

Conference Paper

Relationship Between Personal Protective Equipment Use and Contact Dermatitis in Palm Oil Pesticide Workers

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ORCID:Annes Waren: <https://orcid.org/0000-0001-8779-8788>**Abstract**

Contact dermatitis is the most common occupation-related dermatological disease. Skin contact with chemicals that are irritants or allergens continuously cause vulnerability in workers. Among the chemicals that can cause contact dermatitis are pesticides, which are often used in the community, particularly by palm oil plantation companies. The use of personal protective equipment (PPE) is one risk control for contact dermatitis. This study aimed to determine the relationship between PPE usage and contact dermatitis among palm oil plantation workers who dispense pesticides. Using a cross-sectional research design and a total sampling technique, the study analysed data on contact dermatitis obtained from workers' medical records and PPE usage through random observations for three days. The results showed that 62.2% of pesticide workers had experienced contact dermatitis within the past three months, and there was a significant relationship between insufficient PPE usage and contact dermatitis (p -value < 0.001). Therefore, the occurrence of contact dermatitis can be reduced by increasing PPE usage.

Keywords: contact dermatitis, pesticide, personal protective equipment, palm oil

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1. Introduction

Skin diseases are the second most prevalent occupational disorders in the European Union. Contact dermatitis accounts for 70 - 90% of all occupational skin diseases; a US-based study found that they comprise 80% of occupational skin diseases. Various factors can influence the occurrence of contact dermatitis, one of which is pesticides, which are chemicals that are often used in the community, particularly by palm oil mill companies [1, 2].

PPE can minimize the injuries or illnesses caused by contact with occupational hazards [3–5]. However, the extent to which PPE prevents contact dermatitis and other disorders is determined by the degree to which workers actually use them. The use of

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PPE is often associated with difficulties in working, reduced productivity, and discomfort among workers. Some workers have also claimed that PPE use causes illness [6].

The purpose of this study was to identify the prevalence of contact dermatitis among workers who regularly come into contact with palm oil pesticides and determine whether there was a relationship between the PPE usage and contact dermatitis among this population. A quantitative study with a cross-sectional design was conducted at the palm oil company PT ADEI Plantation and Industry, a company in Bengkalis Regency, Riau, Indonesia. Palm oil pesticide workers at PT ADEI work five hours per day and come into contact with several types of pesticides, namely the herbicide ammonium glufosinate, glyphosate isopropyl amine, methyl methylamine, and cypermethrin. These workers are given complete personal protective equipment (PPE), namely long clothes, aprons, gloves, boots, hat, goggles, and respiratory protection; however, a preliminary survey conducted at PT ADEI found that 60% of its workers have experienced contact dermatitis. The working hypothesis for this study was that there is a relationship between the behaviour of using or not using PPE and the incidence of contact dermatitis among workers who dispense oil palm pesticides.

2. Material and Method

The research was conducted in March 2020. A total sampling technique was used with inclusion criteria being all workers between ages 18–55 who sprayed palm oil pesticides at PT ADEI's Mandau 3 plantation and were willing to be respondents. The study population totalled 37 people.

The dependent variable was incidents of contact dermatitis based on data from workers medical records, and the independent variable was the behaviour of wearing PPE, which was assessed by observation for three days with a random time, categorized on a nominal scale, the classification of the use of PPE is complete (wore all of the PPE: long clothes, aprons, gloves, boots, hat, goggles and respiratory protection) and incomplete wearing PPE. Bivariate analysis with the chi-square one sample test was used to determine whether there was a relationship between the behaviour of using PPE and the incidence of contact dermatitis.

3. Results

Table 1 presents the demographic overview of the study population. Most were over 31 years of age and had an elementary school education, and all were female.

TABLE 1: Characteristics of research subjects (N = 37).

Variable	Category	n	Percentage (%)
Age group (yr)	21–30	5	13.6
	31–40	16	43.2
	41–50	16	43.2
Level of education	Elementary school	15	40.6
	Junior high school	14	37.8
	Senior high school	8	21.6
Gender	Female	37	100
	Male	0	0

Source: Author’s own work.

As can be seen in Figure 1, most (51.4%) participants did not completely wear PPE while working, and the majority (62.2%) had experienced contact dermatitis within the past three months.

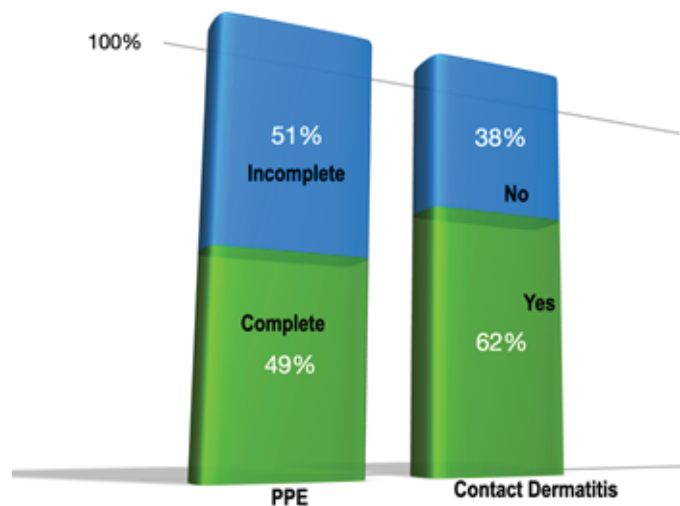


Figure 1: Distribution of personal protective equipment use and contact dermatitis incidence among palm oil pesticide worker. (Source: Author’s own work.)

The results of the Chi-square test showed a *p* value of 0.001; thus, it can be concluded that there is a significant relationship between the behaviour of wearing PPE and contact dermatitis. The results of the calculation of the prevalence ratio (PR) show that the incidence of contact dermatitis is 9.8, which means that not wearing PPE is a risk factor for contact dermatitis among workers providing oil palm pesticides at PT ADEI.

As shown in Table 2, among the 19 respondents who did not wear complete PPE, 17 stated that they had experienced contact dermatitis, whereas of the 18 participants who wore complete PPE, only six had experienced contact dermatitis.

TABLE 2: Results of the Chi-square test analysing links between PPE usage and contact dermatitis.

Personal protective equipment	Contact dermatitis		Total	P-value
	Yes	No		
Incomplete	17	2	19	0.001
Complete	6	12	18	
Total	23	14	37	

Source: Author's own work.

4. Discussion

Based on this research at PT ADEI Bengkalis Regency regarding the relationship between PPE usage and the incidence of contact dermatitis among workers dispensing palm oil pesticides, it can be concluded that: 1) the majority of participants had experienced contact dermatitis; 2) most of the workers did not wear complete PPE while working; and 3) there was a significant relationship between the behaviour of not using PPE and the incidence of contact dermatitis.

The finding that 62% of the participants had experienced contact dermatitis aligns with results of a previous study that found that among a total of 44 respondents studied 33 (75%) had experienced occupational dermatitis (25%) [7]. Similarly, Nuliyana and Maywati's study of Tasikmalaya garbage collectors showed that 18 of the 24 respondents who did not wear PPE gloves experienced skin diseases [8].

The majority of respondents experienced contact dermatitis due to incomplete and non-standard PPE use. A study conducted by Arifin and Susanto found that compliance with the use of PPE had a significant relationship with the availability, comfort, and supervision of such equipment [9]. This finding suggests that incomplete compliance with wearing PPE is often caused by workers' discomfort rather than lack of knowledge regarding its benefits.

The results of the chi-square one sample test showed that there was a significant relationship between not using or improper use of PPE and contact dermatitis among workers dispensing palm oil pesticides at PT ADEI. This result aligns with that of a study conducted by Muhamadiyah, who found a significant relationship ($p = 0.021$) between insufficient use of PPE and the incidence of contact dermatitis among palm oil plantation workers in Belutu Village, Kandis Subdistrict in 2016 [10]. Similarly, Mustikawati et al. found a significant correlation ($p = .000$) between the use of PPE and complaints of skin disorders among scavengers in Tempat Pembuangan Akhir (TPA) Kedaug Wetan

Tangerang [11], and Hartanto reported a significant relationship between the use of PPE and dermatosis ($p = .000$) among household waste collectors in Magelang City [12].

5. Conclusion

In order to reduce the prevalence of skin disorders among its workers, it is recommended that PT ADEI use safer pesticides, provide appropriate and comfortable PPE to workers, and educate workers about their risk of experiencing contact dermatitis and the importance of wearing complete PPE during work. Such education can include the installation of posters and banners in offices and other places at the plantations. In addition, the company should reinforce policies regarding compliance with the use of complete PPE. Knowledge of the benefits of PPE and supporting actions will have a direct effect on real behaviour in reducing the prevalence of occupational accidents and diseases that can be caused by pesticides.

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Conflict of Interest

There was no conflict of interest statements.

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