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The Relationship Between Nutritional Status and Pressure Ulcer Incidence in ICU Patients

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ABSTRACT

Decubitus ulcers are tissue damage to the skin and/or subcutaneous tissue that generally occurs due to prolonged pressure on bony prominences, particularly in hospitalized patients with limited mobility. Nutritional status is suspected to play a role in the development of decubitus ulcers, as suboptimal nutritional status can affect tissue integrity and the wound healing process. However, previous studies on the relationship between nutritional status and the incidence of decubitus ulcers have shown inconsistent results. This study aims to determine the relationship between nutritional status and the incidence of decubitus ulcers in ICU patients. This study was an observational cross-sectional design conducted at Budhi Asih Regional General Hospital, East Jakarta, from January to November 2025, involving 94 subjects. Data on nutritional status and pressure ulcer incidence were obtained from medical records. Statistical analysis was performed using the Chi square test with a statistical significance threshold of $p<0.05$. Of the 94 subjects, the majority (57 patients) were overweight. Pressure ulcers were found in 22 patients (23.4%), while 72 patients (76.6%) did not experience pressure ulcers. Analysis using the Chi-square test showed no significant association between nutritional status and the incidence of pressure ulcers in ICU patients ($p=0.248$).

Keywords: Decubitus Ulcers; ICU Patients; Nutritional Status.

INTRODUCTION

According to the National Pressure Ulcer Advisory Panel (NPUAP), pressure ulcers are defined as localized damage to the skin and/or underlying subcutaneous tissue, typically occurring over bony prominences. This condition is caused by prolonged pressure, either alone or in combination with shear forces (Safitri et al., 2021). Nutritional status is a crucial factor in both the development and healing of pressure ulcers. Nutritional deficiencies may lead to a reduction in subcutaneous fat tissue, muscle atrophy, and disturbances in endocrine metabolism, which ultimately increase pressure loading on specific adipose tissue areas (Chen et al., 2023).

Pressure ulcers represent a serious global health problem, as they contribute significantly to increased morbidity and mortality rates. The global prevalence of pressure ulcers among hospitalized patients ranges from 2.7% to 33%, with the highest rates observed among patients admitted to intensive care units (ICUs) (Yustina, 2021). According to data from the Indonesian Ministry of Health in 2023, the prevalence of pressure ulcers in Indonesia reached 33.3%, which is considered high compared with prevalence rates reported in other Southeast Asian countries (Krisnawati et al., 2022).

The development of pressure ulcers is complex and influenced by a wide range of internal and external factors. In general, this condition results from multifactorial interactions involving clinical aspects such as nutritional status, hydration, and the integrity of the skin and mucosal tissues. In addition, advanced age and the quality of nursing care also contribute to an increased risk of pressure ulcer development (Ciríaco et al., 2023). Nutritional status plays a significant role in the pathogenesis of pressure ulcers. Nutritional deficiencies may lead to a reduction in subcutaneous fat tissue, muscle atrophy, and impairments in endocrine metabolic function. These conditions increase the vulnerability of adipose tissue to excessive localized pressure, thereby elevating the risk of pressure ulcer formation (Chen et al., 2023). Pressure ulcers are strongly influenced by the magnitude of pressure applied to tissues. Body weight induced pressure reduces capillary blood flow, leading to ischemic events that may ultimately result in the development of pressure ulcers (Zulaikah et al., 2017).

Patients with both undernutrition and overnutrition exhibit a higher prevalence of pressure ulcers compared with patients who have normal body weight or moderate obesity. This finding is consistent with data from international pressure ulcer prevalence surveys in the United States, which reported higher incidence rates among underweight and obese populations. In addition, a significant difference in in-hospital mortality rates was observed between underweight and obese groups, with mortality rates of 19% and 9.4%, respectively ($P < 0.001$) (Hyun et al., 2014). Furthermore, a prospective cohort study conducted by Serpa et al. (2020) in Brazil demonstrated that nutritional status is not the sole risk factor contributing to the development of pressure ulcers.

Various risk factors have been identified as contributing to the pathogenesis of pressure ulcers, one of which is nutritional status. However, the relationship between nutritional status and the occurrence of pressure ulcers remains variable and globally inconsistent. Some studies have reported that malnutrition and obesity are significant risk factors for the development of pressure ulcers, whereas other studies have found no statistically significant association. Therefore, this study aims to investigate the relationship between nutritional status and the occurrence of pressure ulcers among patients admitted to the intensive care unit (ICU).

The finding that nutritional status is not associated with the occurrence of pressure ulcers has several important implications. This result emphasizes that

pressure ulcer prevention should focus more on dominant risk factors, such as immobility, prolonged pressure on specific body areas, shear forces, and disease severity. Therefore, nutritional status should not be considered the primary indicator in assessing the risk of pressure ulcer development.

METHOD

In a 2025 study conducted at Budhi Asih Regional General Hospital, East Jakarta, Indonesia, the authors carried out an observational analytic study using a cross-sectional design. Data analysis was performed using patient medical records collected for the period of September to November 2025 and retrospectively reviewed from previous years until the required sample size was achieved. The study population consisted of patients admitted to the intensive care unit (ICU). Consecutive non-random sampling was employed to select the study subjects, who were required to meet the following inclusion criteria: patients aged 20–59 years with complete medical record data on body mass index (BMI) and pressure ulcer status. The exclusion criteria included patients who had pressure ulcers prior to hospital admission and those with a history of stroke, hypertension, or diabetes mellitus.

A total of 94 subjects were included in this study. Nutritional status was assessed using body mass index (BMI) obtained from medical records and classified according to World Health Organization (WHO) standards. For statistical analysis, nutritional status categories were regrouped into undernutrition, normal, and overnutrition. Descriptive statistics were used to summarize subject characteristics and are presented as frequencies, percentages, and mean ± standard deviation for normally distributed variables. The analysis of the impact of nutritional status on the occurrence of pressure ulcers was performed using the Chi-square test. A significance level of $p < 0.05$ was maintained. The Statistical Package for the Social Sciences (SPSS) 22.0 was used for data analysis. This study received ethical approval from the Research Ethics Committee of the Faculty of Medicine, Universitas Trisakti (No. 005/KER/FK/09/2025).

RESULT AND DISCUSSION

Characteristics of Study Subjects

Of the total 94 study subjects, the median patient age was 51 years, with a minimum age of 20 years and a maximum age of 59 years. The age distribution showed that 20 subjects were classified as early adulthood (20–39 years), while 74 subjects were in the late adulthood group (40–59 years). The majority of subjects were male, accounting for 48 individuals (51.1%). Most subjects were classified as having overnutrition, with 57 subjects (60.6%). In addition, the majority of subjects did not develop pressure ulcers, comprising 72 subjects (76.6%) (Table 1).

Table 1
Distribution of Study Subject Characteristics

Variable	Median (min-max)	Frequency (n)	Percentage (%)
Age (years)			
Early adulthood (20-39 years)	51 (20-59)	20	-
Late adulthood (40-59 years)	-	74	-
Sex			
Male	-	48	51,1
Female	-	46	48,9
Nutritional status			
Underweight	-	19	20,2
Normal	-	18	19,1
Overweight	-	57	60,6
Pressure ulcer			
Pressure ulcer	-	22	23,4
No pressure ulcer	-	72	76,6

In this study, patient age data were not normally distributed. Statistically, no significant association was found between age and the occurrence of pressure ulcers. This finding suggests that age is not a primary risk factor. This may be attributed to the predominance of clinical factors in critically ill patients, such as disease severity, immobility, vasopressor use, and hemodynamic instability, as well as the consistent implementation of pressure ulcer prevention measures across all age groups. Therefore, age is not a major determinant of pressure ulcers in critically ill patients (Cremasco et al., 2013).

Majority of patients were male, comprising 48 subjects (51.1%). Male patients were also more predominant in the group without pressure ulcers, accounting for 83.3%. The literature further indicates that both males and females have comparable susceptibility to developing pressure ulcers. Although males are sometimes reported to have slightly higher incidence rates due to greater involvement in activities that may predispose them to trauma, more influential risk factors such as immobility resulting from spinal cord injury, poor nutritional status, and the presence of comorbidities play a more decisive role in the development of pressure ulcers. Therefore, in high risk patient populations, sex cannot be considered an independent predictive factor for the occurrence of pressure ulcers (Artaria, 2016).

Most subjects were classified as having overnutrition, comprising 57 patients (60.6%). Within the overnutrition group, the majority of patients 47

individuals (82.5%) did not develop pressure ulcers. These findings are consistent with the results of the Chi-square test, which demonstrated a non-significant p value of 0.248, indicating that nutritional status was not statistically associated with the occurrence of pressure ulcers. This lack of statistical significance may be influenced by the characteristics of the study population, which consisted of patients at high risk with severe immobility, in whom extrinsic factors such as pressure and shear forces contribute more strongly to tissue damage. The predominance of these mechanical factors may obscure the role of nutritional status as an intrinsic factor, thereby rendering it non-significant in the analysis (Cremasco et al., 2013).

Relationship Between Nutritional Status and Pressure Ulcer

The distribution based on nutritional status showed that in the undernutrition group, the majority of subjects 13 individuals (68.4%) did not develop pressure ulcers. In the normal nutritional status group, most cases also involved patients without pressure ulcers, comprising 12 subjects (66.7%). Similarly, in the overnutrition group, the highest proportion was observed among patients without pressure ulcers, totaling 47 subjects (82.5%) (Table 2).

Table 2
Association Between Nutritional Status and the Occurrence of Pressure Ulcers in ICU Patients

Variable	Pressure ulcer		P-value
	Pressure ulcer, n (%)	No pressure ulcer, n (%)	
Nutritional status			
Underweight	6 (31,6%)	13 (68,4%)	0.248
Normal	6 (33,3%)	12 (66,7%)	
Overweight	10 (17,5%)	47 (82,5%)	

The results of the Chi-square analysis examining the association between nutritional status and the occurrence of pressure ulcers in ICU patients showed a significance value of p = 0.248. This result indicates that nutritional status was not significantly associated with the development of pressure ulcers.

The findings of this study are consistent with the results of the Chi-square test, which demonstrated a significance value of 0.248, indicating that nutritional status was not statistically associated with the occurrence of pressure ulcers (Cremasco et al., 2013). However, these findings contrast with those of other studies that reported a significant association between nutritional status particularly malnutrition and the development of pressure ulcers, as evidenced by a p value of 0.0002 (Kumar et al., 2019). The lack of statistical significance in the present study may be influenced by the characteristics of the study population, which consisted of patients at high risk with severe immobility, in whom extrinsic factors such as pressure and shear forces contribute more

strongly to tissue damage. The predominance of these mechanical factors may obscure the role of nutritional status as an intrinsic factor, thereby rendering it non-significant in the analysis (Cremasco et al., 2013).

According to a Cochrane Review by Langer et al. (2024), undernutrition or malnutrition increases the risk of pressure ulcer development by reducing the ability of skin tissue to tolerate pressure. Inadequate energy and protein intake leads to a loss of supportive tissue and impaired tissue perfusion, rendering the skin more susceptible to ischemia and damage caused by pressure, shear, and friction. In addition, malnutrition delays tissue regeneration and impairs wound healing processes. In contrast, normal and overnutrition statuses have not been reported as major risk factors, thereby reinforcing the conclusion that nutritional deficits play a critical role in the development of pressure ulcers.

Other studies have reported that nutritional status has not been consistently associated with the occurrence of pressure ulcers. This finding is in line with a systematic review by Alderden et al. (2025), which concluded that evidence regarding the role of nutritional status in critically ill patients remains inconclusive. Of the eleven studies evaluating nutrition-related factors, only five studies (45%) identified nutritional status as an independent predictor of pressure ulcers, while the remaining six studies including four with high methodological quality found no such association. Undernutrition, particularly moderate to severe malnutrition, has been shown to increase the risk of pressure ulcer development in critically ill patients. Malnutrition characterized by high nutritional risk scores or low serum albumin levels has been significantly associated with pressure ulcer occurrence, even after controlling for other risk factors. These conditions reduce tissue tolerance to pressure due to the loss of supportive tissue, impaired perfusion, and diminished skin regenerative capacity.

In contrast, normal nutritional status and overnutrition have not shown a consistent association as independent risk factors (Alderden et al., 2025). In patients who are overweight or obese, the accumulation of adipose tissue may compress small blood vessels (capillaries), thereby impairing tissue perfusion. Adipose tissue also has relatively lower vascularization compared with muscle tissue, resulting in suboptimal oxygen and nutrient delivery. These conditions render the tissue more susceptible to hypoxia and ischemia under prolonged pressure, ultimately increasing the risk of pressure ulcer development (Zahra et al., 2023).

The findings of this study are not consistent with several other studies that have reported a significant association between malnutrition and the development of pressure ulcers, particularly among critically ill patients or those with high levels of immobilization (Lichterfeld-Kottner et al., 2020).

Furthermore, the journal emphasized that inconsistencies in findings across studies are largely influenced by variations in the methods used to assess nutritional status. The lack of standardized nutritional assessment tools for ICU patients complicates the identification of the specific impact of nutritional status on the risk of pressure ulcer development. Therefore, although nutritional status

is theoretically considered an important factor in pressure ulcer prevention, current empirical evidence in critically ill populations remains insufficient to establish a definitive causal relationship between nutritional status and the occurrence of pressure ulcers (Alderden et al., 2025).

CONCLUSION

No significant association was found between nutritional status and the occurrence of pressure ulcers among ICU patients. Future studies are recommended to consider other variables that may act as potential confounding factors, such as mobility level, length of hospital stay, comorbidities, and the use of specific medical devices, as well as to employ more standardized clinical documentation to improve data quality and consistency. In addition, studies with longer observation periods (long-term studies) should be considered to provide a more comprehensive understanding of changes in nutritional status and the progression of pressure ulcers during hospitalization.

BIBLIOGRAPGHY

Safitri, I., Amir, Y., Dewi, W. N. (2021). Gambaran pengetahuan mahasiswa keperawatan tentang ulkus dekubitus. *Scientific Journal of Nursing,* 7(1), 1-126. https://doi.org/10.33023/jikep.v7i1.671

Yustina, A., Setiawan S., Putra I S. (2021). Pengembangan panduan pencegahan ulkus dekubitus di Ruangan Intensive Care Unit (ICU). *Journal of Telenursing (JOTING),* 3(1). doi:10.31539/joting.v3i1.2184.

Krisnawati, D., Faidah, N., Purwandari, N. P. (2022). Pengaruh perubahan posisi terhadap kejadian decubitus pada pasien tirah baring di Ruang Irin Rumah Sakit Mardi Rahayu Kudus. *TSCD3Kep Journal,* 7(1),15-26. https://doi.org/10.35720/tscd3kep.v7i01.332

Ciríaco, G. V., Menezes-Júnior, L. A. A., Oliveira, W. W., Talvani, A., & Turbino Ribeiro, S. M. L. (2023). Pressure ulcer incidence in critically ill patients: Role of body mass index, nutrition therapy, and other non-nutritional factors. *Clinical nutrition ESPEN*, *55*, 285–291. https://doi.org/10.1016/j.clnesp.2023.03.024

Chen, F., Wang, X., Pan, Y., Ni, B., & Wu, J. (2023). The paradox of obesity in pressure ulcers of critically ill patients. *International wound journal*, *20*(7), 2753–2763. https://doi.org/10.1111/iwj.14152

Hyun, S., Li, X., Vermillion, B., Newton, C., Fall, M., Kaewprag, P., Moffatt-Bruce, S., & Lenz, E. R. (2014). Body mass index and pressure ulcers: improved predictability of pressure ulcers in intensive care patients. *American journal of critical care : an official publication, American Association of Critical-Care Nurses*, *23*(6), 494–501. https://doi.org/10.4037/ajcc2014535

Serpa, L. F., Oliveira, A. S., Nogueira, P. C., & de Gouveia Santos, V. L. C. (2020). Risk for undernutrition and development of pressure injury in hospitalised patients in Brazil: Multicentre prospective cohort study. *International wound journal*, *17*(4), 916–924. https://doi.org/10.1111/iwj.13352

Cremasco, M. F., Wenzel, F., Zanei, S. S. V., & Whitaker, I. Y. (2013). Pressure ulcers in the intensive care unit: The relationship between nursing workload, illness severity and pressure ulcer risk. *Journal of Clinical Nursing, 22*(15–16), 2183–2191. **https://doi.org/10.1111/j.1365-2702.2012.04216.x**

Artaria, M. D. (2016). Dasar biologis variasi jenis kelamin, gender, dan orientasi seksual. *BioKultur, 5*(2), 157–165.

Kumar, M. M., Mutreja, J., Singh, G. N., Vyas, K. C., Niranjan, A., & Kale, R. (2019). Prevalence, risk factors, and management of pressure sores in the teaching hospital-medical and surgical treatment. *International Journal of Contemporary Surgery, 7*(2),132-140. https://doi.org/10.37506/ijocs.v7i2.3218

Langer, G., Wan, C. S., Fink, A., Schwingshackl, L., & Schoberer, D. (2024). Nutritional interventions for preventing and treating pressure ulcers. *The Cochrane database of systematic reviews*, *2*(2), CD003216. https://doi.org/10.1002/14651858.CD003216.pub3

Alderden, J., Brooks, K. R., Kennerly, S. M., Yap, T. L., Dworak, E., & Cox, J. (2025). Risk factors for pressure injuries in critical care patients: An updated systematic review. *International Journal of Nursing Studies, 169*, 30. DOI: 10.1016/j.ijnurstu.2025.105127

Zahra, A. A., Supriyadi, S., & Dwiningsih, S. U. (2023). Pengaruh massage effleurage dengan Virgin Coconut Oil (VCO) terhadap pencegahan risiko dekubitus pada pasien stroke non hemoragik. *Jurnal Ilmiah Permas: Jurnal Ilmiah STIKES Kendal,* 13(2):665-672. DOI:10.32583/pskm.v13i2.785

Lichterfeld-Kottner, A., Lahmann, N., & Kottner, J. (2020). Sex-specific differences in prevention and treatment of institutional-acquired pressure ulcers in hospitals and nursing homes. *Journal of Tissue Viability, 29*(3), 204–210. DOI: 10.1016/j.jtv.2020.05.001

Zulaikah, Kristiyawati, S. P., & Purnomo, S. E. C. (2017). Pengaruh alih baring 2 jam terhadap risiko dekubitus dengan varian berat badan pada pasien bedrest total di SMC RS Telogorejo. *Jurnal Ilmu Keperawatan dan Kebidanan, 3*.