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EFFECTIVENESS OF EFFLEURAGE MASSAGE IN REDUCING THE RISK OF HOSPITAL-ACQUIRED PRESSURE INJURIES: IMPLICATIONS FOR NURSING MANAGEMENT IN GERIATRIC CARE

Reni Asmara [1], Tri Kurniati[2], Dhea Natashia[3], Harif Fadhillah[4], Muhammad Hadi[5]
[1]Master Student, Master in Nursing Program, Faculty of Nursing, Universitas Muhammadiyah Jakarta
[3]Head Nurse, Primaya Bekasi Hospital, Bekasi, West Java, Indonesia
[2,4,5]Lecturer, Master in Nursing, Faculty of Nursing, Universitas Muhammadiyah Jakarta
natashia_dhea@umj.ac.id

Abstrak
Hospital Acquired Pressure Injury (HAPI) merupakan cedera lokal pada kulit atau jaringan yang terjadi selama perawatan di rumah sakit akibat tekanan, gesekan, atau keduanya. Massage effleurage diyakini dapat meningkatkan sirkulasi darah dan mengurangi risiko HAPI pada pasien geriatri. Penelitian ini bertujuan untuk mengetahui pengaruh massage effleurage terhadap risiko HAPI pada pasien geriatri rawat inap. Penelitian menggunakan desain kuasi-eksperimental dengan pretest-posttest non-equivalent control group, melibatkan 34 pasien geriatri yang dibagi menjadi kelompok intervensi dan kontrol masing-masing 17 orang. Analisis bivariat menggunakan paired t-test dan independent t-test, serta analisis multivariat menggunakan Repeated Measure ANOVA. Hasil penelitian menunjukkan peningkatan skor Braden pada kelompok intervensi dari 13,18 ± 2,038 menjadi 20,71 ± 2,229 setelah 5 hari intervensi ($p < 0,001$), menandakan penurunan risiko HAPI yang signifikan. Kelompok kontrol tidak menunjukkan perubahan signifikan. Analisis multivariat menunjukkan efek waktu, kelompok, dan interaksi yang signifikan terhadap penurunan risiko HAPI, dengan partial eta squared masing-masing 0,649, 0,757, dan 0,703. Temuan ini menegaskan bahwa massage effleurage efektif sebagai intervensi preventif untuk mengurangi risiko HAPI pada pasien geriatri.
Kata Kunci: *Massage Effleurage, Hospital Acquired Pressure Injury, Pasien Geriatri*

Abstract
Hospital Acquired Pressure Injury (HAPI) is a local injury to the skin or tissue occurring during hospital care due to pressure, friction, or both. Effleurage massage is believed to improve blood circulation and reduce HAPI risk in geriatric patients. This study aimed to determine the effect of effleurage massage on HAPI risk in hospitalized geriatric patients. A quasi-experimental pretest-posttest non-equivalent control group design was employed with 34 geriatric patients, divided equally into intervention and control groups. Bivariate analysis used paired and independent t-tests, while multivariate analysis employed Repeated Measure ANOVA. Results showed that Braden Scale scores in the intervention group increased from 13.18 ± 2.038 to 20.71 ± 2.229 after 5 days of intervention ($p < 0.001$), indicating a significant reduction in HAPI risk. The control group showed no significant change. Multivariate analysis revealed significant effects of time, group, and interaction on HAPI risk reduction, with partial eta squared values of 0.649, 0.757, and 0.703, respectively. These findings confirm that effleurage massage is an effective preventive intervention to reduce HAPI risk in geriatric patients.
Keywords: *Effleurage Massage, Hospital Acquired Pressure Injury, Geriatric Patients*

* Corresponding author :
Address : Jl. Cempaka Putih Tengah I/I Jakarta, Indonesia
Email : natashia_dhea@umj.ac.id
Phone : 08111130689

INTRODUCTION

One of the key indicators of quality nursing care in hospitals is the reduction or absence of Hospital Acquired Pressure Injury (HAPI). HAPI is defined as a localized injury to the skin or underlying tissue, which may extend into muscle or bone, usually occurring over bony prominences due to prolonged pressure during hospitalization (NHS, 2018). The etiology of HAPI can be classified into Medical Devices Related Pressure Injuries (MDPIs) and Bed Sores. MDPIs result from prolonged pressure exerted by medical devices on the patient's skin, whereas Bed Sores arise from constant pressure on areas such as the sacrum, heels, coccyx, head, elbows, or ears, and may also result from clothing or incontinence materials (Kurtgöz et al., 2024).

Patients at high risk for HAPI include those with spinal cord injuries, orthopedic surgery patients, intensive care unit (ICU) patients, and geriatric patients (Kottner et al., 2019). Risk factors include intrinsic factors, such as immobility, malnutrition, comorbidities, and advanced age, as well as extrinsic factors, such as pressure, friction, and skin moisture (Aryana et al., 2018). Geriatric patients often present with multiple chronic conditions, age-related physiological decline, and reduced functional status, all of which increase their susceptibility to HAPI (Kvalsvik et al., 2024).

Global prevalence of HAPI remains high, ranging from 6% to 18.5% between 2015 and 2020 (Tubaishat et al., 2018). In Norway, HAPI prevalence was reported at 14.9%, influenced by age, low body weight, and diabetes (Børsting et al., 2018). In Indonesia, HAPI prevalence in hospitals reaches 4.5% (Bikbov et al., 2020), and underreporting remains a concern, with up to 69.7% of cases inadequately documented (Barakat-Johnson et al., 2018). HAPI contributes to severe complications, prolonged hospitalization, and increased healthcare costs (Liu et al., 2023).

Evidence from study indicates that effleurage massage can have a positive effect in preventing pressure injuries, particularly by improving local circulation, reducing tissue stiffness, and promoting skin integrity, which are critical factors in geriatric patients who are often immobile or physiologically compromised (Darmareja et al., 2020). The gentle, rhythmic stroking movements of effleurage massage are thought to enhance blood flow to areas at risk of pressure injury, facilitating nutrient delivery and waste removal in tissues prone to ischemia. Furthermore, clinical guidelines from the National Pressure Ulcer Advisory Panel (Kottner et al., 2019) highlight effleurage massage as an evidence-based intervention that not only prevents pressure injuries but also supports wound healing and pain management, making it a valuable addition to comprehensive geriatric care protocols. Despite these recommendations, implementation in clinical practice remains inconsistent, emphasizing the need for further research to establish standardized protocols and confirm its effectiveness across different hospital settings and patient populations.

Although previous studies suggest benefits of massage interventions, evidence regarding the effect of effleurage massage on reducing HAPI risk among hospitalized geriatric patients remains limited and inconsistent. Therefore, this study aims to address this gap by evaluating the effectiveness of effleurage massage in geriatric inpatients. The findings are expected to provide scientific evidence supporting effleurage massage as an integrated preventive strategy, offering practical guidance for healthcare providers to improve quality and safety in geriatric care.

METHODS

Study Design

This study employed a quasi-experimental design with a pretest-posttest non-equivalent control group approach to examine the effect of effleurage massage on the risk of hospital-acquired pressure injury (HAPI) in geriatric patients. This design allows for the investigation of causal relationships by comparing outcomes between an intervention group and a control group, although participants were not randomly assigned. The intervention group received effleurage massage in addition to standard care, while the control group received standard care only. Assessments were conducted at three time points: baseline (pretest), mid-intervention, and post-intervention.

Study Population and Sample

The study population consisted of all geriatric patients admitted to the inpatient unit at RS Primaya Bekasi Barat. A purposive sampling technique was employed to select participants who met the inclusion criteria, which included age ≥ 60 years, stable neurological status (Glasgow Coma Scale 10–15), adequate muscle strength, absence of psychiatric disorders, and a minimum hospital stay of five days. Patients with pre-existing pressure injuries, impaired mobility due to fractures or paresis, or a hospital stay of fewer than five days were excluded.

Sample in this study was 31 participants. Accounting for a 10% potential dropout, a total of 34 participants were recruited, with 17 assigned to the intervention group and 17 to the control group.

Intervention: Effleurage Massage

In this study, participants in the intervention group received effleurage massage, a gentle hand massage technique where the palms and fingers follow the contours of the body, moving toward the heart. The intervention aimed to reduce the risk of Hospital-Acquired Pressure Injury (HAPI) in geriatric inpatients.

Before the massage, the researcher introduced themselves, explained the procedure, obtained informed consent, and assessed the patient's vital signs and level of consciousness. Patients were positioned comfortably, preferably in prone position, or side-lying if prone was not feasible. A small amount of oil was applied to the hands, and massage was performed on key areas including the head, arms, back, gluteal region, sacrum, and legs, following 3–5 repetitions for each area while monitoring skin integrity and patient comfort.

Each session lasted 15–20 minutes, conducted twice daily for five consecutive days. At the end of each session, patient response was evaluated, the procedure was documented, and follow-up plans were explained.

Data Collection and Instruments

Data were collected using standardized forms and validated instruments. Participant demographics and clinical data, including age, gender, medical diagnosis, body mass index (BMI), blood glucose level, muscle strength, and vital signs, were recorded.

Risk of HAPI was assessed using the Braden Scale, which evaluates six domains: mobility, activity, sensory perception, skin moisture, nutritional status, and friction/shear. Lower scores indicate higher risk. Intervention monitoring was documented using a structured effleurage massage log, recording timing, duration, and staff signature for each session. Effleurage massage was delivered twice daily for 15–20 minutes over five consecutive days according to standard operating procedures.

Study Procedure

The study procedure was conducted following a structured sequence designed to ensure participant safety and methodological rigor. Ethical approval was obtained from the Faculty of Nursing, Universitas Muhammadiyah Jakarta, and permission to conduct the study was secured from hospital management. Prior to the study, pre-assessments were performed to determine the number of eligible geriatric patients in the inpatient unit. Participants were identified from hospital admission records, and those meeting the inclusion criteria were approached. The objectives, procedures, potential risks, and benefits were explained verbally and in writing, and written informed consent was obtained from participants who agreed to take part. All participants retained the right to withdraw at any time without consequences.

Baseline assessments were conducted before the intervention, including collection of demographic and clinical data, safety screening using the Glasgow Coma Scale and vital signs, assessment of hospital-acquired pressure injury risk with the Braden Scale, and evaluation of muscle strength through manual testing. The intervention group received effleurage massage twice daily for 15–20 minutes over five consecutive days, in addition to standard nursing care, while the control group received only standard care. All intervention sessions were documented in a structured log noting timing, duration, and staff signature. Post-intervention assessments were performed on day three and day five using the same Braden Scale to evaluate changes in pressure injury risk within and between groups over time.

Throughout the study, participants were assured that all personal and clinical data would remain confidential and be used solely for research purposes. Data were coded to maintain anonymity. At the end of the study, participants were provided with information about the results and were given the opportunity to ask questions regarding the intervention and outcomes. The overall sequence of the study procedures is illustrated in **Figure 4.1**, which provides a visual overview of participant flow from recruitment to post-intervention assessment.

Ethical Considerations

The study was approved by the Ethics Committee of the Faculty of Nursing, Universitas Muhammadiyah Jakarta (Komite Etik FIK UMJ, No. 1666/F.9-UMJ/XI/2023) and authorized by the management of RS Primaya Bekasi Barat. Participants were fully informed about the study objectives, procedures, risks, and benefits, and written consent was obtained. They retained the right to withdraw at any time without consequence. Confidentiality, privacy, and anonymity were strictly maintained. The intervention was non-invasive, low-risk, and potentially beneficial, providing comfort and improved circulation.

Data Analysis

All collected data were checked for completeness and accuracy before being coded and entered into SPSS version 16.0. Descriptive statistics summarized participant characteristics and baseline measures, with continuous variables presented as means and standard deviations and categorical variables as frequencies and percentages. Group comparability at baseline was assessed using Chi-Square tests for categorical variables and Levene's test for variance homogeneity, while normality of continuous data was evaluated with the Shapiro-Wilk test. Paired

sample t-tests examined within-group changes in Braden Scale scores, and independent sample t-tests compared mean differences between intervention and control groups. One-way repeated measures ANOVA was used to analyze changes across multiple time points. Statistical significance was set at $p < 0.05$.

RESULT AND DISCUSSION

Respondent Characteristics

The study involved 34 geriatric patients, with 17 assigned to the intervention group and 17 to the control group. The groups were comparable in demographic and clinical characteristics. The mean age in the intervention group was 69.35 ± 6.64 years (range 60–84), while the control group had a mean age of 70.53 ± 7.30 years (range 61–82). Body Mass Index (BMI) was similar between groups, with mean values of 25.14 ± 4.32 kg/m² for the intervention group and 24.91 ± 3.76 kg/m² for the control group. Random blood glucose (GDS) also showed no significant difference (138.41 ± 42.26 mg/dL vs. 154.29 ± 66.81 mg/dL). Muscle strength was uniform across groups, with all participants scoring 5 (Table 1).

Gender distribution and medical diagnoses were evenly balanced between groups. In total, 22 participants (64.7%) were male and 12 (35.3%) were female. Metabolic disorders were the most common medical diagnosis (44.1%), followed by cardiovascular disease (26.5%), infection (17.6%), and hematologic disorders (11.8%). Statistical analysis confirmed no significant differences in gender or medical diagnoses between groups, indicating baseline homogeneity (Table 2).

Table 1. Respondent Demographics: Age, BMI, GDS, and Muscle Strength

Characteristics	Intervention (17) Mean ± SD	Control (17) Mean ± SD	t	p-value
Age (years)	69.35 ± 6.64	70.53 ± 7.30	-0.492	0.626
BMI (kg/m²)	25.14 ± 4.32	24.91 ± 3.76	0.165	0.870
GDS (mg/dL)	138.41 ± 42.26	154.29 ± 66.81	-0.828	0.414
Muscle Strength	5.00 ± 0.00	5.00 ± 0.00	0.000	0.000

Table 2. Respondent Characteristics: Gender and Medical Diagnoses

Characteristics	Intervention (17) Mean ± SD	Control (17) Mean ± SD	n (%)	χ^2	p-value
Male	8 (47.1)	14 (82.4)	22 (64.7)	4.636	0.071
Female	9 (52.9)	3 (17.6)	12 (35.3)		
Metabolic Disorder	7 (41.1)	8 (47)	15 (44.1)	0.844	0.839
Cardiovascular Disease	4 (23.5)	5 (29.4)	9 (26.5)		
Infection	4 (23.5)	2 (11.8)	6 (17.6)		
Hematologic Disorder	2 (11.8)	2 (11.8)	4 (11.8)		

Normality of HAPI Risk Scores

Shapiro-Wilk tests confirmed that baseline (T0) and mid-intervention (T1) Braden Scale scores were normally distributed ($p = 0.053$ and $p = 0.170$, respectively), while post-intervention scores (T2) were slightly non-normal ($p = 0.004$). These findings allowed the use of parametric statistical tests for inferential analysis.

Effect of Effleurage Massage on HAPI Risk

The intervention group experienced a significant increase in Braden Scale scores from baseline (13.18 ± 2.04) to post-intervention (20.71 ± 2.23), indicating a reduced risk of HAPI ($p < 0.001$). The control group showed a slight, non-significant decrease from 11.94 ± 1.48 to 11.41 ± 2.69 ($p = 0.387$). Between-group comparison at post-test confirmed a significant difference in HAPI risk ($t = 13.511$, $p < 0.001$) (Table 3).

Time-Dependent Effects of the Intervention

Mauchly's Test of Sphericity indicated that the assumption of sphericity was violated ($W = 0.769$, $p = 0.017$), and Greenhouse-Geisser correction was applied in the Repeated Measures ANOVA. The analysis revealed significant main effects of time ($F = 59.064$, $p < 0.001$, partial $\eta^2 = 0.649$), group ($F = 99.629$, $p < 0.001$, partial $\eta^2 = 0.757$), and time × group interaction ($F = 75.658$, $p < 0.001$, partial $\eta^2 = 0.703$), demonstrating that the intervention significantly reduced HAPI risk over time (Table 4).

Table 3. Comparison of Braden Scale Scores Between Groups

Group	Time	Mean ± SD	MD	t	p-value
Intervention	T0	13.18 ± 2.04	-7.529	-13.072	0.000
	T2	20.71 ± 2.23			
Control	T0	11.94 ± 1.48	0.529	0.890	0.387
	T2	11.41 ± 2.69			

Table 4. Repeated Measures ANOVA for Braden Scale Scores

Source	SS	df	MS	F	p-value	Partial η^2
Group	924.010	1	924.010	99.629	0.000	0.757
Time	251.529	1.625	154.773	59.064	0.000	0.649
Group × Time	322.196	1.625	198.256	75.658	0.000	0.703
Error	136.275	52.005	2.620			

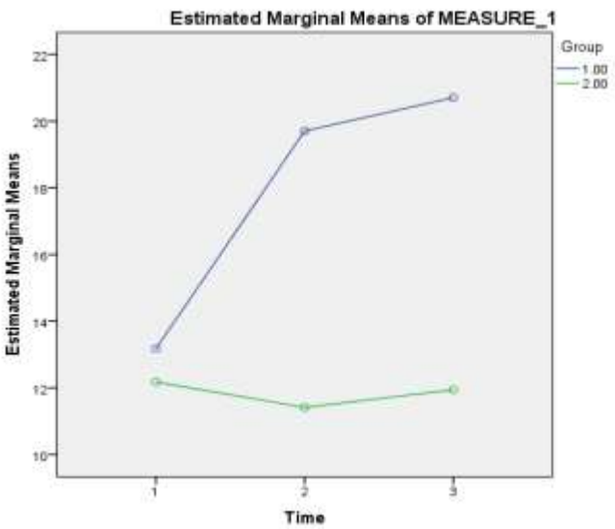
Pairwise comparisons further indicated that Braden Scale scores increased significantly from baseline to post-test 1 (mean difference = 6.529, $p < 0.001$), baseline to post-test 2 (mean difference = 7.529, $p < 0.001$), and post-test 1 to post-test 2 (mean difference = 1.000, $p = 0.001$), confirming the sustained benefit of effleurage massage (Table 5).

Table 5. Pairwise Comparisons of Braden Scale Scores inpatients.

Time (I)	Time (J)	Mean Difference	Std Error	p-value	95% CI	
					Lower	Upper
T0	T1	-6.529	0.595	0.000	-8.119	-4.939
T0	T2	-7.529	0.576	0.000	-9.069	-5.990
T1	T2	-1.000	0.227	0.001	-1.606	-0.394

Figure 2 illustrates profile plots of Braden Scale scores over the three measurement points, clearly showing the increasing trend in the intervention group. This visual representation reinforces the effectiveness of effleurage massage in reducing the risk of Hospital-Acquired Pressure Injury (HAPI) among geriatric

Figure 2. Profile Plots of the Mean HAPI Scores for the Intervention and Control Groups



Discussion

This chapter presents a comprehensive interpretation of the study findings, aligned with the research objectives and supported by relevant literature. The discussion focuses on patient characteristics, the risk of Hospital-Acquired Pressure Injury (HAPI), and the effectiveness of effleurage massage as an intervention, emphasizing implications for nursing management in geriatric care.

Patient Characteristics in Geriatric Patients

Age is a significant determinant of vulnerability to HAPI. In this study, participants were elderly patients aged 60 to 84 years, a range associated with increased susceptibility to pressure injuries due to physiological changes in the skin, blood vessels, and other organs (Cowan et al., 2020). Elderly patients often experience decreased mobility, comorbidities, and reduced tissue resilience, which collectively elevate the risk of HAPI. Understanding these age-related factors allows nurses to tailor preventive interventions more effectively, particularly in monitoring skin integrity and promoting repositioning strategies.

Gender differences were also observed, with male participants representing a higher proportion of the sample. This aligns with prior studies suggesting that men are at higher risk for HAPI due to narrower adipose tissue distribution that provides less cushioning over bony prominences (Sham et al., 2020). Nursing management should therefore account for anatomical and physiological differences in risk assessments and interventions.

Body Mass Index (BMI) further influences HAPI risk. Participants in this study had BMIs in the normal range; however, literature indicates that high BMI contributes to increased pressure on tissues, impaired skin healing, and reduced microcirculation, which can escalate HAPI risk (Marshall et al., 2024). Nurses must integrate

BMI into patient assessments and consider customized repositioning, pressure redistribution, and nutritional interventions to mitigate risk.

Geriatric patients' blood glucose levels and muscle strength are additional determinants of HAPI risk. Controlled blood glucose supports tissue perfusion and healing, while adequate muscle strength facilitates mobility and reduces prolonged pressure on vulnerable areas. Comorbidities such as diabetes mellitus, cardiovascular disease, and other chronic conditions further complicate care, underscoring the necessity for vigilant monitoring and holistic nursing management (Riyadi et al., 2020).

Risk of Hospital-Acquired Pressure Injury

The Braden Scale was used to evaluate HAPI risk systematically. This tool allows nurses to assess six domains: sensory perception, moisture, activity, mobility, nutrition, and friction or shear (Kottner et al., 2019). By using validated scales, nurses can prioritize patients for preventive interventions and monitor outcomes effectively. Early identification of high-risk patients enables timely application of evidence-based strategies such as repositioning, skin care, and mobilization programs (Darmareja et al., 2020; Diaz-Caro & Garcia Gomez-Heras, 2020).

Effectiveness of Effleurage Massage

Effleurage massage was demonstrated to reduce HAPI risk significantly among geriatric patients in this study. The intervention improved Braden Scale scores over time, reflecting enhanced tissue perfusion, reduced edema, and increased skin resilience. This aligns with prior research showing that effleurage massage promotes circulation, relaxation, and well-being in elderly populations (Liu et al., 2023). For nursing management, effleurage massage offers a feasible, low-cost, and patient-centered intervention that can be integrated into routine care, providing both therapeutic and preventive benefits.

Implementing massage interventions within standardized nursing protocols ensures consistent application, enhances staff competence, and supports quality monitoring. Nursing managers can develop guidelines and training programs for clinical staff, ensuring that preventive strategies for HAPI are applied effectively. This approach also encourages patient engagement, individualized care, and early identification of skin changes, fostering a proactive and holistic nursing environment (Al-Otaibi et al., 2019; Noventi & Ainiyah, 2021).

Implications for Nursing Management

The findings highlight the critical role of nurses in geriatric care, particularly in the prevention of HAPI. Understanding patient characteristics and risks allows nurses to implement targeted interventions, while structured nursing protocols incorporating effleurage massage provide measurable improvements in patient outcomes. Nursing managers are encouraged to integrate these interventions into standard care, develop staff education programs, and monitor adherence to evidence-based practices. By doing so, healthcare facilities can enhance patient safety, improve the quality of care, and reduce the incidence of HAPI in vulnerable elderly populations (Potter A, & Perry, 2015).

Limitations

The study has several limitations. Recruitment of participants was challenging because informed consent required approval from family members responsible for the patient's care. Establishing trust and maintaining effective communication with families was necessary to facilitate participation. The quasi-experimental design with two groups provided valuable insight into the intervention's effects, but the study did not implement blinding, which could introduce bias during sample selection and assessment.

CONCLUSION

Effleurage massage is an effective intervention for reducing the risk of HAPI in geriatric patients. Its application improves skin integrity, supports tissue perfusion, and enhances overall patient well-being. Incorporating this intervention into routine nursing management can strengthen preventive care, optimize patient outcomes, and reinforce evidence-based practices in geriatric care settings. Structured protocols, staff training, and consistent monitoring are essential to ensure that the benefits of effleurage massage are fully realized and maintained across clinical practice.

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