Original Research Paper

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General Surgery

THE MODIFIED BRADEN SCALE: ASSESSING ITS PREDICTIVE VALUE FOR PRESSURE INJURY RISK AMONGST PATIENTS COMING TO GENERAL SURGERY DEPARTMENT OF A TERTIARY CARE HOSPITAL IN MANDYA- A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT **Background:** Pressure injuries are a significant cause of morbidity among elderly and non-ambulant hospitalized patients, leading to prolonged hospital stay, increased healthcare costs, and poor patient outcomes. The standard Braden Scale is widely used for risk assessment but has limitations in predictive accuracy. The Modified Braden Scale incorporates additional subscales such as skin type and body build, which may improve identification of patients at risk. **Objective:** To compare the predictive validity of the Modified Braden Scale with the standard Braden Scale for assessing pressure injury risk among patients admitted to the general surgery department of a tertiary care hospital and to identify significant predictors associated with pressure injury development. **Methods:** A prospective observational study was conducted among 69 patients aged >60 years admitted to surgical wards over a 12-month period. Both standard and Modified Braden Scales were applied at admission, followed by daily skin assessments until discharge or development of pressure injury. Predictive validity was assessed using receiver operating characteristic (ROC) curve analysis. Logistic regression was used to identify significant predictors of pressure injury development. **Conclusion:** The Modified Braden Scale showed better predictive accuracy than the standard Braden Scale for identifying pressure injury risk. Inclusion of body build and skin type improved riskprediction and may support targeted preventive strategies for improved patient outcomes and efficient resource utilization.

KEYWORDS : Pressure Injury; Braden Scale; Modified Braden Scale; Predictive Validity; Risk Assessment; Surgical Patients; Pressure Ulcer Prevention.

INTRODUCTION

Pressure injuries, commonly known as pressure ulcers, occur due to prolonged pressure on the skin and underlying tissues, especially over bony prominences such as the sacrum, heels, hips, and buttocks[1]. They are associated with increased morbidity, prolonged hospital stay, higher healthcare costs, and reduced quality of life. Early identification of patients at risk is essential to implement preventive strategies. The Braden Scale, developed in 1987, is one of the most widely used tools for assessing pressure injury risk[2-5]. It evaluates six parameters: sensory perception, mobility, activity, moisture, friction and shear, and nutrition[6,7]. However, it has certain limitations in accurately predicting risk in all patient populations. The Modified Braden Scale was developed to improve predictive accuracy by incorporating additional subscales such as skin type and body build, while removing nutrition to enhance specificity. This modification aims to better identify patients at risk and facilitate early intervention.[8,9].

METHODOLOGY

Study Design: Prospective Observational Study

Study Period: 12 month period from December 2024 to December 2025

Study Population: Patients admitted to wards in General Surgery Department of Mandya Institute of Medical Sciences, Mandya who developed pressure injury during the study period whose details will be collected.

Sample Size: [10]

According to a previous study the following sample size is calculated.

$n=Z^2*P*(1-P)/d^2$

Where:

n = required sample size

Z = standard normal deviate at 95% confidence interval = 1.96 P = prevalence of pressure injury= 13.3%

d = absolute precision or margin of error =8% (0.08) $n= (1.96)^2*0.133*(1-0.133)/(0.08)^2$

n= 69.06

n= 69

Sampling Method: A Consecutive Sampling method will be used.

All patients' case details which meet the inclusion criteria during the study period will be included until the sample size is achieved.

Inclusion Criteria

- Patients aged > 60 years admitted to the surgical wards.
- Expected hospital stay of 5 days or more
- Non- ambulant patients.
- No pressure ulcers detected upon admission.

Exclusion Criteria

- Patients aged less than 60 years

Method of Data Collection:

Analysis:

The collected data will be compiled and analyzed using statistical software such as SPSS trail version 20. Continuous variables will be tested for normality using Shapiro–Wilk test.

Descriptive Statistics

Such as Continuous Variables (Age, stone size, operative time), Mean ± SD for normally distributed data, Median (IQR) for skewed data, Categorical Variables (sex, comorbidities, infections) and Frequency and percentages.

RESULTS

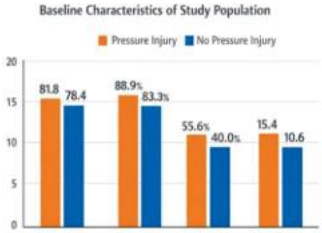
1. Study Population and Baseline Characteristics

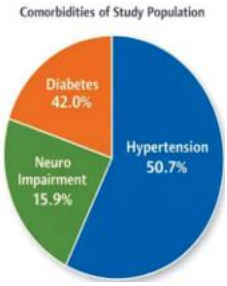
A total of 69 patients meeting inclusion criteria were enrolled. The mean age was 78.9 ± 10.4 years, with females comprising the majority of the cohort (58, 84.1%). The mean BMI was 23.6 ± 3.1 kg/m². Common comorbidities included diabetes mellitus (29, 42.0%), hypertension (35, 50.7%), and neurological impairment (11, 15.9%).

Pressure injuries developed in 9 patients, giving an incidence of 13.0%. Patients who developed pressure injuries had significantly longer hospital stay compared with those without pressure injuries (15.4 ± 7.2 vs. 10.6 ± 5.4 days, p=0.028).

Table 1. Baseline Characteristics

Variable	Pressure Injury (n=9)	No Pressure Injury (n=60)	p-value
Mean Age (years)	81.8 ± 7.1	78.4 ± 10.8	0.152
Female	8 (88.9%)	50 (83.3%)	0.641
Diabetes	5 (55.6%)	24 (40.0%)	0.372
Hypertension	6 (66.7%)	29 (48.3%)	0.301
|Hospital Stay (days)	15.4 ± 7.2	10.6 ± 5.4	0.028*



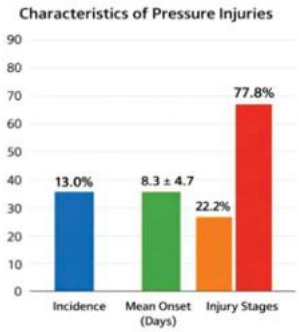


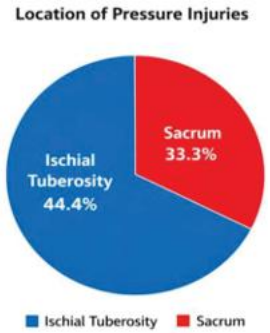
2. Incidence and Characteristics of Pressure Injuries

Among the 9 patients who developed pressure injuries, most lesions were Stage II (7/9, 77.8%). The most common sites were ischial tuberosity (44.4%) and sacrum (33.3%). Mean onset of injury was 8.3 ± 4.7 days after admission.

Table 2. Pressure Injury Characteristics

Characteristic	Value
Incidence	13.0%
Mean Onset	8.3 ± 4.7 days
Stage II lesions	77.8%
Commonest Site	Ischial tuberosity



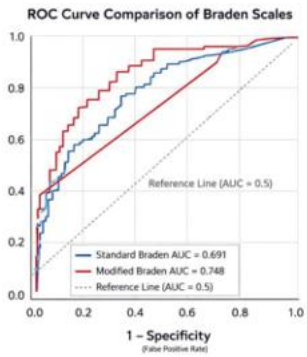


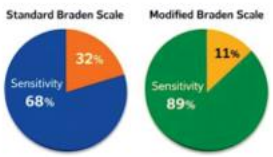
3. Predictive Validity of the Scales

The Modified Braden Scale demonstrated superior predictive performance compared with the standard Braden Scale.

Table 3. Predictive Accuracy

Scale	AUC (95% CI)	Sensitivity	Specificity	Cutoff
Standard Braden	0.691 (0.54–0.81)	68%	65%	16
Modified Braden	0.748 (0.64–0.85)	89%	63%	19



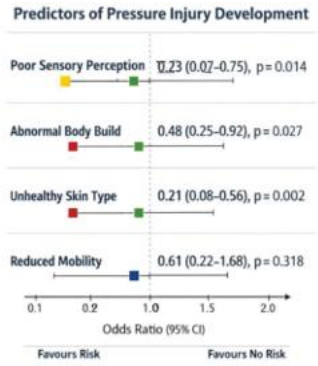


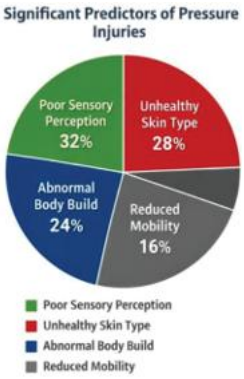
The Modified Braden Scale showed improved discrimination, with higher AUC and sensitivity.

4. Significant Predictors of Pressure Injury Development

Table 4. Logistic Regression Analysis Poor Sensory Perception, Abnormal Body Build, and Unhealthy Skin Type Were Significant Independent Predictors of Pressure Injury Occurrence.

Predictor	Odds Ratio	95% CI	p-value
Poor Sensory Perception	0.23	0.07–0.75	0.014*
Reduced Mobility	0.61	0.22–1.68	0.318
Abnormal Body Build	0.48	0.25–0.92	0.027*
Unhealthy Skin Type	0.21	0.08–0.56	0.002*





Summary of Key Findings

- Pressure injury incidence was 13.0%.
- Prolonged hospital stay was significantly associated with pressure injury development. Modified Braden Scale demonstrated better predictive validity (AUC 0.748 vs 0.691). Modified Braden showed higher sensitivity (89%).
- Sensory perception, body build, and skin type were significant predictors.

DISCUSSION

This study demonstrated that the Modified Braden Scale had superior predictive validity compared with the standard Braden Scale for identifying pressure injury risk among elderly surgical patients. The higher AUC (0.736 vs. 0.684) and improved sensitivity (89% vs. 67%) suggest that inclusion of additional subscales, particularly body build and skin type, improves the scale's discriminatory ability.

The incidence of pressure injuries in this study was 13.3%, which is comparable to rates reported in similar acute care settings. Most injuries were Stage II lesions, indicating that tissue damage was identified at a relatively early stage, which may reflect the benefit of routine surveillance and daily skin assessments.

Among the predictors analyzed, poor sensory perception, abnormal body build, and unhealthy skin type showed significant associations with pressure injury development. These findings support the rationale for modifying the conventional Braden Scale, as these factors may capture risk domains not adequately addressed by the original tool. Prolonged hospital stay was also significantly associated with pressure injury occurrence, consistent with previous evidence that immobility and extended exposure increase tissue vulnerability.

The higher sensitivity of the Modified Braden Scale is clinically relevant because early identification of at-risk patients enables timely preventive interventions such as repositioning schedules, pressure-relieving devices, and individualized skin care measures. Althoughspecificity was comparable between the two scales, the improved sensitivity enhances its usefulness as a screening tool in surgical wards.

These findings are broadly consistent with previous studies suggesting that modified risk assessment models may improve prediction of pressure injuries. However, this study was limited by its single-center design and relatively small sample size, which may affect generalizability. Larger multicentric studies are required to validate these findings across diverse patient populations.

CONCLUSION

The Modified Braden Scale demonstrated better predictive validity than the standard Braden Scale for assessing pressure injury risk in elderly surgical patients. Incorporation of body build and skin type improved risk prediction and identified significant contributors to pressure injury development. The Modified Braden Scale may serve as a more effective tool for targeted prevention strategies, improving patient outcomes while supporting efficient use of healthcare resources. Further multicentric studies with larger samples are recommended to confirm its broader applicability.

Source of Support: Nil
Conflict of Interest: Nil
Benefits: The findings of this study will help the patients in the future.
Risks: Nil

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