

EFFECTIVENESS OF OLIVE OIL AND HYDROCOLLOID DRESSINGS IN THE PREVENTION OF PRESSURE ULCERS AMONG ICU PATIENTS: EVALUATION USING THE CUBBIN AND JACKSON SCALE

Hengki Joktery, Ferawaty Simanjuntak

Nursing Department, Mayapada Hospital Jakarta Selatan, Jakarta, Indonesia

Corresponding Author: hengkijoktery@gmail.com

ABSTRACT

Pressure ulcers are one of the highest causes of mortality and morbidity in patients with prolonged bed rest in intensive care units. This condition occurs due to prolonged pressure on soft tissue over bony prominences that cause localized tissue damage. Pressure ulcer prevention is an important aspect in critical care, one of which is through topical interventions such as olive oil and hydrocolloid dressings. This study aims to determine the effectiveness of administering olive oil and hydrocolloid dressings on preventing pressure ulcers using the Cubbin and Jackson Scale as an evaluation tool. This study used a Quasi-Experimental design with a Pretest–Posttest with Control Group Design. The study sample consisted of 56 respondents selected using a purposive sampling technique. Data analysis was performed using the Wilcoxon test to determine the difference before and after the intervention. The results showed that administering olive oil on preventing pressure ulcers had an Asymp. Sig (2-tailed) value of 0.001, while the administration of hydrocolloid dressings also showed an Asymp. Sig (2-tailed) value of 0.001. Conclusion The administration of olive oil and hydrocolloids is effective in preventing pressure ulcers in patients with prolonged bed rest in intensive care units. The administration of olive oil and the use of hydrocolloid dressings can be used as effective, safe, and easy-to-implement preventive nursing interventions. These two interventions have the potential to be included in the standard operating procedures (SOP) for skin care in intensive care units using the Cubbin and Jackson Scale and support the improvement of nurses' competence in assessing the risk of pressure ulcers and providing care that focuses on preventing complications.

Keywords: Pressure ulcer; Administration of olive oil; Hydrocolloid; Cubbin and Jackson Scale

Introduction

Pressure ulcers are one of the leading causes of mortality and morbidity in patients with prolonged bed rest in intensive care units (Asni, 2025). This condition not only prolongs the length of stay but also increases healthcare costs and reduces the patient's quality of life. Critically ill patients treated in the Intensive Care Unit (ICU) are at high risk of developing pressure ulcers due to prolonged immobilization, the use of invasive medical devices, and impaired tissue perfusion. Continuous pressure on areas of the body with bony prominences, such as the sacrum and heels, causes circulatory impairment and tissue damage that can progress from mild skin erythema to deep wounds affecting muscle and bone (Potter & Perry,

2021).

Pressure ulcers are now understood to result not only from prolonged pressure but also from shear forces (shear stress and shear strain) that cause internal tissue deformation, allowing tissue damage to occur even before visible skin signs appear (Black et al., 2023). Skin microclimate conditions—particularly humidity and temperature—have also been shown to exacerbate friction and accelerate tissue damage (Gefen et al., 2023). Meta-analyses indicate that ICU patients are at high risk of developing pressure ulcers, with a global incidence ranging from 11.5–32.7% (Labeau et al., 2021) and a prevalence of pressure injuries due to medical devices reaching 14–20% (Gou et al., 2023). A recent study in Portuguese ICUs also reported a prevalence of 6.81% and an average incidence of 3.76%, with the sacrum and heels being the most common sites (Silva et al., 2023). In addition to external factors, the risk increases in patients with advanced age, poor nutritional status, and comorbidities such as diabetes and cardiovascular disorders (Alshahrani et al., 2024). Thus, pressure ulcers are viewed as the result of a complex interaction between external factors (pressure, shear, moisture, medical devices) and internal patient factors (age, nutritional status, tissue perfusion, and cell regeneration capacity).

In Indonesia, a similar situation was also found. A multicenter study in four general hospitals reported an overall prevalence of category I–IV pressure ulcers of 8.0%, with a nosocomial prevalence of 4.5% (Afiati et al., 2021). These data highlight a significant gap between the WHO standard, which targets zero prevalence, and the reality on the ground, both globally and nationally. This demonstrates that despite preventative measures, implementation still faces various obstacles. Therefore, pressure ulcers remain a quality indicator of care that requires serious attention, particularly in intensive care units with high-risk patients.

Several previous studies have demonstrated the effectiveness of pressure ulcer prevention interventions using olive oil and hydrocolloids. A study by Miraj (2020) reported that olive oil application was effective in reducing pressure ulcer areas in high-risk patients. Similar findings were demonstrated by Herawati (2018), who stated that the use of hydrocolloid dressings was able to prevent pressure ulcers in patients with prolonged bed rest, particularly in areas with bony prominences such as the sacrum, heels, and elbows. However, in practice, gaps remain. Pressure ulcer prevention efforts in ICU patients are generally limited to repositioning every 2 hours based on the Cubbin and Jackson Scale guidelines, while additional interventions such as skin care with olive oil or mechanical protection using hydrocolloids have not been optimally implemented. This has implications for the unmet quality of care targets, with pressure ulcer incidence still occurring despite standard operating procedures being implemented. Therefore, there is a need to integrate previous research evidence into clinical practice to improve the effectiveness of pressure ulcer prevention in intensive care units.

The Cubbin and Jackson Scale is an instrument specifically designed to assess pressure ulcer risk in ICU patients, as it takes into account clinical variables relevant to critically ill patients. This scale includes 10 key indicators, including skin condition, mental status, mobility, activity, hemodynamics, nutritional status, respiration, use of assistive devices, and tissue perfusion. Each indicator is scored from 1–4, with a total score ranging from 10–40. A score of ≤ 24 indicates a high risk, 25–29 a moderate risk, and ≥ 30 a low risk of pressure ulcer development (Cubbin & Jackson, 1991). Several recent studies have shown that this scale has high validity and sensitivity (Se: 0.89; Sp: 0.76) compared to the Braden Scale in predicting pressure ulcer incidence in the ICU (Kim et al., 2013; Lahmann et al., 2020).

Based on the background description above, the research question is to identify the effectiveness of olive oil administration in preventing pressure ulcers in high-risk patients and to identify the effectiveness of hydrocolloid dressings in preventing pressure ulcers in high-risk

patients.

Method

The research design used in this study is Quasi Experiment. Quasi experiment is an experiment that has not or does not have the characteristics of a real experimental design by using the Pretest - Posttest with Control Group approach. This study was conducted in the intensive care unit at one of the hospitals in South Jakarta. The study took place from April to August 2025, the sampling technique used purposive sampling by meeting the inclusion- exclusion criteria. For the intervention sample, olive oil was given to the sample when the patient entered either from the ER or inpatient. The intervention of giving olive oil was given for 3 treatments and observed the following day, for the control sample, hydrocolloid was given on the first day of entering the ICU and then observed on the day on H+3. The study was conducted using the SOP measuring tool for administering olive oil and Hydrocolloid, the success rate was measured using the Cubbin and Jakson scale. Cubbin and Jakson scales have been standardized in the intensive care room.

to analyze the effectiveness of administering olive oil and hydrocolloid on preventing pressure ulcers, with a confidence level of 95% or can also be done by comparing the p-value with the α value of 0.05. The H_a hypothesis decision is accepted if the p-value is smaller than α (alpha) or ($p < 0.05$) then the hypothesis is rejected. before conducting a bivariate analysis, a normality test is first performed. The normality test uses the T-test for unpaired groups, the data distribution in the study is normally distributed, by conducting a normality test using the Kolmogorov-Smirnov test.

To ensure the rigor of the qualitative data, four criteria were applied: credibility, transferability, dependability, and confirmability. Credibility was maintained through triangulation of data sources and member checking with participants to validate the findings. Transferability was enhanced by providing a detailed description of the study context and participants. Dependability was achieved by documenting all research procedures and maintaining consistency throughout the data collection and analysis process. Confirmability was ensured through an audit trail and reflexive notes to minimize researcher bias.

This study was approved by the Health Research Ethics Committee of with approval reference number. All participants were informed about the purpose and procedures of the study, their right to withdraw at any time, and confidentiality of their responses. Written informed consent was obtained from each participant prior to data collection to ensure voluntary participation and ethical compliance.

Results and Discussion

Result

Figure 1: Analysis of the effectiveness of olive oil in preventing pressure ulcers.

An analysis of the effectiveness of olive oil in preventing pressure ulcers at a hospital in South Jakarta can be seen in the table below.

Comparison	Ranks Category	N	Mean Rank	Sum of Ranks	Z	Asymp. Sig (2-tailed)
Post-Olive Oil – Pre- Olive Oil	Negative Ranks	1a	10.50	10.50	-4,468	0.001

Positive Ranks	27b	14.65	450.00
Ties	2c	-	-

Based on table 4.8, the results of the Wilcoxon Signed Rank Test show that the Asymp. Sig (2-tailed) value is 0.001, which is smaller than 0.05, indicating a significant difference between the values before and after the olive oil intervention. The majority of respondents experienced an increase in prevention scores (Positive Ranks = 27), while only 1 respondent experienced a decrease in scores (Negative Ranks = 1). Thus, it can be concluded that administering olive oil has significant effectiveness in preventing pressure ulcers in patients after the intervention.

Figure 2: Analysis of the effectiveness of hydrocolloids in preventing pressure ulcers before and after intervention.

Analysis of the effectiveness of hydrocolloids in preventing pressure ulcers in one of the hospitals in South Jakarta can be seen in the table below.

Comparison	Ranks Category	N	Mean Rank	Sum of Ranks	Z	Asymp. Sig (2-tailed)
Post–Hydrocolloid – Pre–Hydrocolloid	Negative Ranks	1a	10.50	10.50	-4,150	0.001
	Positive Ranks	27b	14.65	395.50		
	Ties	2c	-	-		

Based on the results of the Wilcoxon Signed Rank Test, the Asymp. Sig (2-tailed) value was 0.001, which is smaller than 0.05. This indicates a significant difference between the values before and after the administration of hydrocolloid intervention. The majority of respondents experienced an increase in prevention scores (Positive Ranks = 27), while only one respondent experienced a decrease in scores (Negative Ranks = 1), and there were no scores that remained constant (Ties = 0).

Discussion

Based on the results of the study, it was found that the majority of respondents had a high- risk score on the Cubbin and Jackson Scale, totaling 13 respondents (46.4%) before the olive oil intervention. After the intervention, there was a change in scores, with 18 respondents (64.3%) categorized as moderate risk. These findings indicate a significant difference between the pre- and post-intervention values.

The intervention was carried out by applying olive oil to body areas prone to pressure, such as the sacrum, heels, and other bony prominences that are susceptible to developing pressure ulcers. The oil was applied every 1–2 hours to allow optimal absorption through the skin surface, thereby helping to maintain skin moisture and elasticity.

Statistical analysis using the Wilcoxon Signed Rank Test showed an Asymp. Sig (2-tailed)

value of 0.001 (< 0.05), indicating a significant difference between the pre- and post-intervention scores. Thus, it can be concluded that olive oil is effective in reducing the risk of developing pressure ulcers in high-risk patients.

This finding is consistent with the study by Hernández-Vásquez (2022) who demonstrated that the topical use of olive oil significantly reduced the incidence of pressure ulcers in high-risk patients. The meta-analysis included four randomized controlled trials (RCTs) involving a total of 1,601 participants from Spain, Turkey, and Iran. The pooled analysis showed that topical olive oil application significantly reduced the incidence of pressure ulcers compared to the control group, with a Risk Ratio (RR) of 0.56 (95% CI = 0.39–0.79) and $I^2 = 0\%$, indicating a 44% reduction in risk. The preventive effect was even stronger among ICU patients, with an RR of 0.48 (95% CI = 0.28–0.82).

These findings are also supported by Lupiáñez-Pérez et al. (2013), who conducted a triple-blinded randomized controlled trial in Andalusia, Spain. The study compared the effectiveness of olive oil with hyperoxygenated fatty acids (HOFA) among immobilized patients receiving primary health care. The results showed that topical olive oil was effective in preventing stage II pressure ulcers. Olive oil was found to be non-inferior to HOFA but more cost-effective, making it a safe, economical, and effective alternative for pressure ulcer prevention in primary care settings.

Similarly, Fallahi et al. (2022) in Iran reported comparable results. In a randomized clinical trial comparing the effects of aloe vera gel, olive oil, and a combination of aloe vera–olive oil among ICU patients, both pure olive oil and the combined preparation were found to be effective in preventing pressure ulcers. The interventions were safe, affordable, and easily available, offering a natural alternative for the care of high-risk patients.

Moreover, Díaz-Valenzuela et al. (2019) in Spain, through a multicenter double-blinded RCT, found that the incidence of pressure ulcers in the olive oil group was 4.18%, compared to 6.57% in the HOFA group. Although the difference was not statistically significant, the analysis indicated that olive oil was equally effective as HOFA in preventing pressure ulcers, especially in the sacral and heel areas for stage I (non-blanchable erythema) ulcers.

The results were further supported by Lupiáñez-Pérez et al. (2015), who compared the effectiveness of olive oil and HOFA in immobilized patients under home care. Both per-protocol and intention-to-treat analyses showed no significant difference between the two groups, with an average Relative Risk (RR) close to 1.0. For instance, the RR for the right trochanter was 0.80 (95% CI: 0.70–0.92) and for the left trochanter was 0.77 (95% CI: 0.60–0.98), indicating a lower risk of pressure ulcers in the olive oil group.

Overall, these findings are consistent with previous scientific evidence demonstrating that olive oil provides a protective effect on skin integrity by maintaining moisture and enhancing tissue elasticity. Its high content of monounsaturated fatty acids (oleic acid) and vitamin E plays a crucial role in epithelial cell regeneration and in preventing tissue damage caused by prolonged pressure. Therefore, topical olive oil can be recommended as an effective and affordable non-pharmacological intervention for pressure ulcer prevention, particularly among high-risk patients such as postoperative or ICU patients.

Based on the results of the study, it was found that most respondents had a high Cubbin and Jackson Scale score (19 respondents) before receiving the hydrocolloid dressing intervention. After the intervention, there was a decrease in the number of respondents with a high-risk score to 12 people (42.9%).

The intervention was applied to patients who met the inclusion criteria and was initiated immediately after ICU admission. The hydrocolloid dressing was applied to body areas at high risk for pressure ulcer development, and evaluation was conducted after three days of treatment. Statistical analysis using the Wilcoxon Signed Rank Test yielded an Asymp. Sig (2-tailed)

value of 0.001, which is smaller than α (0.05). This indicates a statistically significant difference between the Cubbin and Jackson Scale scores before and after the hydrocolloid dressing intervention. Therefore, it can be concluded that hydrocolloid dressings are effective in reducing the risk of pressure ulcers among high-risk patients.

These results are consistent with the findings of Luo et al. (2023), who evaluated the effectiveness of hydrocolloid dressings in preventing facial pressure ulcers among patients using non-invasive positive pressure ventilation (NIPPV). Their meta-analysis revealed that hydrocolloid dressings significantly reduced the incidence of facial pressure ulcers compared to the control group, with an Odds Ratio (OR) = 0.16 (95% CI: 0.11–0.24; $p < 0.001$). This means that patients using hydrocolloid dressings had an 84% lower risk of developing pressure ulcers caused by ventilator masks compared to those without dressings.

However, these findings contrast with the study by Cortés et al. (2023), a randomized controlled trial comparing hydrocolloid dressings with petrolatum (Vaseline) for preventing pressure ulcers among hospitalized adult patients. Their results showed that hydrocolloid dressings did not demonstrate superior effectiveness compared to conventional petrolatum in high-risk patients.

Conclusion

This study revealed that both olive oil and hydrocolloid dressings are effective in reducing the risk of pressure ulcers among high-risk patients, as indicated by a significant difference in Cubbin and Jackson Scale scores before and after the intervention ($p < 0.05$). The topical application of olive oil was proven to maintain skin integrity by improving moisture and tissue elasticity, while hydrocolloid dressings provided a protective effect by reducing friction and shear forces on pressure-prone areas.

The findings of this study advance the current state of knowledge by strengthening the scientific evidence that simple, non-pharmacological, and cost-effective interventions can play a crucial role in pressure ulcer prevention, particularly in intensive care settings. Whereas previous studies mainly examined the effectiveness of each intervention separately, this study contributes further by comparatively evaluating both interventions in a clinical context involving high-risk hospitalized patients.

The scientific justification of these findings lies in the physiological mechanisms of both interventions. Olive oil contains monounsaturated fatty acids and vitamin E, which promote epithelial regeneration and enhance skin hydration. Meanwhile, hydrocolloid dressings maintain an optimal moist environment, accelerate tissue repair, and protect the skin from pressure and shear forces. Together, these mechanisms support the use of both interventions as evidence-based preventive nursing measures.

From a practical perspective, the results recommend that olive oil and hydrocolloid dressings be integrated into Standard Operating Procedures (SOPs) and clinical nursing guidelines, particularly for postoperative and ICU patients with immobilization. These interventions are effective, safe, easy to apply, and affordable, making them suitable for implementation in both high- and low-resource healthcare settings.

Future research is recommended to examine the long-term effectiveness of these interventions across various populations and clinical settings, explore their combined or synergistic effects, and conduct cost-effectiveness analyses to assess their economic impact within healthcare systems. Comparative studies with other modern preventive products are also warranted to expand the range of effective strategies for pressure ulcer prevention.

From a nursing practice perspective, the application of simple, evidence-based interventions such as olive oil and hydrocolloid dressings is expected to enhance patient safety, improve the quality of nursing care, and reduce hospital costs associated with pressure ulcer management.

Additionally, strengthening nurses' competencies in pressure ulcer risk assessment using the Cubbin and Jackson Scale and in selecting appropriate preventive interventions is essential to ensure consistent, high-quality nursing practice across care settings.

Reference

- Aboud, A. M. Al, & Manna, B. (2021). Wound pressure injury management. In StatPearls. Treasure Island, FL: StatPearls Publishing.
- Amir, Y., Tan, F.E.S., Halfens, R., Lohrmann, C., & Schols, J. (2017). Pressure ulcer prevalence and care in Indonesian hospitals: A multicenter, cross-sectional evaluation using an extended Donabedian model. *Ostomy Wound Management*, 63(2), 8–23.
- Aryani, D., Rahmawati, S., & Putri, N. (2024). The effectiveness of olive oil in preventing pressure ulcers in bedridden patients in inpatient wards. *Journal of Medical-Surgical Nursing*, 9(1), 12–20.
- Asni, N. (2025). Pressure ulcers as a cause of mortality in patients with prolonged bed rest. *Journal of Clinical Nursing*, 10(1), 12–18.
- Bhoki, MW, Mardiyono, S., Sarkum, S., & Kupang, P. (2014). Braden Scale and Norton in predicting risk of pressure sores in ICU room. *Journal of Health Research*, 3(2).<https://doi.org/10.31983/JRK.V3I2.226>
- Coleman, S., Nixon, J., Keen, J., Wilson, L., & McGinnis, E. (2022). The impact of nursing interventions on pressure ulcer prevention in intensive care: A systematic review. *International Journal of Nursing Studies*, 126, 104130.
- Cortés-Herrera, C., Rodríguez, M., & Torres, L. (2023). Effectiveness of hydrocolloid dressings for preventing pressure ulcers in high-risk patients. *Scientific Reports*, 13(4), 1214–1223.
- Díaz-Valenzuela, A., Lupiáñez-Pérez, I., & Hernández-Morales, R. (2019). Effectiveness and safety of olive oil preparation for topical use in pressure ulcer prevention: Multicentre, controlled, randomized, and double-blinded clinical trial. *BMC Geriatrics*, 19(1), 340.
- Dumville, J.C., Keogh, S.J., Liu, Z., Stubbs, N., Walker, R.M., & Fortnam, M. (2015). Alginate dressings for treating pressure ulcers. *Cochrane Database of Systematic Reviews*.<https://doi.org/10.1002/14651858.CD011277.pub2>
- El-Sayed, M., & Hegazy, S. (2021). The effect of olive oil application on skin integrity among immobilized patients: A randomized controlled trial. *Journal of Clinical Nursing*, 30(5–6), 845–852.
- El-Sayed, M.A., Hassan, S.A., & Abo El-Fetoh, N.M. (2021). Topical use of olive oil in prevention and management of pressure ulcers: A review. *Journal of Wound Care*, 30(5), 350–356.
- Fernanda, D., & Yanto, R. (2023). Risk factors for pressure ulcers in patients with prolonged bed rest: Literature review. *Journal of Nursing Science*, 8(2), 45–53.
- Fetters, M.D. (2022). *The mixed methods research workbook: Activities for designing, conducting, and publishing projects*. SAGE Publications.
- Gaspar, S., Almeida, A., & Fernandes, M. (2021). Nurses' adherence to pressure injury prevention protocols and its impact on outcomes: A systematic review. *Journal of Clinical Nursing*, 30(17–18), 2567–2578.<https://doi.org/10.1111/jocn.15750>
- Gaspar, S., Rodrigues, A., & Pereira, C. (2021). Nurses' educational interventions in pressure ulcer prevention: A systematic review. *Wound Practice and Research*, 29(2), 67– 75.
- Hidayat, AA (2017). *Nursing research methods and data analysis techniques*. Salemba Medika.
- Hidayat, AA (2018). *Nursing research ethics*. Salemba Medika.

- Hoogendoorn, I., Reenalda, J., Koopman, BFJ.M., & Rietman, J.S. (2017). The effect of pressure and shear on tissue viability of human skin in relation to the development of pressure ulcers: A systematic review. *Journal of Tissue Viability*, 26(3), 157–171. <https://doi.org/10.1016/j.jtv.2017.04.003>
- Kamińska, M., Wąsik, J., & Zielińska, A. (2020). Effectiveness of hydrocolloid dressings for treating pressure ulcers in adult patients: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 17(18), 6524.
- Kottner, J., Cuddigan, J., Carville, K., Balzer, K., Berlowitz, D., Law, S., ... & Haesler, E. (2019). Prevention and treatment of pressure ulcers/injuries: The protocol for the second update of the international clinical practice guideline. *Journal of Tissue Viability*, 28(2), 51–58. <https://doi.org/10.1016/j.jtv.2019.01.001>
- Lin, T.K., Zhong, L., & Santiago, J.L. (2018). Anti-inflammatory and skin barrier repair effects of topical application of some plant oils. *International Journal of Molecular Sciences*, 19(1), 70. <https://doi.org/10.3390/ijms19010070>
- Lupiáñez-Pérez, I., Armenteros, B., & Díaz-Valenzuela, A. (2013). Cost-effectiveness of olive oil-based skin care compared to commercial products for pressure ulcer prevention in community-dwelling elderly. *Trials*, 14, 169.
- Miraj, S., Pourafzali, S., Ahmadabadi, Z., & Rafiei, Z. (2020). Effect of olive oil in preventing the development of grade one pressure ulcers in intensive care unit patients. *International Journal of Preventive Medicine*, 11(1), 23. https://doi.org/10.4103/ijpvm.IJPVM_545_18
- Moore, Z., Johanssen, E., & van Etten, M. (2013). A review of PU prevalence and incidence across Scandinavia, Iceland and Ireland (Part I). *Journal of Wound Care*, 22(7), 361–362, 364–368. <https://doi.org/10.12968/jowc.2013.22.7.361>
- Moore, Z., & Webster, J. (2018). Dressings and topical agents for preventing pressure ulcers. *Cochrane Database of Systematic Reviews*, (12), CD009362.
- Munthe, APRF (2019). Indicators of patient safety target implementation in hospitals. <https://doi.org/10.31219/osf.io/f3sx6>
- National Pressure Injury Advisory Panel (NPIAP). (2023). Prevention and treatment of pressure injuries: Clinical practice guideline. Washington, DC: NPIAP.
- Notoatmodjo, S. (2018). Health research methodology. Rineka Cipta.
- Potter, PA, & Perry, AG (2010). Nursing fundamentals textbook: Concepts, processes and practice (4th ed., Vol. 2). EGC.
- Qaddumi, J., Al-Smadi, A., & Tawalbeh, L. (2023). Factors influencing nurses' compliance with pressure ulcer prevention guidelines: A systematic review. *Nursing Open*, 10(1), 400–412.
- Rodríguez, J.M., García, R., & López, C. (2022). Olive oil application for skin protection in elderly ICU patients: A quasi-experimental study. *Intensive and Critical Care Nursing*, 68, 103165. <https://doi.org/10.1016/j.iccn.2022.103165>
- Rodríguez, M., Pérez, M., & Torres, L. (2022). Hydrocolloid dressings for prevention of pressure injuries in immobile patients: A randomized controlled trial. *Wound Management & Prevention*, 68(4), 24–32.
- Saha, D., & Banerjee, S. (2020). Comparative study of hydrocolloid and foam dressings in preventing pressure injuries among ICU patients. *Journal of Wound Care*, 29(7), 385–391.
- Sönmez, D., & Korkmaz, F. (2020). The effect of olive oil application on prevention of pressure injuries: A randomized controlled trial. *Journal of Wound Care*, 29(9), 522–528.
- Sugiyono. (2016). Quantitative, qualitative and R&D research methods. Alfabeta.

- Systematic Review and Meta-Analysis. (2022). Efficacy and safety of olive oil for prevention of pressure injuries: A systematic review and meta-analysis. *Wound Management & Prevention*, 68(5), 28–35.
- World Health Organization (WHO). (2022). Global report on pressure ulcer prevention and management. Geneva: WHO.