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## CASE REPORT

# Prevalence of occupational contact dermatitis in cleaning service in the Sudirman campus of Udayana University

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## Abstract

**Introduction.** Occupational contact dermatitis is contact dermatitis caused by work-related exposures. While doing their work, cleaning service workers are facing various risks of occupational diseases, one of which is occupational contact dermatitis. The purpose of this study is to determine the prevalence and characteristics of occupational contact dermatitis in cleaning service workers at the Sudirman Campus of Udayana University.

**Method.** This research is a descriptive study using a cross-sectional method and uses 47 samples.

**Results.** The prevalence of occupational contact dermatitis in cleaning services in Sudirman Campus of Udayana University is 10.6%, with the characteristics of age mostly found in 21 – 30 years (9.5%) and 31 – 40 years (18.2%), dominated by men (16.7%), working period <4 years (12.5%), duration of contact ≥3 hours (14.3%), without a history of allergies (10%), with a history of disease other skin (23.5%), good personal hygiene (7.5%), and using Personal Protective Equipment (7.3%). The dominant chemical that is used is acid (11.1%) though workers can contact more than one type of substance. The most common symptoms complained of include itching, burning or burning, redness of the skin, and peeling skin.

**Conclusion.** In this study, it is found the prevalence of occupational contact dermatitis in cleaning service workers at Sudirman Campus of Udayana University is 10.6% and the factors contributing in occupational contact dermatitis in cleaning service workers at Sudirman Campus of Udayana University are the duration of contact, gender, age, contact with chemicals, years of service, history of allergies, history of other skin diseases, personal hygiene, and the use of personal protective equipment.

**Keywords:** *occupational contact dermatitis, dermatitis contact, chemical dermatitis, cleaning service dermatitis*

## Introduction

In the workplace in various sectors, workers are always facing the risk of occupational diseases. Promotional and prevention efforts need to be developed and enhanced to reduce the risk of diseases arising from work or the work environment. This risk varies from the lightest to the heaviest, depending on the type of work. Various risks in occupational health and safety can allow the occurrence of occupational diseases or diseases that can cause disability and death related to work and work accidents. One of the most common occupational diseases is occupational contact dermatitis. Occupational skin diseases can be caused by several factors, including chemical factors (primary irritation, allergens, or carcinogens), mechanical factors (vibration, pressure, trauma, heat, cold, humidity), biological factors (fungi, parasites, and viruses), and psychological factors.<sup>1</sup> In 2009 the development of dermatosis was increasing with a percentage of 50-60% of all occupational diseases.<sup>2</sup>

Contact dermatitis is an acute or chronic inflammatory response caused by direct contact with certain substances.<sup>3</sup> There are two types of contact dermatitis, irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD), both of which can be acute or chronic. Irritant contact dermatitis is an inflammatory reaction on the skin caused by exposure to substances that can cause

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eruptions while allergic contact dermatitis is dermatitis caused by allergen when in contact with the skin.<sup>4</sup> Occupational contact dermatitis is dermatitis caused by work-related exposure.<sup>5</sup>

Cleaning services can be found in all sectors and workplaces, both in private companies and in public places. This type of service includes various tasks. Most of the cleaning service work is carried out on a contract basis where the cleaning service is employed by a cleaning service company but works in one or more locations. Cleaning service is classified as wet work, where more than 50% of the work is carried out in damp hand conditions, which can be caused by contact with water or chemicals such as acids, bases, or other solvents that can irritate. Products containing irritants or allergies are used every day and often come in contact with the skin.<sup>6</sup> Occupational contact dermatitis (OCD) reaches 20% of all occupational diseases, and 80% occurs on the hands. Occupational contact dermatitis can happen to all workers, including cleaning service workers, due to frequent exposure to irritants and allergens at work without using adequate personal protective equipment and poor levels of personal hygiene.<sup>7</sup> Based on the result of the study in Australia by Cahill *et al.*,<sup>8</sup> the incidence of contact dermatitis was 79.95% of all occupational dermatoses, 968 (44%) are irritant contact dermatitis, and 712 (32.7%) are allergic contact dermatitis.

A study in England found the incidence of dermatitis is 28% in cleaning service workers and 18% in the general population.<sup>7</sup> In Indonesia, a review of cleaning service workers at the Abdoel Moeloek General Hospital by Saftarina *et al.*,<sup>9</sup> found 47 out of a total of 102 workers with occupational contact dermatitis. A study by Ristya *et al.*,<sup>10</sup> showed that cleaning service workers at Prof. RSUP Dr. R. D. Kandou Manado had the incidence of contact dermatitis found in 28 workers (20.7%). However, research on occupational contact dermatitis in cleaning service workers in Bali has never been done.

## Method

This research is a descriptive study using a cross-sectional method and uses 47 samples. The target population in this study is cleaning service workers on the Sudirman Campus of Udayana University. The accessible subject in this study is all cleaning service workers who are members of the International Service System (ISS) company that work at the Sudirman Campus of Udayana University in January 2020. The inclusion factors of the research subjects are subjects who are still active workers, working on the Sudirman Campus of Udayana University, and willing to participate in this research. In contrast, the exclusion factors of the study are subjects that have been exposed to contact dermatitis factors not related to their work, and they work at other places(s) where workers are exposed to secondary exposure during the same period while this study is conducted. The sampling technique in this study is total sampling. Total sampling is a sampling technique where the number of samples is equal to the population.<sup>11</sup> The reason for taking total sampling is because the total population is less than 100; the entire population is used as a research sample. Samples taken from this study were 47 people. This study has passed the ethical clearance, and all cleaning services have been given an informed consent sheet and a questionnaire, which will then be filled out by participants independently. Data collection was carried out in December 2019 until January 2020 at the Sudirman Campus of Udayana University, with author visiting participants during lunchtime as not to interfere with the work. The variables that are studied are the duration of contact, gender, age, contact with chemicals, years of service, history of allergies, history of other skin diseases, personal hygiene, and the use of personal protective equipment. After participants fill out the questionnaire, the author will conduct a physical examination to see if there are any symptoms of occupational contact dermatitis on the participant. Participants who tested

positive for occupational contact dermatitis based on questionnaires and physical examinations will then be taken their picture of the location of contact dermatitis by the researchers for documentation. In this study, no further investigation, such as patch test, was done on participants who tested positive for occupational contact dermatitis due to cost, time, and ability limitation. After participants filled out the questionnaire, the data was then collected to show the prevalence and characteristics of contact dermatitis due to work at the cleaning service on the Sudirman Campus of Udayana University.

## Results

Based on the research and physical examination conducted on cleaning service workers at Sudirman Campus of Udayana University, it is found five positive subjects of OCD that were confirmed using Mathias (1989) criteria<sup>12</sup> with a prevalence rate of 10.6%. The results are shown in table 1. Similar results were found in research conducted on cleaning service workers at Prof. RSUP Dr. R. D. Kandou Manado found a prevalence rate of OCD of 20.7%<sup>10</sup> and analysis conducted in 2002 which showed 9 - 35% of occupational dermatoses were OCD which mainly occurred in the hands and arms.<sup>13</sup>

## Discussion

This study result shows different results from research conducted by Anshar *et al.*,<sup>14</sup> which found 15 female respondents and only one male respondent with OCD. The differences between male's skin and female's skin can be seen from the number of hair follicles, *sebaceous* gland, and hormones. Male's skin has androgen as the dominant hormone which can cause male's skin to sweat more and grow more hair, while female's skin is thinner than male's skin which can cause it to be more susceptible to skin damage.<sup>15</sup> Another factors such as personal behaviour, personal hygiene awareness, and the different tasks that are given can affect the occurrence of OCD between male and female workers. This can be explained by the tasks that all female respondents do are mainly focused on only cleaning while the tasks that male respondents do are not only cleaning but also gardening and almost all of the workers who do gardening have a poor personal hygiene awareness, proven by the fact that most of them admit they rarely do not use PPE while gardening.

This study shows the spread of the incidence of OCD in several age groups. Human skin degenerates with age; hence the skin loses its fat layer and becomes drier. Dryness of the skin makes it easy for chemicals to infect the skin, so the skin becomes more susceptible to dermatitis.<sup>16</sup> The difference in results found with Cohen's theory can occur due to differences in the experience and behaviour of each individual. Workers in age group of 41 – 50 tend to have longer years of service and more experience on this field which can cause them to have a better knowledge of the importance of their own safety which resulted them to be more cautious while doing their job and more obedient to use PPE.

The results of this study are also in line with research conducted by Ristya *et al.*,<sup>10</sup> who found the most respondents with OCD were workers with a working period of 1 - 5 years with a total of 13 respondents (46.4%). An increase in the length of one's career could effectively play a crucial role in determining the likelihood of someone contracting an occupational dermatoses from the sheer length of exposure to the work environment, and therefore irritants and allergens that may elicit contact dermatitis. Based on the chemicals factors, this shows that all respondents who experienced OCD use acid while doing their work, while alkaline, solvent, and EDTA and NTA are the second largest chemicals used by respondents with OCD. Based on the results of interviews and questionnaire sheets, it

was found that all cleaning products used by respondents came from the diversey brand provided by the ISS Company with toilet cleaners containing solvents and alkalis, floor cleaners containing solvents, disinfectants containing formaldehyde, ethanolamine, and solvents. Detergents containing solvents, acids, EDTA and NTA, anti-corrosive containing solvents, acids and alkalis, glass cleaners containing solvents and alkalis, and fertilizers containing acids. Almost all workers do more than one type

**Table 1.** Characteristics of Occupational Contact Dermatitis in cleaning service workers on the Sudirman Campus of Udayana University

Characteristics (Mean ± SD)	Number of Cleaning Services	Occupational contact dermatitis			
		Positive		Negative	
		n	(%)	n	(%)
<b>Gender</b>					
Woman	29	2	6.9	27	93.1
Man	18	3	16.7	15	83.3
<b>Age (31.6 ± 10.2)</b>					
≤ 20 years	5	0	0	5	100
21 – 30 years	21	2	9.5	19	90.5
31 – 40 years	11	2	18.2	9	81.8
41 – 50 years	7	1	14.3	6	85.7
> 50 years	3	0	0	3	100
<b>Career Length (2.7 ± 1.9)</b>					
< 4 years	32	4	12.5	28	87.5
≥ 4 years	15	1	6.7	14	93.3
<b>Length of Contact (2.4 ± 2.2)</b>					
< 3 hours	26	2	7.7	24	92.3
≥ 3 hours	21	3	14.3	18	85.7
<b>Use of chemical substance (cleaning service can use more than one chemical substances)</b>					
Acid	45	5	11.1	40	88.9
Alkali	39	3	7.7	36	92.3
Solvent	39	3	7.7	36	92.3
Formaldehyde	17	1	5.9	16	94.1
ethylene diamine tetraacetic acid (EDTA) and nitrilotriacetic acid (NTA)	39	3	7.7	36	92.3
Ethanolamine	17	1	5.9	16	94.1
<b>History of Allergy</b>					
Yes	17	2	11.8	15	88.2
No	30	3	10	27	90
<b>History of other skin diseases</b>					
Yes	17	4	23.5	13	76.5
No	30	1	3.3	29	96.7
<b>Personal hygiene</b>					
Good	40	3	7.5	37	92.5
Bad	7	2	28.9	5	71.1
<b>Use of Personal Protective Equipment (PPE).</b>					
Yes	41	3	7.3	38	92.7
No	6	2	33.3	4	66.7

of work, such as cleaning toilets, cleaning floors, and gardening. This causes workers to be exposed to more than one type of cleaning product that contains many chemicals, making it difficult to determine the exact prevalence of each type of chemical. According to the literature written by Rycroft *et al.*,<sup>19</sup> it is said that chemicals and cleaning agents are one of the causes of OCD, such as detergents, cobalt, nickel, rubber materials, and formaldehyde.

Based on a history of allergies, the results of this study are not in line with research conducted by Utomo *et al.*,<sup>20</sup> which shows that the proportion of workers with a history of allergies and experiencing OCD is 57.7% compared. Contact dermatitis is more likely to occur in people who have a history of allergies because their skin is more vulnerable. The difference of results between the studies is likely because when filling out the questionnaire, participants did not understand the questions correctly or even forgot their history of allergies. This limitation can certainly affect the number of prevalence, hence more time and intensive interviews with each worker is needed to get a more accurate result.

Based on a history of other skin diseases, the result is comparable with a study conducted by Cahyawati *et al.*,<sup>21</sup> in which the history of skin disease was a factor associated with the incidence of dermatitis. Most of the respondents who had a history of previous skin diseases tended to suffer from dermatitis. The proportion of workers with contact dermatitis with a history of skin disease was 90% and workers who had contact dermatitis without a history of skin disease was 10%. In workers with a history of other skin diseases, workers' skin can be sensitive to various chemicals. If inflammation occurs, chemicals will be easier to irritate the skin, so the possibility of contact dermatitis due to work is higher.<sup>22</sup>

Based on personal hygiene, this study shows different results from the study that was done by Harumi *et al.*,<sup>23</sup> which shows a significant relationship between poor personal hygiene and the occurrence of OCD, workers with poor personal hygiene have a risk of experiencing OCD nine times greater than workers with good personal hygiene. This can be explained by several factors. First, affirming to this question is an easier answer to produce, in an attempt to prevent the event of chastise or advice, which would supposedly be considered as an inconvenience to the involved parties. Secondly, there is a profound lack of knowledge in society as to what is regarded as proper hygiene. To some of the respondents, the practice of rinsing one's hands under tap water for the mere act of wetting their hands is regarded as proper hygiene, whereas it is a well-known understanding in healthcare that this simply is not true.

Based on the use of Personal Protective Equipment (PPE), it was found that the incidence of OCD on cleaning service workers at the Sudirman Campus of Udayana University was considered to be the highest among respondents, with a total of three who used PPE (7.3%), and the remaining two did not (33.3%). These results show different results with studies conducted by Ramdan *et al.*,<sup>24</sup> among ship workers who found a significant relationship between the use of PPE and the decreasing incidence of OCD. Though the company has already given standard operating procedure (SOP) which include the use of the right PPE, some of the workers might not follow the procedure properly. The the improper use of PPE can interfere with the workers while doing their work, and if workers come into contact with hazardous substances, it may cause contact dermatitis. The right PPE for every workers should also be considered, if the workers are allergic to the material contained in the gloves, it can increase the occurrence of contact dermatitis caused by the gloves themselves and damage to the skin layer. The choice of gloves that workers can choose if workers are allergic to latex type gloves made of natural rubber can use nitrile gloves made of synthetic rubber, or vinyl made of non-biodegradable PVC (polyvinyl chloride) and plasticizers.

## Conclusion

Based on research conducted on cleaning service workers at the Sudirman Campus of Udayana University in January 2020, it can be concluded that the prevalence of OCD in cleaning service workers at the Sudirman Campus of Udayana University was 10.6%. Characteristics related to the incidence of OCD at cleaning service workers in the Sudirman Campus of Udayana University is gender, age, length of service, duration of contact, use of chemicals, history of allergies, history of other skin diseases, personal hygiene, and use of PPE.

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