Waluya The International Science Of Health Journal
Vol.4 No.1

ISSN: 2829-2278

WALUYA THE INTERNATIONAL SCIENCE OF HEALTH JOURNAL

Analysis of Factors Associated with Contact Dermatitis in Nickel Ore Processing Industry Workers in Morosi District

Nanda Clara Ramadhany, Erwin Azizi Jayadipraja, Rahmawati

Mandala Waluya University, Indonesia
Correspondence : claranajatin@gmail.com

ARTICLE INFO

Article history
Received : March 06th, 2025
Revised : March 11th, 2025
Accepted : March 29th, 2025

Keywords
Contact Dermatitis,
Worker,
Nickel Industry.

ABSTRACT

Introduction: Dermatitis is one of the skin diseases that industrial workers tend to experience. The prevalence of dermatitis in 2021 is 19.5%, then in 2022 it is 21.7% and in 2023 it is 23.1%. The aim of this study was to analyze factors associated with contact dermatitis in nickel ore processing industry workers in Morosi District.

Method: Type of quantitative research with Cross Sectional Study design. The sampel is 71 people Nickel Ore Processing Industry Workers in the smelting sector who live in Morosi District taken using a simple random sampling technique with the Chi-square test and close relationship test.

Result: The chi-square test found p values for age (0.000) and φ (0.505), p values for length of contact (0.000) and φ (0.507), p values for frequency of contact (0.001) and φ (0.399), personal protective equipment (0.023) and φ (0.270), personal hygiene (0.000) and φ (0.827).

Conclusion: The conclusion of this study is that there is a moderate relationship between age and length of contact with contact dermatitis. There is a weak relationship between the frequency of contact and use of personal protective equipment with contact dermatitis and there is a strong relationship between personal hygiene and contact dermatitis in nickel ore processing industry workers in Morosi District.

Introduction

Occupational skin disease is skin inflammation caused by a person's work. Contact dermatitis is a skin disease that is often found today and when it is related to the type of work, contact dermatitis can occur in all types of work and is generally experienced by workers in the industrial sector. Contact dermatitis is caused by various factors such as biological, chemical and physical factors suffered by workers at work.[1;2]

The World Health Organization (WHO) reports that 68.2% of the world's population experiences contact dermatitis, whereas in the United States it is 90%.[3] Based on data from consultations with dermatologists, it was found

that 4-7% of workers' skin problems were caused by contact dermatitis. Likewise, surveillance results in America found that 80% of occupational skin diseases were contact dermatitis. Judging from the classification of contact dermatitis, the highest prevalence is workers who experience irritant contact dermatitis at 80%, followed by allergic contact dermatitis (DKA) at 14%-20%.[4]

The prevalence of dermatitis in Indonesia in 2021, based on the results of epidemiological investigations, found dermatitis cases of 6.78%, of which 92.5% were contact dermatitis, around 5.4% were skin infections, and 2.1% were other skin diseases. Then, in 2022 the prevalence of dermatitis will increase to 8.5% and further increase in 2023 to 10.8%.[5]

Southeast Sulawesi has a fairly high prevalence of dermatitis in 2021, namely 53.2%. Then it increased in 2022 to 56.4% and in 2023 it reached 59.2%.[6;7] The area of Southeast Sulawesi that has increased dermatitis cases is Konawe Regency, namely in 2019 it was 13.2%, then in 2020 it was 14.2% and in 2021 it was 15.8%. In 2022 the prevalence of Dermatitis in Konawe Regency increased to 16.9% and in 2023 it was 18.9%.[8]

Data obtained from the Morosi Health Center in 2021 shows that the number of dermatitis cases was 19.5%, then in 2022 it was 21.7% and in 2023 the number of dermatitis cases was 23.1%. The number of health workers at the Morosi Health Center reaches 42 people and 5 health workers. The health center has never made any efforts to prevent and treat contact dermatitis so this is one of the factors in the increase in dermatitis cases in the Morosi Health Center area.[9] Nickel mining areas are one of the places where workers easily experience contact dermatitis and in Konawe Regency, especially in Morosi District, this is an area where various types of mining can be found and the dominant mining product is nickel mining.

Chemical substances that can cause contact dermatitis in nickel processing are fluxes whose composition includes chromium (Cr3+), lime (CaO), silica (SiO_2), Alumina (Al_2O_3), iron (Fe_2O_3), Magnesia (MgO), Sulfur (SO_3), Potash ($Na_2O + K_2O$). If these chemicals frequently come into contact with the skin, they can cause irritant contact dermatitis in workers.[10] Apart from that, nickel raw materials can also cause dermatitis and other symptoms such as dizziness, headaches, motion sickness and in the long term can cause cancer in workers.[11]

Based on the results of an initial survey of 10 nickel mining workers in Morosi District, it can be seen that 60% of workers found reddish rashes, itching, and bumps on the skin of their hands and feet, this shows several clinical symptoms of contact dermatitis. Then there were 70% aged ≥ 30 years and 30% aged < 30 years. Then the length of work of most workers (80%) is ≥ 1 year and 20% is < 1 year, then the length of work a day reaches ≥ 8 hours as much as 70% and 30% of the work time is < 8 hours a day, then there are 6 people (60%) workers do not use PPE when working, while personal hygiene shows that 9 people (90%) are not used to washing their hands while working.

Based on the background and study of the problem as described above, the author is interested in conducting research by formulating the title: "Analysis of Factors Associated with Contact Dermatitis in Nickel Ore Processing Industry Workers in Morosi District".

Method

This type of research is quantitative research with a cross-sectional study design. This research was conducted from 19 February to 19 March 2024 in Morosi District. The population is all 245 nickel ore processing industry workers in the smelting sector who live in Morosi District and the sample is some of the nickel ore processing industry workers in the smelting sector who live in Morosi District. A total of 71 people were taken using simple random sampling technique. Sample identity data includes education, length of work as well as research variable data in the form of age,

length of contact, frequency of contact, use of personal protective equipment and personal hygiene obtained using a valid and reliable questionnaire. Then data on contact dermatitis, use of personal protective equipment and personal hygiene were obtained using observation sheets. Data processing uses a computer and is analyzed using the Chi-square test and testing the closeness of the relationship between variables.

Result

Table 1 shows that of the 71 samples, the majority were aged ≥ 30 years as many as 57 people and the remaining < 30 years as many as 14 people, then in the samples aged ≥ 30 years, the majority experienced contact dermatitis as much as 75.4%, the rest did not experience contact dermatitis as much as 24.6%. Furthermore, in the sample aged <30 years, the majority did not experience contact dermatitis as much as 85.7%, the remainder experienced contact dermatitis as much as 14.3%. The results of statistical analysis using the Chi-Square test obtained a p value of 0.000 < α (0.05), and φ of 0.505, so it was concluded that there was a moderate relationship between age and the incidence of contact dermatitis in nickel ore processing industry workers in Morosi District.

Table 2 above shows that of the 71 samples, most of the contact duration with irritants was ≥ 8 hours/day as many as 47 people and the remaining < 8 hours/day as many as 24 people, then in the samples whose contact duration was ≥ 8 hours/day, the majority experienced contact dermatitis was 80.9%, the remaining 19.1% did not experience contact dermatitis. Furthermore, in samples with prolonged contact with irritants < 8 hours/day, the majority did not experience contact dermatitis as much as 70.8%, the remainder experienced contact dermatitis as much as 29.2%. The results of statistical analysis using the Chi-Square test obtained a p value of 0.000 < α (0.05), and φ of 0.507, so it was concluded that there was a moderate relationship between length of contact and the incidence of contact dermatitis in nickel ore processing industry workers in Morosi District.

Table 3 shows that of the 71 samples, most of the frequency of contact with irritants was < 5 times/week as many as 36 people and the remainder ≥ 5 times/week as many as 35 people, then in the samples whose frequency of contact was < 5 times/week, the majority did not experience contact dermatitis was 55.6%, the remainder experienced contact dermatitis as much as 44.5%. Furthermore, in samples whose frequency of contact with irritants was ≥ 5 times/week, the majority experienced contact dermatitis as much as 82.9%, the remainder did not experience contact dermatitis as much as 17.1%. The results of statistical analysis using the Chi-Square test obtained a p value of 0.001 < α (0.05), and φ of 0.399, so it was concluded that there was a weak relationship between the frequency of contact and the incidence of contact dermatitis in nickel ore processing industry workers in Morosi District.

Table 4 above shows that of the 71 samples, the majority used PPE as many as 55 people and the remainder did not use PPE as many as 16 people, then of the samples who used PPE, the majority experienced contact dermatitis as much as 56.4%, the remainder did not experience contact dermatitis as much as 43 .6%. Furthermore, of the samples who did not use PPE, the majority experienced contact dermatitis as much as 87.5%, the remainder did not experience contact dermatitis as much as 12.5%. The results of statistical analysis using the Chi-Square test obtained a p value of 0.023 < α (0.05), and a φ of 0.270, so it was concluded that there was a weak relationship between the use of PPE and the incidence of contact dermatitis in nickel ore processing industry workers in Morosi District.

Table 5 shows that of the 71 samples, the majority had poor personal hygiene, 51 people and the remaining 20 people had good personal hygiene. Then, of the samples that had poor personal hygiene, the majority experienced contact dermatitis, 88.2%, the rest did not. experienced

contact dermatitis as much as 11.8%. Furthermore, in samples with good personal hygiene, 100% did not experience contact dermatitis. The results of statistical analysis using the Chi-Square test showed that the p value was 0.000 < α (0.05), and φ was 0.827, so it was concluded that there was a strong relationship between personal hygiene and the incidence of contact dermatitis in nickel ore processing industry workers in Morosi District.

Table 1.
Relationship Between Age and Contact Dermatitis on Industrial Workers Nickel Ore Processing Morosi District

Age (Years)	Incidence of Contact Dermatitis				Total		P-value	Closeness of Relationship (φ)
	Contact Dermatitis		No Contact Dermatitis					
	n	%	n	%	n	%		
< 30	2	14,3	12	85,7	14	100,0	0,000	0,505
≥ 30	43	75,4	14	24,6	57	100,0		
Total	45	63,4	26	36,6	71	100,0		

Table 2.
Relationship Between Long Exposure and Contact Dermatitis on Industrial Workers Nickel Ore Processing Morosi District

Length of Contact	Incidence of Contact Dermatitis				Total		P-value	Closeness of Relationship (φ)
	Contact Dermatitis		No Contact Dermatitis					
	n	%	n	%	n	%		
< 8 hour/day	7	29,2	17	70,8	24	100,0	0,000	0,507
≥ 8 hour/day	38	80,9	9	19,1	47	100,0		
Total	45	63,4	26	36,6	71	100,0		

Table 3.
Relationship Between Contact Frequency And Contact Dermatitis on Industrial Workers Nickel Ore Processing Morosi District

Contact Frequency	Incidence of Contact Dermatitis				Total		P-value	Closeness of Relationship (φ)
	Contact Dermatitis		No Contact Dermatitis					
	n	%	n	%	n	%		
< 5 times/week	16	44,5	20	55,6	36	100,0	0,001	0,399
≥ 5 times/week	29	82,9	6	17,1	35	100,0		
Total	45	63,4	26	36,6	71	100,0		

Table 4.
Relationship Between Use of PPE and Contact Dermatitis on Industrial Workers Nickel Ore Processing Morosi District

Use Tool Personal Protector	Incidence of Contact Dermatitis				Total		P-value	Closeness of Relationship (φ)
	Contact Dermatitis		No Contact Dermatitis					
	n	%	n	%	n	%		
Use PPE	31	56,4	24	43,6	55	100,0	0,023	0,270
Not using PPE	14	87,5	2	12,5	16	100,0		
Total	45	63,4	26	36,6	71	100,0		

Table 5.
Relationship between Personal Hygiene and contact dermatitis on Industrial Workers Nickel Ore Processing Morosi District

Personal Hygiene	Incidence of Contact Dermatitis				Total		P-value	Closeness of Relationship (φ)
	Contact Dermatitis		No Contact Dermatitis					
	n	%	n	%	n	%		
Baik	0	0	20	100	20	100,0	0,000	0,827
Buruk	45	88,2	5	11,8	51	100,0		
Total	45	63,4	26	36,6	124	100,0		

Discussion

Age and Contact Dermatitis

From the results of descriptive data analysis, it can be seen that the majority of the sample age was ≥ 30 years as much as 80.3%, and a small portion < 30 years as much as 14.7%. The largest sample age tends to be in the adult age category, at this age the workforce is able to determine the right steps and have maximum responsibility at work.

The results of this study show that in samples aged ≥ 30 years, the majority experienced contact dermatitis as much as 75.4%, this is because the older a person is, the easier it is to experience skin irritation, because the permeable condition of the skin decreases in function as it increases. age, while 14.3% of samples aged <30 years experienced contact dermatitis. This situation is due to the length of contact and the long frequency of contact with the irritant material. The longer the contact with the irritant material, the greater the risk of experiencing contact dermatitis. Apart from that, it can also be caused by allergies experienced by the sample so that even though it is still young, it can experience dermatitis.

The results of statistical analysis concluded that there was a moderate relationship between age and the incidence of contact dermatitis in nickel ore processing industry workers in Morosi District. According to the researchers' assumptions, the relationship between age and the incidence of contact dermatitis is a negative relationship because most of the samples experienced contact dermatitis in adulthood, where the skin condition is easily irritated. Contact dermatitis is a skin condition that occurs due to direct contact with an irritant or allergen. The relationship between age and contact dermatitis can be seen from several aspects, including prevalence, the types of contact

dermatitis that are more common at certain ages, and changes in immune response with age. In adults, repeated exposure to certain substances may increase the risk of sensitization and development of allergic contact dermatitis.

This is confirmed by the theory which states that age can influence the incidence of contact dermatitis, as a person gets older, the body's systems will experience a decline, including the body's ability to neutralize toxic substances such as chemicals that are exposed to the body, especially the skin.[10]

This research is in line with research by Nada et al., 2021, that the majority of workers' characteristics were found, namely 70% aged ≥30 years, and the results of statistical analysis found that age was related to complaints of contact dermatitis.[11] This research is supported by Megantari's opinion that age can influence the incidence of contact dermatitis, as a person gets older, the body's systems will experience a decline, including the body's ability to neutralize toxic substances such as chemicals that are exposed to the body, especially on the skin.[10]

Based on the results of data recapitulation in the questionnaire, the symptoms experienced by workers who experience contact dermatitis are itching, red rashes found on the surface of the skin, inflammation, itchy skin, swelling or even thickening of the skin, dry, scaly skin, blisters, blisters, cracked. The study also found that the majority of samples experienced irritant contact dermatitis due to exposure to materials used in nickel ore processing in the smelting area.

This research was obtained by the opinion of Sularsito et al., that Dermatitis can occur in all ages, races and genders.[12] Likewise, Widianingsih and Basri's opinion is that elderly people have dry and thin skin so they cannot tolerate soap and solvents.[13] Dryness of the skin causes chemicals to stick more easily to the skin, making the skin more susceptible to skin diseases.[14]

Age is one of the risk factors for skin disorders and has quite a big influence in causing work accidents. As we age, the function of the body's systems will decrease, one of which is the body's ability to deal with toxic substances. Skin conditions will begin to experience an aging process as you get older. This happens because, at that age, the basal layer begins to thin, making it more difficult for skin cells to maintain moisture and many dead cells accumulate because sebum production and cell turnover decrease sharply.[15]

Chemical or physical factors and microtrauma can cause skin irritation. Physical irritants such as abrasion, friction, occlusion, and detergents such as sodium lauryl sulfate can cause contact dermatitis, especially irritant contact dermatitis. Contact dermatitis is also determined by skin type as well, thick, thin, dry or not.[16]

Long Exposure and Contact Dermatitis

The duration of contact in this study is the duration of exposure to chemicals on the skin of mining workers, measured in hours/day. Duration of contact is the duration of the worker's contact with substances, materials or particles attached to the skin which is measured in hours/days. Each job has a different contact time and length of exposure which is adjusted to the type of work. If a person's skin is frequently exposed to irritants or allergens, the likelihood that these substances will penetrate into the skin is greater and trigger an inflammatory skin reaction that can cause skin disease.[17]

Research on the length of contact variable shows that of the 71 samples, most of the time in contact with irritant materials was ≥ 8 hours/day, this is because the samples are constantly in the nickel smelting area and generally have a working time of 8 hours a day, the conditions of the workplace which cannot be left behind so employees must be on standby at the work location without leaving the work they are doing. Then in this study there were also samples that had prolonged contact with irritants < 8 hours/day, this condition was because the samples sometimes left the smelting area and were not in the smelting area throughout the working time.

This research also shows that the majority of samples whose contact duration was ≥ 8 hours/day

experienced contact dermatitis, this was because workers had long exposure to irritants, which were intense so that the skin was easily irritated in certain areas such as the workers' hands and feet. This study also found samples whose contact time was ≥ 8 hours/day, but did not experience dermatitis as much as 19.1%, this situation was because the samples used complete personal protective equipment when working so that even though they were exposed to irritants for a long time, their skin condition still awake and protected from contact dermatitis. In general, the longer the duration of contact with an irritant, the higher the risk and severity of irritant contact dermatitis. Therefore, reducing the duration of contact and using protection such as gloves or moisturizers can help prevent this condition.

Furthermore, in samples with prolonged contact with irritants < 8 hours/day, the majority did not experience contact dermatitis as much as 70.8%, the less contact with irritants the less the risk of contact dermatitis, however this research also found 29.2% of samples who have contact dermatitis. This situation is due to the sample's habits of not using PPE and not maintaining personal hygiene while working.

The results of statistical analysis concluded that there was a moderate relationship between length of contact and the incidence of contact dermatitis in nickel ore processing industry workers in Morosi District. According to researchers' assumptions, the longer the contact with an irritant, the more likely workers will experience contact dermatitis. The duration of contact with an irritant greatly influences the risk and severity of irritant contact dermatitis. Brief contact with an irritant usually causes a mild or temporary reaction, such as redness or irritation that disappears after the irritant is removed while long-term or repeated exposure to an irritant can cause more severe and chronic irritation, including skin cracking, peeling, and even wound.

This research is in line with research by Yulia, et al., which found that length of contact was significantly related to irritant contact dermatitis (p-value = 0.045).[18] Likewise, research by Almaida, et al., found that there was a relationship between long contract duration and complaints of contact dermatitis.[19]

This research is in line with the opinion of Pradaningrum et al., that the length of time a worker's skin is in contact with substances, irritants can cause contact dermatitis, because each job has a different exposure time and the exposure time is adjusted to the type of work. If a person's skin is frequently exposed to irritants or allergens, these substances can penetrate the skin and cause dermatitis.[20] Then Sularsito et al., also stated that the duration of direct contact on the skin can be seen if it is exposed directly for at least one week, month, or even years later, this dermatitis occurs due to repeated or continuous exposure. or recurring.[12]

Frequency of Contact and Contact Dermatitis

This research shows that of the 71 samples, most of the frequency of contact with irritants was < 5 times/week as many as 36 people and the remainder ≥ 5 times/week as many as 35 people, this situation is because nickel industry workers generally work 5 times a week which This means that in a week workers go to work regularly for 5 days and 2 days are holiday periods. However, there are samples who work more than 5 times/week because they replace work shifts from friends.

This research also shows that the majority of samples whose contact frequency was <5 times/week did not experience contact dermatitis, this is because the frequency of contact with irritants or allergens plays an important role in the development and severity of contact dermatitis, if the frequency of contact is less, the body will not be exposed to the substance. chemicals to avoid contact dermatitis.

This research also found that 44.5% experienced contact dermatitis even though the frequency of contact was <5 times/week, this was because the length of contact was excessive and also the sample did not maintain personal hygiene

so they easily experienced contact dermatitis. Short but intense contact with irritants or allergens can cause a rapid and sharp contact dermatitis reaction. This usually occurs with strong irritants.

Furthermore, in samples whose frequency of contact with irritants was ≥ 5 times/week, the majority experienced contact dermatitis, this condition is because skin that is repeatedly exposed to irritants tends to experience structural changes, such as thickening of the skin (lichenification) and excessive dryness, making it more susceptible to further irritation. Initial exposure to an allergen may not cause immediate symptoms, but over time, repeated exposure can induce an immune response that causes contact dermatitis. However, this research still found that 17.1% did not experience contact dermatitis even though the frequency was ≥ 5 times/week, this situation was because the sample used PPE such as gloves, rubber shoes and even used head protectors and face shields at work and the workers were able to maintain personal hygiene properly. Regularly wash your hands with soap and running water before and after work, this action can certainly prevent contact dermatitis.

The results of statistical analysis concluded that there was a weak relationship between the frequency of contact and the incidence of contact dermatitis in nickel ore processing industry workers in Morosi District. According to researchers' assumptions, the more frequently there is contact with an irritant, the greater the risk of experiencing contact dermatitis. Frequency of contact with irritants and allergens is a significant risk factor for the development of contact dermatitis. Repeated exposure, especially without adequate precautions, may result in an increase in the incidence and severity of contact dermatitis. Therefore, efforts to reduce the frequency of contact with these materials, as well as the use of appropriate protection, are essential in the prevention of contact dermatitis.

This research is in line with research by Almaida, et al., which found that there was a relationship between the frequency of contact and complaints of contact dermatitis in car wash workers.[19] Likewise, research by Sholeha, et al., found that the frequency of contact had a p-value = 0.010, which means there is a significant relationship with the symptoms of contact dermatitis in scavengers.[14] This research is also supported by research by Putri et al., where a p value = 0.037 was obtained which states that the frequency of contact is related to the occurrence of work-related contact dermatitis.[20] The results of Afifah's research showed that the frequency of exposure value was p value=0.010, meaning that frequency was significantly related to the occurrence of contact dermatitis.[21] Similar results were also carried out by Ike Puspitasari, et al with a p-value (0.020<0.05), where there was a relationship between the frequency of contact and contact dermatitis.[22]

Frequency of exposure is the number of times a chemical is subjected to repeated exposure to sensitizing substances causing allergic-type contact dermatitis, namely mild chemicals that cause excessive skin inflammation with disproportionate levels and severity. Therefore, the aim is to reduce the occurrence of occupational contact dermatitis by reducing exposure to chemicals.[23]

According to Law no. 13 of 2023 concerning Employment, working hours 6 days a week are limited to 7 hours a day and 40 hours a week. The limit for 5 working days is 8 hours a day and 40 hours a week. Contact dermatitis disorders will become apparent after direct contact for one week or several weeks, months or years later. Contact dermatitis arises due to frequency (continuous or repeated). The results of this study are in accordance with the opinion above, where those who work continuously and are always in contact with waste will be very susceptible to developing symptoms of contact dermatitis.[4]

PPE Ese and Contact Dermatitis

Personal protective equipment (PPE) is equipment that must be worn when working according to working conditions and occupational

hazards so that the safety of workers and those around them is maintained34. To avoid contact dermatitis and serious skin conditions due to a humid work environment, this can be prevented by maintaining clean PPE.[24]

From the results of descriptive data analysis, it can be seen that of the 71 samples, the majority, namely 77.5%, used PPE. Based on the results of data recapitulation in the questionnaire, it can be seen that the types of PPE used by employees in general are face masks, head coverings, hand clothing, rubber shoes and employee work clothes, however there are 22.5% who do not use PPE, this is because the sample do not use PPE gloves and rubber shoes regularly, the PPE focused in this research is the use of hand gloves and shoes that protect the feet and hands from irritants. The findings also show that the sample found PPE while working, but it was incomplete, some employees only wore gloves while other PPE was not used.

This research also shows that the majority of samples who used PPE experienced contact dermatitis as much as 56.4%, this was because the PPE used did not guarantee the cleanliness of the sample's hands and feet and was free from irritants, where the sample's habits were unable to maintain personal hygiene. Hygiene such as not washing your hands and feet regularly before and after work can be a major factor in contact dermatitis, so that even if you use PPE, if you don't maintain personal hygiene, you will easily experience contact dermatitis. This study also contained 12.5% of samples who did not use PPE, but did not experience contact dermatitis. The fact that some people do not experience contact dermatitis even though they do not use personal protective equipment (PPE) can be caused by various factors, including employees who are thought to have good skin resistance, people with stronger and better skin barriers who are more resistant to irritation. Healthy skin has a thick stratum corneum layer that is effective in preventing the absorption of irritants. This can also be caused by some irritants, less strong or less aggressive, so that they do not cause significant irritation even if contact occurs frequently.

The results of the Chi-Square test analysis concluded that there was a weak relationship between the use of PPE and the incidence of contact dermatitis in nickel ore processing industry workers in Morosi District. According to researchers' assumptions, PPE plays a very important role in preventing contact dermatitis in nickel industry employees. The more regularly you use complete PPE, the more protected your body, especially the hands and feet, will be from irritants that cause contact dermatitis. The use of PPE can significantly reduce the risk of contact dermatitis by reducing direct exposure to irritants and allergens. However, choosing the right PPE and good management of use is also important to avoid additional problems such as allergies to PPE materials or irritation from sweat. Overall, PPE is an important tool in the prevention of contact dermatitis, especially in work environments involving chemicals or other irritants.

This research is in line with Widiyana and Wiratmaja's opinion that the use of personal protective equipment (PPE) can also influence the incidence of contact dermatitis. PPE is equipment that workers must use so that workers can avoid contact dermatitis.[25] This research is similar to research by RifkiWiratama, et al where the use of PPE by scavengers was related to the incidence of allergic contact dermatitis with the value obtained (0.001<0.05).[26]

This research is also in accordance with the research of Pratiwi, et al with the p value obtained (0.002<0.05), meaning that there is a relationship between the use of PPE and the incidence of contact dermatitis.[27] This research is also supported by research by Hakim on scavengers in Helvetia Village, Medan, which obtained a p-value (0.018<0.05), where the use of PPE among scavengers has a significant relationship with skin complaints.[28]

Parts of the body that are at risk of developing rashes or dermatitis are the head, body parts, arms, hands and fingers, as well as legs and

feet. Therefore, to reduce the risk of skin infections, plastic/rubber hats, caps, rubber/plastic clothing, gloves and shoes are needed. Personal protective equipment is also equipment that must be used when working as necessary to maintain the safety of the worker himself and those around him. Personal protective equipment is equipment that must be used when working in accordance with working conditions and job hazards to maintain the safety of workers and people around them, to avoid contact dermatitis and serious skin diseases caused by a humid work environment, which can be avoided by maintaining equipment cleanliness. personal protection.[14]

The use of Personal Protective Equipment (PPE) is closely related to the prevention of contact dermatitis. PPE functions as a physical barrier between the skin and irritants or allergens, thereby reducing the risk of contact dermatitis. The use of PPE, especially gloves, protects hands from direct exposure to chemicals, detergents and other irritants. This is especially important in work environments that involve excessive amounts of chemicals or water. Other protective equipment such as face masks, protective clothing, and glasses can also reduce the risk of exposure to irritants or allergens on the skin of the face, body, and eyes.[24]

Personal Hygiene and Contact Dermatitis

Personal hygiene plays an important role in preventing contact dermatitis. Good hygiene habits can help reduce the risk of exposure to irritants and allergens and maintain overall skin health.[14]

Analysis of this research data shows that of the 71 samples, the majority had poor personal hygiene (71.8%). Poor personal hygiene was based on the results of filling out the questionnaire which showed that the sample did not wash their hands and feet using soap and also the sample, respondents also washed their work clothes after use, showered after work, cleaned between their fingers. This research also found that 28.2% of the sample implemented good personal hygiene, this was based on the results of interviews and observations that the sample washed their hands every day and under running water, washed their hands when their hands were dirty, the sample also bathed every day and washed their hands. hands and feet done in the office.

This research shows that of the 71 samples, the majority had poor personal hygiene, 51 people. The results of the recapitulation of interviews and observations on the sample show that the habit of maintaining personal hygiene which is generally not carried out by the sample is not washing their hands and feet using soap. This research also shows that the majority of samples who had poor personal hygiene experienced contact dermatitis as much as 88.2%, but did not experience contact dermatitis as much as 11.8%, this was due to other factors such as the age of the sample being <30 years old so The structure and immunity of the skin are still good, supported by the long and low frequency of contact with irritating materials accompanied by the use of complete PPE so that even though personal hygiene is poor, the skin condition is still protected from contact dermatitis.

The results of the Chi-Square test concluded that there was a strong relationship between personal hygiene and the incidence of contact dermatitis in nickel ore processing industry workers in Morosi District. According to the researchers' assumptions, the better the personal hygiene of samples, the more likely they will be protected from contact dermatitis, but samples with poor personal hygiene are more likely to experience contact dermatitis. Good personal hygiene is very important in preventing contact dermatitis. Washing your hands and showering regularly, using gentle hygiene products, and keeping your skin moisturized can help reduce the risk of exposure to irritants, as well as maintain overall skin health. Good hygiene practices also help prevent infections and inflammation that can worsen dermatitis. Therefore, adopting good personal hygiene habits is an important step in the management and prevention of contact dermatitis.

This research is in line with Kasiati and Roamalawati's research that workers' personal

hygiene factors are one of the efforts to maintain personal hygiene and health by keeping all parts of the worker's body clean while at the work site.[29] Workers who maintain personal hygiene have a low risk of experiencing dermatitis.[10] Other research also found a similar thing, personal hygiene is also related to the incidence of contact dermatitis where the p-value is (0.000 <0.05).[30]

Personal hygiene is an effort or behavior to maintain personal hygiene and health in order to maintain physical and mental health which includes cleanliness of skin, hair, nails, hands, feet, teeth, mouth, eyes, nose and ears.[31] The better personal hygiene, the lower the risk of contact dermatitis. There needs to be self-awareness for every scavenger to maintain personal hygiene from the risks of an unfavorable work environment, for example the large amount of dirt, bacteria, fungi and germs which can trigger skin diseases in scavengers. It is hoped that scavengers can maintain personal hygiene starting from the cleanliness of their skin, nails, feet and hands, as well as their clothes.

Conclusion

There is a moderate relationship between age and contact dermatitis. There is a moderate relationship between length of contact and contact dermatitis in nickel ore processing industry workers in Morosi District. There is a weak relationship between the frequency of contact and contact dermatitis and there is a weak relationship between the use of personal protective equipment (PPE) and contact dermatitis, and there is a strong relationship between personal hygiene and contact dermatitis in nickel ore processing industry workers in Morosi District.

Reference

1. Wardani HK, Mashoedojo M, Bustamam N. Factors associated with occupational contact dermatitis in airport project workers. *The Indonesian Journal of Occupational Safety and Health.* 2019;7(2):249. doi: 10.20473/ijosh.v7i2.249 259.
2. Chu C, Marks JG, Flamm A. Occupational contact dermatitis: common occupational allergens. *Dermatologic Clinics.* 2020;38(3):339-349.
3. WHO. WHO Guidelines on Hand Hygiene in Health Care (Advance Draft): A Summary. *Switzerland: WHO Press*; 2020.
4. Ismi S. *Relationship between Atopic History and Work Period with the Incident of Irritant Contact Dermatitis in Motorcycle Wash Workers in Jebres District, Surakarta [Internet] [Thesis]*. [Surakarta]: Faculty of Medicine Sebelas Maret University; 2019.
5. Ministry of Manpower. *Republic of Indonesia Law No. 13 of 2023 concerning Employment.* 2023;(1):345.
6. Southeast Sulawesi Health Office. *Profile of the Southeast Sulawesi Health Service*. Kendari. Southeast Sulawesi. 2023.
7. Hasda H, Jayadipraja EA, Mendri K, Harun A. Factors Associated with Occupational Sickness in Employess of PT. Virtue Dragon Nickel Industry. *Waluya The International Science of Health Journal*. 2022; 1(2): 66-72.
8. Konawe Health Office. *Profile of the Konawe District Health Service for 2023*. Konawe. Southeast Sulawesi. 2023.
9. Morosi Health Center. *Morosi Health Center Monthly Data for 2023*. Konawe: Morosi Health Center; 2023.
10. Megantari G. Contact Dermatitis in Tofu Factory Workers. *HIGEIA.* 2020;4(Special 1):112–123.
11. Nada KF, Kasumawati F, Fadhilah H. Relationship Between Individual Factors and Direct Factors Complaints of Irritant Contact Dermatitis in Workers at CV. Fatra Metal Works, Tangerang Regency. *Frames of Health Journal.* 2023; 1(2): 54-63.
12. Sularsito SA, Soebaryo RW. Contact Dermatitis. In: Menaldi, editor. Skin and Venereal Diseases. *Seventh.* Jakarta: Faculty of Medicine, University of Indonesia; 2021:1–535.

13. Widianingsih K, Basri S. Incidence of Contact Dermatitis in Scavengers at the Pecuk Indramayu Final Processing Site. *Journal of Public Health*. 2017;2(2):45–52.
14. Sholeha et al. Factors Associated with Symptoms of Contact Dermatitis in Scavengers at Talang Gulo TPA, Jambi City, 2021. *e-SEHAD*. 2021; 2(2): 82-93.
15. Health and Safety Commission. To ensure that risks to people's health and safety from work activities are properly controlled. *Natl Stat.* 2021;1(2):228.
16. Litchman G. et al. Contact dermatitis - statpearls - ncbi bookshelf, *Ncbi*. 2020.
17. Mausulli A. F*actors Associated with Irritant Contact Dermatitis in Waste Processing Workers at Cipayung TPA, Depok City in 2020*. Depok; 2020. Accessed 25 July 2023.
18. Yulia A, Adha MZ, Komariah L. Relationship between personal hygiene, length of contact and work period with symptoms of irritant contact dermatitis in silver humans in South Tangerang City. *Frames of Health Journal*. 2022;1(2). 1-11.
19. Almaida P, Adha MZ, Bahri S. The Relationship between Personal Hygiene, Length of Contact and Frequency of Contact with Complaints of Contact Dermatitis in Car Wash Workers in Bojongsari District. *Prepotive: Journal of Public Health.* 2022;6(2), 1757-1762.
20. Putri E, Budiastuti A, Widodo A. Factors that cause occupational contact dermatitis in salon workers. *Diponegoro Medical Journal.* 2021;6:1–11.
21. Afifah A, Ernawati D, Sudaryanto S. Factors Associated with the Occurrence of Occupational Contact Dermatitis in Laundry Employees. *Diponegoro Medical Journal.* 2022;(1):138413.
22. Putri IPS, Martiana T, Rahman FS. Correlation between Environmental and Individual Factors with Contact Dermatitis on Tobacco Farmers. *Indonesian Journal of Occupational Safety and Health.* 2020;9(1):95-103.
23. Ameliana. *Things That Are Related to Allergic Contact Dermatitis in Sufferers in Several Locations in Indonesia for the Period 2015 to 2020 (Systimatic Review) [Internet] [Thesis]*. Makassar: Bosowa University; 2022.
24. Lampel HP, Powell HB. Occupational and Hand Dermatitis: a Practical Approach. *Clin Rev Allergy Immunol.* 2019;56(1). doi:10.1007/s12016-018-8706-z.
25. Widiyana, Wiratmaja. *Occupational Health and Safety*. Yogyakarta: Graha Ilmu; 2019.
26. Wiratama R, Cahyati WH, Laksono B. *Analysis of The Relationship Allergic Contact Dermatitis on Scavengers*. 2020;5(3):212–220.
27. Pratiwi AD, Abdillah F, Karimuna SR. Factors Associated with Contact Dermatitis in Shrimp Workers at PT. Sultra Tuna Samudra Kendari. Kesmas Uwigama: *Public Health Journal*. 2020;6(1):30–39.
28. Hakim L. *Factors Associated with Skin Complaints among Waste Scavengers at the Helvetia Village TPA, Medan, Year 2019 [Internet] [Undergraduate Thesis]*. Deli Serdang: Helvetia Health Institute; 2021.
29. Kasiati, Rosmalawati NWD. *Printed Nursing Teaching Material Module: Basic Human Needs I.* Jakarta: Ministry of Health of the Republic of Indonesia; 2016.
30. Rahmatica A, Saftarina F, Anggraini DI, Mayasari D. Relationship between Risk Factors for Contact Dermatitis in Farmers. *Journal of Health.* 2020;1(1):101-107.
31. Janah DL, Windraswara R. Incidence of Contact Dermatitis in Scavengers. *HIGEIA (Journal of Public Health Research and Development)*. 2020;4(2):404–414.