KNOWLEDGE AND SKILLS IN THE USE OF FIRE EXTINGUISHERS THROUGH FIRE FIGHTING TRAINING FOR PRINTING WORKERS PT X KARANGANYAR

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ABSTRAK

In manufacturing companies, the use of production equipment and facilities has the potential and risk of fire hazards that can occur at any time. Prevent and reduce the impact of fire with a fire suppression system. Training and simulations on the use of fire extinguishers are conducted to improve workers' knowledge and skills. This study aims to determine the differences in knowledge and skills in using fire extinguishers before and after training for printing workers at PT X Karanganyar. This study used an experimental design with a pre-experimental approach, using a one group pre-test post-test design. The intervention used is fire extinguisher training. Fire extinguisher training is carried out by providing material on the fire triangle, how to control fires, how to use fire extinguishers, parts of fire extinguishers with theory and simulation methods for two weeks. The population of this study amounted to 50 respondents of PT X Karanganyar printing workers. This study used a total sampling technique with measurement of knowledge using a questionnaire and measurement of skills using a checklist. The data analysis technique used was the paired T test. The results showed that there was a significant difference in knowledge ($p=0.000$; $p<0.05$) and skills ($p=0.001$; $p<0.05$).

Keywords: *Light Fire Extinguisher Knowledge, Light Fire Extinguisher Skills, Light Fire Extinguisher, Light Fire Extinguisher Training.*

INTRODUCTION

Manufacturing companies transform basic goods into high-value goods by using equipment that is at risk of danger (Sutriyanto, 2021). BPJS Ketenagakerjaan 2019-2020 data shows a significant increase in workplace accidents in the manufacturing and construction sectors, with fire as one of the serious threats. Fires are caused by the interaction of heat, fuel and oxygen, disrupting operations and causing financial losses. In Central Java, there were 466 cases of building and residential fires in 2019-2024.

Training will result in increased knowledge and skills. Some of the stages in the process include:

A. Receiving, which is the ability to receive stimulus or stimuli with full attention, which is initially passive. stimulus with full attention, which is initially passive and then develops into active responsiveness. then develops into active responsiveness.
B. Responding, namely the ability to respond deliberately to a stimulus or stimuli, feel involved, and actively paying attention.
C. Valuing, in the form of an assessment process or value judgment of certain symptoms or activities, which then encourages further responses or certain activities, which then encourages further responses to find ways to take action against the situation that occurs.
D. Organization, involves the application of values in action or organizing, where individuals are able to form an internal value system based on values that have been accepted. system based on values that have been accepted.

Research conducted by Sinaga and Handayani (2017), stated that the characteristics of respondents showed that 76.6% of them had not participated in the training. The average score before training was 36.17, while after training it increased to 42.17. With this finding, it can be concluded that there is a significant difference in the scores before and after the training. the use of fire extinguishers.

Fire prevention requires extinguishing systems such as sprinklers, fire alarms, and fire

extinguishers. Based on the Indonesian Ministerial Decree No. 186 Year 1999, companies must be able to manage fires through training to improve knowledge and skills. PT X Karanganyar, which is engaged in woven bags and cement bags, has 315 workers, including 50 in the printing department.

In 2019, there was a fire caused by static electricity that ignited solvent and paint materials. Solvent and paint material is one of the flammable materials because it contains methanol material with a flash point of 11℃. PT X only has APAR as a protection system, with limited training for management and staff. The fire fighting training program only focuses on staff and management, so it has not reached all workers in the printing department. then, it is necessary to improve the fire fighting training program so that all workers will have a level of fire hazard awareness. the training program carried out only focuses on providing material with the lecture method.

Workers in the production area have not received adequate training on fire extinguishers, so they rely on HSE and security staff. An initial survey showed that 80% of workers lacked knowledge and 90% lacked skills in the use of fire extinguishers. These deficiencies risk exacerbating fires. This study aims to assess the differences in knowledge and skills in the use of fire extinguishers before and after training for printing workers at PT X Karanganyar.

METHODS

This study uses experimental design with a pre-experimental approach. The design used was a one group pre-test post-test design, with an intervention in the form of fire extinguisher training. The research location is the printing section of PT X Karanganyar which is located on Jl. Raya Palur Km.8, Jetis Village, Jaten District, Karanganyar Regency, Central Java Province.

Firefighting training is the process of educating workers on the skills and knowledge of using fire extinguishers. Firefighting skills worker's ability to execute the practical use of firefighting in the workplace. Fire extinguisher knowledge is the ability to understand and explain information related to the parts and how to use a fire

extinguisher.

Measurement Tool: APAR Knowledge Questionnaire consisting of 15 items of statement analysis. Assessment of APAR knowledge uses a Guttman scoring data collection measurement scale. Measurement results: answers correctly score 1, answers not correctly score 0. Measurement Tool: fire extinguisher skills checklist which consists of 10 assessment items. The fire extinguisher skills assessment uses a Guttman scoring data retrieval scale. Measurement results: answers correctly score 1, answers not correctly score 0.

The research was conducted from May to July 2024. The study population consisted of 50 printing workers of PT X Karanganyar. The sampling technique used was non-probability sampling, namely total sampling, where all members of the population were taken as samples because there were less than 100 people. Thus, the sample of this study amounted to 50 people. The reason for using total sampling is that the researcher focuses on printing areas where fires have occurred. Research results from the population can be directly generalized because it includes all members of the population.

The measuring instrument has been tested for validity and reliability so that it is valid and reliable, the knowledge questionnaire on the use of APAR is measured by a test (Knowledge; $p < 0.05$; Cronbach's Alpha> 0.7). Other variables that have the possibility of influencing the dependent variable have been made inclusion criteria such as having more than 3 years of work experience, the age of workers is productive age, and the level of education is high school.

Differences in knowledge and skills in using fire extinguishers through fire extinguisher training are measured by measuring knowledge using a questionnaire of 15 statement items and measuring skills using a checklist of 10 assessment items. The measurement scale for knowledge and skills in using APAR uses a ratio scale. For knowledge results if answered correctly get a score of 1 while wrong score 0. For skill results if done correctly get a score of 1 if wrong score 0.

The criteria for assessing the skills of using fire fighting by means

of workers simulating the use of fire fighting with a checklist guide. respondents who simulate the use of fire will be observed by researchers, for example, such as respondents being able to correctly show the parts of fire fighting, it will be assessed by researchers as correct with a score of 1. Determination of the correct answer in fire fighting skills by observation method using the fire extinguisher skills checklist.

Researchers conducted a data normality test for the variable knowledge and skills of fire extinguishers both pretest and posttest data using the Shapiro-Wilk test, the p-value results were 0.063, 0.056, 0.056, 0.051, which means the p-value> 0.05 so it can be concluded that the data on knowledge and skills of fire extinguishers are normal data. Statistical analysis uses a paired T test to test differences before and after APAR training on knowledge and skill variables.Duration of the training is 3 hours. The training and simulation materials were fire classification, fire triangle theory, potential fire hazards in the printing work area, fire extinguishing media, how to use fire extinguishers, parts of fire extinguishers, techniques for carrying fire extinguishers, and fire extinguisher inspection stages. The device used to test statistical analysis is SPSS version 26 testing at a significance level of 5%.

RESULT AND DISCUSSION

1. Characteristics of research subjects

Table 1. Characteristics of research subjects

Respondent Characteristics	n	%
Age		
Late adolescence (16-25 years)	5	10%
Early adulthood (26-35 years old)	31	62%
Late adulthood (36-45 years)	14	28%
Early old age (46-55 years)	0	0.0%
Education Level		
Elementary School	0	0.0%
Junior High School	11	22%
Senior High School	35	70%
Collage/Other	4	8.0%
Fire extinguisher training experience		

Ever	5	10%
Never	45	90%

The results of the distribution of respondents' age characteristics show that the dominant age is in the early adult category (62%), the dominant education level is Senior high school education (70%), the dominant APAR training experience has never conducted APAR training (90%).

2. Differences in APAR Knowledge Through APAR Training

Table 2. Distribution of Knowledge of APAR Use

No	Statement	Questionnaire		
		Pre-test	Post-test	Difference (Σ)
P1	Fire classification is a grouping based on the source of the fire.	28	49	+21
P2	Fires can be classified into class A, B, C and D fires.	29	28	-1
P3	Based on the theory of the fire triangle, the factors that cause fires include: Heat, combustible materials, and carbon dioxide.	25	28	+3
P4	Uncontrolled electrical disturbances and uncontrolled cigarette end flames are some examples of sources of ignition.	28	28	0
P5	Fires of flammable liquids such as petroleum are class A fires.	22	27	+5
P6	Fires from materials containing metals such as iron or steel are class D fires.	30	28	-2
P7	APAR stands for assembled fire extinguisher.	21	50	+29
P8	APAR with a type of extinguishing media in the form of pressurized water is effective for extinguishing fires originating from paper materials.	27	25	-2
P9	Images (handle and lever) circled on the side function as a handle used to lift and extinguish the fire.	29	33	+4
P10	Fire extinguishers with Foam media types are commonly used to extinguish class C fires.	26	27	+1
P11	APAR with a type of gas chemical media, usually the gas uses oxygen gas (O2)	26	27	+1
P12	The ideal distance for spraying APAR with a fire source is about 3 meters.	25	28	+3
P13	Bring the top handle together with the bottom handle - Sweep - Hold and pull the locking pin - Point the hose (S-S-P-A) is a step to operate APAR properly and correctly.	24	27	+3
P14	The technique used when bringing fire extinguisher to the location of a fire properly and correctly is to guide it to the shoulder to the location of the fire.	30	30	0
P15	The purpose of carrying the fire extinguisher guided on the shoulder is to make it easier to make the mobility of the fire extinguisher carrier.	32	32	0
Mean		26.8	31.1	4.3

The results of the knowledge pre-test before the fire extinguisher training showed an average score of 8.04. A total of 64% of respondents, i.e. 32 out of 50, could answer correctly on how to carry a fire extinguisher, indicating that they had observed or received training before. However, the lowest score was obtained on the question regarding APAR abbreviations, where 58% of respondents could not answer correctly. This indicates that many workers only know the name of the fire extinguisher without understanding the abbreviation.

The results of the knowledge post-test after the APAR training showed an average score of 9.34. All respondents (100%) managed to answer correctly about the APAR abbreviation, signaling the success of the training in improving basic understanding. However, 50% of respondents could not answer correctly about the ability of fire extinguishers with pressurized water media materials in extinguishing fires from paper materials. This is because the company uses Dry Chemical Powder extinguishers as the main tool, so respondents focus more on this type and consider water extinguishers ineffective for paper fires, which explains their inability to answer the question correctly.

Table 3. Paired T Test Results of Fire Extinguisher Knowledge

Test	*n*	Descriptive Statistics	Paired T Tests		
		Mean	*t*	*df*	Sig. (2-tailed))
Pre-Test	50	8.04			
Post-Test	50	9.34	-5.508	49	0.000

This study shows an increase in knowledge of the use of fire extinguishers on PT X Karanganyar printing workers after training. A paired t-test with a t value of -5.508 and a significance of 0.000 indicated that the average post-test score (9.34) increased compared to the pre-test (8.04), demonstrating the effectiveness of the training. The training used a lecture method outside of working hours, with material delivered through a projector and PowerPoint application covering the definition, classification, and techniques for using fire extinguishers.

Respondents actively

participated in the question and answer session, increasing their understanding. With 80% of workers experiencing an increase in knowledge, these results are consistent with previous studies showing an increase in knowledge following extinguisher training.

According to Setyaningrum (2020), the interactions between trainers and trainees have different variations. trainers and trainees affect the formation of knowledge and skills arising from the training. The expectation is that the training will result in increased knowledge and skills. Training on the use of fire extinguishers which includes includes materials such as fire classification, types of fire extinguishers, how to use, install, and maintain fire extinguishers. use, installation, and maintenance of fire extinguishers. training conducted on an ongoing basis can have a positive impact on the quantity and quality of employee work. It also creates an experienced, skilled and error-free workforce, as well as ensuring the company meets fire prevention requirements. ensures the company meets fire prevention requirements.

3. Differences in fire extinguisher skills through fire extinguisher training

Table 4. Distribution of Knowledge of APAR Use

No	Statement	*Checklist*		
		Pre-test	*Post-test*	Difference (Σ)
P1	Able to demonstrate Dry Chemical Powder type extinguishers	29	28	-1
P2	Able to show CO2 type extinguishers	31	27	-4
P3	Able to show the safety pin on APAR	26	32	+6
P4	Able to show the APAR nozzle and handle	30	28	-2
P5	Workers are able to carry fire extinguishers on their shoulders to facilitate mobility to the fire scene and are able to set a distance of 3 meters from the source of the fire.	27	31	+4
P6	Pulling the safety pin of the fire extinguisher	33	38	+5
P7	Directing the fire extinguisher hose upward and then pressing the handle to ensure that there is no blockage in the fire extinguisher.	23	30	+7
P8	Directing the APAR nozzle to the fire source	33	37	+4
P9	Pressing the handle continuously until the fire is extinguished or until the contents of the extinguisher run out	34	38	+4
P10	Sweeping the hose to the base of the fire from right to left or vice versa according to the wind direction.	31	35	+4
Mean		29.7	32.4	2.7

The pre-test results showed that the average fire extinguisher usage skill before the training was 5.98. A total of 68% of respondents were able to use

fire extinguishers correctly, such as pressing the handle and extinguishing the fire, which reflects their practice in replenishing and restocking fire extinguishers. However, the lowest score was found in the indicator of being able to point the hose upwards for checking, where 54% of respondents had not done so correctly. This is likely due to a lack of training, with only 10% of respondents having received fire extinguisher training.

The post-test results showed that the average skill of using APAR increased to 6.64. A total of 76% of respondents were able to practice the use of fire extinguishers correctly, including pulling the pin and pressing the handle to extinguish the fire. This shows that the training with simulation and practice methods by HSE staff improved their skills. However, 46% of respondents were not able to correctly demonstrate the use of CO2 fire extinguishers. This problem was caused by labeling defects on the CO2 extinguishers used during the post-test, which hindered proper identification.

Table 5. Paired T Test Results of Fire Extinguisher Skills

Test	*n*	Descriptive Statistics	Paired T Test		
		Mean	*t*	*df*	Sig. (2-tailed))
Pre-Test	50	5.98	-3.384	49	0.001
Post-Test	50	6.64			

This study shows an increase in the skills of using fire extinguishers on PT X Karanganyar printing workers after training. Paired T test results with a t value of -3.384 and a significance of 0.001 showed that the mean post-test score (6.64) was higher than the pre-test (5.98), indicating an increase in skills. The simulation training method contributed significantly to the skills improvement, with 56% of workers having improved scores. The training intervention using the simulation method, after the lecture, was conducted in the field with practical explanations by certified staff. The results are consistent with previous studies that have shown improved skills after simulation training.

CONCLUSIONS

Based on the results of research and discussion regarding

differences in knowledge and skills in the use of fire extinguishers through fire extinguisher training for printing workers at PT X Karanganyar, then the practical implication that can be applied is to make the training program on the use of fire extinguishers a mandatory program for all employees.

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