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Original Article

Prevalence of bed sores among patients referring to a medical center in iran

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Abstract

Introduction: Despite the advances in medical technology and preventive programs, the incidence of pressure ulcers during hospitalization is increasing. This study aimed at evaluating the prevalence of bedsores among hospitalized patients in a hospital in the north of Iran.

Methods: This analytical cross-sectional study was conducted on all patients (n=244) with pressure ulcers admitted to Poursina Hospital, Rasht, Iran, within more than 48 h. The information of patients, such as age, gender, history of hypertension, history of diabetes, length of hospital stay, and body mass index were gathered from the patient's hospital records. Ulcer evaluation was performed using the Braden Scale. The collected data were analyzed in Stata software version 14.1 using mean and standard deviation to describe the quantitative variables and numbers and percentages for qualitative variables.

Results: Based on the findings, among all patients, 1.2%of the cases had pressure ulcers. The mean age of patients was obtained at 61.7±18.6 years. It was revealed that the frequency of pressure ulcers was higher in elderly patients. The history of diabetes had a significant positive relationship with pressure ulcers and Braden score. However, no significant relationship was observed between the history of smoking and ulcers. There was a significant inverse relationship between hypertension history and pressure ulcers and Braden score, meaning that the score was lower in patients with hypertension history. It was also found that patients with high BMI had a lower and significant score than patients with low BMI. A significant relationship was present between the length of hospitalization and the degree of bedsores. In the ulcers of the scapula, the Braden score was significantly higher.

Conclusion: Pressure ulcer was more common in patients aged over 60 years. The subjects with diabetes had a 5 times higher degree of pressure ulcers, and the prolonged hospitalization increased the degree of ulcer. Patients with high BMI had less, while significant pressure ulcers, compared to patients with low BMI.

Keywords: Pressure, Ulcer, Prevalence, Patients

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Introduction

Pressure ulcers are localized skin damages that occur if the soft tissue between the bony protrusion and the outer surface is compressed for a long time, leading to ischemia, cell death, and tissue necrosis by compression of the capillaries and restriction of blood flow (1). This condition can be highly painful for the patient and reduce his/her ability to participate in physical and social activities (2). These ulcers are among the most important causes of morbidity and mortality which need high-quality clinical care in healthcare centers (3). They lead to prolonged hospitalization, reduced quality of life, and increased use of hospital resources (4, 5[1]). Pressure ulcers are generally divided into four stages in terms of severity (6), namely stage I: ulcers with inflexible skin erythema; stage II: loss of the outer layer of the skin; stage III and IV: large wounds, including damaged fat, muscle, and bone (7). Pressure ulcers are developed by numerous factors, which according to the results of studies, they are caused by personal and environmental factors (8). Local risk factors include immobility during sleep for more than 2h, pressure on bony protrusion at an angle of more than 45 degrees, blockage of capillaries and lymphatic drainage, and increase in body temperature and humidity (e.g., due to sweating or urinary incontinence).The systemic risk factors leading to the development of this disease are aging; decreased mobility due to fractures, paraplegia, coma, and extensive surgery; malnutrition (reduced protein intake and lack of oral nutrition); vascular disease; and low blood pressure (9). Despite advances in medical technology and the use of preventive programs, the incidence of pressure ulcers during hospitalization is increasing (10).Epidemiological information on the occurrence of pressure ulcers is limited in the United States; however, it is estimated at about 1-3 million cases per year (11).The prevalence of bedsores in European countries is reported to be 18% (12). In Iran, this figure is reported to be 5% and 10.1%-21% in general special wards of hospitals, respectively (13). Statistics show that pressure ulcers, in addition to causing pain, increase the length of hospital stay in patients in the United States by at least four days, raising the risk of nosocomial infections by 25% (14). Pressure ulcers are often not recorded due to the lack of medical statistical codes (15). Different studies have investigated the prevalence of bedsores in Iran; however, a general estimation has not yet been performed on the prevalence of pressure ulcers in specific groups, such as women and men. This study aimed at investigating the prevalence of pressure ulcers in these groups due to the importance of this health issue and the high costs of related treatment.

Materials and Methods

In this analytical cross-sectional study, all patients (n=244) admitted to Poursina Hospital, Rasht, Iran, from April 2017-September 2019with more than 48 h of admission were examined for pressure ulcers. The patients' records were studied to check whether they had pressure ulcers or not through a designed checklist. The inclusion criterion was facing ulcer pressure. The ulcer was divided into three stages, namely stage I: the skin was not broken; however, a reddish in the color of the skin occurred; stage II: a break in the skin and pain occurred; and stage III: the ulcer was deeper than the second stage. Body mass index (BMI) was categorized into four groups of less than 18.5 (underweight), between 18.5 and 25 (normal weight), between 25 and 30 (overweight), and more than 30 (obesity).Moreover, the variables, including age, gender, history of blood pressure, history of diabetes, length of hospital stay, and BMI, were gathered. The results of wound evaluation were determined by number using the Braden Scale with six categories of criteria, namely sensory perception, moisture, activity, mobility, nutrition, and friction or shear). Patients with a previous history of bedsores were excluded from the study. Finally, the collected data were encoded and entered into STATA software (version 14) and were analyzed using mean and standard deviation

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to describe the quantitative variables and number and percentage to describe qualitative variables. Ordered logistic regression models were also applied to analyze the relationship between different variables. The reason for the selection of ordered logistic regression in this study was related to the ordered form of the dependent variable (i.e., degree of pressure ulcers). This research was approved by the Ethics Committee of Guilan University of Medical Sciences(IR.GUMS.REC.1398.130).Due to the utilization of previously gathered data from the data bank of the healthcare information system, patient informed consent was not obtained, nevertheless, for ethical reasons the names of patients were not gathered from the database.

Results

In a total number of 20,582 hospitalized patients, the prevalence of pressure ulcers within 48 h of hospitalization was estimated at 1.2%. The mean age of patients was calculated at 61.7±18.6 years, among whom 53.7% of the cases were male. The majority of the patients had normal weight and were over 60 years (36.1% and55.7%, respectively); moreover, 33.2% of the patients were smokers. Hypertension was reported in 50%and diabetes in 76% of the patients. It was found that 43.4% of the patients had less than 10 days of hospitalization. Most of the cases developed grade 2 ulcers (58.6%). The examination of the frequency of pressure ulcers based on the Braden score showed that about 50% of the subjects were high-risk (Table 1).

Table 1: Frequency distribution and percentage of pressure ulcers based on demographic variables and Braden Scale

Variable	Category	Frequency	Percent
Age	Less than 60 years old	108	44.3
	More than 60 years old	136	55.7
History of smoking	Yes	81	33.2
	No	163	66.8
Body mass index	Underweight (less than 18.5)	20	8.2
	Normal weight (18.25-5)	88	36.1
	Overweight (25-30)	65	26.6
	Obese (over 30)	40	16.4
	Not clear	31	12.7
History of hypertension	Yes	112	45.5
	No	132	54.1
History of diabetes	Yes	185	75.8
	No	59	24.2
Length of hospital stay	Less than 10 days	106	43.4
	10-20 days	70	28.7
	More than 20 days	68	27.9
Braden scale	Mild	67	27.5
	High-risk	112	45.9
	Very high	65	26.6
Ulcer stages	Stage 1	28	11.5
	Stage 2	143	58.6
	Stage 3	73	29.9

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The frequency of pressure ulcers was assessed based on both the Wound Healing Index and the length of hospitalization. The results suggested that an increase in the length of hospital stay (more than 10 days) led to a higher number of high-risk victims (Figure 1).

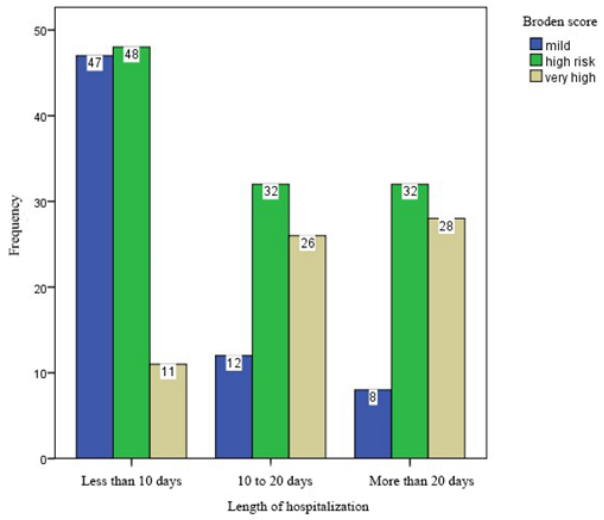

Figure 1: Comparison of pressure ulcer frequency calculated using the Braden Scale based on length of hospital stay

Table 2 presents the findings of the study on the relationship between different variables and the degree of pressure ulcers using ordered logistic regression. It was revealed that the patient's age and gender had no significant relationship with the degree of pressure ulcer; nonetheless, there was a positive and significant relationship between the history of diabetes and pressure ulcers. The odds ratio (OR) for this variable was estimated at 5.822 (P-value=0.000), which indicated that the degree of pressure ulcer was about 5.8 times higher in patients with diabetes. No significant relationship was found between smoking history and pressure ulcers. However, the number of hospitalization days had a significant relationship with the degree of bedsore, meaning that in patients who were hospitalized for 10-20 days, the likelihood of pressure ulcers was 2.37 times higher (P-value=0.031). For those who were hospitalized for more than 20 days, the degree of the ulcers was reported to be 4.18 (P-value=0.001).It was revealed that the history of hypertension was inversely and significantly correlated with pressure ulcers; in other words, the cases with a history of hypertension had lower degrees of ulcers. Furthermore, the degree of pressure ulcers was lower in patients with high BMI than in those with low BMI; nevertheless, the finding was significant(OR=0.272, P-value =0.044).Considering the ulcer area, the degree of bedsore was significantly lower in bedsores found in the head (OR=0.074759, P-value=0.0039).The cut-off point 1 and cut-off point 2 contained the estimated cut-off point on the latent variable used to differentiate stage I of ulcer pressure from stage II and stage II from stage III ,respectively when the values of the predictor variables were evaluated at zero.

Table 3 tabulates the findings of the study on the relationship between different variables and the Braden scale using an ordered logistic estimator. Accordingly, the patient's age and gender had no significant relationship with Braden scales. Nevertheless, a history of diabetes had a positive and significant relationship with Braden scales. The OR coefficient for this variable was obtained at 6.953 (P-value<0.001), suggesting that Braden was about 56 times higher in cases with diabetes. No significant relationship was found between smoking history and pressure ulcers. However, the number of hospitalization days had a significant relationship with the degree of bedsore. In patients who were hospitalized for 10-20 days, the probability of pressure ulcer was 3.47 times higher (P-value=0.001), and for those with more than 20 days of hospitalization, the degree of ulcers was 3.75(P-value=0.001).

The history of hypertension was inversely and significantly related to the Braden score, meaning that cases with a history of hypertension had a lower score (OR=0.3919737, P-value=0.004).It was also reported that the subjects with high BMI had a lower degree of pressure ulcers, compared to those with low BMI, which was significant (OR=0.197, P-value=0.008). Additionally, the Braden score was significantly higher in the ulcers of the scapula (OR=0.074759, P-value=0.0039).

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Table 2: Relationship between different variables and the degree of pressure ulcers

Scar degree	Odds ratio	Std. Err.	P-value	Lower limit	Upper limit
Age	1.009	0.009	0.329	0.990	1.027
1.Gender (male)	1.674	0.702	0.219	0.735	3.810
1.History of diabetes-yes (reference: No)	5.822	2.435	<0.001	2.565	13.21
Being smoker	1.037	0.449	0.932	0.444	2.425
Hospitalization					
Between 10-20 days	2.371	0.951	0.031	1.080	5.204
More than 20 days	4.18	1.760	0.001	1.832	9.544
2.History of hypertension	0.431	0.155	0.020	0.212	0.876
Body mass index					
Normal	0.320	0.199	0.068	0.094	1.0891
Overweight	0.272	0.176	0.044	0.076	0.968
Obesity	1.632	1.157	0.490	0.406	6.552
Ulcer area					
Back	448,495.2	4.03E+08	0.988	0	
Scapula	2.439	1.543	0.159	0.705	8.428
Spine	0.598	0.619	0.620	0.078	4.549
Head	0.074	0.094	0.039	0.006	0.881
Elbow	0.521	0.713	0.634	0.035	7.627
Cut-off point 1	-2.363	0.969		-4.262	-0.464
Cut-off point 2	1.679	0.960		-0.203	3.561

Table 3: Relationship between different variables and the Braden scale

Braden	Odds ratio	Std. Err.	P-value	Lower limit	Upper limit
Age	1.010	0.008	0.227	0.993	1.027
Gender	1.465	0.582	0.336	0.672	3.192
History of diabetes	6.953	2.752	<0.001	3.201	15.105
Smoking	2.223	0.920	0.054	0.987	5.005
Hospitalization					
Between 10-20 days	3.479	1.292	0.001	1.680	7.204
More than 20 days	3.751	1.453	0.001	1.755	8.014
History of hypertension	0.392	0.128	0.004	0.206	0.744
Body mass index					
Normal	0.200	0.119	0.007	0.062	0.642
Overweight	0.197	0.120	0.008	0.059	0.652
Obesity	1.322	0.891	0.678	0.353	4.950
Ulcer area					
Back	778145.6	5.96E+08	0.986	0	
Scapula	3.599	2.086	0.027	1.154	11.211
Spine	0.360	0.329	0.264	0.060	2.157
Head	0.725	0.894	0.794	0.064	8.143
Elbow	1.599	2.043	0.714	0.130	19.585
Cut-off point 1	-0.892	0.875		-2.607	0.824
Cut-off point 2	2.198	0.887		0.459	3.937

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Discussion

This study aimed at evaluating the prevalence of beds ores among hospitalized patients referring to Poursina hospital. The effect of pressure ulcers on the quality of life is significant since it influences the physical, psychological, emotional, social, and financial aspects of an individual's life, which according to the characteristics of individuals, can be significant and long-lasting (16). In our study, most of the pressure ulcer cases were observed in patients over 60 years. Karimian et al. reported that the highest and lowest prevalence of pressure ulcers in Iran belonged to the age groups of 60-70 and 40-50 years with the prevalence rates of 22% and 14%, respectively, suggesting that the incidence of pressure ulcer increased by aging (17).

The results of a study performed by Tubaishat et al. in Jordan indicated a 12% prevalence rate of beds ores among patients over 80 years (18). In the current study, most patients with bedsores had a normal weight; however, those with a high BMI had a lower and significant degree of pressure ulcer, compared to cases with low BMI. In another study conducted by Samantha et al., it was found that pressure ulcers were significantly higher in patients with higher BMI than in other groups. This increased risk was related to both ends of the BMI spectrum (19). Drake et al compared the morbidity rate between the two groups of cases with a BMI greater than 40 and less than 40. In the mentioned study, it was found that obesity increased the risk of pressure ulcers even after controlling Barden risk factors (20).

Swanson et al. reported that there was a significant difference between the groups with pressure ulcers having BMI more and less than 30 (21). These results were in line with those of a study carried out by Pokorny et al, showing that obese individuals had a higher chance of developing pressure ulcers. Nonetheless, the difference between the two groups was not statistically significant (22), which can be attributed to the effect of weight or obesity ,accompanied by high BMI with metabolic syndrome and vascular disorders that increase vascular insufficiency and the risk of pressure ulcers.

In our research, a small percentage of patients were smokers, and no significant relationship was observed between smoking history and pressure ulcers. However, the findings of a study performed by Nassaji et al. revealed a significant difference in the prevalence of pressure ulcers between the two groups of patients with and without a smoking history. In the present study, it was found that smoking could increase the risk of pressure ulcers due to the effect of vasoconstriction on skin capillaries and the reduction of oxygen delivery to the tissue, which is often caused by nicotine, increasing the risk of developing these ulcers. Furthermore, other factors in cigarette smoke, such as carbon monoxide, may interfere with the wound healing process (23).

In a study conducted by Suriadi et al. on 105 patients admitted to the intensive care unit, it was reported that smoking could increase the risk of bedsores (24). Krause et al. performed a study on 650 patients with spinal cord injury and showed that smoking was significantly associated with an increased risk of pressure ulcers (25). However, the findings of several studies were indicative of the existence of no association between smoking and pressure ulcers (26-28). According to the results of our study, the majority of patients with pressure ulcers (about 76%) had a history of diabetes, which had a positive and significant relationship with pressure ulcers. Casimiro et al. found that the risk of pressure ulcers in patients with diabetes was 1.54 times more than that in the normal population, which was predictable according to our information about diabetes and its arterial injuries (29).

Based on the findings of this study evaluating the length of hospitalization among patients with pressure ulcers, the majority of the cases (106 patients) had less than 10 days of hospital stay. A prolonged hospitalization increases the risk of pressure ulcers (8, 30, 31). The results of the present study revealed that bedsore in the head and scapular areas were significantly lower and higher,

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respectively. The prevalence of bedsores in certain areas mainly depends on the constant pressure on that area (9). In our study, most patients had grade 2 or grade 3 ulcers. Gedamu et al. proposed that 62%and 26.8% of the patients in their study had respectively grade 1 and grade 2 ulcers (1).

In the present research, half of the patients had a history of hypertension, which was inversely and significantly associated with Braden score, meaning that patients with a history of hypertension had a lower score. The findings of other studies have demonstrated that individuals with high blood pressure had a higher prevalence of bedsores (32). Another finding of our research was that 50% of the patients were high-risk based on the frequency of pressure ulcers and the Broaden Scale score. In other studies, this score was associated with the occurrence of ulcers (1, 33)

Conclusion

The results of our study suggested that pressure ulcers were higher in patients aged over 60 years and the majority of these patients had diabetes. A history of diabetes had a positive and significant relationship with pressure ulcers. It was also revealed that patients with a previous history of diabetes had a degree of ulcer 5 times higher than other cases, which increased with the prolonged hospitalization. Based on the results of this research, patients with a history of hypertension had a lower degree of bedsore. The subjects with high BMI had a lower, while a significant degree of pressure ulcer than cases with low BMI. Furthermore, based on the findings of the Braden Scale, 50% of our patients were high-risk. According to these results, pressure ulcers are still a major threat for elderly patients and individuals with a smoking history, higher BMI, and longer hospital stay. Therefore, special attention needs to be paid to the reduction of financial costs and maintenance problems of such patients.

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Conflicts of interest

The authors declare that there is no conflict of interest.

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