

Original Research Article

Prevalence of pressure injury and associated factors among adult ICU patients admitted to selected governmental hospitals in South Nation Nationalities and Peoples Regional State, Ethiopia, 2023

Workneh Eias^{1*}, Ayalnesh Zemene², Kibatu Gebre³, Wondimagegn Gananeh¹,
Tsehaynesh Deneke¹, Habtamu Bekele¹

¹Department of Nursing, Wolaita Sodo University, Sodo, Ethiopia

²Department of Maternity and Reproductive Health, St. Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia

³Department of Nursing, St. Paul Hospital Millennium Medical College, Addis Ababa University, Addis Ababa, Ethiopia

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*Correspondence:

Dr. Workneh Eias,

E-mail: eliasworkneh18@gmail.com

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ABSTRACT

Background: Localized damage to the skin and/or underlying tissue is known as pressure injury. It still affects about 3 million persons worldwide and is a serious health issue for intensive care unit patients.

Methods: Using an institution-based retrospective cross-sectional study design, 336 adults were admitted to intensive care units in three chosen hospitals in South Nation Nationalities between March 10 and April 10, 2023, to evaluate the prevalence of pressure injuries and related factors. A multistage sampling strategy was used to contact each study participant individually. SPSS version 26 statistical software was used to examine the data after it was entered into EPI-data version 4.6. To evaluate statistical relationship utilizing the odds ratio, descriptive statistics, bivariate and multivariate logistic regression were calculated. Statistical significance was evaluated using a p-value of less than 0.05 and a 95% confidence range.

Results: 53 (16.9%) 95% CI (12.98–20.82) participants in a sample of 336 patients hospitalized to intensive care units suffered pressure injury. 16.9% of people had pressure injuries overall. Pressure damage development was observed to be substantially correlated with the following factors: age above 50 years, co-morbidity condition, mechanical ventilation requirement and bathing and messaging after intensive care unit admission.

Conclusions: The occurrence of pressure injuries was significant among patients admitted to adult Intensive Care Units. It is recommended to carry out a prospective study to explore the incidence and related factors of pressure injuries in patients admitted to adult Intensive Care Units.

Keywords: Pressure injury, Prevalence, Southern Ethiopia

INTRODUCTION

Pressure injury is also known as bed sore, pressure sore and decubitus ulcer.¹ Predisposing factors include limitations inactivity/mobility, deficiencies in nutrition and skin moisture, inadequate perfusion and the use of mechanical devices that exert pressure on the skin.² Some of the earliest research on pressure injury was done with

canine models found an inverse relationship between pressure applied and length of time, such that there was a high degree of tissue susceptibility at low pressure over prolonged periods and higher pressures for shorter time frames.³ It usually occurs over bony prominence such as the sacrum, heels and hips. It graded according to the amount of tissue damage and classified into stages I–IV, unstageable and suspected deep tissue injury according to

the extent of the tissue damage.⁴ It has detrimental effects on the health care system and poses a major risk to patient safety by raising death rates, lowering quality of life, lengthening hospital stays, raising healthcare expenses and delaying healing. Globally 65,000 of the 1,000,000 patients worldwide who develop pressure injury die from its consequences. Pressure injury occurs in 2.5 million hospitalized patients annually in the United States, with an incidence of 22% and injury-related complications claimed the lives of almost 60,000 patients each year. However, it has been calculated that the cost of treatment is 2.5 times higher than the cost of prevention.⁵⁻⁷

The ICU patient has the greatest rate of pressure injury prevalence. Due to their innate immobility, hemodynamic instability, inadequate tissue perfusion and oxygenation and a myriad of intricately intertwined intrinsic and extrinsic risk factors.⁶ Patients in the intensive care unit (ICU) are particularly susceptible to suffering pressure injury. Additionally, they are exposed to medical equipment frequently. The number of elderly patients and long-term residents in ICUs has increased as a result of medical and technological advancements, raising their risk of suffering pressure injury even further.⁷ The ICU patients have the highest incidence rates of acquired pressure injury among all hospitalized patients, according to a study done by Pennsylvania State University on May 9, 2016. Patients in the ICU have the greatest prevalence rates of acquired pressure ulcers, ranging from 14% to 42%, as their risk of developing them may be higher than that of other patients.^{4,8}

Across the board, the precise severity of pressure injury varies depending on the condition and the population being treated in a given therapeutic context. For instance, the United Kingdom (UK) has a 4.7% prevalence of pressure injury. 12.3%, 13.8%, 36.8% and 16%, respectively, for the US, Canada, Nigeria and Ethiopia.⁹ Due to insufficient pressure relieving devices, a lack of nursing staff dedication and a lack of awareness of pressure injury prevention strategies in developing nations, it is anticipated that it will be higher in emerging nations than in industrialized ones.¹⁰

The severity of pressure injury varies among African nations. Prevalence ranges from 0 to 6.9% in south-west Nigeria and from 16.8% in northern Ethiopia, respectively. Males are slightly more affected than females.¹¹ Study results on the prevalence of pressure injury in Northern and Southern Ethiopia, Felegehiwot Referral Hospital, Bahir Dar and Hawassa University Referral Hospital, revealed a rate of 16.8% and 8.3%, respectively, for hospital patients. Hospitalized patients had a high rate of pressure ulcers. Prolonged hospital stays, the use of pressure relieving equipment and standardized, qualified nursing care, as well as ineffective nursing care, all contribute to long hospital stays, substantially linked to the emergence of pressure injury.¹²

Pressure injury development is a complex, multi factorial process. According to numerous studies, factors like age, duration of hospital stay, nutritional status, disorders that limit movement and mobility, patient's level of mental health, bed quality and a general lack of nursing care can all affect the development of pressure injury. Pressure injury is an extra co-morbid risk for patients in critical care who are already physiologically challenged.¹³

As soon as a pressure injury appears, adequate wound care and nutrition (a high-protein diet) are advised to speed up the healing process.^{1,5,6} Use of the Braden scale pressure ulcer risk assessment tool can also be used to prevent the development of pressure ulcers as the tool is important to identify those at risk and not at risk and to prepare ahead of time to provide quality and appropriate care based on risk analysis and level of severity.^{14,15} Pressure injury can be prevented by changing the patient's position every two hours, providing effective skin care and using pressure-relieving mattresses.^{1,11,16} Impaired. According to the study conducted in Acute Trauma and Surgical Unit, North West of Anglia Foundation Trust, Huntingdon, United Kingdom the Impact of Stress on Pressure Ulcer Wound Healing Process results revealed that the correlation between stress and wound healing in acute wounds has been thoroughly investigated and its negative effects have been established, so the stress management is used to facilitate pressure injury wound healing.¹⁷

Currently challenging critical care practitioners are; accuracy of risk factors quantification of pressure injury of critical ill patient in ICU and unavailability of pressure injury development among critical ill patient in ICU. There were few local data which were done in zonal and regional hospitals of Ethiopia and from these studies the prevalence of pressure injury in general ward admissions of adult patients from 3.4 to 16.8% and the commonest identified risk factor was prolonged immobilization.^{3,18,19} But all of these studies were done in general ward admissions and thus, it could not reflect the magnitude and associated factors of pressure injury in the ICU setup.

Also, there was no study conducted in study area on prevalence and associated factors of pressure injury. So, the purpose of this study was to assess the prevalence and associated factors of pressure injury among adult ICU admitted patients in Wolaita Sodo University teaching and specialized hospital, Dr. Bogelach Geber Memorial General Hospital and Halaba Kulito General Hospital.

METHODS

Study setting, design and period

This study was carried out at Dr. Bogelach Gebre Memorial General Hospital, Halaba Kulito General Hospital and Wollaita Sodo University Teaching and Referral Hospital. The capital cities of Wollaita, Durame

and Halaba Kuilito are, respectively, Kambata Tambaro and Halaba Kuilito. The distances of these study hospitals from Addis Ababa were 328 km, 215 km and 203.32 km, respectively. The South Nation Nationality Regional State of Ethiopia is home to these general and referral hospitals. 2,135,000 patients were anticipated to receive care from these hospitals. 85,000 people from Dr. Bogalach Gebre Memorial Hospital, 50,000 people from Halaba Kuilito General Hospital and 2 million people from Wollaita Sodo Teaching and Referral Hospital, respectively.

It is anticipated that these hospitals will serve 2,135,000 residents in the surrounding woredas and zones. There are various wards at this hospital. These wards include the gynecological and intensive care units, as well as the medical and surgical wards. With a total of 22 beds, adult ICUs are crucial to this study. Ten of these units are located at Wollaita Sodo University Teaching and Referral Hospital, six are located at Dr. Bogelach Gebre Memorial General Hospital and six are located at Halaba Kuilito General Hospital.

The service delivery is structured under many departments in which the majorly include Internal medicine, Surgery, Obstetrics-Gynecology, Pediatric and Child health and diagnostic departments. Critically sick patients from every unit, both inpatients and outpatients, are treated in their own pulmonary and critical care unit. Trained intensive care unit nurses, pulmonary and critical care specialists and residents in internal medicine, surgery, anesthesiology and emergency and critical care are providing the care in the intensive care unit. The adult intensive care unit is in charge of caring for critically ill patients from several units.²⁰

Study design

From March 10, 2023, to April 10, 2023, a cross-sectional study design using retrospective chart review was carried out.

Population

Every patient admitted to the adult intensive care unit (ICU) of a government hospital served as the population source and every patient's chart admitted to the ICU in a few government hospitals between June 30, 2021 and July 1, 2022, served as the study population.

Inclusion criteria

all patient charts for patients older than 18 who were admitted to the intensive care unit between June 30, 2021 and July 1, 2022.

Exclusion criteria

Patient charts for unintentional injuries or injuries other than pressure injuries over bony prominence areas

Study variables

Dependent variables

Pressure injury was presented.

Independent variables

Socio demographic characteristics of the adult ICU admitted charts of patients such as: Age, gender and residence of adult ICU admitted charts of patients.

Hospital and service-related factors of pressure injury: including: length of stay in the adult intensive care unit, mechanical ventilation requirements, frequency of patient position changes, methods for changing positions, bathing and massaging following ICU admission and length of time on mechanical ventilation. Patient related factors of pressure injury: the main cause of an adult's admittance to the intensive care unit. Acute coronary syndrome, cerebro vascular accidents, septic shock, respiratory failure and others. Co morbidity of adult ICU admitted patients such as: cerebrovascular disease, any cause of neurologic weakness (coma) and malnutrition. The frequency of position changes is determined by examining patient charts that have been recorded and using the time intervals of position changes in ICU. The time intervals of every two, three, four, six and more than six hours are used to measure.¹¹

Duration of stay ICU patient: determined by looking at the patient's medical records and figuring out how long the patient stayed there and experienced pressure injuries before being released. It is determined by how long a patient stays in the intensive care unit. It falls into three categories: shorter ICU stay (81 hours or 3.3 days), medium ICU stay (281 hours or 11.7 days) and prolonged ICU stay (ICU Patients stayed for more than 281 hours (11.7 days). Three, three to seven and eight to fourteen days.⁸ The length of time a patient has been on mechanical ventilation is determined by looking at their records of the times they have been on it and the occurrence of pressure injuries. Time intervals of less than 24 hours, 24 hours to 3 days, 4 to 7 days, 8 to 14 days and more than 14 days for patients on mechanical ventilation are used to measure this.⁴

Operational definition

Pressure injury

Any lesions or sores caused by unrelieved pressure that resulted in harm to the skin and underlying tissues were noted in the adult intensive care unit patients' charts.

Prevalence of pressure injury

Patients who were hospitalized to the adult intensive care unit and who had any skin lesions or wounds at the time

of the study been recorded in the adult ICU patients' charts.

ICU is a hospital or medical facility that treats and cares for patients with severe or potentially fatal illnesses and injuries.

Sample size and sampling technique

Three public hospitals with intensive care units (ICUs) were chosen from eight hospitals in South Nation Nationality Regional State, Ethiopia, using a multistage sampling technique and purposive sampling. Wollaita Sodo Teaching and Referral Hospital, Dr. Bogelech Gebre Memorial General Hospital and Halaba Kulito General Hospital were chosen purposefully because no research had been done in the study area on the prevalence and contributing factors of pressure injuries (Figure 1).¹

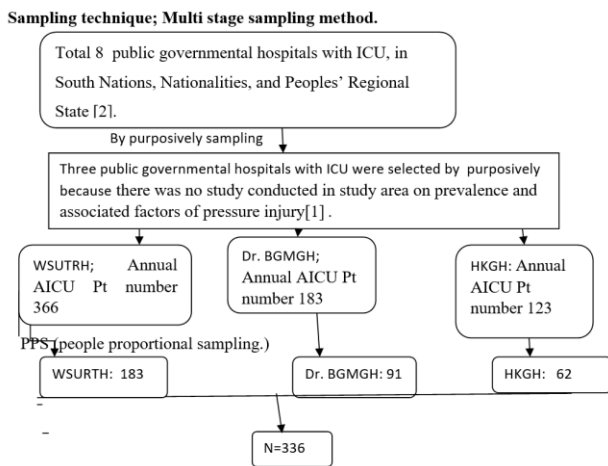


Figure 1: Schematic presentation of sampling procedure of the study in Southern Ethiopia.

Sample size

Sample size is determined by using single population proportion formula; the prevalence of bedsore 15.7%.³ This is taken from Public Hospitals Sidama Zone done on Pressure Ulcer and Associated Factors among Hospitalized Adult Patients.

(n) Sample size at a Z-value of 1.96 with 95% CI and d of 5%

$n = (z \alpha/2)^2 \rho (1-p)/d^2$ Where, Z= 1.96, the confidence limits of the survey result (value of Z at $\alpha/2$ or critical value for normal distribution at 95% confidence interval).

P= 0.157 the proportion pressure ulcer

d= 0.05, the desired precision of the estimate

n= the total sample size.

$$n = (1.96)^2 \cdot 0.157(1-0.157) / (0.05)^2 = 204$$

$$n = 204 \text{ considering a 10\% non-response rate } 204 \times 10/100 = 20,204 + 20 = 224$$

Figuring out the design effect (1.5), Due to the large number of sample schemes with PPS features, the predicted sampling variance is corrected using design effect (1.5). The design effect is essentially the ratio of the variance calculated under the premise of simple random sampling to the variance actually observed under the sampling method. It rises with increasing cluster size, such as across zonal hospitals and interclass correlation.

336 people made up the total sample size. As a result, 336 patient charts from particular hospitals in Ethiopia's southern area were included in this study. Lastly, population proportionate sampling was used to calculate the number of patient charts in each institution, PPS). $n = (nf \times N) / (N \text{ total})$ Where, n = Proportion of patient participate in the study in each selected hospital, nf = Final Sample size (336), N=is the number of patient in each selected hospital total = Total number of patients in all selected hospitals (672).

Wollaita Sodo University Referral and teaching Hospital $366 = 336 \times 366 / 672 = 183$. Dr. BGMGH $183 = 336 \times 183 / 672 = 91$. Halaba kulito General Hospital = $123 = 336 \times 123 / 672 = 62$. K-interval is equal to $= 672 / 336 = 2$

Sample size determination for the second objective

Particular goal

sample size A two-sided 95% confidence level will be used to identify the specific aim by taking into account characteristics that are strongly connected without the variable. Power of 80%, the exposed to unexposed ratio of 1:1 using Epi Info version 7.2.2.6 and the sample size determined for the parameters that were chosen (Table 1).^{8,24,25}

Sampling procedure

From each institution, the initial study subject or individual volunteers were selected using simple random sampling (the lottery method). The method of systematic random sampling was used to choose the other research participants. The k-interval is $= 672 / 336 = 2$, Dr. BGMGH = $180 / 91 = 2$, HKGH = $123 / 61 = 2$ and WSUTRH = $366 / 183 = 2$.

According to HMIS log book registrations in three chosen hospitals, there were 672 adult intensive care unit admissions throughout the study period. Following the clear retrieval of 336 participant MRNs from the HMIS log book, 336 participant charts were obtained from the card room. Ultimately, this study contained the charts of 336 patients.

Data collection method

Six BSC nurses collected the data under the supervision of three MSC nurses who were familiar with the format of data extraction check lists and structured procedures for chart reviews.

Data quality control

The questionnaire was written in English to assure data quality and prior to data collection, the instruments were pretested in a hospital outside the study area with comparable conditions. The quality, consistency, clarity and completeness of the data were examined. Prior to the actual data collection, the appropriate adjustments were made and rates were performed using 5% of the study population at Araka General Hospital, which is situated in Araka town, 10 km from WSURTH. After being examined and cleaned, the data was imported into SPSS version 26.0. Confidence intervals were used to interpret the association. In this investigation, a p value of less than 0.05 was deemed statistically significant.

Data analysis and presentation

Every piece of data that was gathered was cleaned and examined for quality. After that, SPSS version 26 was used to code and enter the data. Following a completeness check, the data was examined and the frequency table and outcome graphical findings were shown. After calculating the prevalence of pressure injuries, a bivariate analysis was carried out to find significant variables with $p < 0.25$. In the second phase, logistic regression analysis was performed on the bivariate analysis's significant results ($p < 0.05$). The chi-square test for categorical variables and the Kolmogorov-Smirnov test for normality and homoscedasticity of the data are used in the bivariate analysis.

To ascertain the independent effect of the associations by means of the odds ratio (OR), with a 95% confidence interval and a significance level of 0.05, logistic regression using the step-by-step method was carried out in the multivariate analysis. Variance inflation factors (VIF) < 2.5 for each independent variable were used to check the multi colinearity of the variables and Hosman and Lemeshow's (person model) was used to check the fitness model. Adjusted odds ratios with 95% confidence intervals were used to interpret the degree of relationship between the dependent and independent variables and a P value of less than 0.05 was deemed statistically significant.

Ethical consideration

Informed consent and ethical approval are provided by the Institutional Research Ethics Review Board (IRB). (Approval protocol No: PMRS 2122, October 18, 2023) at Millennium Medical College (SPHMMC), St. Paul's Hospital. The Declaration of Helsinki, which provides

guidelines for researchers to protect their research subjects, was followed in this study. and ethical approval was acquired. Halaba Kulito General Hospital Southern Nations, Nationalities, and Peoples' Region of Ethiopia, Dr. Bogalach Gabre Memorial General Hospital and Wollaita Sodo University Referral and General Hospital all granted permission to carry out the study.

RESULTS

Socio demographic factors of study participants

A total of 336 ICU admitted patients participated in three selected hospitals of south nation nationality regional state of Ethiopia. Among the participants of the study 183 (54.46%) were admitted to wollaita sodo university referral and teaching hospital, 91 (27.08%) were admitted to Dr. Bogalech gebre memorial and general hospital and 62(18.4) were admitted to Halaba Kulito General Hospital. In this study, 157 (46.7%) were males and 179 (53.27%) were females. The median age of the study participants was 47 years.

All respondents were above 18 years old and 199(59.2%) and 137 (40.77%) of the respondents were below 50 and above 50 years of age group respectively. Concerning the residence of study participants, 143 (42.5 %) were live in urban. Whereas 193 (57.4%) were live in rural (Table 2).

Hospital service-related factors of pressure injury in adult ICU admitted patients of three public governmental hospitals

The length of ICU stay

Among the study participants who were stay in ICU less than or equal 7 days, 165 (49.1%) and 171 (50.8%) participants were stay in ICU 8 to 14 days in ICU. There was no patient were stay in ICU > 14 days. 104 (30.9%) study participants were on mechanical ventilation and 232 (69.04%) participants were not. 141 (42.26%) study participants were bed ridden and 195 (58.03%) were not bed ridden. From those beds ridden study participants 131 (92.9%) participants were get position changing service and 10 (7.09%) participants were not. From those position changing service gotten study participants, 72 (70.27%) participants were getting position changing service every 2-4 hours hours, 108 (82.4%) participants were getting every > 4 hours, 23 (17.55%). Also, from those study participants 87 (25.8%) participants were bathed and messaged after ICU admission and 249 (74.1%) participants were not (Table 3).

Primary reasons for ICU admitted study participants

The primary reasons for overall ICU admission were respiratory failure 86 (25.6%), septic shock 90 (26.8%), cerebrovascular accidents 49 (14.6.7%), acute coronary syndrome 45 (13.3%) and other/miscellaneous causes 63 (18.8%) (Figure 2).

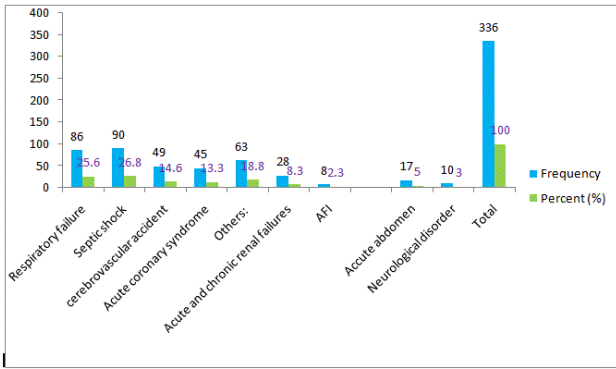


Figure 2: Primary reason for ICU admission among study participants in adult ICU admitted patients of three public governmental hospitals.

Prevalence of pressure injury in study participants

A total of 336 admitted patients in three Public governmental hospitals in South Nation Nationality Regional State of Ethiopia were Participated in the study. From this 57-pressure injury was detected, with the prevalence rate of 16.9% (Figure 3). The prevalence of pressure injury among WSUTRH, DBGMGH and HKGH admitted participants were 30 (16.4%), 15 (16.5%) and 12 (19.3%) respectively. The prevalence was higher among male respondents and the sacral and heel anatomical site were the main one (Figure 4).

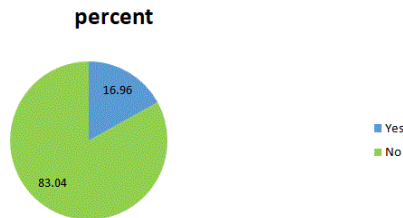


Figure 3: Overall prevalence of pressure injury among adult ICU admitted patients in three selected hospitals.

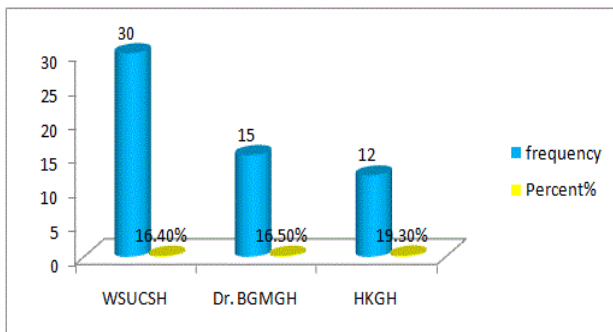


Figure 4: The prevalence of pressure injury among adult ICU patients in three hospitals descriptive statistics show the stage and anatomical site of pressure injury among study participants.

Descriptive statistics show the stage and anatomical site of pressure injury among study participants

The current study finding showed that the prevalence of pressure injury was 16.9% (57/336) and all of these 57 (100%) was occurred after ICU admission. Based on EPUAP grading scale 19 (33.07%) was stage I pressure injury, 30 (52.6%) stage II pressure injury and 8 (14.03%) stage III pressure injury (Figure 5). According anatomical site 24 (42.1%) was sacral area, 7 (12.3%) was on greater trochanter, 22 (38.5%) was on heel and 4 (7%) was on multiple site (Figure 6).

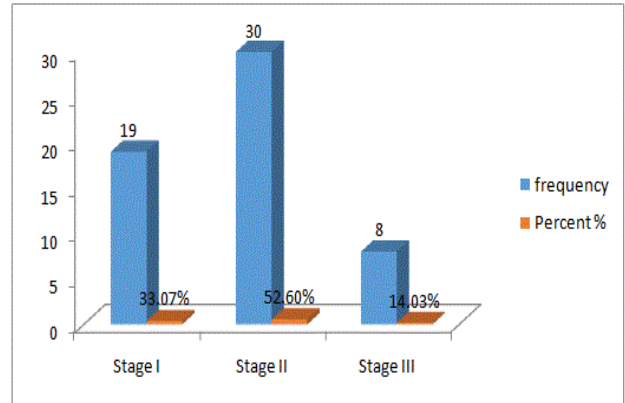


Figure 5: Prevalence of pressure injuries according to their stages among adult ICU patients in three hospitals.

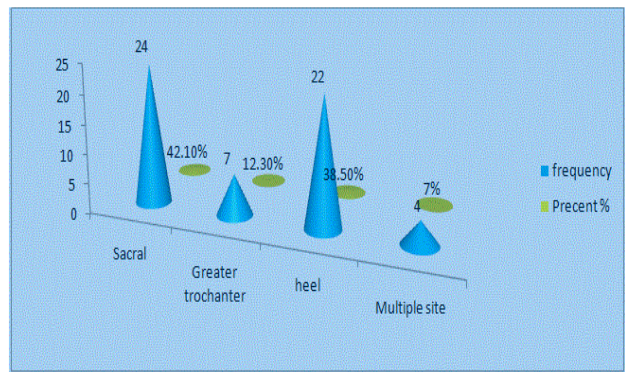


Figure 6: Prevalence of pressure injury according to anatomical location among adult ICU patients in three hospitals.

Factors associated with the occurrence of pressure injury in adult ICU admitted patients

All independent variables were analyzed in binary logistic regression with the dependent variable to know their association. Among those variable age ICU admitted patient, Length of ICU stay, Residence of ICU admitted patient, co morbidity of ICU admitted patient, BMI, requirement of mechanical ventilation, positioning of bed ridden patient, bathed and massaged after ICU admission and primary reason of ICU admission were found to be

significant in binary logistic regression and then taken into multivariate analysis.

Those variables which were significant at $p \text{ value} \leq 0.25$ entered into multivariate logistic regressions. This multivariate analysis had identified that, Age of ICU admitted patient, bathed and massaged after ICU admission, co morbidity and requirement of mechanical ventilation had significant association with pressure injury. In bivariate analysis of this study, there was

evidence which showed a significant association between the development of pressure injury were; primary reason for ICU admission, Ventilator requirement, duration of mechanical ventilation, co morbidities and length of ICU stay, position changing, Residence of ICU admitted patient, age, co morbidity condition ICU admitted Patients, BMI and bathed and massaged after ICU admission. These variables were entered into multivariate logistic regression model (Table 4).

Table 1: The prevalence of pressure injury and associated variables among adult intensive care unit patients admitted to government hospitals in South Nations and Peoples' Regional State, Ethiopia, are determined by sample size calculations.

Significantly associated factors of pressure injury	% of non-exposed	% of exposed	AOR	Power	Allocation	Total sample size adding none response rate
Patients on mechanical ventilation	72.4	27.6	4.2	80%	1;1	46
Length of stay in hospital >21 days	6.2	20	3.78	80%	1;1	214
Length of ICU stay >3days	98.6	1.4	3.57	80%	1;1	10
Position change	24.3	10	2.411	80%	1;1	244

Table 2: Socio demographic characteristics of study participants in southern Ethiopia, 2023.

Variables	Category	Frequency	%
Gender	Male	157	46.2
	Female	179	53.27
	Total	336	100
Age (in years)	<50	199	59.2
	Above 50	137	40.77
	Total	336	100
Residence	Urban	143	42.5
	Rural	193	57.44
	Total	336	100

Table 3: Hospital related factors pressure injury in adult ICU admitted patients of three public governmental hospitals.

Variables	Category	Frequency	%
Length of stay in the ICU	≥7 days	165	49.1
	8 to 14 days	171	50.8
	Total	336	100
Requirement of mechanical ventilation	Yes	104	30.9
	No	232	69.04
	Total	336	100
Does the patient were bed ridden	Yes	141	42.26
	No	195	58.03
	Total	336	100
Patient position change in bed?	Yes	131	90.8
	No	10	9.15
	Total	141	100
Frequency of patients position change	2-4 hours	108	82.44
	>4 hours	23	17.55
	Total	131	100
Means of changing position?	Nurse	129	98.47
	Relatives	2	1.52
	Total	131	100
Ever bathed and massaged after admission	Yes	87	25.89
	No	249	74.1
	Total	336	100

Table 4: Association between some selected variables and pressure injury among adult ICU patients in three hospitals.

Variable	Category	Pressure injury			AOR (CI 95%)	P value
		Yes	No			
Age of study participants	<50	10	189	1	1	
	Above 50	47	90	20(8.056,54.348)	5 (1.184, 21.147)	0.029
Sex study participants	Male	30	127	1.330(0.751,2.353)	1.647 (0.367, 7.392)	0.515
	Female	27	152	1	1	
Residence	Urban	10	132	1	1	
	Rural	47	147	4.28 (2.080, 8.812)	1.283 (0.216, 7.626)	0.784
Bathed and messaged after admission	Yes	8	79	0.483 (0.226, 1.032)	0.158 (0.040, 0.627)	0.009
	No	49	200	1	1	
Mechanical ventilation	Yes	34	70	4.414 (2.436, 7.997)	3.565 (1.579, 8.051)	0.002
	No	23	209	1	1	
Length of ICU stay	<7 day	24	141	1	1	
	7 to 14 days	33	138	1.405 (0.790, 2.499)	0.316 (0.051, 1.963)	0.216
Frequency of position changing	2-4 hours	20	88	.0.499 (0.188, 1.324)	0.630 (0.126, 3.145)	0.573
	>4 hours	18	5	1	1	
BMI	<18.5 m ²	5	33	3.199 (1.009, 10.143)	1.126 (0.295, 4.301)	0.863
	18.5-24.99 m ²	9	130	1	1	
	25-29.99 kg/m ²	41	58	0,197 (0.071, 0.548)	1.304 (0.304, 5.594)	0.721
Had a patient any co morbidity condition	Yes	45	53	1	1	
	No	10	228	0.048 (0.023, 0.1)	0.80 (0.035, 0.181)	0.000
Primary reason for ICU admission?	Respiratory failure	28	61	1	1	
	Septic shock	10	80	0.39 (0.174, 0.876)	0.264 (0.021, 3.286)	0.301
	CVA	5	44	1.509 (0.588, 3.875)	1.23 (0.128, 11.346)	0.872
	ACS	5	40	2.893 (0.751, 11.152)	0.457 (0.001, 14)	0.791
	Others	9	54	1.509 (0.478, 4.764)	3.344 (0.289, 38.65)	0.334

After multivariate logistic regression, four variables such as, co morbidity condition of the ICU patients, ICU admitted patients were on mechanical ventilation and bathed and messaged after ICU admission and Age of study participants were found to be independently associated with the development of pressure injury in adult ICU. The odds pressure injury development among Intensive care unit admitted patients who had no co morbidity condition were 20% lower compared to the odds of Intensive care unit admitted patient who had co morbidity (AOR=0.80,95% CI 0.035 to 0.181). Those ICU admitted a patient who was on mechanical ventilation in ICU was 3.565 times at increased risk of developing pressure injury compared to who were not on mechanical ventilation in ICU. (AOR=3.565,95% CI 1.57 to 8.051). The ICU admitted patients whose age above 50 years were 5.004 times at increased risk of developing pressure injury compared to those ICU admitted patients whose age were below 50 years (AOR=5.004, 95% CI 1.184, 21.147). The odds of pressure injury development among Intensive care unit admitted patients, who were bathed and messaged after Intensive care unit admission were 84.2% lower compared to the odds of Intensive care unit admitted patient, who were not messaged and bathed

after Intensive care unit admission (AOR=0.158, 95% CI 0.040 to 0.627). These sets of four factors are strongly indicators for increased risk of pressure injury. Therefore, the applied logistic model showed statistical significance according to the Omnibus Test (p<0.001). In addition, the coefficients of each factor included in the model were significant based on the Wald Chi-square test (p<0.05). The coefficient of the model (R² of Nagelkerke) had a value of 0.552, indicating that the risk factors included in the regression model explain 55.2% of the occurrence of pressure injury in ICU patients. Finally, the observed and expected frequencies in the final model did not have significant differences according to the Hosmer-Lemeshow test (p=8.730), providing evidence of the goodness of the fit.

DISCUSSION

Hospital based cross-sectional study was conducted among 336 patients admitted Adult ICU of three selected hospitals in south nation nationality regional state. The study finding revealed that the overall prevalence of pressure injury was 16.9 %. The current study lined with Bahir Dar Felge Hiwote Hospital that the prevalence of

pressure injury was 16.8%.⁵ The current study was higher than studies conducted in Australia among adult ICU patients, which was 11.3% 15, 12.26 % in China and 8.94% in the city of São Paulo.^{15,20} The discrepancy of the findings may be due to the difference in hospital factors such as nursing care service, sample size of study participants, economical status and adequate health service equipment's availability due to developed countries.

The current study finding of prevalence of pressure injury was 16.9%. which was slightly exceeded than studies done in Sidama Public Hospitals, 15.7% and US14.3% And higher than in Sweden hospital acquired pressure injury decreased from 8.1% to 6.4%.^{3,21,22} This decrement of the prevalence of pressure injury in Sweden due to the use pressure-reducing mattresses, sliding sheets, heel protection and repositioning plans. So, the implementation of a national patient safety program has had an impact on the nationwide prevalence of pressure injury in hospital care and the occurrence of prevention strategies.²² When compared to global critical care prevalence studies the prevalence in these three selected hospitals south nation nationality regional state prevalence of pressure injury was lower, for instance Labeau and colleagues reported on global study on pressure injury prevalence in 13,254 patients in 1117 ICUs based in 90 countries. The overall and acquired prevalence in ICUs was 26.6%.⁴ Also, the prevalence of decubitus ulcers in hospitalized patients in the United States is between 5 and 15% and the prevalence of this study results in intensive care unit is lower than the current study.²¹ This discrepancy of the findings may be due to the difference in sample size, study design, economic and cultural variation present from country to country.

According to the current finding pressure injury was identified on different anatomical location of the patients. Among the total patients who developed pressure injury, 42.1% were found on sacral area, 12.3%, were greater trochanter and 41.5% were on the heel. This finding was slightly less than the study done Jimma University Medical Center, 44% were found on sacral area, 25% were greater trochanter.¹³ Also, this study result was less than the study done at Felge Hiwot referral hospital of Ethiopia which showed 70.4% pressure injury were developed on sacral region.²³ The most common body sites for PIs were sacral and heel region These findings were consistent with findings from the national study conducted in the Chinese population in immobile patients and other previous studies in hospitalized patients.^{20,24} As evidenced in other studies, in this study, the sacral region was the most affected by PIs with the majority of them classified as stages 2 and 1, respectively. One possible explanation may be the sacral area is exposed to moister due to incontinency. This was supported by the current finding which revealed that all patients who developed pressure injury were bed ridden. PIs occur in areas subject to greater pressure from body weight, especially

areas of bony prominence. Patients in intensive care often have limited mobility, are bedridden, sedated, on mechanical ventilation and restricted to the supine position, where the sacral region and heel are support sites that suffer excess pressure when positioned in this position with the head elevated at an angle greater than 30 degrees.

From the total 57 (16.9%) of pressure injury developed. 33.07% were stage I. 52.6% were stage II. 14.03% were stage III. Study done at Felge Hiwot referral hospital indicated that among patients who developed pressure injury, 62% were stage I which was higher than the current study. Stage II and III were 26.8%, 8.4% which was lower than the current study.²³ Study result from jumc hospital reveals were stage I and II were 18.5% and 44% respectively which was lower than the current finding. But stage III was 25% which was higher than the current study result. Stages 1 and 2 are initial classifications in which restoration of skin integrity occurs more easily than in more advanced stages of the injury. Therefore, skin assessment is essential to identify the presence of injuries early and reduce harm to patients through preventive interventions.¹⁵ In this study, patients on mechanical ventilation, co morbidity, bathed, messaged after ICU admission and age of study participants above 50 years were associated with the development of pressure injury adult ICU patient.

According to the current study length of stay in the ICU and BMI, were not associated with occurrence pressure injury. But other studies revealed that the development of pressure ulcer was associated with longer stay of the patients in ICU and BMI.^{2,10} According to the current finding pressure injury association factors, Age, co morbidity, ICU patients on mechanical ventilation, which was in line with the study done in Risk Factors for Pressure Injuries in Adult ICU Patients.²⁵

In this study, presence of pressure injury was significantly associated with absence of co morbidity condition in ICU admitted patients. (AOR=0.80, 95% CI 0.035, 0.181) 0.8 times less likely to developing pressure injury compared to those had co morbidity condition. This finding was in line with previous retrospective case-control study, conducted in the first semester of 2016 in a general ICU of a large university hospital in northeast Brazil.¹⁸

Also, in this study the ICU admitted patients who were on mechanical ventilation in ICU were 3.565 times at increased risk of developing pressure injury compared to who were not on mechanical ventilation in ICU. (AOR=3.565, 95% CI 1.579 to 8.051) in consistent with the study done Decubitus in Intensive Care Units study⁴. Also, in this study finding the co morbidity condition of the patients and patients on mechanical ventilation during ICU admission were associated with the occurrence of pressure injury in adult ICU, this finding was supported

by the study conducted in Spain Risk factors for pressure injury development in Intensive Care Units⁶. Also in this study the presence pressure injury was strongly associated with the age of ICU study participants. Current study finding showed that the ICU admitted patients whose age above 50 years were 5.004 times at increased risk of developing pressure injury compared to those ICU admitted patients whose age were below 50 years (AOR=5.004, 95% CI (1.184, 21.147). in consistent with the study done decubitus ulcers at global, regional and national levels.⁷

The possible explanations for the variations due to different factors which can explain the occurrence of pressure injury in ICU patient such as methodological differences (i.e., data analysis and eligibility of study participants), variations in the quality of care, variation in sampling and the tool used for assessing the pressure injuries in ICU admitted patient. This study is the first which tried to assess the prevalence and factors associated with pressure. Injury among adult patients admitted to ICU of, WSURTH, Dr. BGMGH and HKGH, Ethiopia. So, it might help a lot for future large-scale studies in this regard. The retrospective nature of the study is one of the great limitations which preclude us from assessing the nursing care, the Braden pressure ulcer assessment tool and other important parameter.

The initial plan was to undertake prospective cross-sectional study but due to the Constraint of, the study design was made to be a retrospective one firstly, the cross-sectional design of this study limits our ability to make causal inferences. Second Limitation of this study is time and resource limitation for not doing a prospective study.

Thirdly, a patient who already developed a pressure injury was not grouped on their disease type it lacks regional representativeness, as no data were found for all zonal hospitals of Southern Nations, Nationalities, and Peoples' Region. There was no local data which was done on prevalence and association factors of pressure injury in ICU patients, which makes our section short.

CONCLUSION

From this study found that the prevalence of pressure injury in three selected hospitals in south nation nationality regional state of Ethiopia is 16.9%. Co morbidity, mechanical ventilation requirement, bathed messaged after ICU admission age of the study participants above 50 years were significantly associated with the development of pressure injury.

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REFERENCES

1. Belachew T. Prevalence and associated factors of pressure ulcer among adult inpatients in Wolaita Sodo University Teaching Hospital, Southern Ethiopia. *Prevalence*. 2016;6(11):41-8.
2. Kifle F. Intensive care in sub-Saharan Africa: a national review of the service status in Ethiopia. *Anesthesia Analgesia*. 2022;134(5):930.
3. Muhammed EM. Nurses' knowledge of pressure ulcer and its associated factors at Hawassa University comprehensive specialized hospital Hawassa, Ethiopia, 2018. *BMC Nurs*. 2020;19(1):1-8.
4. Team DSC. Medicine and T.G. Collaborators, Prevalence, associated factors and outcomes of pressure injuries in adult intensive care unit patients: the DecubICUs study. *Intensive Care Med*. 2021;47(2):160-9.
5. Tschannen, D., C. Anderson, The pressure injury predictive model: a framework for hospital-acquired pressure injuries. *J Clin Nurs*. 2020;29(8):1398-421.
6. Serrano ML. Risk factors for pressure ulcer development in Intensive Care Units: A systematic review. *Medicina Intensiva*. 2017;41(6):339-46.
7. Zhang, X. The global burden of decubitus ulcers from 1990 to 2019. *Scientific Reports*. 2021;11(1):1-10.
8. Cox J. Predictors of pressure ulcers in adult critical care patients. *American J Crit Care*. 2011;20(5):364-75.
9. Angmorte SK. A narrative review on pressure ulcer (PU) studies relevant to medical imaging. *Pan African Med J*. 2020;36(1):857.
10. Shiferaw WS, Aynalem YA, Akalu YA. Prevalence of pressure ulcers among hospitalized adult patients in Ethiopia: a systematic review and meta-analysis. *BMC Dermatol*. 2020;20(1):1-10.
11. Ebrahim J. Prevalence and factors associated with pressure ulcer among patients admitted in Hawassa University Referral Hospital, South Ethiopia. *J Health Care Prev*. 2018;1(105):22.
12. Alderden J. Risk factors for pressure injuries among critical care patients: a systematic review. *International J Nurs Stud*. 2017;71:97-114.
13. Assefa TF, Mamo D, Shiferaw. Prevalence of bed sore and its associated factors among patients admitted at Jimma University Medical Center, Jimma Zone, Southwestern Ethiopia, 2017 cross-sectional study. *Orthoped Rheumat J*. 2017;8(4):74-81.
14. Bergstrom, N., The Braden Scale for predicting pressure sore risk. *Nurs Res*. 1987;36(4):205-10.
15. Souza TMP. Pressure injury in critically ill patients: prevalence and associated factors. 2024.
16. Berihu H. Practice on pressure ulcer prevention among nurses in selected public hospitals, Tigray, Ethiopia. *BMC Res Notes*. 2020;13(1):207.
17. Charalambous C. The Impact of Stress on Pressure Ulcer Wound Healing Process and on the

- Psychophysiological Environment of the Individual Suffering from them. *Med Arch.* 2018;72(5):362-6.
18. Medeiros AB. Predictors of pressure ulcer risk in adult intensive care patients: A retrospective case-control study. *Int Critical Care Nurs.* 2018;45:6-10.
 19. Bereded DT, Salih MH, Abebe AE. Prevalence and risk factors of pressure ulcer in hospitalized adult patients; a single center study from Ethiopia. *BMC Res.* 2018;11(1):1-6.
 20. Lin FF. Pressure injury prevalence and risk factors in Chinese adult intensive care units: A multi-centre prospective point prevalence study. *Int Wound J.* 2022;19(3):493-506.
 21. Cox J. Pressure injuries in critical care patients in US hospitals: results of the International Pressure Ulcer Prevalence Survey. *J Wound, Ostomy Cont Nurs.* 2022;49(1):21-8.
 22. Källman, U. Pressure ulcer prevalence and prevention interventions—A ten-year nationwide survey in Sweden. *Int Wound J.* 2022;3:875-8.
 23. Gedamu HM, Hailu A, Amano. Prevalence and associated factors of pressure ulcer among hospitalized patients at Felegehiwot referral hospital, Bahir Dar, Ethiopia. *Adv Nurs.* 2014;2:7587.
 24. Gökdemir S, Aslan M. Main Factors Regarding Pressure Injury in Intensive Care Unit Patients and the Effects of Nursing Interventions. *Turkish J Inten Care.* 2024;22(1):31-40.
 25. Chung ML. Risk factors for pressure injuries in adult patients: a narrative synthesis. *Int J Env Res Publ Health.* 2022;19(2):761.

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