Vol 1 No 4 2024 || E-ISSN 2997-7258

The Journal of Academic Science

journal homepage:
https://thejoas.com/index.php/

Factors Affecting Contact Dermatitis Disease in Workers in Landfill Areas

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KEYWORDS

Length of Work, Personal Hygiene, Contact dermatitis, landfill, Soil Pollution

ABSTRACT

Indonesia's rapid population growth will indirectly lead to an increase in waste production, which, if not accompanied by effective waste management, will result in waste accumulation at final disposal sites. Many landfills (Final Disposal Sites) in Indonesia serve merely as open dumping grounds, posing significant health risks and the potential for disease. One notable health issue affecting the scavenger community at these Final Disposal Sites (TPA) that warrants serious attention is contact dermatitis, caused by exposure to waste containing irritant materials. The objective of this study is to identify the factors influencing contact dermatitis among landfill workers. This research employs a literature review methodology, collecting data from secondary studies that focus on articles and journals relevant to the factors contributing to the occurrence of contact dermatitis among garbage haulers and scavengers. Sources were gathered from several databases, including Google Scholar, PubMed, ScienceDirect, and Opengate. A total of 40 journals were included in the review based on predetermined inclusion and exclusion criteria. The results indicate a significant relationship between the hygiene practices of landfill workers and the incidence of contact dermatitis among these workers.

1. INTRODUCTION

Lake Toba, as a water landscape, has been designated as a National Strategic Area as outlined in Government Regulation No. 81 of 2014 concerning Spatial Planning Regulations. This designation serves as a foundational operational framework to ensure the environmental quality control of Lake Toba and its surrounding areas. As an ecotourism destination within a broader development scheme, it requires an environmental vision aimed at attracting local, national, and international tourists. However, achieving this goal necessitates.

Sustainable water quality monitoring of Lake Toba necessitates the application of informed strategies and expertise (Environmental Agency Samosir, 2015) [1].

Water pollution in Lake Toba can occur as a result of various activities that increase pollutant levels, such as forest concession activities, aquaculture, farming, industrial operations, and water transportation. These activities directly influence the changing water quality of Lake Toba.

The sources of pollutants will adversely affect the water quality of Lake Toba by altering its physical and chemical indicators. Changes in the water quality of Lake Toba can harm the environmental quality of tourism areas, which are vital for meeting the needs of local communities and future generations. Therefore, the management of Lake Toba's water must prioritize water and soil conservation to directly support the sustainability of the lake's water resources.

Government Regulation No. 32 of 2004 on Spatial Planning defines that the management of natural resources and the environment directly depends on enhancing the capacity and quality of management, stabilizing information systems, optimizing technologies to reduce environmental impact, and building institutional capacity for the effective management of natural resources and the environment, particularly in the management of water resources, coastal resources, and reserved areas [2]. Therefore, pollution and environmental degradation will necessitate increased community participation in actions to control pollution and mitigate environmental damage. Various sources accessed from the internet indicate that the water quality of Lake Toba has changed significantly, particularly regarding the diversity and quantity of fish species over time. This serves as a significant indicator of the unsuitability of Lake Toba's water as a habitat for fish, especially for familiar species such as Jahir fish, Batak fish, and goldfish.

In light of this situation, the researcher aims to investigate the changes in Lake Toba by conducting water sample analysis in four designated zones: the agricultural zone, harbor zone, ecotourism zone, and aquaculture zone. This study seeks to evaluate pollution categories through water sample analysis and laboratory testing, comparing the results to environmental standards established by Government Regulation No. 82 of 2001 and Minister of Health Regulation No. 492 of 2010, which serve as legal references [3].

The water quality of Lake Toba has been declining year by year due to various activities occurring both in and around the lake. The degradation of Lake Toba's water quality can occur directly or indirectly; therefore, it is essential to monitor and evaluate these changes to inform decision-making regarding appropriate actions, whether through conservation efforts or direct interventions, to foster a sustainable living system for the communities surrounding the lake.

The high-intensity use of water in Lake Toba results in significant amounts of water pollutants. On the other hand, Lake Toba serves as an economic resource, generating profits for both local communities and corporations. To ensure that all activities within the Lake Toba area are conducted sustainably, regular water testing is necessary to monitor changes in water quality. This testing will help identify even minor alterations that may disrupt the overall activities of the community.

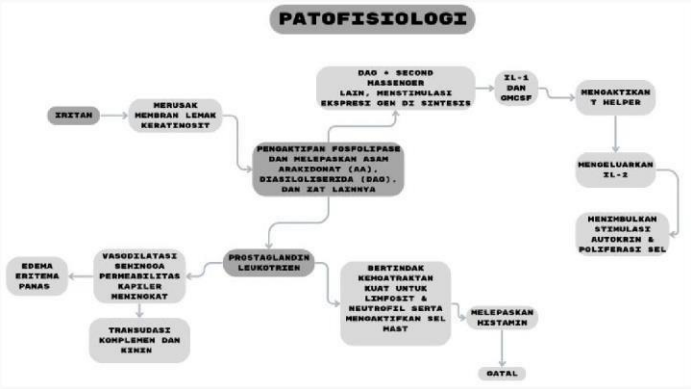
2. METHOD

The methodology employed in this study is a literature review, which involves analyzing selected literature from various sources to draw conclusions and generate new ideas. The literature sources include primary data from national and international journals published within the last six years (2019-2024), focusing specifically on the factors contributing to contact dermatitis among workers in landfill areas. Literature searches were conducted through Google Scholar using the keywords "contact dermatitis," "landfill," and "garbage." The initial search yielded a total of 40 journals relevant to the topics addressed in this study, which were subsequently re-filtered based on specific criteria. Ultimately, a total of 8 journals that met the desired criteria were identified.

3. RESULT AND DISCUSSION

CONTACT DERMATITIS

In Indonesia, dermatitis ranks as the third most prevalent among the ten leading diseases, accounting for 86% of 192,414 reported cases of skin diseases in various public hospitals in 2011 (Ministry of Health of the Republic of Indonesia, 2011). Epidemiological studies in Indonesia indicate that 97% of 389 skin disease cases are attributed to contact dermatitis, of which 66.3% is classified as irritant contact dermatitis (Aprilliani et al., 2022). The incidence of irritant contact dermatitis has significant health implications, necessitating treatment and resulting in reduced income for affected workers. Indirectly, it also leads to lost working hours and decreased worker productivity, thereby affecting overall quality of life. The pathophysiology of the disease is illustrated in the following diagram.



Irritant contact dermatitis (ICD) refers to the skin's reaction to an external foreign substance that causes irritation. The mechanism underlying this condition occurs in several phases. Exposure to irritants in the dermis results in skin damage, which varies according to the level and potency of the irritant.

Upon contact with irritant substances, the skin may experience keratin denaturation, loss of the fat layer, release of lysosomal enzymes, and inflammatory reactions. These inflammatory responses involve an innate immune response that extends beyond the cellular immune system. Key components include the activation of cytokines and chemokines such as IL-1α, IL-1β, IL-6, IL-8, TNF-α, GM-CSF, and IL-10. Symptoms of infection may manifest as rashes, erythema, scaling, fissures, vesicles, and pustules. Irritant dermatitis typically manifests within a few hours following exposure to the causative agent and resolves within a few days after discontinuation of that exposure.

The clinical presentation and progression of occupational contact dermatitis can vary significantly based on a range of internal and external factors. The distinction between the two types of dermatitis lies in their causes, onset, symptoms, and the body's immune response. The most notable difference is that irritant contact dermatitis results from direct chemical damage to the skin, whereas allergic contact dermatitis is triggered by an allergic reaction to a substance. Additionally, irritant dermatitis typically occurs immediately after exposure to the irritant, while allergic contact dermatitis usually arises after repeated exposure and may not become apparent until several days after the initial contact. Based on the substances that cause irritant dermatitis, these irritants are categorized into two groups: strong irritants and weak irritants. Strong irritants include substances such as sulfuric acid, sodium hydroxide, chlorine, sulfur, and mercury, whereas weak irritants encompass materials like detergents, bleach, pesticides, water, and preservatives.

The likelihood of developing irritant contact dermatitis increases with the duration, intensity, and concentration of the substances involved. Both chemical and physical agents, as well as microtrauma, can contribute to skin irritation, leading to the onset of irritant contact dermatitis.

Physical irritants, such as friction, blisters, and occlusion, along with detergents like sodium lauryl sulfate, produce a greater incidence of irritant contact dermatitis when used in combination than when applied individually.

The severity of irritant contact dermatitis is influenced by several factors, including the quantity and concentration of the irritants, as well as the duration and frequency of exposure. Additionally, individual skin characteristics, such as thickness, oiliness, dryness, sensitivity, previous damage, and any pre-existing atopic tendencies, play a significant role. Environmental factors, such as high or low temperatures and humidity levels, also contribute to the severity of the condition.

Factors of the duration of a person's work against contact dermatitis.

Based on research conducted by Fatia Sarah in 2022, a relationship exists between the duration of an individual's employment and the occurrence of contact dermatitis among scavengers or communities surrounding landfills. The longer a person works in such an environment, the greater their likelihood of being exposed to both physical and chemical factors that can lead to health problems or diseases associated with their occupation. This exposure can result in a decline in work efficiency and productivity.

Personal Hygiene Factors for Contact Dermatitis

A relationship exists between personal hygiene and the incidence of contact dermatitis among workers or communities surrounding landfills. Personal hygiene refers to the efforts made by individuals or groups to maintain health through the management of personal cleanliness and the control of environmental conditions. The primary objectives of personal hygiene are to enhance health, sustain individual cleanliness, and prevent disease. Workers with poor personal hygiene are at a slightly higher risk of developing contact dermatitis compared to those who maintain good personal hygiene practices. Workers who maintain good personal hygiene are generally more aware of occupational diseases, particularly skin conditions resulting from exposure to their work environment. They engage in healthy behavior practices (PHBS) such as washing their hands before and after work, keeping their nails trimmed, and ensuring their nails are clean. In contrast, workers with poor personal hygiene often neglect the risks of illness associated with their work environment and are reluctant to engage in healthy behavior practices. **Factors for the Use of Personal Protective Equipment (PPE) Against Contact Dermatitis**

A study titled "The Relationship between Personal Hygiene and the Use of Personal Protective Equipment (PPE) with the Incidence of Contact Dermatitis in Waste Handling Officers at the Final Disposal Site (TPA) of Tadukan Raga Deli Serdang in 2023" demonstrated a relationship between the use of PPE and the occurrence of contact dermatitis among workers or communities surrounding the landfill. The use of PPE is identified as one of the risk factors for contact dermatitis among landfill workers. Workers who fully utilize PPE, including gloves, protective glasses, masks, and specialized clothing, can significantly reduce their risk of exposure to both physical and chemical pollutants in their work environment. Therefore, the appropriate use of PPE can serve as an important preventive measure against contact dermatitis in landfill workers. Additionally, the implementation of a safe work culture and the regular maintenance of PPE are essential for maximizing the effectiveness of contact dermatitis prevention strategies.

Contact Dermatitis Prevention Solution for Workers in Landfills

Contact dermatitis occurring in a landfill environment can pose a significant problem due to exposure to chemicals, dust, and dirt. To mitigate this issue, it is essential to enhance sanitation and environmental hygiene through regular cleaning of the area and ensuring that workers use adequate personal protective equipment. Furthermore, the adoption of safer and more environmentally friendly chemicals can help reduce the risk of skin irritation.

Education regarding the importance of skin care and preventive measures is also essential for reducing the incidence of dermatitis in landfill environments. Collaborative efforts among workers, landfill management, and local health authorities can contribute to creating a safer and healthier environment for all stakeholders involved.

4. CONCLUSION

Based on the results of the conducted research, it can be concluded that there is a significant relationship between the hygiene practices of workers in landfills and the incidence of contact dermatitis among these workers. The occurrence of contact dermatitis in landfill workers is primarily attributed to the landfill system in Indonesia, which still fails to meet established standards, resulting in the leakage of various irritant wastes. Additionally, the insufficient hygiene practices within the surrounding community play a crucial role in contributing to the incidence of contact dermatitis in the vicinity of the landfill.

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