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FACTORS RELATED TO ACUTE RESPIRATORY INFECTION (ARI) COMPLAINTS AMONG FURNITURE WORKERS IN EAST OKU TIMUR

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ABSTRACT

Occupations within the furniture industry process that are exposed to particulate matter (PM10) are hazardous and can lead to diseases, one of which is respiratory complaints (ISPA). Industrial furniture workers who experience ISPA symptoms can be caused by several factors. This study aims to analyze the factors associated with ISPA complaints among furniture workers in East OKU Timur. The research employs a cross-sectional design with a sample size of 59 respondents, selected through Purposive Sampling technique. The measuring instrument used in the study is the Haz Dust Epam 5000. The obtained data are subjected to univariate and bivariate analysis using SPSS with the chi-square test. The results of the bivariate analysis indicate that there is a correlation between Particulate Matter (PM10), duration of exposure, smoking habits, mask usage, and work duration with ISPA complaints. However, in terms of nutritional status variable, there is no correlation between ISPA complaints among furniture workers in east OKU Timur. In conclusion, the research finds that the factors related to ISPA complaints include Particulate Matter (PM10), duration of exposure, smoking habits, mask usage, and work duration.

Keywords: furniture industry, ARI complaints

Introduction

Progress in the industrial sector in Indonesia can have positive impacts, namely the opening of job opportunities, transportation and communication facilities, as well as the improvement of socio-economic standards for the community. Industrial development, in general, is a potential sector as a source of pollution that can be harmful to both health and the local environment. The negative impact of the furniture industry is the emergence of air pollution caused by dust generated during the processing or output of the furniture industry (1).

The physical process of raw material processing to create furniture tends to generate pollution, such as wood dust particles. The furniture industry has the potential to cause air pollution in the workplace in the form of wood dust. The size of the sawed and finely ground dust particles will become airborne wood dust. Air pollution caused by the dust generated during the processing or output of the furniture industry contaminates the air and its environment, thereby exposing furniture industry workers to dust. This exposure can impact human health, particularly causing respiratory system disorders that can lead to issues such as acute respiratory tract infections (2). Acute respiratory tract infection (ARI) is an acute inflammation of the upper and lower respiratory tract caused by infections from microorganisms such as bacteria, viruses, or rickettsia, with or without inflammation of the lung parenchyma (3). Acute Respiratory Tract Infection (ARI) is one

of the illnesses that can be caused by air pollution. ARI is an acute infectious disease that affects one or more parts of the respiratory tract, ranging from the nose to the lung sacs (alveoli), including its associated tissues like the sinuses around the nose (paranasal sinuses), the middle ear cavity, and the pleura. This disease can occur due to factors such as cigarette smoke, household combustion emissions, vehicle and industrial exhaust gases, forest fires, and others (4).

According to the WHO in 2016, the causes of death worldwide attributed to occupational factors were as follows: cancer accounted for 34%, workplace accidents 25%, respiratory diseases 21%, cardiovascular diseases 15%, and 5% were due to other factors (5). The national prevalence of Acute Respiratory Tract Infections (ARI) based on healthcare provider diagnoses and experienced symptoms reached 9.3%, and there were 13 provinces with prevalence rates higher than the national average. The province with the highest ARI prevalence was East Nusa Tenggara (NTT) at 13.1%, while the province with the lowest ARI prevalence was Jambi at 5.5%. The prevalence of ARI cases in South Sumatra province was 7% (6). Based on data from the Central Statistics Agency (BPS) of South Sumatra province in 2019, out of the top ten primary diseases, ARI ranked first with a total of 583,915 cases, accounting for 49.89% of all cases compared to other diseases.

Factors influencing Acute Respiratory Tract Infections (ARI) include the duration of dust exposure to workers, the composition of total dust levels, smoking behavior, working hours, and the use of personal protective equipment (PPE) to shield the respiratory system from dust exposure(7). Another factor is nutritional status; individuals with poor nutritional status are more vulnerable to infections due to their compromised immune response. Infections can lead to inflammation and worsen nutritional conditions, exacerbating the immune system's deterioration. A weakened immune system is directly associated with decreased defense functions in the digestive and skin systems, as well as decreased respiratory muscle function, rendering individuals susceptible to Acute Respiratory Tract Infections (ARI) (8).

Based on this background, Acute Respiratory Tract Infections (ARI) continue to be a health issue in Indonesia, especially in East Ogan Komering Ulu (OKU Timur) Regency, which is particularly concerning for workers in the wooden furniture industry. ARI is a concern because workers in the wooden furniture industry are consistently exposed to wood dust and have not yet received the expected occupational health services. Dust is a pollutant that poses health problems for the community, hence the researcher's interest in conducting a study on factors related to ARI complaints among furniture workers in East OKU Timur Regency.

Methods

This study is a cross-sectional research with a sample size of 59 respondents, employing the Purposive Sampling technique for sample selection. The measurement tool utilized in this study is

the Haz Dust EPAM 5000. The acquired data are analyzed using univariate and bivariate analysis through SPSS software, employing chi-square tests.

Results

Univariate Analysis

Particulate Matter (PM10)

Table 1. Frequency Distribution of *Particulate Matter* (PM10)

Particulate Matter (PM10)	Frequency(n)	Percentage (%)
≥10 mg/m³	45	76,3
<10 mg/m³	14	23,7
Total	**59**	**100**

ARI Complaints

Table 2. Frequency Distribution of ARI Complaints

ARI complaints	Frequency(n)	Percentage (%)
Yes	28	47,5
No	31	52,5
Total	**59**	**100**

Characteristics of Individuals Among Furniture Workers in East OKU Timur

Table 3. Frequency Distribution of Individual Characteristics

Variable	n	%
Duration of Exposure		
<8 hours	35	59,3
≥8 hours	24	40,7
Smoking Habit		
Yes	40	67,8
No	19	32,2
Mask Usage		
Not Disciplined	33	55,9
Disciplined	26	44,1
Nutritional Status		
Not Ideal	21	35,6
Ideal	38	64,4
Length of Service		
<10 Years	35	59,3
≥10 Years	24	40,7

Bivariate Analysis

The Relationship Between Particulate Matter (PM10),Duration of Exposure, Smoking Habit,Mask Usage, Nutritional Status, Length of Service and ARI Complaints

Variable	ARI Complaints				Total		*p-value*	PR (95% CI)
	Yes		No		N	%		
	n	%	n	%				
***Particulate Matter* (PM10)**								
≥10 mg/m³	15	53,6	5	16,1	20	100	0,006	2,667 (1,209-5,81)
<10 mg/m³	13	46,4	26	83,9	39	100		
Duration of Exposure								
≥8 jam	17	60,7	7	22,6	24	100	0,007	0,425 (0,219-0,825)
<8 jam	11	39,3	24	77,4	35	100		
Smoking Habit								
Yes	24	85,7	16	51,6	40	100	0,012	0,507 (0,325-0,791)
No	4	14,3	15	48,4	19	100		
Mask Usage								
Not Discipline	22	78,6	11	35,5	33	100	0,002	0,433 (0,256-0,734)
Discipline	6	21,4	20	64,5	26	100		
Nutritional Status								
Not Ideal	10	35,7	11	35,5	21	100	1,000	0,995 (0,599-1,653)
Ideal	18	64,3	20	64,5	38	100		
Length of Service								
≥10 Years	17	39,3	7	22,6	24	100	0,007	0,425 (0,219-0,825)
<10 Years	11	60,7	24	77,4	35	100		

Discussion

Based on the research results regarding ARI complaints among furniture workers, out of the total 59 respondents, there were 28 (47.5%) respondents who experienced ARI complaints, with a proportional difference of 5%. Respondents experiencing ARI complaints were working in wood sawing and finishing processes, specifically in the sanding process. ARI complaints among the respondents in this study can be observed through the classification of ARI and the symptoms experienced by the respondents. According to Riskesdas (2018), the classification of ARI can be determined by its symptoms, which include fever, cough, nasal congestion or runny nose, and sore throat lasting for more than two weeks(6).

According to a study conducted by Asfian et al. (2016) on factors related to the occurrence of ARI among rice milling workers in the village of Wononggere, several factors can increase the risk of ARI among rice milling workers. These factors include smoking habits, the use of personal protective equipment (PPE), length of service, and dust exposure. These factors have significant potential in contributing to the onset of ARI(9).

Based on observations at the research site, the onset of ARI is determined by the symptoms experienced by the respondents while working. Environmental factors such as inhalation of Particulate Matter (PM10) generated from furniture manufacturing processes and unfavorable

workplace conditions, combined with the duration of exposure, smoking habits, mask usage, and length of service, indicate that engaging in continuous work for extended periods increases the risk of ARI among furniture workers.

Based on the analysis results using the chi-square test, a p-value of 0.006 was obtained (p-value < 0.05), indicating a significant relationship between Particulate Matter (PM10) and ARI complaints among furniture workers in East OKU Timur.

The results of this study are consistent with the research conducted by Annisa et al., (2020), indicating a significant relationship between Particulate Matter (PM10) and respiratory complaints (ISPA) among workers of construction project X in Depok. This can be observed from the obtained p-value of 0.001. The results of the statistical analysis show an Odds Ratio (OR) of 0.214, indicating a 0.214 times increased risk of developing respiratory complaints (ISPA)(10). Similar findings were also observed in a study conducted by Fuqoha et al. (2017), which demonstrated a connection between wood dust and Acute Respiratory Tract Infections (ISPA) among furniture workers at PT.X Jepara, with a p-value of 0.007(11).However, the results of this study contradict the research conducted by Helmy (2012), which indicated that the obtained p-value of 0.084 suggests that there is no significant relationship between total dust levels and impaired lung function due to work-related pneumoconiosis among workers in the production department of Silver Crafts in Kotagede, Yogyakarta(12).

Based on the research findings, measurements of Particulate Matter (PM10) levels in the furniture industry indicate that furniture production takes place outdoors. In this location, it can be observed that dust is airborne, and the working conditions within the furniture industry are cleaned only a few times per month.

Based on the analysis results using the chi-square test, a p-value of 0.007 was obtained (p-value < 0.05), indicating a significant relationship between the duration of exposure and respiratory complaints (ISPA) among furniture workers in East OKU Timur.

The results of this study are in line with the research conducted by Fujianti et al. (2015), which showed that the statistical test yielded a p-value of 0.009, indicating a significant relationship between the duration of exposure to dust and respiratory disorders among workers of Jati Berkah Furniture in Jambi City. This is attributed to the fact that the daily duration of exposure determines the daily dose received by workers, leading to a risk that is 14.667 times higher for workers who work ≥8 hours/day compared to those who work <8 hours/day(1).

This study is consistent with the theory proposed by Fujianti et al. (2015) that the duration of exposure determines the daily exposure dose received by workers, meaning that the longer the exposure, the greater the inhaled exposure dose for the workers. Workers with workplace conditions exceeding the Threshold Limit Value (NAB) and a working duration of ≥8 hours per day are at risk of experiencing respiratory disorders in the future. In general, working for 8 hours

per day is recommended. Working beyond 8 hours per day can lead to a significant decrease in productivity, as well as fatigue, illnesses, and work-related accidents(1). The duration of exposure is regulated by the Ministry of Manpower and Transmigration Regulation concerning overtime working hours and overtime pay, where the exposure duration and working hours are set at 8 hours per day or 40 hours per week(13).

Based on the research findings, the variable of duration of exposure among furniture workers in East OKU Regency shows that the respondents have varying working hours. These hours include: 8 hours/day (working from 08:00 AM to 12:00 PM, taking a break, and then continuing from 01:00 PM to 04:00 PM). 9 hours/day (working from 08:00 AM to 12:00 PM, taking a break, and then continuing from 01:00 PM to 05:00 PM). 10 hours/day (working from 07:00 AM to 12:00 PM, taking a break, and then continuing from 01:00 PM to 05:00 PM).

Based on the analysis results using the chi-square test, a p-value of 0.012 was obtained (p-value < 0.05), indicating a significant relationship between smoking habits and respiratory complaints (ISPA) among furniture workers in East OKU Regency. The smoking habit variable is associated with ISPA complaints because it directly and indirectly impacts the respiratory health of workers who smoke, disrupting the work productivity of furniture workers.

This study is consistent with the research conducted by Putra et al. (2017), which found a significant relationship between smoking habits and respiratory complaints (ISPA) among brick factory workers in Manggis Gantiang Bukittinggi. This can be observed from the obtained p-value of 0.031. The results of the statistical analysis show an Odds Ratio (OR) of 9.000 with a 95% Confidence Interval (CI) of 1.031-78.574. It can be concluded that respondents who have a smoking habit are 9,000 times more likely to experience respiratory complaints (ISPA) compared to respondents who do not have a smoking habit(14).

According to the theory proposed by Akili et al. (2017), smoking has a significant impact on human lung health. Cigarettes contain hazardous and toxic substances, causing health disturbances not only in active smokers but also affecting individuals around them. Cigarettes containing nicotine have various pharmacological properties, such as stimulation that affects the heart and endocrine system. The acute effects include increased heart rate, blood pressure, and blood vessel constriction. The factors leading to smoking habits in an individual are categorized into three factors: predisposition, enabling factors, and reinforcing factors(15).

Based on research results, it has been found that respondents have a smoking habit both during work and non-working hours. Respondents have had the habit of smoking since their teenage years, starting at the age of 15. The number of cigarettes smoked per day ranges from 6 to 12 cigarettes, or even a whole pack or more. This can lead to an increase in respiratory complaints among furniture workers, as the smoke emitted by cigarettes can disturb the respiratory system, and the unfavorable environmental conditions can exacerbate the effects, making them even worse.

Based on the analysis results using the chi-square test, a p-value of 0.002 was obtained (p-value < 0.05), indicating a significant relationship between mask usage and ARI complaints among furniture workers in East OKU Timur.

This study aligns with research conducted by Putra et al. (2017)which also found a significant relationship between mask usage and ARI complaints. This can be observed from the obtained p-value of 0.002. The statistical analysis results show an odds ratio (OR) of 9.800 with a 95% confidence interval (CI) of 2.500-38.411. It can be concluded that respondents who are not disciplined in using masks have a 9.800 times higher likelihood of experiencing ARI complaints compared to respondents who are disciplined in mask usage(14).

Yunus et al. (2020) revealed a similar finding that the use of masks as personal protective equipment (PPE) in the workplace is crucial and has long-term health implications when continuously exposed to an unsupportive environment. The function of masks is to protect and assist the respiratory system in filtering the air that enters the respiratory tract. While masks may not provide complete protection, they can reduce the amount of dust entering the respiratory tract. If mask usage among workers is low, they face a high risk of respiratory tract diseases. However, if workers are aware and conscious of using masks as Personal Protective Equipment, they will have a lower risk of respiratory tract diseases(16).

Based on the research results, there were 44.1% of respondents who demonstrated disciplined usage of 3-ply masks while working and showed understanding of proper mask usage by covering both the nose and mouth thoroughly.

Based on the analysis results using the chi-square test, a p-value of 1.000 was obtained (p-value > 0.05), indicating that there is no significant relationship between nutritional status and Acute Respiratory Infection (ISPA) complaints among furniture workers in East OKU Regency.

The results of this study are consistent with the research conducted by Akbar (2016), which stated that there is no relationship between nutritional status and respiratory disorder complaints. This is observed based on the data analysis results using the Fisher exact test, which yielded a p-value of 0.195(17).

According to the theory proposed by Hamdin et al. (2021), Body Mass Index (BMI) is one of the factors contributing to respiratory disorders that can be modified due to its reversible nature. Individuals with excessive BMI (overweight-obesity) or inadequate BMI (underweight) tend to experience changes in the body's systems that lead to the occurrence or worsening of respiratory disorders in individuals(18).

Based on the research results, furniture workers have a normal Body Mass Index (BMI), but the possibility of a relationship cannot be ruled out because 35.6% of respondents have an abnormal BMI, either being overweight or underweight.

Based on the analysis results using the chi-square test, a p-value of 0.007 was obtained (p-

value < 0.05), indicating a significant relationship between work experience and Acute Respiratory Infection (ISPA) complaints among furniture workers in East OKU Timur.

The results of this study are in line with the research conducted by Fujianti et al. (2015), which also showed statistical significance with a p-value of 0.003. This implies a meaningful relationship between work experience and the emergence of respiratory disorder symptoms among workers at Mebel Jati Berkah in Jambi City(1).

According to the theory proposed by Suma'nur (1996), it is stated that the longer an individual's work experience in a dusty work environment, the higher the likelihood of that individual being at risk of developing respiratory disorders or lung diseases(19).

Based on the research results, among the furniture workers in East OKU Timur, there were 24 out of 59 respondents who had been working for 10 years or more. However, during this period of over 10 years, a notable portion of the respondents experienced periods where they were not working for several months within a year. The reasons for these breaks were due to factors such as a limited number of orders or the impact of the pandemic.

Conclusion

Respondents exposed to Particulate Matter (PM10) with a value of ≥10 mg/m^3 have a percentage of 76.3%. Respondents exposed to Particulate Matter (PM10) and experiencing respiratory complaints (ISPA) have a percentage of 47.5%. Respondents working for ≥8 hours/day have a percentage of 40.7%, active smokers among respondents have a percentage of 67.8%, respondents not consistently using masks have a percentage of 55.9%, respondents with less than ideal nutritional status have a percentage of 35.6%, and respondents with a work experience of ≥10 years have a percentage of 40.7%. There is a significant correlation between Particulate Matter (PM10) and ISPA complaints among furniture workers in East OKU Timur. There is a significant correlation between the duration of exposure and ISPA complaints among furniture workers in East OKU Timur. There is a significant correlation between smoking habits and ISPA complaints among furniture workers in East OKU Timur. There is a significant correlation between mask usage and ISPA complaints among furniture workers in East OKU Timur. There is no significant correlation between nutritional status and ISPA complaints among furniture workers in East OKU Timur. There is a significant correlation between work experience and ISPA complaints among furniture workers in East OKU Timur.It is recommended that furniture workers should clean their workspaces and tools used in furniture production, such as saws, sanding machines, planers, chisels, and drills, at least twice a day before and after work. Active smoker furniture workers are advised to replace cigarettes with candies and reduce smoking habits in their daily activities, as smoking can have harmful effects on their own health and the health of those around them. Business owners in the furniture industry are encouraged to enforce discipline among their

workers, including making it mandatory to wear masks in the workplace and providing masks free of charge to the furniture workers. This is important because wearing masks is one way to minimize exposure to Particulate Matter (PM10).

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