



Factors associated with the Incidence of Occupational Contact Dermatitis of the Hands among Cleaning Service Workers

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ABSTRACT

Background: Occupational contact dermatitis (OCD) is one of the most common occupational diseases worldwide. Occupational diseases in hospitals can affect all workers, including both medical and non-medical personnel, such as cleaning service workers. **Purpose:** This study aims to determine the factors associated with the incidence of OCD of the hands among cleaning service workers at Dr. M. Djamil Central General Hospital Padang. **Methods:** This study is an observational analytic study with a cross-sectional design. The sampling technique used was consecutive sampling with 77 total samples. The data were collected by direct interview with a questionnaire instrument. Data analysis used univariate and bivariate analysis with a chi-square test. **Result:** The results revealed that 28 out of 77 respondents experienced OCD (36.4%). The results of the chi-square test show that the factors of gender ($p=0.000$) and the use of moisturizers ($p=0.017$) had a significant relationship with the incidence of OCD. Meanwhile, the factors of age ($p=0.725$), working period ($p=0.492$), duration of contact ($p=0.862$), history of skin diseases ($p=0.176$), history of atopy ($p=0.421$), duration of PPE use ($p=0.119$) did not have a significant relationship with the incidence of OCD. **Conclusion:** The study concludes that the incidence of OCD of the hands among cleaning service workers at Dr. M. Djamil Central General Hospital Padang is correlated with their gender and their use of moisturizers.

Keywords: cleaning service, contact dermatitis, occupational contact dermatitis, risk factors.

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BACKGROUND

Workers are always at risk of occupational diseases in various sectors of work. Promotive and preventive efforts need to be developed and improved to reduce the risk of occupational or environmental diseases. These risks vary from the mildest to the most severe, depending on the type of work. One of the most common occupational diseases is occupational contact dermatitis (OCD).¹

The definition of OCD is a skin disease that results from contact with exogenous substances at work,

which then triggers an allergic or irritant reaction.² OCD typically affects the hands, but it can also affect other parts of the body due to the hand's frequent exposure to irritants and allergens. Hand dermatitis accounts for about 80-90% of all OCD incidents.³

Epidemiological studies conducted in Indonesia revealed that contact dermatitis accounted for 97% of 389 cases of occupational skin diseases, with 66.3% being irritant contact dermatitis and 33.7% being allergic contact dermatitis.⁴

OCD can also occur in hospital personnel and affect all members of the team, including medical and non-medical personnel, such as cleaning service workers. Contact dermatitis impairs the effective performance of workers. The discomfort and pain caused by poor skin conditions can disrupt concentration and focus, affecting overall work productivity.⁵ Furthermore, if workers with untreated contact dermatitis fail to properly treat their wounds or skin irritations, they could potentially spread the infection to hospital patients. More than 50% of the work performed by cleaning service workers is done with wet hands, which is caused by contact with water or chemicals such as acids, alkaline, or other solvents that can cause irritation.⁶

Some previous studies have identified several risk factors for the incidence of OCD. However, there has been a lack of studies on OCD affecting the hands. At Dr. M. Djamil Central General Hospital Padang itself, no research has been conducted about OCD of the hands among cleaning service workers. Therefore, the author seeks to understand the distribution and factors associated with the incidence of OCD among cleaning service workers at DR. M. Djamil Central General Hospital Padang so that this study can be used as a reference for preventive and promotive measures for cleaning service workers to prevent OCD incidence.

METHODS

This study is an observational analytic study with a cross-sectional design. We conducted this study at Dr. M. Djamil Central General Hospital Padang. The study population was all cleaning service workers at Dr. M. Djamil Central General Hospital Padang. We calculated the number of samples used in this study using the binomial proportions formula. The minimum number of samples obtained based the formula's calculation is 70. To prevent dropouts in the study, which resulted in a reduced sample size, the author added 10% to the sample so that the total minimum sample size was 77. The study employed a sequential sampling technique. The data were collected by direct interview with a questionnaire instrument, spanning from January 2024 to February 2024. The instrument used in this study is a questionnaire containing questions that will be asked of respondents and has been used by several previous researchers with research related to occupational contact dermatitis. The questionnaire contains an informed consent sheet, complete identification of the respondent, and research-related question items.

The variables studied included gender, age, working period, duration of contact, history of skin

disease, history of atopy, use of moisturizers, and duration of personal protective equipment (PPE) use. A dermatologist determines the diagnosis of OCD by conducting a physical examination, reviewing the history of exposure to the suspected substance, and applying the Mathias criteria. We can conclude that the dermatitis may be occupation-related if 4 out of the 7 criteria are present. Due to cost and time limitations, this study did not conduct further examinations, such as patch tests, on participants suspected of having occupational contact dermatitis. The data obtained were statistically analyzed with the Statistical Package for the Social Sciences (SPSS). Data will be presented in table form through univariate and bivariate analysis. Univariate analysis aims to analyze each variable independently. The chi-square test, a nonparametric hypothesis test, served as the statistical test for bivariate analysis. The significance was determined at $p < 0.05$. This study was approved by the Healthcare Research Ethics Committee of Dr. M. Djamil Central General Hospital Padang No: DP.04.03/D.XVI.XI/03/2024.

RESULT

Table 1 showed that 28 (36.4%) respondents had OCD, 52 (67.5%) respondents were female, 46 (59.7%) respondents were over 30 years old, 57 (74%) respondents had worked for less than two years, and 43 (55.8%) respondents had contact for less than two hours per day.

Table 1 also revealed that the majority of respondents, 66 (85.7%), had no history of skin disease, while 64 (83.1%) had no history of atopy. More than half of the respondents, namely 44 (57.1%) respondents, did not use moisturizers, and 42 (54.5%) used PPE ≥ 2 hours per day.

Table 2 shows that the proportion of workers who experienced OCD was more prevalent among male workers (64%), aged ≤ 30 years (38.7%), working period ≥ 2 years (38.6%), duration of contact ≥ 2 hours (37.2%), had a history of skin disease (45.5%), had a history of atopy (46.2%), did not use moisturizer (47.7%), and used PPE < 2 hours (45.7%).

The results of bivariate analysis, using the chi-square test, revealed a significant correlation between gender ($p=0.000$) and the use of moisturizers ($p=0.017$) with the incidence of OCD affecting the hands.

Table 1. Incidence and characteristics of OCD of the hands among cleaningservice workers

Variable	Frequency	Percentage (%)
OCD		
Yes	28	36.4
No	49	63.6
Gender		
Male	25	32.5
Female	52	67.5
Age		
≤ 30 Years	31	40.3
> 30 Years	46	59.7
Working Period		
< 2 Years	20	26
≥ 2 Years	57	74
Duration of Contact		
< 2 Hours	34	44.2
≥ 2 Hours	43	55.8
History of Skin Disease		
Yes	11	14.3
No	66	85.7
History of Atopy		
Yes	13	16.9
No	64	83.1
Use of Moisturizers		
Yes	33	42.9
No	44	57.1
Duration of Personal Protective Equipment Use		
< 2 Hours	35	45.5
≥ 2 Hours	42	55.5

OCD: occupational contact dermatitis

It's also clear from the table above that there is no significant link between age ($p=0.725$), working period ($p=0.492$), duration of contact ($p=0.862$), history of skin disease ($p=0.176$), history of atopy ($p=0.421$), or duration of PPE use ($p=0.119$) and the incidence of OCD on the hands.

Table 2. The relationship of several factors with the incidence of OCD of the hands among cleaningservice workers

Variable	OCD				<i>p-value</i>
	Yes		No		
	f	%	f	%	
Gender					
Male	16	64	9	36	0.000
Female	12	23.1	40	76.9	
Age					
≤ 30 Years	12	38.7	19	61.3	0.725
> 30 Years	16	34.8	30	65.2	
Working Period					
< 2 Years	6	30	14	70	0.492
≥ 2 Years	22	38.6	35	61.4	
Duration of Contact					
< 2 Hours	12	35.3	22	64.7	0.862
≥ 2 Hours	16	37.2	27	62.8	
History of Skin Disease					
Yes	6	45.5	5	54.5	0.176
No	22	28.8	44	71.2	
History of Atopy					
Yes	6	46.2	7	53.8	0.421
No	22	34.4	42	65.6	
Use of Moisturizers					
Yes	7	21.2	26	78.8	0.017
No	21	47.7	23	52.3	
Duration of PPE Use					
< 2 Hours	16	45.7	19	54.3	0.119
≥ 2 Hours	12	28.6	30	71.4	

OCD: occupational contact dermatitis

DISCUSSION

This study revealed that 52 respondents, or 67.5%, were female. This result is influenced by the cleaning service population at Dr. M. Djamil Central General Hospital Padang, which is dominated by female workers, because cleaning service jobs are often available in large numbers and require more general skills, making it an accessible job choice for many women. In addition, gender roles in society often influence a person's career choices.⁷ Women are considered more suitable and comfortable working jobs related to cleanliness and environmental care, such as cleaning service in hospitals.

This study also revealed that 46 respondents, or 59.7%, were over 30 years old. This is influenced by the cleaning service population at Dr. M. Djamil Central General Hospital Padang which is dominated by workers aged > 30 years. To maintain a clean and sterile environment, hospitals require a reliable and

experienced workforce to perform cleaning tasks. Therefore, they tend to hire cleaning service workers who already have experience and proven skills. Older workers tend to be more stable in doing their jobs. Many of them have been working in the industry for a long time and have a substantial amount of knowledge and skills.

More than half of the respondents, specifically 57 individuals (74%), had been employed for less than two years. Many cleaning services choose to stay in hospitals for an extended period due to the perception of hospital work as a stable job that offers financial security. Hospitals require employees who possess the necessary training and skills to maintain a clean and sterile environment. Hospitals prioritize the retention of employees who possess experience and skills in this field.⁸

The study's results also revealed that 43 respondents, or 55.8%, had a contact duration of less than two hours. The Standard Operating Procedure (SOP), applicable to all cleaning service workers at Dr. M. Djamil Central General Hospital Padang, includes the use of PPE, particularly gloves, during work. The use of personal protective equipment (PPE) is one effective method to prevent workers from direct exposure to chemicals. Based on data regarding cleaning service workers at Dr. M. Djamil Central General Hospital Padang, it was found that most workers were assigned to the indoor area, so this could increase the possibility of obtaining more respondents with a duration of contact ≥ 2 hours.⁹

The majority of respondents, specifically 66 (85.7%), reported no history of skin disease, while 64 (83.1%) reported no history of atopy. This is influenced by the lack of knowledge and ability of respondents to remember about the history of skin disease and history of atopy that has been suffered. In addition with a history of skin disease or atopy are more aware of the risk of exposure to chemicals or other irritants, leading them to avoid jobs that involve exposure to chemicals or environments that could exacerbate their condition.¹⁰ As a result, not many individuals with these conditions choose to work as a cleaning service.

The results of this study also showed that more than half of the respondents did not use moisturizers, as many as 44 respondents (57.1%). The discomfort from using moisturizers, which can leave hands feeling sticky and greasy after application, influences this result. Additionally, certain moisturizers may take a considerable amount of time to absorb, leading some workers to worry that their use could potentially

interfere with hand hygiene or even worsen the condition of their hands.

Workers should use an ideal moisturizer that doesn't clog pores, is non-irritant, non-sticky, colorless, easy to apply, economical, comfortable to use, and effective without interfering with work activities. In addition, the effect of moisturizers is not only to provide moisture to the skin, but can also affect the structure and function of the barrier in healthy skin as well as in compromised skin conditions. It is recommended to use a protective cream before work, gently cleanse the skin of irritants, and take care of the skin after work, especially for workers exposed to water and occlusion situations for more than 2 hours.¹¹ This study also showed that more than half of the respondents used gloves for ≥ 2 hours, namely 42 respondents (54.5%). The Standard Operating Procedure (SOP), applicable to all cleaning service workers at Dr. M. Djamil Central General Hospital Padang, includes the use of PPE, particularly gloves, during work. The use of personal protective equipment (PPE) is one effective method to prevent workers from direct exposure to chemicals. The duration of glove use is influenced by the type of cleaning task performed, the type of glove material, the user's comfort, and company policies regarding regular glove changes to maintain safety and cleanliness.¹²

The results of this study indicate that the proportion of incidence of OCD affecting the hands is more prevalent among male respondents with a percentage of 64%. The results of this bivariate analysis have a significance value of 0.000 ($p < 0.05$), which indicates that there is a significant relationship between gender and the incidence of OCD affecting the hands. Due to poorer PPE use and different tasks, male workers tend to have jobs that expose them to more chemicals or irritants at work, which can cause more OCD in them. The distinction in tasks also stems from variations in work environments, primarily situating male workers in outdoor spaces with horticultural responsibilities, necessitating their interaction with rough surfaces like grass and other plants.

A p-value of 0.725 ($p > 0.05$) indicates that age does not significantly influence the incidence of OCD affecting the hands. However, we found that respondents under 30 years old had a higher incidence of OCD on their hands. Lestari's (2007) research aligns with this outcome, suggesting that the lack of experience among younger workers is a contributing factor. Therefore, chemical contact remains a common occurrence among younger workers. Moreover, older workers tend to have a higher level of self-awareness of the importance of occupational safety and health, so

they pay more attention to the use of PPE compared to younger workers.¹³ In addition, young workers with prime physical strength are often placed in more rough work positions or, in this study, in outdoor areas, so the risk of developing OCD is greater than older workers.

This study contradicts the findings of Wibowo et al.'s (2020) research, which indicates a higher incidence of OCD in individuals aged over 30.¹⁴ The results of this study are also contrary to the research of Ristya et al. (2017).¹⁵ According to the study, the results obtained were due to human skin degenerating with age; therefore, the skin loses its fat layer and becomes drier. Dry skin conditions make it easier for chemicals to enter and infect the skin, so the skin becomes more vulnerable to OCD.

The bivariate data analysis revealed no significant relationship between the factor of working period and the incidence of OCD affecting the hands, as indicated by a p-value of 0.492 ($p > 0.05$). Despite the statistical lack of a relationship between the working period and the incidence of OCD affecting the hands, workers with a working period of less than 2 years tend to have a higher incidence of OCD. This is due to the consistent and repeated exposure of workers in a particular environment over an extended period of time. Repeated exposure to allergens or irritants can increase the risk of contact dermatitis.¹⁶ In addition, workers who have worked in a particular environment for a long time may become less aware of the risks of exposure to hazardous substances. They tend to neglect or reduce the use of appropriate PPE, thus increasing the risk of contact dermatitis. This could potentially increase the incidence of contact dermatitis in workers with ≥ 2 years of service.

The bivariate data analysis results showed no significant relationship between the duration of contact and the incidence of OCD affecting the hands ($p = 0.862$). However, the incidence of OCD in this study was more prevalent among workers who had a contact duration of ≥ 2 hours. This is because prolonged contact between the skin and irritants can cause contact dermatitis, because prolonged exposure increases the likelihood of irritants or allergens damaging the skin and triggering inflammatory reactions. Repeated exposure to various factors, such as water, soaps and detergents, oils, and acidic and alkaline chemicals, commonly causes irritant contact dermatitis. The repeated use of soaps, detergents, gloves, and water exposure tends to slowly cause damage or disruption to the skin.

The data collected in this study revealed that the respondents used various brands of cleaning products

provided by the outsourcing company. The most common cleaning products used were soap, detergent, solvent, quaternary ammonium compounds, alcohol, and bleach. These products are suspected as materials that cause OCD in this study. Exposure to soap or cleansers and water causes significant structural and functional changes. Alkaline soap, a product containing synthetic detergents, effectively removes debris and normal flora, leading to dry and irritated hands. In the epidermis, there is hyperproliferation, structural damage, a reduced ability to bind water, inadequate hydration, and desquamation. After chronic surfactant exposure, there is an increase in stratum corneum turnover. Abnormalities in the stratum corneum, due to an increased immune response, an accelerated nerve response, and an increase in epidermal growth factor, cause neurosensory irritation of the skin, resulting in discomfort, itching, stinging, and burning.¹²

The bivariate data analysis results revealed no significant relationship between the history of skin diseases and the incidence of OCD affecting the hands, as indicated by the p-value of 0.176 ($p > 0.05$). The study found no statistical relationship between the history of skin disease and the incidence of OCD affecting the hands, but workers with a history of skin disease were more likely to have OCD. This is because individuals with a history of skin disease generally have skin that is more sensitive and prone to irritation. Repetitive exposure to irritants or allergens in the workplace can worsen their skin condition and lead to the onset of contact dermatitis.¹⁷ Exposure to irritants or allergens in the workplace can trigger an immune response in the skin. In individuals with a history of skin disease, this immune response may be stronger or imbalanced, causing a more severe inflammatory reaction.¹⁸

The results of this study also indicate that the proportion of incidence of OCD affecting the hands is more prevalent among workers with a history of atopy. The results of this bivariate analysis have a significance value of 0.421 ($p > 0.05$), which indicates that there is no significant relationship between history of atopy and the incidence of OCD affecting the hands. This is because individuals with a history of atopy, such as atopic dermatitis (eczema), generally have skin that is more sensitive and susceptible to irritants and allergens. Atopic dermatitis weakens or damages skin, making it more vulnerable to exposure to irritants in the workplace. Workers with a history of atopy also have a more active immune response and often have increased sensitivity to irritants or allergens. Exposure to these substances in the work environment can trigger a

stronger inflammatory reaction in the skin that can lead to OCD.¹⁹

The results of bivariate analysis in this study shown that there is a significant relationship between the use of moisturizers and the incidence of OCD affecting the hands ($p=0.017$). The study's results also indicate that respondents who do not use moisturizers have a higher incidence of OCD affecting their hands. The discomfort of using moisturizers, which can result in a sticky and oily feeling after use, influences the number of respondents who do not use them. Respondents who do not use moisturizers tend to have dry skin; this condition causes the skin to lose moisture and natural oils necessary to maintain moisture and elasticity. This compromises the skin's barrier function, making it easier for irritants or allergens to penetrate and trigger inflammatory reactions. In addition, dry skin conditions tend to cause the skin to become more fragile and prone to damage. Exposure to irritants can easily cause abrasions, scratches, or small wounds on dry skin, which then allow the penetration of these substances and cause OCD.²⁰

The results of this bivariate analysis shown that there is no significant relationship between the length of PPE use and the incidence of OCD affecting the hands ($p=0.119$). However, this study found that respondents who used gloves for less than 2 hours experienced a higher incidence of OCD. Long periods of glove use can cause the skin of the hands to become humid due to sweat or natural body moisture trapping. A humid environment like this can increase the growth of microorganisms, such as bacteria or fungi, which can cause irritation or infection. Humid conditions can also worsen contact dermatitis by allowing trapped irritants or allergens to interact with the skin for a longer period of time. In addition, prolonged use of gloves can cause repetitive friction on the skin, especially in areas where the gloves come into direct contact. Friction damages the outer skin layer, making it more susceptible to irritants and allergens. The materials used in the manufacture of gloves can also contribute to the occurrence of OCD, particularly if they are not tailored to individual needs, leading to allergic reactions or skin irritation. Prolonged use of gloves increases the duration of contact between the skin and the glove material, which in turn can increase the risk of developing OCD.²¹

In this study, latex gloves are also suspected as an allergen material that causes the incidence of OCD. Chemicals added during the process of manufacturing latex gloves can cause abnormalities in the skin. The materials in latex gloves that can cause allergies include

chemical antigens. Latex glove powder comes from talcum powder. Powder on gloves that are not absorbed in latex protein has the potential to cause irritant contact dermatitis because the entry of glove powder into the body can interfere with physiological functions. Despite providing effective protection against infectious agents, latex gloves have also been associated with allergic reactions and irritation.²²

The study concludes that the incidence of OCD of the hands among cleaning service workers at Dr. M. Djamil Central General Hospital Padang is correlated with gender and the use of moisturizers. The findings recommend applying moisturizers to hands before wearing PPE, washing them with soap, and reducing the duration of PPE use, particularly for workers with a history of OCD.

The purpose of this research is to gather data that aligns with its objectives. However, there are still some difficulties and limitations in the process of conducting this research, particularly the weakness of the questionnaire-based research data that is collected from each individual. If respondents do not answer fairly or do not understand the meaning of the statement items, the resulting data will be less accurate.

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