Identification of the Factors Causing the Skin Disorder at Rubber Processing Factory

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Keywords: Skin disorder, Rubber Workers, Printing Industry

Abstract: Skin disorder is disease because of work with amount around 22% off all disease from work. One of the causes is chemicals often used in industry.The research is survey research analytic with cross sectional design. The aim of the research was to analyze factors correlated with skin disorder in rubber processing worker. The population was 51 workers and was taken by using a technique total sampling. Bivariate analysis using *Chi Square* test with α=0,05. The results of a study of 51 workers in the production division of the Rubber Processing Plant in 2019 showed that of the 22 workers who worked in direct work units, there were 17 people (77.3%) workers who had skin problems and only 5 people (22.7 %) workers without skin disorders.

1 INTRODUCTION

Indonesia is one of the largest rubber producing countries with an area of 34 million hectares. The rubber processing industry in its production process uses chemicals such as fomiat acid or commonly called ant cid which is used as a strong acid of rubber coagulant to unite the rubber grains contained in the latex liquid, so that it becomes a lump or coagulant.

According to the International Labor Organization (2000) every year 1.1 million deaths occur due to illness or are caused by work. Around 300,000 deaths occur from 250 million accidents and the rest are deaths due to occupational diseases where an estimated 160 million diseases occur due to new work relationships each year (Buchari, 2011).

Skin is a part of the human body that is quite sensitive available various diseases. Occupational dermatoses or occupational dermatoses are all skin disorders caused by work. The disease occur when or after the workforce performs work or caused by factors that exist in the work environment. This disease constitutes 50-60% of all occupational diseases, most of which are caused because workers come into contact with materials that are used, processed, or generated by the work.

Occupational dermatitis is the second most occupational occupational disease after muscoluskeletal disease, with around 22% of all occupational diseases. British data show 1.29 cases per 1000 workers are occupational contact dermatitis. More than 95% are contact dermatitis, while others are other skin diseases such as acne, contact urticaria, and skin tumors (Anies, 2014) .

Work-related skin disorders are abnormalities in the skin felt by workers at work or after work. This skin disorder is a symptom of an occupational disease. Complaint skin disorders felt by workers can give an idea about what types of skin diseases are at risk of suffering by workers. Complaints of Interference this skin can be itching, burning, redness, swelling, small blisterson the skin, peeling skin, dry skin, scaly skin, and thickening of the skin (Anhar, 2016).

The percentage of occupational dermatoses from all occupational diseases occupies the highest portion of around 50-60%, therefore the disease is on the place gets proportional attention. Besides the high prevalence, occupational dermatoses whose abnormalities are usually in the arms, hands and fingers are very annoying sufferers do work so influential on the productivity of his work.

Occupational skin diseases, such as inflammation dryness, redness / erythema and scaling (scaly), 80% of cases occur in hand skin, which is the point most

Siregar, A., Parinduri, A., Irmayani, . and Manalu, S.
Identification of the Factors Causing the Skin Disorder at Rubber Processing Factory.
DOI: 10.5220/0009467701420148
In *Proceedings of the International Conference on Health Informatics and Medical Application Technology (ICHIMAT 2019)*, pages 142-148
ISBN: 978-989-758-460-2

often in contact with hazardous materials while working.

Based on research data in Indonesia 1985, which was conducted by 14 Health Clinic centers, it was reported that 90% of occupational skin diseases in Indonesia were contact dermatitis due to chemicals (Cahyono, 2010). One cause of contact dermatitis is chemicals that are often used in industry, such as one of the rubber processing industry companies that use a lot of chemicals. These materials can cause skin abnormalities in workers who come into direct contact with the processing process.

Phosphoric acid is the molecular formula HCOOH is a liquid chemical substance. These chemicals can cause inflammation or sensitization when in contact with moist body surfaces, such as the skin, eyes, and respiratory tract (Cahyono, 2010).

According to NIOS Pocket Guide to Chemical Hazards (2016) when acidic contact form with eyes, skin and respiratory tract can cause effects on health in the form of eye irritation, skin irritation, and nasal irritations throat. Symptoms that arise are the skin feels like burning, blisters, lacrimation (tears coming out), blurred vision, redness of the eyes, rhinorrhea (discharge of thin mucus from the nose), dyspnea (difficulty breathing), nausea, pulmonary edema, metabolic acidosis and unconsciousness. sore throat, stomach ache, cramps, vomiting, diarrhea.

Skin inflammation that is characterized by itching, scaly skin, redness, and sometimes blisters. If exposed in the long term, it can cause severe skin irritation. Inflammation of the eye is characterized by redness, runny eyes, itching and inflammation of the airways is characterized by coughing, choking and shortness of breath.

Based on preliminary surveys and brief interviews conducted with factory assistants and 5 production workers section, information was obtained in rubber processing plant was one of the rubber processing industries that used phomiic acid in the coagulation or latex freezing process.

The aim of the research was to analyze factors correlated with skin disorder in rubber processing worker. According to 3 of the 5 workers, they complained of experiencing skin disorders such as dry skin, itchy skin, and hot skin at work and after work

Figure 1. Workers not using PPE

Exposure to chemical carcinogens in rubber manufacturing remains a serious occupational health concern. Workers are exposed to these carcinogens via skin or inhalation. Rubber manufacturing work is associated with a high prevalence of dermatologic diseases such as eczema, allergic contact dermatitis and atopic dermatitis. The role that epidermal exposure plays in the development of malignancies historically associated with the rubber industry is less certain. We present a case relevant to this discussion and review the role of skin exposure in the rubber industry, providing an overview of the cutaneous and systemic manifestations of occupational exposures in modern day rubber workers.

2 RESEARCH METHODS

This research was conducted at the Rubber Processing Plant. The sample in this study was 51 production workers taken by total sampling technique. Data collection in this study was done by collecting primary data and secondary data. Data was done with SPSS.

Data shows that based on age, most workers in the Rubber Processing Plant are included in the old age group (≥ 35 years), which is 32 people (62.7%). According to years of service, most workers are long-term workers (> 2 years), which is 27 people (52.9%). Based on work units, most workers work in indirect work units, namely 29 people (56.9%), and based on the use of personal protective equipment, most workers wear incomplete personal protective equipment, as many as 38 people (74.5%) people (70.6%) do not have a history of previous skin diseases.

Table 1: shows that the most workers, is 26 people (51.0%) have skin diseases.

Skin disorders	Frequency (people)	Percentage (%)
Yes	26	51,0
No	25	49,0
Jumlah	**51**	**100,0**

3 RESULTS

Table 2. shows that based on age, the most workers in the Rubber Processing Plant belong to the old age group (≥ 35 years), which is 32 people (62.7%). When viewed based on years of service, most workers are long-term workers (> 2 years), which is 27 people (52.9%).

Based on work units, most workers work in indirect work units, namely 29 people (56.9%) and based on the use of personal protective equipment, most workers used incomplete personal protective equipment , as many as 38 people.

Apart from the fact that because the structure of the skin has turned thin so it is more susceptible to skin disorders, at the age of 35 years, workers usually have a lot of experience related to their work, especially if the work period is long. People who have worked for long periods of time and have a lot of experience tend to ignore the rules and act more according to their experience, not even using personal protective equipment because they feel uncomfortable and uncomfortable.

Even though they work in units that are not in direct contact with formic acid, but still have the risk of feeling skin disorders because in these units the possibility of latex still contains formic acid. In one study, researchers found that there were 2 workers who put formic acid into a latex solution and stirred it without using personal protective equipment on the grounds that they were accustomed to doing this and did not feel any effect. This certainly causes more frequent contact of formic acid to the skin of work.

Table 3 shows that of the 32 people included in the old age group, there were 21 people (65.5%) who had skin problems and 11 (34.4%) had no skin problems.

Respondent characteristics observed in this study include age, years of service, work units and personal protective equipment. The results showed that based on age, the most workers in the Rubber Processing Plant were included in the old age group (≥ 35 years), as many as 32 people (62.7%).

Table 2: Workers characteristic

Characteristic	Frequency (person)	Precentage (%)
Age		
Yes	26	51,0
No	25	49,0
Count	51	**100,0**
Years of service		
New	24	47,1
Old	27	52,9
Count	51	**100,0**
Work Unit		
Direct	22	43,1
Not direct	29	56,9
Amount	51	**100,0**
Using PPE		
Using	13	25,5
Not Using	38	74,5
Count	51	**100,0**

When viewed based on years of service, most workers are workers with long tenure (> 2 years), which is as many as 27 people (52.9%). Based on work units, most workers work in indirect work units, namely as many as 29 people (56.9%), and based on the use of personal protective equipment, most workers use incomplete personal protective equipment, as many as 38 people .

Age is one of the factors that influence the occurrence of skin disorders in a person. Workers with old age have skin that has changed its structure. Their skin is less elastic, and has lost a layer of fat on it so that their skin becomes dry and looks thin. This causes their skin to be more susceptible to skin disorders (Suryani, 2011).

Skin disorders are also influenced by the work period of a worker. The working period is the length of time a person is exposed to possible sources that can cause skin disorders. According to (Suma'mur, 2009) the longer a person is at work, the more he has been exposed to the dangers posed by the work environment.

Researchers assume that in addition to being due to the structure of the skin that has turned thin making it more prone to skin disorders, at the age of tahun 35 years workers usually have a lot of experience related to their work, especially if the working period is long. People who have worked for long periods time and have a lot of experience tend to ignore the rules and act more according to their experience.

Table 3: Associations between variable and skin disorders

Variable	Skin Disorders				*P*
	Yes		No		
	N	%	n	%	
Age					
Young	5	26,3	73,7	19	0,015
Old	21	65,6	34,4	32	
Years of Service					
New	6	25,0	18	75,0	0,001
Old	20	74,1	7	25,9	
Work Unit					
Direct	17	77,3	5	22,7	0,003
Not Direct	9	31,0	20	69,0	
History of Skin Disorder					
No	14	38,9	22	61,1	0,018
Yes	12	80,0	3	20	
Using PPE					
Using	1	7,7	12	92,3	0,001
Not Using	25	65,8	13	34,2	

At the time of the study, researchers found that there were 2 workers who put formic acid into a latex solution and stirred it without using personal protective equipment on the grounds they were accustomed to doing so and did not feel any effect. This certainly causes more frequent contact of formic acid to the skin of workers.

Work units can affect skin disorders. Workers whose work is directly related to chemicals will be more susceptible to skin diseases. Based on research (Adillah, 2012) the specifications of the work done by workers are proven to have a relationship with the incidence of contact dermatitis. Workers whose work is directly related to chemicals will be more susceptible to skin diseases.

In this study the work unit is categorized into two categories namely direct contact and not direct contact with formic acid. Work units that are in direct contact with formic acid are in the process of freezing or coagulation. Formic acid dosage used is 7.5 - 9 kg / ton latex. In this unit formic acid is used to freeze the latex into a lump or coagulum.

The results showed that most workers in the Rubber Processing Plant worked in indirect work units (56.9%) . Researchers assume that even though they work in units that are not in direct contact with formic acid, they still have the risk of feeling skin disorders because in these units the possibility of latex still contains formic acid.

In addition, skin disorders are also influenced by other factors, such as the use of personal protective equipment. The use of personal protective equipment is very important for workers to protect themselves from the risks of hazards that can arise in the workplace, both occupational diseases and occupational accidents. protection of the body or the skin surface in the form of work clothes, work gloves and work shoes can be used to prevent: k of damage the skin due to an allergic reaction or corrosive chemicals .

Complaints of skin disorders often occur in workers who are in direct contact with formic acid used in the freezing process. All workers who work in the freezing unit feel complaints of skin disorders. This matter shows that complaints of skin disorders felt by workers occur because workers come in contact with formic acid when doing work processes.

In addition, in this study there are other factors that support opportunities for complaints of skin disorders, such as the use of tools incomplete personal protection to all workers, a history of illness skin on the worker, as well as the working period ie the longer a person works then the more often he is exposed and in contact with the chemicals used (Anhar, 2016)

The use of personal protective equipment in this study is the use of gloves made from *vinyl* or *neoprene* and covering the arms, the use of boots, and the use of long shirts and trousers. Researchers assume that workers feel uncomfortable and uncomfortable using personal protective equipment. Based on interviews with workers obtained information that there are 38 people (74.5%) workers do not use complete personal protective equipment. The average worker only uses personal protective equipment boots and trousers. The clothes used by workers are short-sleeved shirts because the company only provides short-sleeved shirts. There is no availability of long-sleeved shirts because the company only gets short-sleeve clothes from the center for all employees. Workers more often do not wear clothes provided by the company while working. They more often wear short-sleeved shirts and even wear sleeveless shirts when working. This is because according to them the clothing provided by the company feels hot and does not absorb sweat when used while working.

Based on previous research in Rubber Processing Factory at PTPN III Sei Silau there is 31 workers had skin disorders and there is association between age, years of service.

Workers in the sorting unit, workers wear gloves made of cloth and only one worker in the coagulation unit uses gloves made from *vinyl* or *neoprane*. This is because workers are not accustomed to working with gloves and wearing gloves can slow down their work.

The history of skin diseases in this study were all skin disorders experienced by workers before working in the production section of the PTPN III Kebun Pulau Mandi Rubber Processing Plant. History of skin diseases is known based on interviews using a questionnaire to workers. The results showed that most workers did not have a history of skin disease (70.6%).

Djuanda (2011) explains that individual factors contribute to contact dermatitis. Difference of Thickness of the skin in several places causing permeability differences, race, gender, age, and skin diseases is or ever experienced.

Based on interviews with workers obtained information from 15 workers who have a history of skin diseases, skin disorders that have been felt most in the form of itching namely 14 workers, skin peeling 8 workers and 12 workers feel dry skin. The body parts that have been affected by the most skin disorders in the palm of the hand are 12 workers, in the legs of 10 workers, and in the arms of the hands of 7 workers.

According to the researchers' assumptions, workers who had a history of skin disease were more likely to get occupational contact dermatitis, because the skin's protective function had been reduced due to previous skin disease. The palm of the hand is the part of the body most often affected by skin disorders due to direct contact with formic acid without using complete personal protective equipment.

Age is one of the factors that influence the occurrence of skin disorders in a person. According to Cronin (1980) cited by Lestari and Utomo (2007) in the industrial world older workers become more vulnerable to irritants. Often in the elderly there is a failure in the treatment of contact dermatitis, resulting in chronic dermatitis.

The results of a study of 51 workers in the Rubber Processing Plant Production Year 20 19 showed that of 19 workers in the young age group, there were 14 people (73.7%) workers who had no skin problems and only 5 people (26.3%) workers who have skin disorders . While from 32 people included in the old age group, there were 21 people (65.5%) workers who had skin problems and 11 people (34.4%) workers who had no skin problems.

Based on the results of the study, there were still 5 people (26.3%) workers in the young age group who had skin disorders and 11 people (34.4%) workers in the old age group who had no skin disorders. According to the researchers' assumptions, skin disorders in workers can occur in all age groups depending on the length of work and frequent contact with irritants at work.

The results of the study showed that workers with older age had more skin problems because they had a longer working period. The working period of the worker is at the age of 3 years and the maximum is 19 years. Some workers with a young age also feel skin disorders. This is because there are workers with young age who have a work period of> 2 years. The working period of workers at the youngest is 1 year and the maximum is 2 years.

According to a study by Garmini (2014) older workers are at risk of developing irritant contact dermatitis because it is thought that this group has a skin condition that is more susceptible to infection compared to younger ages. The length of service also has an effect because older age has a longer service life so there is a risk of developing irritant contact dermatitis.

The results of the statistical test by using test *of chi square* with 95% confidence level ($\alpha = 0.05$) showed *the p value* = 0.0 15, then this hypothesis is accepted, which means there an association u nuts with skin disorders

The results of this study are consistent with research conducted by Budianto (2010) on printing workers who showed that individuals aged 30-60 years were 7 times more likely to be affected by DK-AK than individuals aged ≤ 30 years. . The results of this study are also in accordance with the results of research conducted by Suryani (2011) on processing and filling workers PT. Cosmar Indonesia Tangerang Selatan which shows that there is a significant relationship between age and the incidence of contact dermatitis. Statistical test results obtained *p value* <0.05 which is 0.008.

Study of 51 workers at the processing plant production 201 Year 9 shows that of 24 workers with new work period, there were 18 (75.0%) of workers who no skin disorders and 6 (25.0%) of workers that there are skin disorders . While from 27 workers with long working periods, there were 20 people (74.1%) workers who had skin problems and 7 people (25.9%) workers who had no skin problems.

Based on statistical test by using test *of chi square* with 95% confidence level ($\alpha = 0.05$) showed *the p value* = 0.0 01 , then this hypothesis is

accepted, which means theres an association tenure with skin disorders in Rubber Processing Factory 2019.

Workers who have long years of service experience more skin disorders because these workers are longer exposed and repeatedly contact with formic acid. Contact with formic acid repeatedly can cause inflammation of the skin and can even cause severe irritation to the skin (dermatitis).

In accordance with the theory that the longer the person's service life, the more often workers are exposed and in contact with chemicals. The duration of exposure and contact of chemicals will increase the occurrence of occupational contact dermatitis which is a skin disorder . The longer a person is at work, the longer he has been exposed to the dangers posed by the work environment (Suma'mur, 2009). According to Taylor (2003) chemicals have different abilities to cause irritant reactions. Some of them will cause damage even with low concentration. Strong irritants will cause dermatitis in almost all individuals if adequate contact occurs.

The results of this study are in line with the results of research conducted by Suryani (2011) on the processing and filling workers at PT. Cosmar Indonesia Tangerang Selatan which shows that is significant relationship between the length of work with the incidence of contact dermatitis. Workers who experience contact dermatitis are workers who have an average working period of 2 years, while workers who do not experience contact dermatitis are workers who have an average work period of 1 year.

According to Suryani (2011) the longer workers come into contact with chemicals every day, plus a long work period will aggravate the incidence of contact dermatitis in workers. Workers who are longer exposed to and come into contact with chemicals cause damage to the outer skin cells, the longer the exposure the more damaging the skin cells to the inside and make it easier for dermatitis to occur.

The results of a study of 51 workers in the production division of the Rubber Processing Plant in 2019 showed that of the 22 workers who worked in direct work units, there were 17 people (77.3%) workers who had skin problems and only 5 people (22.7 %) workers without skin disorders. While 29 workers who work in indirect work units, there are 20 people (69.0%) who have no skin disorders and 9 people (31.0%) have skin disorders.

Work units that are in direct contact with formic acid are in the process of freezing or coagulation. Formic acid dosage used is 7.5 - 9 kg / ton latex. In this unit formic acid is used to freeze the latex into a lump or coagulum. Many workers feel skin disorders because workers in this unit are exposed and in direct contact with formic acid on an ongoing basis. If seen based on the results of the study, there were still 5 people (22.7%) workers in the direct work unit without skin problems. This is assumed by researchers to occur because workers use complete personal protective equipment so they are not exposed to formic acid.

The results also showed that there were still 9 people (31.0%) workers who did not come in direct contact with formic acid but felt skin disorders. Researchers assume workers who work in units that are not in direct contact with formic acid also have the risk of feeling skin disorders because in that unit the possibility of latex still contains formic acid.

4 CONCLUSION

a) There is a relationship of working period with skin disorders in production section workers at the Rubber Processing Plant.
b) There is a relationship of work units with skin disorders in production section workers at the Rubber Processing Plant.
c) There is a relationship between the use of personal protective equipment with skin disorders in production section workers at the Rubber Processing Plant.
d) There is a history of skin disease and skin disorders in production workers at the Rubber Processing Plant.
e) There is a relationship of age with skin disorders in production section workers at the Rubber Processing Plant.

5 SUGGESTION

a) Workers are advised to check the skin disorders they feel to the dermatologist.
b) Workers should maintain a safe and comfortable work ethic while working so latex that contains formic acid does not scattered and exposed to the body.
c) The company is expected to be able to socialize to workers about the dangers of formic acid when in contact with body parts and conduct periodic health checks related to skin disorders of workers.

d) For further research, researcher should do a skin examination with involve a dermatologist to find out which type of skin disease felt by workers.
e) The company requires workers to use PPE in full, if notused will be penalized. This is to reduce the occurrence skin disorders felt by workers.

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