

The difference of serum albumin level in grade 2 and 3 pressure ulcer patients

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Abstract

Background Pressure ulcer is one of the complications in chronically bed ridden patients resulting in prolonged hospitalization, increased cost and burden for the patients. Malnutrition can increase the risk and worsen the condition. Albumin level is an effective prognostic indicator for assessing nutritional status because it can detect protein malnutrition. Early detection of hypoalbuminemia may help predicting the severity of pressure ulcer and optimal prevention can be carried out.

Methods An observational analytical retrospective study was conducted in 34 subjects with grade 2 and 3 pressure ulcers at Dr. Moewardi Hospital Surakarta, Indonesia between April 2020 and April 2021. Bivariate analysis using parametric independent T test was applied to determine the differences in albumin levels and $p < 0.05$ was considered significant. All data were analyzed with SPSS version 21.

Results Nineteen males (55.8%) and 15 females (44.2%) with the mean age of 53.06 ± 14.46 yr. met our inclusion criteria. Twenty-seven patients with grade 2 (82.4%) were more dominant than grade 3 with 7 patients (17.6%). The mean albumin levels of grade 2 and 3 pressure ulcers were 2.99 ± 0.46 g/dl and of 2.73 ± 0.43 g/dl. The most common ulcer site was sacrum (76.5%). There was no statistically difference in albumin levels of grade 2 and 3 pressure ulcer ($p = 0.223$).

Conclusion There was no significant difference in albumin level of patients with grade 2 and 3 pressure ulcer.

Key words

Albumin; Nutritional status; Pressure ulcer; Prolonged bed rest.

Introduction

Pressure ulcers are the loss of skin and/or underlying tissues located above bony prominences caused by pressure or a combination of shear stress or friction.¹ Pressure ulcers are influenced by various factors such as age, nutritional status, body mass index, long bed rest, immobility and the presence of

comorbidities.^{1,2} Patients with long bed rest and impaired mobility have a high risk of developing pressure ulcers due to decreased tissue perfusion and prolonged mechanical stress.³

Braden scale is a measuring tool to assess risk factors of occurrence of pressure ulcers and consists of six assessments including sensory perception, humidity, activity, mobility, nutritional status and friction.⁴ Nutritional deficiencies in long bed rest patients have a greater risk of developing pressure ulcers than patients with adequate nutrition.^{4,5} Chen *et al.* reported that Braden scale (ALB), which is a modification of Braden scale with an assessment

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of nutritional status based on albumin levels increases the reliability of assessing the risk of pressure ulcers.⁴

Hypoalbuminemia increases the risk and worsens the condition of pressure ulcers due to impaired wound perfusion, decreased intravascular osmotic pressure, interstitial edema, reduced oxygenation and tolerance of tissues against excessive pressure.⁶ Hypoalbuminemia also causes disruption of transportation of important substances needed such as fatty acids, bile acids, cholesterol and drugs.⁷

Methods

it was an observational analytic study. Sample selection was done using consecutive purposive sampling. The inclusion criteria were inpatients diagnosed with grade 2 and 3 pressure ulcers who were treated in RSUD Dr. Moewardi Surakarta from April 2020-April 2021, aged 15-90 years old, on bed rest for >48 hours before and during hospitalization and had data on albumin level during the period of care while the exclusion criteria were patients with unconsciousness, spinal trauma and/or cervical trauma, pre-hospital acquired pressure ulcers

and patients with immobilization. A retrospective study was conducted by taking data from medical record installations based on ICD-10 L89.0, L89.2, L89.3. Data analysis was done using SPSS version 21 with significance level of $p < 0.05$. Univariate analysis was performed for several variables including sex, body mass index, grade, number, location of pressure ulcer, underlying disease and albumin level. Bivariate analysis was continued with the independent parametric T test if the data were normally distributed and the non-parametric Mann-Whitney test if the data were not normally distributed.

Results

In this study, 34 subjects were obtained with 19 males (55.8%) and 15 females (44.2%) and mean age of 53 years. A total of 27 subjects (82.4%) were diagnosed with grade 2 pressure ulcers and 7 patients (17.6%) with grade 3 pressure ulcers (**Table 1**). This study showed that the mean value of albumin level in grade 2 and 3 pressure ulcers were 2.99 ± 0.46 and 2.73 ± 0.43 , respectively, with p -value > 0.05 , which means that there was no significant difference in albumin levels between groups (**Table 2**).

Table 1 The subjects characteristics based on the severity of pressure ulcer.

Variable	Pressure Ulcer			p value
	Total (n=34)	Grade 2	Grade 3	
Sex				0.368
Male	19 (55.8%)	14 (51.9%)	5 (71.4%)	
Female	15 (44.2%)	13 (48.1%)	2 (28.6%)	
Age (years old)	53.06 ±14.46	54.75 ±13.60	45.17 ±17.0	0.143
Body Mass Index				
Obese	1 (2.9%)	1 (3.6%)	0 (0.0%)	
Normal	9 (26.5%)	6 (21.4%)	3 (50.0%)	0.337
Underweight	24 (70.6%)	21 (75.0%)	3 (50.0%)	
Length of Bedrest (days)	17.00±10.38	16.18±10.74	20.83±8.16	0.326
Diabetes Mellitus				
Normal	27 (79.4%)	21(75.0%)	6 (100.0%)	0.169
DM	7 (20.6%)	7 (25.0%)	0 (0.0%)	
Serum Albumin level				
≥3.5 g/dl	5 (14.7%)	5 (17.9%)	0 (0.0%)	
3.4-3.0 g/dl	14 (41.2%)	11 (39.3%)	3 (50.0%)	0.531
<3.0 g/dl	15 (44.1%)	12 (42.9%)	3 (50.0%)	

Table 2 Differences of albumin serum level between grade 2 and grade 3 pressure ulcers.

Pressure Ulcer	Albumin Level Mean±SD	P-value
Grade 2	2.99±0.46	0.223
Grade 3	2.73±0.43	

*Significant if p value<0.05

Discussion

Pressure ulcers are defined as injuries to skin and/or layers beneath that occur on bony prominences due to pressure for a long time.⁸ poor Nutritional status is one of the risk factors for formation of pressure ulcers and malnutrition can aggravate the patient's condition.⁹ Serum albumin is an important prognostic indicator in assessing nutritional status because it can detect protein malnutrition.¹⁰ Fourteen subjects (41.2%) had albumin levels of 3.4-3.0 g/dl while 15 subjects (44.1%) had albumin levels <3.0 g/dl (**Table 1**).

Research by Vikram *et al.* reported that albumin levels <3.0 g/dl are associated with increased complications in postoperative patients such as infection, wound dehiscence and intravascular fluid leakage.¹⁰ Protein malnutrition also has a negative impact on the wound healing process.¹¹ In this study, patients with grade 2 and 3 pressure ulcers had a mean albumin level of <3.0 g/dl. Hypoalbuminemia can reduce fibroblast cell activity and inhibit angiogenesis in the proliferative phase as well as reduce collagen synthesis and maturation in the remodeling phase.⁶

Table 2 shows that grade 3 pressure ulcers had lower serum albumin level than grade 2 but this difference was not significant. Demarre *et al.* conducted a study on differences in risk factors for grade 2 and 3 pressure ulcers but this study did not include serum albumin level as risk factor.¹² Serum albumin is a diagnostic and follow-up marker of malnutrition that is widely used and is examined routinely in hospitalized

patients.⁴

The insignificant results in this study may be influenced by various factors such as the small number of sample, the presence of confounding factors and disproportionate pressure ulcer samples. The limitations of this study are using retrospective approach and the small number of patients with unequal sample comparisons so that the results of the study may not be able to represent the actual population. Further research with more subjects is needed to determine the relationship between albumin levels and the severity of pressure ulcers in patients on long bed rest.

Conclusion

This study showed that there was no significant difference in albumin levels in patients with grade 2 and 3 pressure ulcers, but patients with grade 3 pressure ulcers had a lower mean albumin level compared to grade 2.

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