Relationship between Knowledge Level and Attitude about personal protective equipment, years of service, length of work with the incidence of ARI in East Jakarta traffic police

Abstract

This study discusses the relationship between the level of knowledge and attitudes about personal protective equipment, years of service, and length of work with the incidence of Acute Respiratory Infections (ARI) in traffic police in East Jakarta. This study used a questionnaire with a cross-sectional method with a total sample of 54 people. The results showed that there were 32 (59.3%) cases of Acute Respiratory Infection (ARI), and the most influential factor in a row was the lack of knowledge about PPE as many as 21 respondents (84.0%), negative attitudes towards the use of equipment. Personal protective equipment as many as 21 respondents (84.0%), long working period (≥ 5 years) 26 respondents (83.9%), length of service 26 respondents (92.9%). Based on the results of the study, it can be concluded that the level of knowledge and attitudes about personal protective equipment, years of service, and length of work affect the incidence of ARI.

***Keywords**: ARI, Traffic Police, Personal Protective Equipment.*

Introduction

The growth of economic activity and urbanization is quite high in developing countries in the world, both urban and suburban areas, one of which is experiencing Indonesia. This growth increases the demand for energy, such as fuel for power generation and transportation [1]. In urban areas, progress in the transportation sector is increasing, as can be seen by the number of vehicles that continues to grow from year to year. One of the problems that arise in urban areas is air pollution.

The very high number of vehicles both globally and in Indonesia results in high exhaust emissions. The materials contained in the exhaust gases of motor vehicles are carbon monoxide (CO), various hydrocarbon compounds, various oxides of nitrogen (NOx) and sulfur (SOx), and particulate dust including lead (PB).

Ministerial Regulation No. 05 of 2006 concerning the Threshold for Exhaust Gas Emissions for Motorized Vehicles, it was written that the CO threshold for gasoline engine cars produced above 2007 was 1.5% Vol. Indonesia's exhaust emission standards are always changing and are constantly striving towards the best. The emission standards in 1991 are not the same as in 2021 because the times are much different. Concentrations of pollutant gases that exceed the threshold value will have a negative impact on the environment. Exposure to air pollution in the long term can cause changes or damage to the histopathology of the lungs. One of the diseases that can be caused by air pollution is Acute Respiratory Infection (ARI) [2]. The workplace on the road at the traffic police is a vulnerable location that becomes an intermediary for exposure to air pollution, the cause of ARI [3].

The World Health Organization (WHO) states air pollution is a major environmental problem that poses a health risk. Dubbed as the silent killer because air pollution can cut the lives of the human population, globally an average of two years around 7 million deaths in the world are caused by air pollution. In this regard the health of traffic police needs to be considered, it was determined that air pollution is the cause of one in eight deaths worldwide. Indoor and outdoor air pollution is currently an important concern because it can cause health

problems, it is known that around 4 million deaths occur due to indoor pollution and 3 million deaths come from outdoors [4,5]

Around 17,600 people out of 22,000 (80%) members of Polda Metro Jaya have ARI. most of them work in the field for a long time, 70% of which is related to the high pollution in Jakarta that comes from motor vehicles [6]. Knowledge and understanding of ARI are important because its spread is very wide, its complications are dangerous, and cause loss of working days, even resulting in death (especially pneumonia). If ARI can be detected early and treated appropriately, then the incidence of ARI can be drastically reduced [3,7].

Based on the description above, the researchers wanted to know the relationship between the level of knowledge and attitudes about personal protective equipment, years of service, and length of work with the incidence of Acute Respiratory Infection (ARI) in traffic police in the East Jakarta Region.

Literature Review

Air pollution is the entry or inclusion of substances, energy, and/or other components into ambient air by human activities, so that the quality of ambient air decreases to a certain level which causes ambient air to not fulfill its function, changes in natural air composition exceed a certain concentration which causes ambient air cannot fulfill its function, then the air is said to have been polluted

The source is any business and/or activity that emits pollutants into the air which causes the air to not function properly [8]. Sources of movable or immovable emission in one place originating from motorized vehicles. The governor's regulation on the blue sky program in the special province of Yogyakarta in 2009-2013 is a program to control air pollution from movable and immovable sources. Air pollution is the presence or entry of one or more pollutant substances in the air in a certain amount and time which can cause disturbance to humans, animals, plants, and other objects [9].

Along with the progress of the times, the number of motorized vehicles increases as well as industrial factories. The high number of vehicles is correlated with an increase in air pollution. This causes human lung health problems [10]. Disproportionately low air quality as a result of pollutants produced by industry and modes of transportation is very dangerous for health if it accumulates in the air in high enough concentrations [11; 12].

In the last few decades, clinicians have faced the reality of an increasing incidence of atopy and allergic diseases. The factors underlying this phenomenon are very complex and it turns out that the increase is parallel to the increase in industrialization and urbanization in various parts of the world, especially in developing countries that experience heavy pollution, including air pollution, causing health problems [13,14].

Some of the diseases associated with air pollution include cardiovascular disease, asthma, allergies, immunological disorders, and cancer. The respiratory disease itself can cause health problems ranging from mild respiratory disorders to death which has an impact on social and economic life [13,15]. Most of the pollutant substances can be directly inhaled, and affect the respiratory tract and lungs, besides that these pollutant substances then enter the blood vessels so that they can affect the function of other body organs.

The Air Quality Standard Index that is officially used in Indonesia is the Air Pollutant Standard Index (ISPU). This is by the Decree of the State Minister of the Environment Number: KEP 45 / MENLH / 1997 to provide convenience from the diversity of ambient air quality information to the public at a certain location and time as a material consideration in carrying out air pollution control efforts [13]. The Air Pollutant Standard Index is determined by changing the measured air pollutant level into a dimensionless number. According to the Directorate of Air Pollution Control, the Air Pollution Standard Index (ISPU) in East Jakarta

is in the medium category with the parameter being PM10, which means it slightly affects the health of living things [14].

The upper respiratory system consists of the nose, pharynx, the larynx; while the lower respiratory tract includes the trachea, bronchi, bronchioles, and lungs which end in the alveoli. The respiratory tract from the nose to the bronchioles is lined by a ciliated mucous membrane (vibrating hair), the three processes which are main functions of the respiratory mucosa are air entering the nasal cavity, the air will be filtered, warmed, and humidified. Coarse dust particles will be filtered by the nose hairs, while fine particles will be trapped in the mucus layer. The movement of the cilia will push the mucus layer into the lower respiratory system towards the pharynx so that the mucus will be swallowed or coughed up. Furthermore, the air will be humidified and warmed with heat coming from the underlying tissue which is rich in blood vessels, so that when the air reaches the lower respiratory tract it is almost dust-free, has a temperature close to body temperature, and the humidity reaches 100% [15].

After that, the air flows down through the trachea, bronchi, and bronchioles, and up to the ducts of the alveoli. The alveoli are surrounded by pulmonary capillaries where gas exchange of O^2 and CO^2 occurs with a very thin membrane [16]. In the alveoli, there are 2 types of epithelial cell pneumocytes, namely type I and type II pneumocytes. Type I cells are large cytoplasmic cells and are the main cells that line the alveoli, besides that in the lungs there are other types of cells, namely pulmonary alveolar macrophages (pulmonary alveolar macrophages), lymphocytes, plasma cells, and mast cells [17].

The trachea and bronchi have cartilage (cartilage rings) in their walls, have less smooth muscle, and are lined by a ciliated epithelium containing mucous and serous glands [18]. The lungs are elastic, conical organs located in the chest or thoracic cavity. The two lungs are separated by the central mediastinum, which contains the heart and several large blood vessels. The right lung is larger than the left lung and is divided into 3 lobes, while the left lung is divided into 2 lobes. In the chest cavity, there is a thin layer that contains collagen and elastic tissue called the pleura. The parietal pleura lines the chest cavity, while the pleura that surrounds the lungs is called the visceral pleura. Between the parietal and visceral pleura is a thin layer of pleural fluid that allows the two surfaces to move during respiration. If there is inflammation of the pleura, the presence of air or fluid that enters the pleural cavity, for example, due to a tear in the pleura, the lungs can be compressed or collapse [19].

Breathing is a process that occurs automatically, even in a state of sleep, because the respiratory system is influenced by the autonomic nervous system. According to the place where gas exchange occurs, respiration can be divided into 2 types, namely external respiration, and internal respiration. External respiration is the exchange of air between the air in the alveoli and the blood in the capillaries. Deep breathing is breathing that occurs between the blood in the capillaries and the cells of the body. The entry and exit of air in the lungs are influenced by the difference in air pressure in the chest cavity with the air pressure outside the body. If the pressure outside the chest cavity is greater, then air will enter. Conversely, if the pressure in the chest cavity is greater then the air will come out [20].

Acute Respiratory Infection is often abbreviated as ARI. This term is adapted from the term in English Acute Respiratory Tract Infections (ARTI). ARI includes three elements, namely infection, respiratory tract, and acute infection. ARI is defined as an acute respiratory tract disease caused by an infectious agent that is transmitted from human to human. The onset of symptoms is usually rapid, ie within a few hours to a few days. Symptoms include fever, cough, and often a sore throat, coryza (runny nose), shortness of breath, wheezing, or difficulty breathing. ARI is more common in toddlers and children, compared to adults, with an incidence of 6-8 times in one year [21]. Acute Respiratory Infection (ARI) is an acute infectious disease that attacks one part or more of the respiratory tract from the nose (upper

tract) to the alveoli (lower tract) including adnexal tissues such as sinuses, middle ear cavity, and pleura [22].

The use of personal protective equipment has been regulated in the Regulation of the Minister of Manpower and Transmigration No. 8/Men/VII/2010 concerning. Personal Protective Equipment, workers entering the workplace are required to wear or use PPE in accordance with the potential hazards and risks. For the use of PPE, there are 3 elements that are often associated, namely knowledge, attitudes, and actions or behavior.

A study interviewing workers, the reasons for not using PPE, feeling difficulty breathing, and feeling uncomfortable. Other studies have stated that the use of PPE, especially masks, whether at work or not working in a workplace environment with high dust concentrations or exposure to chemicals, can minimize occupational disorders or diseases, especially those related to the respiratory health of workers. In the Regulation of the Minister of Manpower and Transmigration of the Republic of Indonesia number PER.08/MEN/VII/2010 concerning Personal Protective Equipment.

Research Method

This research was conducted using an analytical survey method with a cross-sectional survey design, with the stages of identifying research variables and risk factors, determining research subjects or populations and samples, and observing or measuring risk factors and effects. At the same time, based on the status of the variable at that time (data collection), conducting correlation analysis by comparing the proportions between groups of observations (measurement). This research was conducted at the East Jakarta Traffic Unit on December 2017. The population is a generalization consisting of objects or subjects with certain quantities and characteristics applied by researchers to be studied, and then the conclusions are drawn. In this study, the population will be all traffic police in the East Jakarta area. The sample is part of the number and characteristics possessed by the population. Gay offers a minimum acceptable size based on the type of analytical survey research by assessing the correlation is 30 subjects (samples). So, the number of samples in this study is around 54 people. Research subjects were selected using purposive sampling. The population obtained was based on the research subjects' inclusion and exclusion criteria. Validity is an index that shows the measuring instrument measures what is being measured. An instrument is valid if it can measure what it wants to measure. The high and low validity of the instrument shows the extent to which the data collected does not deviate from the description of the intended validity. The instrument was then calculated using the product-moment correlation test using the computer-assisted SPSS version 21 program to test the validity. The correlation technique used was the "product moment" correlation technique. The rxy results obtained are then compared with the results in the product moment table. The r value for 20 samples is 0.444, with a significant level of 5% or a 95% confidence level. If rxy > rtable, then the items in the questionnaire are declared valid. Based on the results of calculations from questions about several factors related to the incidence of ARI, r count > 0.544. To test the reliability of the instrument carried out after the validity test. The instrument reliability test for valid questions was tested by assessing Cronbach's Alpha. The criteria for a research instrument are said to be reliable using this technique if the reliability coefficient (r11) > 0.6 or compared with the r table (Product Moment). If the Cronbach Alpha reliability coefficient is greater than the r table, then it is said to be reliable, and vice versa. This instrument's Cronbach's Alpha coefficient value is 0.737 (high reliability). The instruments used in this study were questionnaires, observation sheets, and checklist sheets. Univariate analysis was carried out to produce the distribution and percentage of each variable. Bivariate analysis to determine whether there is a relationship between the level of knowledge and attitudes about personal

protective equipment, years of service, and length of service with the incidence of ARI in traffic police using the chi-square test.

Result and Discussion

This study on several factors related to the incidence of ARI at Traffic Police in the East Jakarta area used 54 people (respondents). in East Jakarta City.

Table 1. Distribution of Respondents by Years of Service

Length of working	Number	%
New	23	42.6
Long	31	57.4
Total	54	100.0

Based on the table above, it can be seen that the frequency of respondents with a long working period is 57.4% (31 people), while the respondents with a new tenure are 42.6% (23 people).

Table 2. Distribution of Respondents by Length of Working Hours

Working Hours	Number	%
Fast	26	48.1
Long	28	51.9
Total	54	100.0

Based on the table above, it can be seen that the frequency of respondents with long working hours is 51.9% (28 people), while respondents with fast working hours are 48.1% (26 people).

Table 3. Distribution of Respondents based on Knowledge of PPE

Knowledge	Number	%
Less	25	46.3
High	29	53.7
Total	54	100.0

Based on the table above, it can be seen that the frequency of respondents whose knowledge level about PPE is in the high category is more, namely 53.7% (29 people), while those with less category are 46.3% (25 people).

Table 4. Distribution of Respondents based on Attitudes towards the Use of PPE

Attitude	Number	%
Negative	25	46.3
Positive	29	53.7
Total	54	100.0

Based on the table above, it can be seen that the highest frequency of respondents has a positive attitude towards the use of PPE, is 53.7% (29 people), and respondents who have a negative attitude are 46.3% (25 people).

Table 5. Distribution of Respondents by Incidence of ARI

ARI incident	Number	%
Not	22	40.7
Yes	32	59.3

Total	54	100.0

Based on the table above, it can be seen that the frequency of respondents who suffer from ARI is more, namely 59.3% (32 people), while respondents who do not suffer from ARI are 40.7% (22 people)

Table 6. The relationship between the working period and the incidence of ARI in the traffic police

Length of Working	IRA				Number		*p-value*	CC
	Yes		No					
	N	%	N	%	n	%		
New	6	26,1	17	73,9	23	100,0	0,000	0,503
Long	26	83,9	5	16,1	31	100,0		
Total	32	59,3	22	40,7	54	100,0		

Based on the table above, it can be seen that of the 23 level respondents with the new category of tenure, 73.9% (17 people) did not experience ARI, while 26.1% (6 people) experienced ARI. Of the 31 respondents with a long working period, 16.1% (5 people) did not experience ARI, while 83.9% (26 people) experienced ARI. Based on the results of the analysis using the chi-square test, the p-value = 0.000 (p-value <0.05) with a contingency coefficient (CC) of 0.503. Because the p-value is smaller than 0.05, Ha is accepted, which means a relationship exists between years of service and the incidence of ARI at the traffic unit for East Jakarta. Meanwhile, the close relationship or contingency coefficient (CC) between years of service and the incidence of ARI is 0.503, including the medium category.

Table 7. The relationship between the length of working hours and the incidence of ARI in the traffic police

Working hours	IRA				Number		*p-value*	CC
	Yes		No					
	N	%	N	%	n	%		
Fast	6	23,1	20	76,9	26	100,0	0,000	0,579
Long	26	92,9	2	7,1	28	100,0		
Total	32	59,3	22	40,7	54	100,0		

Based on the table above, it can be seen that of the 26 respondents with fast working hours, 76.9% (20 people) did not experience ARI, while 23.1% (6 people) experienced ARI. Of the 28 respondents who worked long hours, 7.1% (2 people) did not experience ARI, while 92.9% (26 people) had ARI.

Based on the results of the analysis using the chi-square test, the p-value = 0.000 (p-value <0.05) with a contingency coefficient (CC) of 0.579. Because the p-value is smaller than 0.05, Ha is accepted, which means that there is a relationship between the length of working hours and the incidence of ARI, at the traffic unit for East Jakarta. Meanwhile, the closeness of the relationship or the contingency coefficient (CC) between the length of working hours and the incidence of ARI is 0.579, including the medium category.

Table 8. Relationship of Knowledge about PPE with ARI Incidence in Traffic Police

Knowledge PPE	IRA				Number		*p-value*	CC
	Yes		No					
	n	%	N	%	n	%		
Less	21	84,0	4	16,0	25	100,0	0,001	0,424
High	11	37,9	18	62,1	29	100,0		

Total	32	59,3	22	40,7	54	100,0

Based on the table above, it can be seen that of the 25 respondents with poor knowledge, 16.0% (4 people) did not experience ARI, while 84.0% (21 people) had ARI. Of the 29 respondents with good knowledge, 62.1% (18 people) did not experience ARI, while 37.9% (11 people) had ARI.

Based on the results of the analysis using the chi-square test, the p-value = 0.001 (p-value <0.05) with a contingency coefficient (CC) of 0.424. Because the p-value is smaller than 0.05, Ha is accepted, which means that there is a relationship between the level of knowledge about PPE and the incidence of ARI, at the traffic unit for East Jakarta. Meanwhile, the close relationship or contingency coefficient (CC) between knowledge and the incidence of ARI is 0.477, including the medium category.

Table 9. The relationship between attitudes in the use of PPE with ARI at the traffic police

Attitude	IRA				Number		*p-value*	CC
	Yes		No					
	n	%	N	%	N	%		
Negative	21	84,0	4	16,0	25	100,0	0,001	0,424
Positive	11	37,9	18	62,1	29	100,0		
Total	32	53,9	22	40,7	54	100,0		

Based on the table above, it can be seen that of the 25 respondents with a negative attitude, 16.0% (4 people) did not experience ARI, while 84.0% (21 people) had ARI. Of the 29 respondents with a positive attitude 62.1% (18 people) did not experience ARI, while 37.9%% (11 people) experienced ARI.

Based on the results of the chi-square test analysis, the p-value = 0.001 (p-value <0.05) with a contingency coefficient (CC) of 0.424. Because the p-value is smaller than 0.05, Ha is accepted, which means that there is a relationship between attitudes in the use of PPE and the incidence of ARI, at the Traffic Unit in East Jakarta. Meanwhile, the close relationship or contingency coefficient (CC) between attitudes in the use of PPE and the incidence of ARI is 0.477, including the medium category.

The analysis showed that years of service were associated with the occurrence of ARI in the traffic police. This means that traffic police who have a long working period (≥ 5 years) have a risk of getting ARI 2.6 times greater than traffic police whose tenure is relatively new (< 5 years). The results of this study are in accordance with Asep Irfan's research on 57 respondents showing that respondents with a working period of 5 years experienced pulmonary function disorders as much as 65.8% and 34.2% did not experience ARI symptoms. Respondents who worked < 5 years experienced pulmonary function disorders 6.3%, and 93.8% did not experience ARI symptoms [23]. The results of this study are also in line with the opinion of Morgan and Parkes, who states that someone exposed to dust for a long time will be at risk for impaired lung function [24]. Dorste's study also showed similar results, the only difference being that in Morgan's study, the length of time required for pulmonary function impairment to occur was after ten years of exposure, while Dorste's study had a period of 20 – 30 years [25]. Heri Sumanto's research also showed the same results, which can be known from the survey that dust exposure would reduce lung capacity by 35.3907 ml per year of work [26]. All of these previous studies support the findings of this study, although the duration of exposure resulting from each study is different. This may be influenced by the different types or the materials' direction and other variables that can affect the occurrence of pulmonary function disorders and ARI symptoms.

Police officers who obey wearing masks at work will minimize the amount of exposure to pollutant particles that can be inhaled. In addition to the amount of exposure, the

particle size likely to escape from the mask is small. If the particle size is less than 1μ, the incoming dust particles can come out again by "brown movement" [27; 28]. In addition, with a lung defense mechanism in the form of a gag reflex, dust particles that escape from the mask will be prevented from entering the trachea. There is also a cough reflex, which can be stronger to push secretions into the upper respiratory tract so they can be swallowed or expelled. Furthermore, if dust still escapes, the alveolar macrophages will release them into the lymph vessels or bronchioles, where the particles will be removed by the mucociliary escalator [29].

Conclusion

The results of this research by the traffic police in East Jakarta indicate that the independent variables that have a relationship with the incidence of ARI are: a) years of service (≥ 5 years) 83.9% (p-value <0.05) (CC) 0.503, b) length of working hours 92.9% (p-value < 0.05) (CC) of 0.579, c) knowledge of PPE 37.9% (p-value < 0.05) (CC) of 0.424 and d) negative attitude towards use PPE 84.0% (CC) of 0.424, based on this study, it was found that the risk factors that influence the incidence of ARI in traffic police in East Jakarta. By knowing the various risk factors related to the incidence of ARI, the traffic police are expected to be able to make efforts: a) Identify risk factors for ARI related to work, such as length of service, length of work, knowledge of personal protection and the use of protective equipment. self; b) carry out early prevention by always using personal protective equipment such as masks, gloves, goggles, and road safety, with the aim that air pollution can be reduced and c) carry out routine health checks at the nearest health facility, so that an early diagnosis of ARI can be made. immediately enforced, with more optimal treatment, and can be done so that it does not develop into a chronic respiratory-disease.

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