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The Relationship of Individual Characteristics and Farm Biosecurity Implementation with The Incident of Contact Dermatitis

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A B S T R A C T

Poultry workers risk contracting diseases due to physical or biological exposure. One such disease is contact dermatitis. This study aims to analyze the individual and the application of livestock biosecurity that can be associated with cases of contact dermatitis in cage workers. This study a descriptive-quantitative that uses a cross-sectional approach. The research was conducted at PT. X in June 2022. The sample of this study was 43 people who were taken through simple random sampling. Data was collected using questionnaires, interviews, and observations. The results were then tested using Chi-Square and Odds Ratio (OR) with a Confidence Level of 95%. The study showed that two variables were associated with contact dermatitis, namely cage ventilation (OR= 5.45; 95% CI: 1.21 - 24.43; P=0,020) and frequency of hand washing (OR= 2.70; 95% CI: 2.57 - 282.99; P=0,001). Meanwhile, variables that were not significantly related were age (P=0.306), gender (P=0.206), length of work (p=0.698), floor (P=1.000), and PPE usage (P=0.245). Poor environmental quality and personal hygiene practices could affect contact dermatitis in workers. Therefore, efforts are needed, such as occupational safety and health education for workers, routine health checks, and environmental inspections at PT. X.

Pekerja unggas berisiko tertular penyakit akibat paparan fisik maupun biologis, salah satunya adalah dermatitis kontak. Penelitian bertujuan menganalisis faktor individu dan penerapan biosekuriti ternak dengan kasus dermatitis kontak pada pekerja kandang. Penelitian ini bersifat deskriptif-kuantitatif dengan pendekatan cross-sectional. Penelitian dilakukan di PT. X pada bulan Juni 2022. Sampel penelitian ini sebanyak 43 orang yang diambil melalui simple random sampling. Pengumpulan data dilakukan dengan menggunakan kuesioner, wawancara, dan observasi. Keseluruhan data kemudian diuji menggunakan dengan Chi-Square dan Odds Ratio (OR) dengan tingkat Kepercayaan 95%. Penelitian menunjukkan bahwa terdapat dua variabel yang berhubungan dengan dermatitis kontak yaitu ventilasi kandang (OR= 5,45; 95% CI: 1,21 - 24,43; P=0,020) dan frekuensi cuci tangan (OR= 2,70; 95% CI: 2,57 - 282,99; P=0,001). Sedangkan variabel yang tidak berhubungan secara signifikan yaitu usia (P=0,306), jenis kelamin (P=0,206), lama bekerja (p=0,698), lantai (P=1,000), dan penggunaan APD (P=0,245). Kualitas lingkungan dan praktik higiene perorangan yang buruk dapat mempengaruhi dermatitis kontak pada pekerja. Oleh karena itu, diperlukan upaya seperti penyuluhan keselamatan dan kesehatan kerja bagi pekerja, pemeriksaan kesehatan rutin, dan inspeksi lingkungan di PT. X.

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1. Introduction

Skin diseases are one of the most common diseases experienced by workers. According to the survey, skin diseases contribute 1.79% of Global Burden Diseases (GBD) measured through years of life adjusted to disability (DALY). Approximately 15% of the adult general population suffers from contact dermatitis, a common skin disease (Svensson et al., 2018). In Indonesia, dermatitis has a 6.78% known prevalence (Rinawati & Wulandari, 2020). Dermatitis can occur in workers in various industries, such as health care, agriculture, mining, convection, and farming. Contact with disease-causing substances, such as dust, chemical solvents, disinfectants, and physical hazards, like scratches, pressures, and high temperatures, usually lead to dermatitis. Farmers work in a wide range of jobs and are exposed to various chemical, biological, and physical hazards. They also clean and repair farm equipment and frequently contact livestock. Veterinary medications, feed additives, and pesticides are some chemicals they are exposed to (Chu, Marks, & Flamm, 2020).

According to a study of workers working in the shoe sewing department of a shoe factory in West Java, skin diseases are the most common and account for 57% of all cases. Most (52%) are contact dermatitis (Hendra, Nirwana, & Isahak, 2018). An additional study found that 62.9% of workers at the chicken farms of merchants in North Sumatra suffered from dermatitis. The study found that the personal hygiene of workers who have worked for more than a year is a risk factor (Sirait & Sinaga, 2020). By 2021, dermatitis, one of the ten most common skin diseases in the Pasuruan district, reached 6% of the total cases (Dinkes Kabupaten Pasuruan, 2022).

One skin disease is dermatitis, which can be acute, subacute, or chronic. Various types of dermatitis are triggered by internal and external factors (Rahmatika, Saftarina, Anggraini, & Mayasari, 2020). Some external factors that can cause dermatitis, especially in workers, are workplace sanitation and staff hygiene (Baruffi et al., 2020). Implementing biosafety is one way to prevent dermatitis. It is an attempt, regulation, policy, and action to prevent the entry of disease-causing agents. It can be applied in a variety of industries, especially farms. Government Regulation No. 47 of 2014 on the Control of Animal Diseases in Indonesia regulates the use of biosecurity to protect humans, animals, and environmental aspects of life from animal disease agents. Self-protection for humans, use of self-protective equipment, cleaning, washing, and disinfection of equipment, machinery, cages, and buildings, isolation of infected animals, and surveillance of people, animals, other animal disease carriers, and non-food animal products that are at risk of spreading disease to animals and the environment, feed and feed materials in farms or other farming enterprises are some of the ways biosecurity can be done (Peraturan Pemerintah, 2014). Biosecurity is used to prevent and control diseases, maintain a safe environment for chickens and workers, and provide safe food assurances for consumers. Its components include isolation, traffic control, staff sanitation, and cage sanitation (D. Indrawan, Cahyadi, Daryanto, & Hogeveen, 2020).

Preliminary surveys show that the Chicken Farm PT. X moves to a chicken farm. Workers are exposed to poultry feathers, feed, cage disinfectant solutions, and daily dirt that sticks to their hands, bodies, and clothes. Besides, there is a possibility that the worker will be stabbed by a chicken or scratched into a cage chain. Besides, the cage environment tends to be high-temperature but humid. Workers risk developing dermatitis due to some of the above factors. Contact dermatitis is the most common. Employee reported that they frequently experienced itchiness, skin redness, heat, and discomfort in their hands and feet while working, which served as evidence to implement this research. Because they rarely wore PPE like gloves or boots to work, employees were at risk for contact dermatitis at the time of observation. Furthermore, the worker has never had a regular physical examination. The study aims to analyze individual characteristics and biosafety applications with contact dermatitis.

2. Methods

The study employed a cross-sectional design and a quantitative descriptive technique to ascertain the association between worker cases of contact dermatitis and individual factors related to livestock biosafety. This study focuses on all employees who work in the adult chicken layer.

Using a simple random sampling technique, 43 samples were collected, and their values were computed using the Lemeshow formula. Research on PT. X chicken farm in Tutur, Pasuruan district, began in June 2022.

The information collected for this study covers individual factors, including the respondent's age, gender, years of work, cage ventilation, cage floor, PPE usage, and hand-washing habits in Chicken Farms PT. X, and frequency of contact dermatitis. A doctor's diagnosis then established the case of contact dermatitis. Then, univariate and bivariate analysis were performed on the data using IBM SPSS Statistics Ver 21 software. On the other hand, a 95% confidence level Chi-square analysis is used to assess a correlation between the independent and dependent variables. Odds Ratio (OR) and 95% Confidence Interval (CI) were applied to assess the risk of exposure to contact dermatitis. This research has passed the ethical clearance by the Health Research Ethics Committee, Faculty of Public Health, Airlangga University (Ethical Approval No: 57/EA/KEPK/2022).

3. Results

The chicken farms of PT. X are in Dusun Bandut, Ngembal Village, Tutur Prefecture, Pasuruan District. PT. X was founded in 2009 and now has 6,000 DOCs and 45,000 layer chickens. PT.X has a strategic location because of its proximity to the main highway and moves in the production and development of chickens (Kementerian Pertanian RI, 2020). The chickens are placed in two DOC cages and four-layer cages. Cases of contact dermatitis in respondents were determined through a doctor's diagnosis. Based on the anamnesis results (Table 1), 72.1% of respondents did not suffer from contact dermatitis, while 27.9% of workers were diagnosed with contact dermatitis.

Table 2 shows that respondents' ages ranged from 19 to 35 (39.54%) and between 36 and 64 (60.46%). These findings were then examined to see if there was a relationship between age and the incidence of contact dermatitis. The statistical analysis results did not show a significant relationship between age and cases of contact dermatitis (P= 0.306).

There were 22 (51.2%) male respondents and 21 (48.8%) female respondents. The statistical analysis results did not show a significant relationship between gender and cases of dermatitis (P= 0.206). A total of 11 (25.6%) respondents had worked for less than six years, and 32 respondents (74.4%) had worked for more than six years. The statistical analysis results also showed no significant relationship between years of work and cases of dermatitis (P= 0.698).

Table 1. Univariate

Variables	n (%)
Contact Dermatitis	
Yes	12 (27.9)
No	31 (72.1)
Age	
>35 years	26 (60.46)
≤35 years	17 (39.54)
Sex	
Female	21 (48.8)
Male	22 (51.2)
Years of Work	
≥6 years	32 (74.4)
<6 years	11 (25.6)
Cage' ventilation	
Good	23 (53.5)
Poor	20 (46.5)
Cage'floor	
Poor	14 (32.6)
Good	29 (67.4)
PPE Usage	
Not appropriate	19 (44.2)
Appropriate	24 (55.8)
Handwashing	
Never	6 (13.9)
Seldom	5 (11.6)
Always	32 (74.5)

23 (53.49%) respondents worked in cages with good ventilation. Meanwhile, 20 (48.84%) respondents worked in cages with limited ventilation. The statistical analysis showed a significant relationship between cage ventilation and the incidence of contact dermatitis (P= 0.020). Respondents who worked in rooms with limited ventilation were 5.45 times more likely to get contact dermatitis than those with good ventilation (OR= 5.45; 95% CI: 1.21 - 24.43).

29 (67.4%) people worked in cages with good floor conditions. Meanwhile, 14 (32.6%) respondents worked in cages with dirty floors. The statistical analysis did not show a significant

relationship between cage floors and the incidence of contact dermatitis (P= 1.000).

It is known that 24 (55.8%) respondents have used PPE effectively, while 19 (44.2%) others still use PPE ineffectively. The statistical analysis did not show a significant relationship between the use of PPE and contact dermatitis P= 0.245).

As many as 74.5% of respondents always wash their hands with soap during and after work, 13.9% never wash their hands during and after work, followed by 11.6% of respondents who rarely wash their hands. The statistical analysis showed a significant relationship between the frequency of washing hands after work and cases of contact dermatitis (P= 0.001). Respondents who never wash their hands are 2.70 times more likely to get contact dermatitis than those who always wash their hands (OR= 2.70; 95% CI: 2.57 - 282.99).

Table 2. Bivariate Analysis

`Variables	Contact Dermatitis		P-value	OR (95% CI)
	Yes n (%)	No n (%)		
Age				
>35 years	9 (34.7)	17 (65.3)	0.306	2.47 (0.56 – 10.91)
≤35 years	3 (17.7)	14 (82.3)		1
Sex				
Female	8 (36.4)	14 (63.6)	0.206	2.43 (0.60 – 9.78)
Male	4 (19.1)	17 (80.9)		1
Years of Work				
≥6 years	10 (31.2)	22 (68.8)	0.698	2.04 (0.37 – 11.25)
<6 years	2 (18.8)	9 (81.2)		1
Cage' ventilation				
Poor	9 (45.0)	11 (55.0)	0.020	5.45 (1.21 – 24.43)
Good	3 (13.3)	20 (86.7)		1
Cage' floor				
Poor	4 (28.6)	10 (71.4)	1.000	1.05 (0.25 – 4.33)
Good	8 (27.6)	21 (72.4)		1
PPG Usage				
Poor	7 (36.8)	12 (63.2)	0.245	2.21 (0.57 – 8.50)
Good	5 (20.8)	19 (79.2)		1
Washing hands				
Never	5 (83.3)	1 (16.7)	0.001	2.70 (2.57 – 282.99)
Seldom	2 (40.0)	3 (60.0)		3.60 (0.47 – 27.35)
Always	5 (15.6)	27 (84.4)		1

4. Discussion

At PT. X, most employees are under or equal to 35 years old. This study demonstrates no connection between the age of employees and contact dermatitis instances. Similar to Karnefi et al. (2022) in Musi Rawas also reported no relationship between age and the incidence of contact dermatitis experienced by workers (P= 0.481). In contrast to Yuliana et al. (2021) in Bogor, age was related to contact dermatitis (P= 0.038).

All ages, from toddlers to the elderly, are susceptible to contact dermatitis. Children typically get contact dermatitis from allergies, which is uncommonly identified (Neale, Garza-Mayers, Tam, & Yu, 2021). People older than 18 to 35 may be more sensitive to bee venom, which causes contact dermatitis (Scheinman et al., 2021). The fatty layer beneath the skin thins with age, resulting in dry, irritated skin and contact dermatitis (Martin, Rustemeyer, & Thyssen, 2018).

There is nearly equal representation of men and women among the PT. X workforce. The study found no statistically significant relationship (P= 0.206) between gender and contact dermatitis. The outcomes agree with the investigations conducted by Gafur and Syam (2018). It has a p-value of 1.000

and indicates no significant correlation between contact dermatitis and gender in Makassar City's Rappokaling District. Chen et al.'s (2017) investigation yielded similar outcomes and reported no relation between gender and the frequency of contact dermatitis in Chinese textile workers (P= 0.583).

Women are known to be more prone to contact dermatitis due to their frequent exposure to allergens and irritants from daily activities such as cosmetics and cleaning products. Sedó-Meja et al. (2020) elaborated on this viewpoint in their retrospective research of the sociodemographic conditions and clinical symptoms of contact dermatitis patients treated at the San Juan De Dios Regional Hospital. However, it was noted in this study that the high frequency of dermatitis cases in women was attributed to women paying more attention to medical issues and health control than males. This caused women to visit doctors more frequently to check on their health.

According to the findings, there is no significant link (P= 0.698) between the length of work and the occurrence of contact dermatitis in workers. These findings are consistent with research conducted on furniture workers at PT. X Jepara Regency. According to this study, workers with less than or equal to two years of experience, considered insufficient, had no significant link with the incidence of dermatitis (P= 0.182) (Putri, Suwondo, & Widjasena, 2016). Indrawan et al. (2014) discovered a similar result: there was no significant link (P= 1.000) between work length and the incidence of dermatitis in premix workers at PT. X Cirebon.

However, tofu plant workers in the Citeureup district of Bogor Regency had different outcomes. According to this study, there is a link (P= 0.041) between work duration and the incidence of contact dermatitis with work durations of < 6 years and ≥ six years (Eka Yuliana et al., 2021). Hendra et al. (2018) discovered other significant findings on shoe industry workers in West Java. According to this study, having more than three years of work experience is a protective factor, with a 0.422 times reduced chance of acquiring dermatitis compared to those with fewer than three years of experience.

Air circulation in the cage can also be improved with proper cage ventilation. This will lessen the health hazards associated with high temperatures and humidity. Aside from that, feed dust can be cycled by proper ventilation. According to the findings, there is a significant (P= 0.02) association between cage ventilation and the occurrence of contact dermatitis. Respondents who worked in rooms with limited ventilation were 5.45 times more likely to get contact dermatitis than those with good ventilation (OR= 5.45; 95% CI: 1.21 - 24.43). Pefbrianti et al.'s (2022) study yielded similar results, suggesting that the ventilation area is one of the elements that must be considered in contact dermatitis (P= 0.015). The same study found that workplace temperature substantially affected the incidence of contact dermatitis in tofu plant workers in Central Java. This study also found that humidity has no significant link with the occurrence of contact dermatitis (Megantari, 2020).

Maximum air exchange can be supported by adequate ventilation. An unstable air temperature can cause contact dermatitis. Cold temperatures have the potential to cause frostbite and irreversible blood vessel damage. Meanwhile, warmer temperatures can weaken the skin's outer layer and create heat rashes (Megantari, 2020). The ventilation circumstances in PT. X is entirely closed by wire. However, the ventilation hygiene is poor due to cobwebs in the ceilings and ventilation. Furthermore, the direction of ventilation at the PT.X Chicken Farm has been turned from west to east, reducing direct sunlight.

According to the findings, there is no significant association between the state of the cage floor and the occurrence of contact dermatitis in PT. X employees. According to interviews and observations, most respondents wore sandals to work. As a result, it is critical to maintain the cleanliness of the cage floor so that it does not pose health problems for workers. Non-waterproof floors will allow the cage to grow damp, perhaps becoming a breeding ground for germs or other allergens (Mappanganro, Syam, & Ali, 2018). According to observations, the P.T. X Chicken Farm's cage floor is mainly clean, and the chicken feed seeds have been cleared. Because of the cage design that overlooks the stage house, the cage floor in PT.X is composed of wood and is not directly in contact with the ground. This can prevent water from pooling on the cage floor during the rainy season.

PPE is an effective tool for protecting workers from hazards encountered while at work. This study exposed respondents to risks such as feed dust, wastewater, vaccination fluid, and chicken droppings. Masks, gloves, and boots are examples of PPE often used in the livestock business. According to PT research, masks and gloves are the most regularly utilized PPE by responders. Meanwhile, boots are the least commonly utilized PPE among respondents.

The relationship test results revealed no association between the use of PPE and the incidence of contact dermatitis in PT. X employees. These findings are consistent with the findings of Indrawan et al. (2014) on premix workers at PT. X Cirebon who said that the usage of PPE was not a role in the prevalence of contact dermatitis. PT workers. X Cirebon revealed that he did not utilize PPE since he was uncomfortable doing his job. This is almost the same rationale as research respondents at PT. X who never or rarely utilizes PPE such as masks and gloves. They become overheated and sweat quickly when wearing PPE. Meanwhile, workers choose sandals over boots for footwear because they believe it is more flexible. Based on this, there is a need for worker education regarding occupational safety and health because it has never been held at PT. X.

According to Yuliana et al. (2021) research, there was a significant link (P= 0.000) between the use of PPE and subjective complaints of contact dermatitis in tofu factory workers in the Citeureup district of Bogor. Other findings indicate a link between the use of PPE and the incidence of contact dermatitis, particularly among rubber plantation workers. According to this study, workers who do not wear PPE correctly had a 6.2 times greater risk of acquiring dermatitis than workers who do wear PPE properly (Listiono, Romadhon, & Aisyah, 2022).

Workers currently using PPE appropriately may nevertheless develop contact dermatitis owing to various other circumstances. These include factors such as the use of improper gloves, a lack of worker care, or the PPE being cracked or no longer fit for use.

One of the variables related to contact dermatitis is the habit of washing hands with soap (CTPS). According to the findings of interviews and observations at the site, most personnel perform CTPS only while bathing at rest. Meanwhile, when personnel conclude their work, they wait to implement CTPS.

Similar to Aeni et al. (2020) on fishermen in Cirebon Regency. Aeni said that personal hygiene habits, including washing hands, had a significant relationship with the incidence of contact dermatitis in fishermen (P= 0.045). Respondents who never wash their hands are 2.70 times more likely to get contact dermatitis than those who always wash their hands (OR= 2.70; 95% CI: 2.57 - 282.99). Meanwhile, workers who rarely wash their hands are 3.60 times more likely to get contact dermatitis than those who always wash their hands (OR= 3.60; 95% CI: 0.47 - 27.35).

Fithri et al. (2019). This study discovered a link between hand washing behaviors and the occurrence of contact dermatitis among cleaning service workers in North Jakarta. Workers who do not wash their hands had a 3.12 times higher risk than workers who washed their hands.

The habit of washing hands can help reduce exposure to chemicals, contamination, and allergens on the skin. Hand washing correctly and adequately can prevent contact dermatitis by removing chemicals that stick to the worker's skin (Rinawati & Wulandari, 2020).

5. Conclusion

This study concluded that poor ventilation in farms and personal hygiene practices, especially handwashing habits, could affect contact dermatitis in workers. Meanwhile, age, sex, years of work, cage floor, and PPE usage have no significant effect on contact dermatitis. Therefore, efforts are needed, such as education on occupational safety and health for workers, routine health checks, and environmental inspections at PT. X.

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