

Conference Paper

Personal Hygiene and Personal Protective Equipment Use Affect Irritant Contact Dermatitis: A Sectional Cross Study

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ABSTRACT

Irritant contact dermatitis occurs due to exposure of the skin to various substances that are irritants. Lack of compliance with personal hygiene practices and personal protective equipment (PPE) regulations can cause contact dermatitis. This research aims to determine the relationship between personal hygiene and the use of personal protective equipment and the incidence of irritant contact dermatitis in tofu factory workers. This observational quantitative study used a cross-sectional design. This study included 33 samples from a tofu factory in Dadirejo Village, Pati, using a purposive sampling method based on predetermined inclusion and exclusion criteria. Between-group comparisons were conducted using the Chi-Square test. There was a significant relationship between personal hygiene and the use of personal protective equipment and the incidence of irritant contact dermatitis, with p-values of 0.001 and 0.000. The conclusion is that there is a significant relationship between personal hygiene and the use of personal protective equipment by tofu factory workers in Dadirejo Village, Pati Regency.

Keywords: Irritant contact dermatitis, personal hygiene, use of personal protective equipment

Introduction

Contact dermatitis is caused by contact with allergens or the presence of irritants. Allergic contact dermatitis, generally called the type IV hypersensitivity response, is an immunological response to antigen contact with the skin. Irritant contact dermatitis (ICD) means a non-specific skin reaction to tissue damage after exposure to an irritant, either individually or repeatedly (Elmas et al., 2020).

The 2020 epidemiological study found 97% of the 389 cases of contact dermatitis consisted of allergic contact dermatitis (33.7%) and irritant contact dermatitis (66.3%). According to the Riskesdas by the Department of Health (2020), the data obtained shows that cases of dermatitis, according to complaints, have a national prevalence of 6.8%. In Central Java, the prevalence of dermatitis was 7.95% (Apriliani et al., 2022).

Work-related contact dermatitis is also common in humans. There is a range of 85% to 98% of various types of work-related skin diseases (Saftarina et al., 2015). In addition, this also involves hands and occurs in about 80% of people, and the most common form is chronic cumulative irritant contact dermatitis (Hutagalung, 2017). This triggers damage to the integrity of the eyelids with epidermal lesions that have varying degrees of severity, as well as inflammatory reactions in the lower dermis. (Gunawan & Setyawati, 2022).

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The manufacturing industry knows that it's a job in the food industry. Workers who are involved in the production process are highly likely to be in direct contact with chemicals such as whey or clamps. The use of whey is acetic acid or vinegar acid (CH_3COOH). Exposure to chemicals in the process of accumulation can irritate and trigger other skin disorders such as bolts, cracks, dry skin, redness, and itching that are hard to heal. This type of skin damage can make it easier for toxic chemicals to enter the body through the injured skin (Chafidz & DwiYanti, 2018).

Use of personal protective equipment (PPE) and personal hygiene include factors that are crucial in preventing disease, especially for factory workers to know that they always use PPEs and apply personal hygiene when working because it can suppress the risk of developing skin diseases due to work (Megantari, 2020; Romdhona et al., 2022). In fact, employees know that having personal hygienic behavior and using PPE that tends not to be so good will be more likely to result in a high risk of contact dermatitis irritant (Apriliani et al., 2022; Megantari, 2020).

This study aims to determine the relationship between personal hygiene and the use of personal protective equipment and the incidence of irritant contact dermatitis in tofu factories. This research needs to be done because tofu factory workers in the process of making tofu come into direct contact with chemicals (acetic acid or vinegar acid), and the incidence of irritant contact dermatitis is quite high due to the lack of awareness of workers on the importance of personal hygiene and the use of personal protective equipment while working.

Material and Methods

The observational analytical study had a cross-sectional design. The target population consisted of all tofu workers in Dadirejo village, Pati regency, and a sample of 33 people was selected using purposeful *sampling*, wherein respondents were subjectively selected according to inclusion criteria. The inclusion criteria for this study were: (1) Tofu factory workers who actively worked in the Dadirejo village area, Pati regency; (2) Tofu factory workers aged 20–50 years; (3) Tofu factory workers with a length of contact per day above 5 hours whose work part was in contact with vinegar acid; and (4) Workers willing to participate in research by signing informed consent. Respondents with a previous history of allergies, respondents who did not complete the questionnaire, and respondents who were absent during the study were excluded. Assessment of personal hygiene use The Personal Hygiene Questionnaire assessment contained five questions, which were then answered by respondents. If the score was $< 50\%$, it was considered bad, while a score of $\geq 50\%$ was considered good. Assessment of Personal Protective Equipment Use The assessment of the Personal Protective Equipment Use Questionnaire contained five questions, which were then answered by respondents. If the score was < 50 , it indicated that personal protective equipment was not being used, while a score of ≥ 50 indicated the use of personal protective equipment. Assessment of ICD use The Irritant Contact Dermatitis complaint questionnaire contained 11 questions, which were then answered by respondents. If, from the history (questionnaire) and examination of the status of the palm, no signs of irritant contact dermatitis were found, it meant the individual did not have irritant contact dermatitis. If signs of irritant contact dermatitis were found from the history and examination of the palm, it meant the individual had irritant contact dermatitis. All other statistical analyses were conducted using SPSS. P value of less than 0.05 was considered significant for all statistical measures.

Results and Discussion

The results of this study show that there is a relationship between personal hygiene and the use of personal protective equipment and the incidence of irritant contact dermatitis. 33 respondents were male, and most were 20–30 years old (42.4%). 21 respondents (63.6%) were most exposed to irritant substances for 8–9 hours. 18 respondents (54.5%) had poor personal hygiene, and 22 respondents (66.7%) did not use personal protective equipment. The complete characteristics of the respondents are listed in Table 1.

Table 1. Respondent characteristics

Characteristics	N (%)
Gender	
Male	33 (100)
Female	0 (0)
Age	
20-30 years	14 (42,4)
31-40 years	11 (33,3)
41-50 years	8 (24,2)
Last educational	
Elementary School	5 (15,2)
Junior high school	14 (42,4)
Senior high school	14 (42,4)
Duration of contact with irritant	
6-7 hours	12 (36,4)
8-9 hours	21 (63,6)
Personal hygiene	
Negative	18 (54,5)
Positive	15 (45,5)
Use self protection tool	
Do not use self protection	22 (66,7)
Using self protection	11 (33,3)
Irritant contact dermatitis	
Non irritant contact dermatitis	12 (36,4)
irritant contact dermatitis	21 (63,6)

Based on Table 2, a significant relationship between personal hygiene and the incidence of contact dermatitis irritant in factory workers in Dadirejo village of Pati district emerged with a value of 0,001. This evidence was shown in the factory, where employees have poor personal hygiene as well as no experience with contact irritant dermatitis, i.e., there are a total of 2 people (11.1%) and a total of 16 people (88.9%) who suffer from irritant contact dermatitis. The OR (odds ratio) value of 0.063 (95% CI = 0.010-0,386) (<1) means that personal hygiene includes protective factors from contact dermatitis irritants. Personal protective equipment with an incidence of contact dermatitis irritant in factory workers know in village Dadirejo district of Pati significantly worth 0,000. This was shown in factory workers who did not wear PPE and did not have irritable contact dermatitis, i.e., 4.5%, or 1 person, and 21 people (95.5%) with irritable contact dermatitis. 11 people (100%) knew that they were using self-protecting equipment and didn't have irritant contact dermatitis. The OR (Odds Ratio) value of 0.045 (95% CI = 0.010-0,386) (<1) meant that the use of protective equipment included protective factors against irritating contacts.

Referring to the Chi-square analysis test on personal hygiene with incidents of contact dermatitis irritant, the findings of this study provide evidence that personal hygiene and the incidence of contact irritant dermatitis are significantly related. This result is in line with the evidence presented by Pradananingrum and Lestantyo (2018) entitled "Personal hygiene, long contact, and working time relationships with symptoms of irritable contact dermatitis in craftsmen know mrican Semarang, "with the result being a p-value of 0.026, which means that of all the variables there is a relationship. This result is in line with a study by Lawrencesou et al. (2022) entitled "Risk factors for contact dermatitis in workers in the factory know" where the results were obtained with a with a p-value 0.012, or personal hygiene related to contact dermatitis in workers at factories know.

Table 2. Relationship of personal hygiene and use self-protection toll with incidence of irritant contact dermatitis

	Irritant Contact Dermatitis		p-value	OR (CI 95)
	No N (%)	Yes N (%)		
Personal hygiene			0,001*	0,063 (0,010-0,036)
Negatif	2 (11,1)	16 (88,9)		
Positif	10 (66,7)	5 (33,3)		
Use self-protection tool			0,000*	0,045 (0,007-0,308)
Do not use self-protection	1 (4,5) 11 (100)	21 (95,5) 0 (0)		
Using self-protection				

*p-value<0,005

Personal hygiene includes the hygiene measures of individual employees, both before, during, and after work (Ade Indrawan et al., 2014). Personal hygiene includes factors that can prevent contact dermatitis. Bad habits of washing hands can trigger irritant contact dermatitis. The unclean habit of washing hands also leaves chemicals on the skin surface. In general, the pH of the skin is normal, i.e., acidic, or in the range of 4.5 to 7, but the appearance of symptoms of contact dermatitis irritants can occur when in contact with acetic acid. (Citrashanty & Irmada, 2012). Acetic acid is a chemical compound of the kind of carboxylic acid that is commonly used in society. Although this aesthetic acid is described as a weak acid, it is capable of damaging the skin if it is in high concentrations because it is corrosive (Rhizkiyana, 2019). How good is it to use suitable soap when washing your feet and hands? The kind of hand wash soap can also affect the hygiene and health of the skin. It is better to choose soap that does not irritate the skin and does not make contact dermatitis irritants worse. It is best to use soap that has a pH of 4.5 to 6.5. (Ali & Yosipovitch, 2013). After washing hands, dry them with a dry towel and moisturize the skin. It can suppress skin contact with acetic acid. The importance of choosing a hand cleaner is to remove chemicals, but the skin is not damaged (Pradananingrum & Lestantyo, 2018).

The application of personal hygiene by workers can be categorized as bad based on the analysis of 33 respondents, of whom 18 had poor personal hygiene, as well as the lack of adequate facilities for factory workers to know from the business owners. Based on the results of questionnaires and field observations, the factory workers found out that they only washed their hands without using soap and dried their hands with clean clothes. The factory owner provided a place to wash hands in one place with a production place and also became a place for storing water as a material for making cheese. A water hose for hand washing is a tool that is also used to conduct water into the tub or burner from the tap. Special soaps for hand washing are not provided by the factory owners, which is why the workers do not use soap when washing their hands after work. (Pradananingrum & Lestantyo, 2018).

The use of PPE is significantly associated with the incidence of contact dermatitis irritants among factory workers in Dadirejo village, Pati district. This is in line with a study by Chafidz and Dwiyantri (2018) entitled "Long-term contact relationships, types of work, and use of self-protection tools with contact dermatitis incidents in workers who know Kediri "where his research obtained a p-value of 0.000, or between the two variables, there is a relationship. The occurrence of dermatitis in factory workers know in Soreang district" conducted by Rais et al. (2022) with the results obtained p-value of 0,007 or means between the use of PPE and the occurrence of dermatitis in factories know developing a relationship (Rais et al., 2022). Primary stimulant chemicals (irritants) are included as the chemicals

that trigger irritant contact dermatitis. CaCl stones and acetic acid, or acid acetate, are chemicals that make it known that the average acid ratio is 90% (Megantari, 2020). Referring to the rules in the Ministry of Labour and Transmigration Regulations No. PER.13/MEN/X/2011 of 2011, the use of acetic acid has a threshold value of 25 mg/m³. Garmini (2014), in his research after the acid content of processing water was measured by titration, obtained acetic acid, which is 44.19 mg/L, therefore stated to have acid content exceeds the maximum level standard (Ginting, 2021). Skin irritation can be caused by physical or chemical substances as well as microtrauma (oklusi). The level of irritation concentration, exposure time, and frequency are factors that contribute to the severity of irritant contact dermatitis. Skin types like thick, thin, dry, or not play a role. Proinflammatory cytokines are released by keratinocytes, usually as a reaction to chemical stimuli, causing inflammation. The skin barrier becomes damaged as a result, and the cells of the epidermis change. Irritants can be classified as cumulatively toxic, subtoxic, degenerative, or toxic (Litchman et al., 2020). The contact dermatitis of natural workers is chronic and cumulative because the majority of the symptoms are on the hands and without the presence of self-protection gloves, so direct contact with acetic acid. Acetic acid itself is a type of weak acid, and the hands of workers are repeatedly exposed to acetate acid. Some of the symptoms are thick skin, scabies, dry skin, and erythema. This condition triggers damage to the stratum corneum, resulting in decoction and disappearing sawar function; therefore, damage to cells below it and keratinocyte damage are more likely to occur (Wijaya & Gilang, 2016).

Conclusion

A significant association of personal hygiene and use of self-protection equipment with contact dermatitis was found in factory workers in Dadirejo Village, Pati district.

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