A Study on Determinants of Irritant Contact Dermatitis in the Workers of a Slaughterhouse on Jalan Abu Bakar Lambogo, Makassar

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Abstract

Contact dermatitis, in general, is a non-infection inflammatory condition because the skin has contact with both chemical and biological compounds. The aims of this study is to analyze determinants of irritant contact dermatitis in the workers of a slaughterhouse. This study was analytical observation using a cross-sectional approach. The population of this study was 93 workers of a broiler chicken slaughterhouse located on Jalan Abu Bakar Lambogo, Makassar. Data collection was by performing a direct observation and interview to the skin condition of the workers' hands who were suffering from the symptoms of irritant contact dermatitis, such as skin rash, dry skin, itchy and painful skin, swollen skin, and chapped, and observing the work process of chicken slaughtering. Data were analyzed using multiple logistic regression analysis. The result of this study shows that the use of PPE, personal hygiene, length of employment, personal history of diseases of the skin, and duration of contact are significantly correlated with ($p < 0.05$) the incidence of irritant contact dermatitis symptoms. Based on the result of the multiple logistic regression analysis, personal hygiene ($p = 0.003$) and duration of contact ($p = 0.004$) are the main determinants of irritant contact dermatitis symptoms in the workers of the broiler chicken slaughterhouse. It can be concluded that the personal hygiene and duration of contact are the main determinants of irritant contact dermatitis symptoms in the workers of the broiler chicken slaughterhouse.

Keywords: *irritant contact dermatitis, personal hygiene, duration of contact*

Introduction

Work-related diseases still become a health issue as a concern for stakeholders, the government, and entrepreneurs. Occupational diseases are the disease caused by an occupation and work environment. In Asia, work-related dermatitis contributes highly and significantly to occupational diseases felt by the majority of the workers in the formal and informal sectors[(1)]

Occupational skin disease with the highest proportion felt by people is contact dermatitis (92.5%), around 5.4% is caused by skin infection and 2.1% is caused by other factors. Globally, in more

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than two decades, the incidence rate of occupational dermatitis reaches around 1.3 to 8.1 per worker annually[2] Occupational contact dermatitis is a skin disease caused by work that is widely found in worker populations with a prevalence of 70 – 90 %[3]

Contact dermatitis, in general, is a non-infection inflammatory condition because the skin has contact with both chemical and biological compounds. Contact dermatitis is divided into two types. First, irritant contact dermatitis is a non-immunological response to substances or factors that worsen the condition, such as damp workplace, soap, or liquid triggering a hot condition in the skin. Second, allergic contact dermatitis is caused by specific immunological mechanisms[4]

The prevalence of dermatitis in Indonesia is 6.78%. An epidemiological study in Indonesia shows that 97% out of 339 cases is contact dermatitis, whereby 66.3% of them is irritant contact dermatitis([5]. A study conducted by Fath on the workers of a poultry slaughterhouse showed that contact dermatitis happened due to several factors, such as length of employment, personal hygiene, the use of personal protective equipment (PPE), and water contact[6]. Meanwhile, the result of a study conducted by Marwah on daily freelance workers at PT. Indojaya Agrinusa, Medan, showed a significant relationship between the length of employment (p=0.003), personal history of diseases of the skin (p=0.0001), and the use of PPE (p=0.033) against the symptoms of contact dermatitis[7]

One of the industries having a risk of contact dermatitis symptoms is a poultry slaughterhouse. The broiler chicken slaughterhouse industry located on *Jalan Abu Bakar Lambogo*, Makassar, is one of the traditional slaughtering areas (home industry). The flow of a simple work process starting from weighing to non-hygiene slaughtering has a risk of emerging irritant contact dermatitis in workers. The preliminary study showed that the majority of workers complained about feeling itchy and hot, especially in the space between fingers while working. Therefore, a study on determinants of contact dermatitis symptoms in the workers of a broiler chicken slaughterhouse located on *Jalan Abu Bakar Lambogo*, Makassar, needs to be conducted. The specific objective of this study was to know the relationship between the use of Personal Protective Equipment (PPE), personal hygiene, length of employment, personal history of diseases of the skin, and duration of contact with contact dermatitis symptoms in the workers of the broiler chicken slaughterhouse and to know the main determinants of irritant contact dermatitis symptoms in the workers of the broiler chicken slaughterhouse.

Material and Methods

This study was an analytical observation using a cross-sectional approach in 93 workers of a broiler chicken slaughterhouse located on Jalan Abu Bakar Lambogo, Makassar. It was analyzed from the dependent variable, namely the symptoms of irritant contact dermatitis, and the independent variables in the form of the use of personal protective equipment (PPE), personal hygiene, length of employment, personal history of diseases of the skin, and duration of contact. This study was conducted from July to September 2021.

Data collection was by performing a direct observation to the skin condition of the workers' hands who were suffering from the symptoms of irritant contact dermatitis, such as skin rash, dry skin, itchy and painful skin, swollen skin, and chapped, and observing the work process of chicken slaughtering. In addition, an interview with the workers was done according to the questions provided in the questionnaire. The questionnaire contained several questions related to research variables, namely the questions related to the symptoms of irritant contact dermatitis, length of employment, personal history

of diseases of the skin, personal hygiene, duration of contact, and the use of personal protective equipment (PPE). To analyze the most influential variable as a determinant, multiple logistic regression analysis was used, whereby a p-value of less than 0.05 was considered as the most influential and significant variable statistically.

Findings

Table 1 The Relationship between Research Variables and the Symptoms of Irritant Contact Dermatitis in the Workers of a Broiler Chicken Slaughterhouse on *Jalan Abu Bakar Lambogo*, Makassar

Variable	Total (93)	%	Sig
The Use of PPE			
Poor	87	93.5	0.018
Good	6	6.5	
Personal Hygiene			
Poor	62	66.7	0.000
Good	31	33.3	
Length of Employment (years)			
≥ 3	39	41.9	0.023
< 3	54	58.1	
Personal History of Diseases of the Skin			
Yes	24	25.8	0.019
No	69	74.2	
Duration of Contact (hours/day)			
≥ 8	82	88.2	0.000
< 8	11	11.8	
The symptoms of Irritant Contact Dermatitis			
Experiencing	73	78.5	
Not Experiencing	20	21.5	

The result of this study can be seen in table 1. Table 1 shows that 73 respondents have the symptoms of irritant contact dermatitis (78.5%). The use of PPE in the respondents is mostly poor APD of 87 respondents (93.5%), and 62 respondents (66.7%) have poor personal hygiene. The majority of the respondents' length of employment is less than 3 years with a total number of 54 respondents (58.1%). Most of the respondents do not have a personal history of diseases of the skin (74.2%), and 82 respondents (88.2%) have a duration of contact greater than or equal to 8 hours.

Table 2. The Symptoms of Irritant Contact Dermatitis Perceived by the Workers of A Broiler Chicken Slaughterhouse on Jalan Abu Bakar Lambogo, Makassar

No	Symptoms	n	%
1	Skin Rash	60	27.8
2	Dry Skin	23	10.7
3	Itchy and painful skin	72	33.3
4	Swollen Skin	18	8.3
5	Chapped Skin	43	19.9

The symptoms of irritant contact dermatitis was statistically and significantly correlated with the use of PPE (p = 0.018), personal hygiene (p = 0.000), length of employment (p = 0.023), personal history of diseases of the skin (p = 0.019), and duration of contact (p = 0.000) (See Table 1). Meanwhile, the symptoms of dermatitis mostly experienced by the workers were itchy and painful skin (33.3%), skin rash (2.8%), chapped skin (19.9%), dry skin (10.7%), and swollen skin (8.3%). (See Table 2).

Table 3. The Result of the Multiple Logistic Regression Analysis

Variable	B	Wald	Df	Sig
The use of PPE	2.731	1.274	1	0.032
Personal Hygiene	2.576	0.856	1	0.003
Length of Employment	-1.179	0.739	1	0.110
Personal History of Diseases of The Skin	1.950	1.363	1	0.152
Duration of Contact	3.91	1. 357	1	0.003
Constant	-14.261	10.546	1	0.001
Nagelkerke R Square = 0.590 Hosmer-Lemeshow goodness of fit test = 0.605 Overall percentage = 0.785				

Based on the result in Table 3, it can be seen that the Nagelkerke R Square value is 0.590, indicating that the ability of independent variables to explain the dependent variables is 0.590 or 59%, whereby 41% of them is the factor outside the equation model explaining the dependent variables. The Hosmer-Lemeshow goodness of fit test (GoF) value of 0.605 (p > 0.05) indicates that the equation model that has been performed is correct since there is no significant difference between the models and the observation value. The overall percentage of 0.785 indicates that the accuracy value of this research model is 78.5%.

Based on the multiple logistic regression analysis, three variables had a significant impact, namely personal hygiene, duration of contact, and the use of PPE. The contribution value of each independent variable can be seen from the B value. The values are as follows: personal hygiene of 2.576, duration

of contact of 3.92, and the use of PPE of 2.731 (See Table 3). From the result, it can be inferred that the variables with the highest contribution are the duration of contact, personal hygiene, and the use of PPE. The following is the regression equation model that can be calculated.

"The symptoms of irritant contact dermatitis = 14.261+2.576 x personal hygiene + 3.92 x duration of contact + 2.731 x the use of PPE"

Discussion

The result of the study showed that 73 respondents (78.5%) suffered from irritant contact dermatitis and the symptoms frequently felt by the respondents were itchy and painful skin and skin rash on their hands. The industries with a high risk of being exposed to this disease are industries in the manufacturing sector, food production, construction and machine tool operations, printing, leather craftsmen, and agriculture. The workers in the informal sector, such as a chicken slaughterhouse, are prone to the symptoms of irritant contact dermatitis, whereby the production process has some dangers in the form of chemical exposure, such as chlorine, and biological exposure in the form of bacteria in a chicken carcass, namely *Staphylococcus* and *Salmonella sp.* The sources of bacterial contamination in chicken carcasses encompass feces, water, feathers, digestive system, workers, and equipment used for slaughtering. The stages of the process, such as scalding, chicken feather removal, evisceration, and cleaning, have a significant impact on bacterial contamination.

In this study, personal hygiene had a significant impact on the symptoms of irritant contact dermatitis. The workers' behavior of the chicken slaughterhouse that became the factor causing the symptoms of irritant contact dermatitis was not washing hands using flowing water and soap; instead, they only washed their hands using water in the provided tub or container. Therefore, the bacteria in the container of dirty water penetrate the workers' skin and cause the symptoms of irritant contact dermatitis. Proper and correct hand-washing is performed by using soap since using only water is proven ineffective [8]. The result of this study is in line with a study conducted by Callahan et al. that hand-washing behavior (≥ 10 times a day) is correlated with irritant contact dermatitis affecting the hands [9].

The duration of contact statistically and significantly influenced the symptoms of irritant contact dermatitis. The result of the observation toward some workers with the symptoms of irritant contact dermatitis showed that it was caused by having direct contact with irritant substances and most workers had direct contact with irritant substances for around ≥ 8 hours/day resulting in inflammation to the skin and the workers suffered from irritant contact dermatitis. A study conducted by Behroozy & Keefel stated that working in a damp/wet workplace (dipping hands in the water) for around > 2 hours per work hour is the main risk factor of suffering irritant contact dermatitis that affected the hands [2]. The workers with a duration of contact of ≥ 8 hours were potentially infected with irritant contact dermatitis due to the exposure of irritant substances that continuously come into direct contact with the workers' skin causing inflammation and stimulating action in the skin making the workers' hands feel itchy, skin rash, thickening of the skin, swollen skin, and blisters or vesicles (small bumps filled with clear liquid) on the skin; all of them are the symptoms of irritant contact dermatitis.

The result of this study showed a significant impact of the use of PPE on the symptoms of irritant contact dermatitis. Based on the observation, the majority of the workers did not use the PPE in the form of a pair of rubber gloves. This happened due to several reasons. Based on the result of the direct interview with the respondents, the first reason was

that the respondents did not feel comfortable when wearing PPE while slaughtering chickens. They felt bothered if something was obstructing their hands during the process of slaughtering poultries. The second reason was that their actions were limited and they could not move freely when performing the job. The result of this study is in line with a study conducted by Birawida et al. that the use of PPE is significantly correlated with the incidence of contact dermatitis symptoms in fishermen in Spermonde Island, Makassar [10]

The multivariate analysis in the multiple logistic regression test showed a result that personal hygiene and duration of contact became the highest determinant variable for the symptoms of irritant contact dermatitis in the workers of a chicken slaughterhouse on *Jalan Abu Bakar Lambogo*. This result is in line with a study conducted by Iwan et al. that personal hygiene and duration of contact are the most influential variable with a significant impact on the incidence of irritant contact dermatitis caused by a job in ship workers in Samarinda, Indonesia[11]

The result of this study shows that the use of PPE, personal hygiene, length of employment, personal history of diseases of the skin, and duration of contact are significantly correlated with the incidence of irritant contact dermatitis symptoms. Based on the result of the multiple logistic regression analysis, personal hygiene and duration of contact are the main determinants of irritant contact dermatitis symptoms in the workers of the broiler chicken slaughterhouse located on Jalan Abu Bakar Lambogo, Makassar. The workers are expected to always apply good personal hygiene, especially when they have had contact with irritant substances for a long term. Moreover, the owner of a chicken slaughterhouse business is expected to provide complete PPE and supervises the use of PPE by the workers while performing their job.

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