Surabaya in 2019

Variable	COPD				p	O R
	Yes		No			
	N	%	N	%		
Genetic						
Genetic	1	13.	9	6.	0.05	2.3
No	8	8	5	9	2	
Genetic	4	36.	6	43		
	7	1				
95%CI= 0.979 - 5.798						

Table 4 shows that there were 18 people (13.8%) who had a family history of COPD and had COPD, whereas those who

did not have a family history, but experienced COPD as many as 47 people (36.1%). A total of 9 people (6.92%) had a family history, but did not have COPD, while those who had no family history of COPD and did not have COPD as many as 56 people (43.07%).

Based on statistical analysis, it can be seen in Table 4 that p-value = 0.052 and Odds Ratio (OR) = 2.3. This shows that there is no relationship between family history and the incidence of COPD in Surabaya Haji General Hospital in 2019. Family history is also not at risk for COPD.

The Relationship between Smoking Behavior and the Degree of Smoking with the Incidence of COPD in Surabaya Haji General Hospital in 2019

Smoking behavior is often cited as a major risk factor for COPD in the world. In this study, not only looked at smoking behavior or not, but also looked at smoking rates by someone with COPD at the Haji general hospital in Surabaya.

The Brinkman Index is a way to measure a person's smoking level. The Brinkman Index is calculated by multiplying the average number of cigarettes consumed a day and smoking length in a number of years. The measurement results from the Brinkman Index (IB) are high, if the calculation result is more than 600. It is classified as moderate if the calculation result is 200 to 600 and classified as light smoking if less than 200.

Table 5 shows that there were 42 people (32.3%) who had smoking behavior and experienced COPD, while those who did not have smoking behavior, but had COPD as many as 23 people (17.6%). Five people (3.84%) had smoking but did not have COPD, while 60 people did not have smoking and did not have COPD (46.15%).

Table 5. The Relationship between Smoking Behavior and the Degree of Smoking with COPD in Surabaya Haji Hospital in 2019

Variable	COPD				<i>p</i>	OR	95%CI	
	Yes		No				Lower	Upper
	N	%	N	%				
Smoking								
Smoking	42	32.3	5	3.84	0.00	21.9	7.71	62.271
No Smoking	23	17.6	60	46.15				
Smoking Degree								
High	15	11.5	1	0.76	0.00	60	7.65	470.3
Moderate	10	7.7	1	0.76		31.3	3.85	254.6
Low	17	15.3	3	2.3		6.1	1.45	25.6
No Smoking	23	13	60	46.15				

The degree of smoking was high and 15 people experienced COPD (11.5%), while those who had a high degree of smoking but did not have COPD were only 1 person (0.76%). There were 10 people (7.7%) who had moderate degrees of smoking and those who had COPD, while those who had moderate smoking but did not have COPD only 1 person (0.76%). The degree of smoking was low and experiencing COPD were as many as 17 people (15.3%), while those with low smoking degrees, but not experiencing COPD were only 3 people (2.3%). Based on statistical analysis, it can be seen in Table 5 that p -value = 0.00 in both variables and Odds Ratio (OR) = 21.9 in smoking behavior. 21.9 times the risk of having COPD compared to nonsmokers.

DISCUSSION

Relationship of Respondent Characteristics with COPD at Surabaya Haji Hospital

Risk factors that often fall into the non-modifiable risk category are gender and age. Based on the Global Initiative for Chronic Obstructive Lung Disease, illustrating that age reflects the amount of cumulative toxin inhalation exposure, and this is followed by a decrease in lung function due to aging. Airways and aging parenchyma will occur structural changes associated with COPD vulnerability in old age (GOLD, 2019).

Most studies reported that COPD prevalence and death is greater in men than women, although recent studies in developed countries have reported that COPD prevalence is almost the same in men and women. This is caused by changes in tobacco smoking patterns in women that are increasing in developed countries. In Indonesia, active smokers still constitute the majority of the male group, according to the Global Adult Tobacco Survey (GATS) report in Indonesia that around 36.1% of Indonesians smoke, as many as 67.4% of them are men and 4, 5% of them are women (WHO; Indonesian Ministry of Health; CDC Foundation, 2012). This reinforces the results of this study, that male sex is one of the risks of COPD in Indonesia.

This study shows that age and sex have a relationship with COPD. This variable is a variable that cannot be modified, so more preventive measures to maintain life to stay healthy by implementing a clean and healthy lifestyle. This study shows that male sex and <40 years are at risk of developing COPD. This is in accordance with several previous studies, such as the 2018 Safitri study in a hospital in Blitar, Indonesia (Safitri, 2018). In addition, besides Winda, this is also consistent with Ying Yang's research in China in 2017, that male sex and > 40 years old have a risk of COPD (Yang et al., 2017). This happens because men use more tobacco in men and age > 40 years are also

at risk due to decreased lung function so that it is less than optimal (WHO, 2013).

Relationship of Hypertension History with COPD at Haji Hospital Surabaya

Hypertension is one of the main risks of CVD and is an important contributor to poor prognosis and mortality in COPD. History of hypertension has a relationship with COPD in this study with (p-value = 0.00) and has a risk of 2.5 times and in this study hypertension history is not a modifiable risk or a risk that cannot be modified, but a history of hypertension is a medium risk which will worsen the COPD prognosis and some cases can accelerate the onset of COPD. Previous studies examining the risk of a history of hypertension with COPD are the Soon-Hye study with colleagues in 2017 with an Odds Ratio (OR): 1.7; 95% CI: 1.37-2.13; p = 0.001. The presence of hypertension is also associated with the main risk factor for COPD, namely smoking behavior. Aside from being just a disease, COPD produces restrictions on air flow, COPD can be a systemic disease that can affect the cardiovascular system and autonomic nerves (Kim et al., 2017).

Someone who has a history of hypertension will be at risk for several other diseases. Based on the Global Initiative for Chronic Obstructive Lung Disease in 2019, hypertension is perhaps the most common comorbidity in COPD patients. Hypertension can also have implications for COPD prognosis. Diastolic dysfunction due to hypertension can be associated with sports intolerance that has been treated optimally. Hypertension is also a symptom associated with acute exacerbation, which triggers hospitalization in COPD (GOLD, 2019).

A person who has hypertension and COPD does not have a different treatment from COPD patients who do not have hypertension, because hypertension is treated according to the usual hypertension guidelines. The role of treatment with beta-blockers is less prominent in current

hypertension guidelines, and there is no evidence that patients with COPD increase the risk of cardiovascular beta-blockers to either reduce the benefits of treatment with LABA or increase cardiovascular risk. (GOLD, 2019).

COPD with hypertension also cannot be separated from one of the main factors of COPD which is smoking. Smoking can cause hypertension, and hypertension can worsen COPD. COPD patients who have hypertension will be associated with a poor prognosis and can develop into right-sided heart failure (Imaizumi, 2015). Based on this study, hypertension in COPD patients is caused by loss of alveolar remodeling of the pulmonary vessels by chronic hypoxia and inflammation, decreased levels of endothelial vasodilators such as nitric oxide, vasospasm and so on. This change is also seen in COPD patients who do not have hypertension or normal blood pressure with normal pulmonary function and endothelial dysfunction from smoking behavior as an alleged main cause or a great risk in developing pulmonary hypertension in COPD patients (Imaizumi, 2015).

The Relationship between Genetic with the Incidence of COPD in Surabaya Haji General Hospital in 2019

A significant family history risk of limited air flow has been observed in people who smoke, all smokers and siblings of patients with severe COPD, suggesting that 49 shows that genetics along with environmental factors can influence this vulnerability. Single genes, such as matrix encoding matrix metalloproteinase 12 (MMP-12) and glutathione S-transferase have been linked to risk and decreased lung function (GOLD, 2019). This has been confirmed by several previous studies. One of them is the Brashiel study, which stated that there are substantial steps that have been neglected to have an impact on the understanding of COPD genetics in the last 50 years especially on epidemiology, that a small number of smokers develop COPD,

while others have a similar number of undeveloped smoking history (Brashier & Kodgule, 2012).

Based on Brashier's research, it was shown that a severe genetic risk factor identified was the SERPINA1 gene that had encoded the serine protease inhibitor, alpha-1 antitrypsin (AAT). Disorders of the SERPINA1 gene cause AAT-1 deficiency. This causes the absence of protection of respiratory organs resulting in emphysema. M allele emphysema is associated with normal AAT while Z allele is often associated with AAT-1 deficiency emphysema. This occurs in only about 1-2% of the population that shows anomalies in SERPINA1. This shows that there are many other genetic variations that can cause the development of COPD. This results in an understanding that COPD is a polygenic disease that involves complex interactions between various polymorphic genes. Studies have examined many genes that have been linked to COPD, but these tend to be lacking (Brashier & Kodgule, 2012).

Some other studies are Yang's research from China, which links genetics with COPD. This shows that genetics is one of the risk factors for COPD incidence in China with (OR = 2,068; 95% CI: 1,466 - 2,918) (Yang et al., 2017). Although research on genetics with COPD is very rare and this study shows that genetics has no relationship and is not a risk factor for COPD at Hajj General Hospital in 2019 with an Odds ratio (OR): 2.38; 95% Confidence Interval (CI): 0.979 - 5.798. This is reinforced by the statement from the Global Initiative for Chronic Obstructive Pulmonary Disease (EMAS) that the best genetic risk factor is severe hereditary alpha-1 alitrypsin deficiency, and this is only relevant to a small part of the world population. It also illustrates that interactions between genes and environmental exposure that affect a person occur COPD (GOLD, 2019).

The Relationship between Smoking Behavior and the Degree of Smoking with the Incidence of COPD in Surabaya Hajj General Hospital in 2019

In general, smoking behavior is a major risk factor for COPD incidence worldwide. Although it is not only smoking behavior that can cause COPD and there is significant evidence regarding epidemiological studies that non-smokers can also cause limited air flow and chronic entry. However, compared to smokers with COPD, never smoking with chronic inflow and outflow has fewer symptoms, is mild disease and has a lower burden of systemic inflammation. People who have never smoked with chronic limited air flow do not seem to have an increased risk of lung or cardiovascular cancer. However, there is evidence that nonsmokers with COPD have an increased risk of pneumonia and death due to respiratory failure (GOLD, 2019).

Some longitudinal studies of COPD have followed groups and populations for up to 20 years, to date there have been no studies that monitor the progress of the disease through its entire course, or include pre and perinatal periods that will shape the future of the individual. Thus, an understanding of current COPD risk factors is in many cases incomplete resulting from complex interactions between genes and the environment. Smoking is a major environmental risk factor for COPD, but even less than 50% of the development of COPD over a patient's lifetime. That's because there are other risk factors involved (GOLD, 2019).

Based on Yang's research, et al., Showed that smokers have a higher prevalence of respiratory symptoms and lung function, abnormalities, a greater annual FEV1 reduction rate and a greater COPD mortality rate than nonsmokers. This is supported by statistical analysis in the study of Yang et al. The risk of COPD is higher for smokers than nonsmokers (OR: 2,092, 95% CI: 1,707-2,565). based on this, smoking cessation should be advocated as a key step and important

intervention to prevent COPD (Yang et al., 2017). Smoking can also cause emphysema or as a risk factor for emphysema. Continual exposure to secondhand smoke causes an increase in pulmonary macrophages in the matrix metalloproteinase (MMP). Types of MMP 9 and 12 can inhibit endogenous antiproteases (alpha-1 antitrypsin) and degradation of pulmonary matrix molecules that play an important role in the defense of lung integrity (Oktaria et al., 2017). Smoking is a major factor in COPD, smoking can interfere with ciliary movements and inhibit the function of alveolar macrophages, besides smoking can also cause hypertrophy and hypersecretion of the mucous glands and continuous exposure can cause lung damage (Oktaria et al., 2017).

The exposure to inhalation which is a risk of COPD, smoking is the risk that has the greatest relationship in several countries. However, only about 15% of smokers who have COPD appear clinically and have a history of exposure of 40 years or more. Smokers with pre-existing airway reactivity (defined by increased sensitivity to inhaled metacholine) even without clinical asthma, have a higher risk of developing COPD than nonsmokers. Other risk factors include low body weight, respiratory distress in childhood, and exposure to passive cigarette smoke, air pollution, and work dust or inhaled chemicals that have contributed to the risk of COPD, but the risk of inhalation exposure which contributes most is smoking (Wise, 2018).

Inhalation exposure can trigger an inflammatory response in the respiratory tract, especially in alveoli which can cause disease in genetically susceptible people. This process is usually mediated by an increase in protease activity and a decrease in antiprotease activity. Lung proteins such as neutrophil elastase, matrix metalloproteinases and cathepsin, break down elastin and connective tissue in the normal process of tissue repair. Under

normal circumstances, protease activity will be balanced with antiprotease. In COPD patients, activated neutrophils and other inflammatory cells release proteases as part of the inflammatory process. The activation of neutrophils and macrophages also leads to the accumulation of free radicals, such as superoxide anions and hydrogen peroxide, which inhibit antiproteases. This can cause bronchoconstriction, mucosal edema, and mucosal hypersecretion. COPD inflammation increases with increasing disease severity and followed by a history of severe illness, inflammation does not completely heal despite stopping smoking (Wise, 2018).

Previous studies throughout the world have shown a higher smoking prevalence among COPD patients compared to nonsmokers, and in people who smoke younger they are exposed to COPD than nonsmokers. One interesting indicator is when lung function and mobility / endurance are relatively unaffected in COPD patients who continue to smoke, have risks because of their younger age or shorter smoking times. At the time of diagnosis, more intensive education must be given to COPD patients, not only regarding inhalation, but also about the results and systemic effects and the importance of stopping smoking and avoiding exposure to cigarette smoke is an effective way to prevent COPD (Karadogan, et al., 2018).

Smoking behavior from person to person is different, this is distinguished by the level of smoking. Smoking rates can be calculated with an index called the Brinkman Index (IB). The Brinkman Index is a doubling between the number of cigarettes smoked per day and the length of smoking a year. The Brinkman Index (IB) classification results are mild with a score of 0-200, moderate with a score of 200-600, and high with a score of more than 600 (Naser, et al., 2016). Based on the results of this study, the degree of smoking has a relationship with COPD which has a value

of $p = 0.00$ and those who have high smoking rates are 16 respondents, of which 15 respondents are exposed to COPD. The smoking rate is moderate as many as 11 respondents, 10 of them affected by COPD. Low smoking rates of at least 20 respondents, 17 of whom have COPD. This can be the basis for creating non-communicable diseases prevention programs, especially COPD. Not smoking or stop smoking is an effective prevention for COPD or other non-communicable diseases. A person who tries not to smoke and quit smoking must be supported in his efforts with motivational counseling and also supported by government policies on tobacco control (Karadogan et al., 2018).

Smoking behavior is a major risk factor for COPD, however, there are a number of studies that do not show smoking behavior with COPD and more research shows that there is a relationship between smoking behavior and COPD as in the Safitri 2018 study, smoking behavior (OR: 4.09; 95% CI : 1.34-12.4) (Safitri, 2018). Based on the results presented, this study shows that there is a significant relationship between smoking behavior and COPD (OR: 21.9; 95% CI: 7.71 - 62.271). Smoking is the main cause because in cigarettes there are chemical compounds such as nicotine, tar, and CO that can damage the respiratory organs, especially the lungs (GOLD, 2019). In addition to smoking behavior, smoking rates using the Brinkman index also have a relationship with COPD ($p = 0.00$). This is reinforced by supportive research, namely Naser, Irvan, Erly's research in 2016 showed that there is a relationship between smoking rates and COPD (Naser et al., 2016). This is supported by the literature which stated that the higher the level of smoking a person will be at increased risk of COPD because the higher the smoking rate the more accumulation of inflammatory toxins that enter the body (GOLD, 2019).

This study has several limitations, obtaining a history of hypertension through medical records and not obtaining

information about the severity of COPD due to biased information and simplicity of questions on the instrument. The strength of this research is that it can provide information about the risk of hypertension and cigarette exposure with COPD.

CONCLUSION

Based on the above results, it can be concluded that there is a relationship between male sex, > 40 years with COPD, history of hypertension with COPD, and smoking behavior and degree of smoking with COPD. This is not only an association relationship, but also these variables are risk factors for COPD. This is evidenced by the OR value and the estimated interval. While unrelated and not included as a risk factor in this study at Surabaya Hajj General Hospital is a genetic variable. This is evidenced by the p-value which is not significant, so the OR value and the estimated interval cannot be used on genetic variables.

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