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Risk Factors and Prevalence of Pressure Injury in Elderly Hospitalized Patients

Hastanede Yatan Yaşlı Hastalarda Basınç Yaralanması Risk Faktörleri ve Prevalansı

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ABSTRACT

Objective: This study aimed to determine the risk factors and prevalence of pressure injury (PI) in elderly hospitalized patients.

Methods: This study has a descriptive, prospective, cross-sectional design. The sample size was 382, and data were collected using an introductory information form, the Braden Scale, a health diagnosis form, a skin assessment chart, and the pressure injury staging classification of the National Pressure Injury Advisory Panel.

Results: The mean age of the patients was 76.20 ± 8.36 years. In this study, 55.2% of the patients were female. PI was present in 14.6% of patients hospitalized in the research hospital and 16.0% of patients referred from another hospital. About 6.8%, 31.6%, and 17.9% of the patients were in PI stages I, II, and III. Unstageable and suspected deep tissue injuries comprised of 36.7% of cases. PI was mostly (37.6%) around the sacrum and coccyx. PI was 2.5 times higher (P = .001) in the 75 years and older age group than in those aged between 65-74 years. PI was 15.8 times higher in patients who could not change the bed position, 10.6 times higher in those with many invasive procedures, and 8.8 times higher in the presence of urinary incontinence.

Conclusion: The prevalence of PI in hospitalized elderly patients is high. It is important for nurses to determine the risk factors for elderly patients. PI frequency and stages indicate the risk factors ofelderly and inmobile patients to which nurses should pay attention.

Keywords: Elderly patient, hospitalized patient, pressure injury, prevalence, risk factor

ÖZ

Amaç: Bu çalışmada hastanede yatan yaşlı hastalarda basınç yaralanması (BY) risk faktörleri ve prevalansının belirlenmesi amaçlandı.

Yöntemler: Bu çalışma, tanımlayıcı, prospektif kesitsel bir tasarımdır. Örneklem büyüklüğü 382 idi, veriler tanıtıcı bilgi formu ve sağlık tanılama formu, cilt değerlendirme kartı, Braden skalası ve Ulusal Basınç Yaralanması Danışma Paneli'nin BY evreleme sınıflandırması kullanılarak toplandı.

Bulgular: Hastaların yaş ortalaması 76,20 ± 8,36 idi. Bu çalışmada hastaların %55,2'si kadındı. Araştırma hastanesinde yatan hastaların %14,6'sında ve başka hastaneden sevk ile gelen hastaların %16,0'ında BY vardı. Hastaların BY evreleri I %6,8, II %31,6 ve III 17,9 idi. Evrelendirilemeyen ve şüpheli derin doku yaralanmaları vakaların %36.7'sini oluşturuyordu. BY çoğunlukla (%37,6) sakrum ve koksiks çevresindeydi. 75 yaş ve üstü grupta 65-74 yaş grubuna göre BY 2,5 kat daha yüksekti (P=,001). BY yatakta pozisyon değiştiremeyen hastalarda 15,8 kat, çok sayıda invaziv işlem geçirenlerde 10,6 kat, idrar kaçırma varlığında 8,8 kat daha yüksekti.

Sonuç: Hastanede yatan yaşlı hastalarda BY prevalansı yüksekti. Hemşirelerin yaşlı hastaların risk faktörlerini belirlemesi önemlidir. BY sıklığı ve evreleri, yaşlı ve hareketsiz hastaların hemşirelerin dikkat etmesi gereken risk faktörlerine sahip olduğunu göstermektedir.

Anahtar Kelimeler: Yaşlı hasta, hastanede yatan hasta, basınç yaralanması, prevelans, risk faktörü

INTRODUCTION

A pressure injury (PI) is a localized injury caused by pressure or pressure-associated friction, tearing, or rupture of the skin or deep tissues over bony prominences.[1,2] Such injuries frequently occur in patients

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who are hospitalized for a long time. Such injuries cause the patients to suffer and impair their well-being and quality of life.[3-5]

Although PI can be reduced with current measures, it cannot be prevented. Prevention is more difficult in elderly patients; therefore, elderly-specific control of risks is important. As such, it is vital to determine the prevalence of PI in the geriatric population.[4-7] However, in various studies, estimates of the prevalence and incidence of PI in elderly hospitalized patients differ.[5,8,9] Pressure injury prevalence was 8.97% and Hospital-Acquired Pressure Injury (HAPI) prevalence was 2.58% in the USA.[5,6,7] Turkey has been shown to have a PI prevalence of 12.7%. It has been reported that PI is seen at a significant rate, especially in patients with a mean age of 65 years and older.[1]

Several factors may play a role in causing PI, including treatment (vasopressors), care conditions, and sociodemographic (e.g., age and gender) and clinical characteristics (e.g., diseases affecting mobility/activity level, a history of PI, and incontinence).[1,4-6]

It is important to determine the frequency and risks of PI specific to the elderly to reduce the frequency of PI in that population.[5,8,9] Therefore, this study aimed to determine the risk factors and prevalence of PI in elderly patients hospitalized for various reasons. Answers to the following questions were sought in the study.

- What is the PI prevalence rate?
- What stages of PI are seen and in which region(s) do they occur more often?
- Which risk factors are thought to play a role in PI?

METHODS

Research Design

This study has a descriptive, prospective cross-sectional design.

Sample and Setting in Research

The study was conducted in the internal medicine service of a private university hospital in Istanbul, Turkey. This service had 28 beds. One of the most important features of this service is that, although there was no geriatric service, the majority of patients were elderly patients. In 2021-2022, the number of nurses in this service varied between 28 and 34. In general, six nurses worked at night and seven nurses worked during the day. All nurses in the service were university graduates.

The sampling criteria were as follows: being 65 years old or older, being able to communicate (Turkish speaking), agreeing to participate in the study, and being hospitalized for at least two days. For the sample calculation of the study, the literature data were examined, and the number of patients aged 65 and older who were hospitalized in the internal medicine service from January 1, 2021, through December 31, 2021. The information technology directorate of the hospital reported that 594 elderly patients had been hospitalized during that time period. effect on the number of patients being hospitalized in 2021 compared to that in 2022. In the first three months of 2022 (January, February, and March), 396 elderly patients met the sampling criteria and were hospitalized in the internal medicine service for at least two days. However, 14 patients could not be included in the study due to missing data. A power analysis was performed for the representativeness of the sample (n=382); the acceptable error rate was 5%, the effect size was 90%, the chi-square was 282.361, and the variance was between 2.390 and 1.931. The study was completed with 382 elderly patients.

Data Collection

According to the hospital protocol, the skin examination data of all patients admitted to the internal medicine service, regardless of whether they had PI, were recorded in a form. The researcher requested permission and stated that she wanted to use this information in her research. The researcher used the clinic data in her study. After that, a skin assessment for PI was performed daily. The PI Braden Scale score, PI stage, location, number, size, depth, width, number of tunnels, presence of exudate, humidity, condition, and color of the wound bed and wound edges were recorded in this form. The specialist doctor evaluated each patient for PI, both at the time of admission and when a new skin injury was noticed, and any PI classification was recorded.

In this service, the PI was photographed during all care times, shared with the doctor, and archived. Every week, a doctor and a service nurse examined the patients and their skin evaluation chart and evaluated whether the PI occurred in the hospital. Since the researcher who collected the data in this study was a nurse of the service in which the research was conducted, she regularly took part in these meetings. As a research nurse working in the research service, she took an active role in the data collection, evaluation, and care of the patients. She also checked the information recorded by other nurses because she was in charge of the weekly PI meetings. Collecting data for this study lasted until patients were discharged or transferred to another institution.

Instruments

The data forms were used in the clinic where the patient was hospitalized, and the hospital's quality commission approved them.

For the collection of data, an introductory information form" was used to learn the sociodemographic and clinical characteristics of the patients. TheBraden Scale was used to determine the risk of PI. The stage of the pressure ulcers in the patients was determined according to the classification of the National Pressure Ulcer Advisory Panel (NPIAP).

Data were collected using 4 forms: introductory information form[4,6-9], health diagnosis form[4,8,9], Braden Scale[10], and skin assessment chart[2]. The stage of the pressure injury of the patients was determined according to the classification of the National Pressure Injury Advisory Panel.[2]

Introductory Information Form: It includes introductory features [age, gender, and body mass index (BMI)] and some clinic characteristics [diagnosis, length of stay (LOS) in hospital, feeding route, blood pressure, dependence on position change, history of PI, number and duration of invasive interventions, incontinences, and Braden Scale score, laboratory values (blood glucose, oxygen saturation, hemoglobin, albumin, c-reactive protein, and leukocyte)]. It is a data form developed according to the literature information.[4,6-9]

Health Diagnosis Form: It includes pressure ulcer history, activities and levels of in daily living, skin examination findings, and PI risk score.[4,8,9]

Braden Scale: It was developed by Bergstrom et al[10] in 1987. The Braden Scale has 6 sub-dimensions: sensory perception, skin moisture, activity, mobility, nutritional status, friction, and shear. Sub-dimension scores range from 6 to 23. For PI, 6-10 points indicate very high risk, 11-15 points indicate high-level risk, 16-19 points indicate moderate risk, and 20-23 points indicate low risk. Pınar and Oğuz[11] validated the scale in Turkey in 1998, and the

Cronbach's alpha coefficient was 0.88. The validity coefficient varied between 0.77 and 0.94. In the presented study, the Cronbach's alpha value was also found to be 0.71. The Braden Scale was used throughout the hospital where we conducted the study and in the surgical clinics.

Skin Assessment Chart: It includes health and health deviation indicators of the skin. See "the data collection" for detailed information. This chart also includes the NPIAP (2016)[2] PI staging classification. National Pressure Ulcer Advisory Panel (NPIAP) developed a Pressure Ulcer Classification System guide to prevent and treat PI.[2] In this guideline, it published the term "pressure ulcer" and revised the term "pressure injury staging system" in 2016; stage I, II, III, IV, unstageable and suspected deep tissue injury.[2] In our study, participants' PI was assessed using this staging system. This staging system is the most widely used method for staging pressure injuries in Turkey.

Ethical Considerations

We acquired approval from Koç University's ethical committee (Date: July 23, 2020, approval number: 325.IRB.115) and a written permit from the hospital (November 20, 2020 No:1227). We obtained both written and verbal consent from the participants. We informed the participants that their data would be used for scientific research and that we would not share their personal information in our publication. We also informed the patients that they would not undergo any interventions and that they would not receive any rewards or compensation.

Statistical Analysis

We analyzed the data using Statistical Package for the Social Sciences version 26.0 (IBM SPSS Corp., Armonk, NY, USA). The normality test of the data was done using the Kolmogorov–Smirnov test. According to the SPSS normality recommendations of George and Mallery,[12] the skewness and kurtosis values of most of the data were far from –2 /+2 ($P < .05$). We used number, percentage, mean, independent samples, 2-tailed *t*-test, chi-square, and logistic regression lbümin data analysis. Significance was set at $P < .05$. We used the Minitab 18 program to calculate the power of this study, which was found to be 0.90.

RESULTS

Table 1 shows some of the introductory and clinic characteristics between the patients and the relationship of these characteristics and PI. In this study, most of the patients (52.8%) were 75 years of age or older, 55.2% were women, and 53.9% were hospitalized for cardiovascular and peripheral vascular and respiratory diseases. With a statistically significant difference, PI was 2.5 times higher ($P = .001$) in the 75 years and older age group than in those aged between 65 and 74 years. PI was 1.6 times higher in those with cardiovascular and respiratory system diseases than in those with other system diseases ($P = .027$).

The hospital stay of the majority of the patients (64.7%) was 1-14 days; 77.0% came to the hospital with a stretcher-wheelchair; BMI was 24.31 ± 4.34;, 85.3% were tube fed, and 82.2% were patients on antibiotics, systole/diastole blood pressure was (mean ± SD) 116.21 ± 14.45/70.41 ± 10.45 mm Hg, and the Braden Scale PI risk score of the patients in the study was 16.37 ± 4.09.

According to the logistic regression analysis, the PI correlated 10.6 times with the LOS in the hospital, 3.9 times with the method of admission to the hospital, and 3.9 and 6.9 times with the treatments used (such as steroid/insulin or antibiotic/insulin).

Table 2 shows some introductory and clinic characteristics of patients and their relationship to PI.

About 23.1% of the patients with PI were independent when changing positions, 35.9% had a history of pressure ulcers in the past, the number of invasive attempts was 4.37 ± 0.88 and its duration was 31.64 ± 29.63 (mean ± SD) days, 81.2% of the patients had urinary incontinence, and 22.2% had fecal incontinence. Among these variables, PI was 15.8 times higher in patients who were not change bed position, 10.6 times higher in those with many invasive procedures, and 8.8 times higher in patients who had urinary incontinence.

In this study, there was no significant difference between the oxygen saturations of patients with and without PI ($P = .303$). However, blood glucose levels (mean ± SD: 137.53 ± 40.36/109.75 ± 28.70 mg/dL) and leukocyte levels (mean ± SD: 11.05 ± 4.11/8.34 ± 3.73 μL) were higher in those without PI, and oxygen saturation (mean ± SD: 95.76 ± 3.11/96.37 ± 2.07%), hemoglobin (mean ± SD: 9.43 ± 1.24/10.62 ± 1.96 mg/dL), albumin (mean ± SD: 28.12 ± 3.53/32.02 ± 3.39 g/dL), and hematocrit (mean ± SD: 28.44 ± 4.09/43.77 ± 42.43%) levels were lower. However, no significant relative risk (RR) relationship was found for any of these variables ($RR = 1$ or $RR < 1.5$).

Table 3 includes the PI characteristics of the patients. About 14.6% of the patients were hospitalized in the research hospital and 16.0% of the referred patients had PI. Of the PIs 6.8% were stage I, 31.6% were stage II, and 17.9% were stage III (the sum of stages I and II was 38.4%). In addition, the prevalence of PI pertaining to "unstageable and suspected deep tissue injury" was 36.7%. The patients' PI size (mean ± SD) was 1.36 ± 6.69 cm, and 69.2% had more than one. PI was mostly 37.6% located the sacrum and coccyx.

DISCUSSION

Age, Sex, and BMI

One of the patient groups most affected by the event is the elderly due to epidermal thinning and a reduction in dermal vascularity. Research shows that pressure is an important injury factor against the decreasing resistance of the skin with aging.[1,9,13-15] It is known that the ability of an individual to move their body, adjust their position, and control it decreases, especially at an advanced age. In particular, accompanying chronic diseases may play an important role in the formation of PI.[6,8,16,17] In the presented study, the 2.5-fold increase in the risk of PI with increasing age supports the idea that age may be an important variable.

Although there are studies suggesting that the risk of PI is higher in men than in women,[6] it has been reported that gender is mostly not an important risk factor.[6,17,18] Characteristics such as the differences between the number of men and women in the studies, the selection criteria of the sample, the age distribution of men and women, and the health histories of the patients are shown in these discussions.[6]

Another variable is that low or high BMI may be an important predictor of PI.[6] Low or high BMI has been shown to be associated with PI.[3,6] However, in the presented study, high or low BMI was not a risk factor for PI. Perhaps this was because the BMI of the patients with and without PI was close to normal.

Table 1. Some Descriptive Characteristics of Patients and Their Relationship to Pressure Injury

Characteristics	Total patient (n = 382), n (%)	With Pressure Injury (n = 117), n (%)	Without Pressure Injury (n = 265), n (%)	RR (95% CI) *P*
Age (years) (mean ± SD) (minimum–maximum)	76.20 ± 8.36 (65-98)	79.34 ± 8.38 (65-98)	74.81 ± 7.98 (65-96)	
65-74	146 (48.2)	38 (32.1)	146 (55.1)	
≥75	135 (52.8)	79 (67.5)	119 (44.9)	2.551 (1.616-4.026) **.001**
Gender				1.019 (0.658-1.578) .933
Female	171 (44.8)	52 (44.4)	119 (44.9)	
Male	211 (55.2)	65 (55.6)	146 (55.1)	
BMI (mean ± SD) (minimum–maximum)	24.31 ± 4.34 (15.10-50.50)	22.69 ± 5.30 (15.10-49.95)	25.03 ± 3.63 (15.70-50.50)	0.842 (0.786-0.942) **.001**
Clinical diagnosis				
Cardiovascular and peripheral vascular system, respiratory system, and COVID-19	206 (53.9)	73 (62.4)	133 (50.2)	1.647 (1.055-2.569) **.027**
Renal system, fluid electrolyte imbalances, digestive system, and other	176 (46.1)	44 (37.6)	13 (49.8)	
LOS (mean ± SD) (minimum–maximum)	18.20 ± 21.39 (1-180)	32.97 ± 29.84 (8-180)	11.63 ± 11.40 (1-86)	
1-14 days	247 (64.7)	13 (28.2)	214 (80.0)	
≥15 days	135 (35.3)	84 (71.8)	51 (19.2)	10.681 (6.444-17.704) **.001**
Method of admission to the hospital				
Stretcher-wheelchair	294 (77.0)	106 (90.6)	188 (70.9)	3.947 (2.009-7.753) **.001**
Ambulatory	88 (23.0)	11 (9.4)	77 (29.1)	
Feeding				1.380 (1.212-1.572) **.001**
Tube feeding: NGT/ NJT/ PEG/ PEJ	326 (85.3)	38 (32.5)	18 (6.8)	
Oral	56 (14.7)	79 (67.5)	247 (93.2)	
Medical treatment				
Antibiotics and insulins	314 (82.2)	112 (95.7)	202 (76.2)	6.986 (2.730-17.875) **.001**
Vasopressor	241 (63.1)	66 (56.4)	175 (66.0)	0.666 (0.426-1.039) **.072**
Other: insulin and steroids	170 (44.5)	79 (67.5)	91 (34.3)	3.975 (2.503-6.313) **.001**

RR, relative risk; CI, cumulative index; LOS, length of stay in the hospital; NGT, nasogastric tube; NJT, nasojejunal tube; PEG, percutaneous endoscopic gastrostomy; PEJ, percutaneous endoscopic jejunostomy. 7 the patient's BMI was below 18.5 kg.

Clinical Characteristics: Length of Stay in the Hospital, Mobility, and Sensory Perception

One of the clinical characteristics shown to be associated with PI in studies is LOS.[19] However, LOS alone is not a cause of PI. Causes such as poor disease prognosis, poor health history of the patient, and inability to change position due to medical devices prolong the hospitalization period of the patient and increase the relationship with PI.[4,17,19-23] In the presented study, long LOS duration was an important variable that increased the risk of PI. In particular, the patients' dependence on position change, the history of medical treatment (health history requiring insulin and antibiotic steroids), and the number of invasive treatments may have shown a relationship with PI as they both prolong the LOS duration. It is clear that these are interventions that limit the patient's activity. Most of these patients with a long LOS duration have reduced capillary circulation to keep them in immobilized position. Therefore, it can be said that the risks of PI increase.

One discussed PI risk factor is urinary and/or fecal incontinence. Wetness due to incontinence can lead to macerations and disrupt the integrity of the skin.[3,7,9,21,24] In the presented study, the strong relationship between PI and incontinence draws attention to the fact that patients may have experienced this problem for a long time and to the importance of skincare. In studies, it has been shown that as the contact time of urine and feces with the skin increases, skin integrity deteriorates.[6,7]

In the present study, another factor that showed a strong relationship with the risk of PI was the history of PI. It can be said that some patients have experienced similar PI risks for a long time and have fragile skin structures. In the literature, it has been shown that patients with a history of pressure ulcers develop PI more easily.[18]

In this study, Braden Scale scores for PI showed that 39.5% of patients had moderate or high risk and 60.5% had low or no risk. The literature revealed that patients who had a Braden Scale score of 15 or less had a 63.6% risk of PI.[6,20,25] Some studies report that Braden Scale may not be sufficient for early diagnosis of PI risk.[6,26,27] It is recommended to be used with other scales in patients with neurological deficits.[34]

Table 2. Some Introductory and Clinic Characteristics of Patients and Their Relationship to Pressure Injury

Characteristics	Total patient (n = 382), n (%)	With Pressure Injury (n = 117),	Without Pressure Injury (n = 258)	Exp (*B*) (95% CI) *P*
Systolic blood pressure (mm Hg) (mean ± SD) (minimum–maximum)	116.21 ± 14.45	113.29 ± 18.18 (50-160)	117.50 ± 12.27 (90-170)	0.974 (0.950-0.998) **.074**
Diastolic blood pressure (mm Hg) (mean ± SD) (minimum–maximum)	70.41 ± 10.45	71.00 ± 9.41 (50-100)	69.07 ± 12.44 (30-95)	1.009 (0.977-1.043) **.177**
Activity, n (%)				
Ambulant	246 (64.4)	27 (23.1)	219 (82.6)	
Walk with help or badfast	136 (35.6)	90 (76.9)	46 (17.4)	15.870 (9.296-27.091) **.001**
History of pressure injury in the past, n (%)				
Present	60 (15.7)	42 (35.9)	18 (6.8)	7.684 (4.177-14.137) **.001**
None	322 (84.3)	75 (64.1)	247 (92.8)	
Number of last invasive attempts (mean ± SD) (minimum–maximum)	2.53 ± 1.53	4.37 ± 0.88 (2-6)	1.71 ± 0.93 (1-5)	10.363 (6.269-17.144) **.01**
Last invasive procedure time (days) (mean ± SD) (minimum–maximum)	16.36 ± 21.11	31.64 ± 29.63	9.61 ± 10.41	1.103 (1.076-1.131) **.01**
Incontinence				
Urinary	182 (47.6)	95 (81.2)	87 (32.8)	8.835 (5.201-15.008) **.001**
Fecal	42 (11.0)	26 (22.2)	16 (6.0)	
Braden pressure injury (mean ± SD) (minimum–maximum)	16.37 ± 4.09	12.01 ± 1.93 (9-16)	18.30 ± 3.22 (11-24)	1.546 (1.381-1.744) **.02**
Low or no risk	231 (60.5)	15 (14.5)	214 (80.8)	
Medium or high risk	151 (39.5)	100 (85.5)	51 (19.2)	
Oxygen saturation (%)	96.18 ± 2.45	95.76 ± 3.11 (81-100)	96.37 ± 2.07 (90.00-100)	0.908 (0.808-1.031) **.203**
Blood sugar (mg/dL)	118.26 ± 35.09	137.53 ± 40.36 (86-273)	109.75 ± 28.70 (62-270)	1.024 (1.016-1.031) **.001**
Hemoglobin (mg/dL)	10.25 ± 1.85	9.43 ± 1.24 (6.60-14.0)	10.62 ± 1.96 (6.50-16.0)	**1.023** (0.918-.2.412) **.001**
Albumin (g/dL)	30.82 ± 3.88	28.12 ± 3.53 (17.20-41.20)	32.02 ± 3.39 (18.50-42.0)	0.764 (0.697-0.837) **.001**
Leukocytes (µL)	9.17 ± 4.04	11.05 ± 4.11 (3.25-26.45)	8.34 ± 3.73 (1.0-28.0)	1.184 (1.116-1.257) **.001**
Hematocrit (%)	31.08 ± 5.50	28.44 ± 4.09 (7.6-43.3)	32.24 ± 5.64 (20.0-49.0)	0.797 (0.676-0.940) **.001**
CRP	58.18 ± 64.43	90.83 ± 89.38 (8.20-264)	43.77 ± 42.43 (2.0- 263.0)	1.016 (1.011-1.021) **.001**

CRP, C-reactive protein; CI, cumulative index; SD, Standard Deviation, Exp (B), multinomial logistic regression.

Laboratory Values and Blood Pressure

Some studies have suggested that the relationship of PI with some biological and physiological indicators and treatments for the patients should be examined. One of them is low albumin level.[6,27] According to studies, the relationship between the risk of PI and albumin is controversial. Studies with different bias levels (high vs. low) have reported that low albumin level is an important risk factor for stage II PI[27] and an insignificant risk factor for stage I PI.[28] In the present study, a meaningful comparison could not be made because the albumin values of the patients with and without PI were already low. Although the nutritional route of the patients showed a weak relationship with PI, oral nutrition may not have been adequately provided.

Hemoglobin is considered a reliable method for evaluating anemia. Wound healing may be adversely affected because oxygen cannot be effectively transported to organs and tissues with a low hemoglobin concentration.[6,29,30] Studies have shown tissue oxygenation to be important in PI.[22,30] In the present study, patients with and without PI had low hemoglobin levels and tissue oxygenation at the lower limit. Although these laboratory values do not appear to be related to PI, it is known that they help the resistance of the healthy tissue and the healing speed of the injured tissue in the patient's immobility state. More data on anemia and/or hemoglobin and oxygen saturation are needed to make a conclusive and consistent explanation for their association with the development of PI.

Vasopressor Therapies and Blood Pressure

There is generally reported insufficient evidence to show that vasopressors significantly affect pressure injuries. Vasopressors were not a risk factor for PI in the present study. However, studies (for adrenaline and noradrenaline) have shown that vasopressors may be a risk factor in deep PI.[31-33]

Although hypotension is the focus of interest in studies investigating PI due to its negative effect on tissue oxygenation and nutrition, the results are controversial.[6,21,30,31,34] In the present study, systolic and diastolic blood pressures of patients with and without PI were normal or close to this limit, so it was not a risk factor.

Prevalence and Characteristics of Pressure Injury

In the present study, it can be said that the prevalence of PI was higher in patients referred to the hospital (16.0%). The prevalence

Table 3. Pressure Injury Characteristics of the Patients

Characteristics	Number (n = 117), n (%)
The institution where the pressure injury occurred	
Referral from another hospital	61 (16.0)
In the research hospital	56 (14.7)
Number of pressure injuries	
More than 1	81 (69.2)
Sore size (mean ± SD) (minimum–maximum)	1.36 ± 6.69 (0.45-6.12)
Stage of pressure injury	
Stage I	8 (6.8)
Stage II	37 (31.6)
Stage III	21 (17.9)
Stage IV	8 (6.8)
Unstageable and suspected deep tissue injury	43 (36.7)
Location of pressure injury	
Sacrum and coccyx	44 (37.6)
Trochanter /iliac and ischium	33 (28.2)
Lateral malleolus or heel	11 (9.4)
Ears and occipital	6 (5.2)
Other: scapula, arm, chest	23 (19.6)

SD, Standart Deviation

of PI in the elderly is similar to this study in various studies. The hospital-acquired PI prevalence was 2.58% in the USA[7,] 17.5% in Ethiopia,[17] and 24.6% in a multicenter study in Italy.[24] On the other hand, it is reported that the prevalence of PI may show some differences between countries. Contrary to the studies above, the fact that the PI is 7.1% of the elderly in Germany[4] can be an example. This difference is explained by the fact that advanced nursing care initiatives and resources, risk assessment tools, and treatment guidelines are not similar among countries.[17] As it has been suggested in the present study and various studies over the last 10 years,[4,17,21,24] it can be said that PI is an important health problem in the elderly population at an increasing rate.

In the present study, the patients' PI was the most frequently cited in the literature, such as the sacrum/coccyx, hips, heels, and ankles,[6,16] and showed that they mostly stayed in the supine position. In addition, the number of advanced PI was higher than superficial PI (than stages I and II). In a systematic review and meta-analysis study,[13] stage I, II, III, and IV and unstaged and suspected deep tissue injuries in elderly patients were 43.5%, 28.0%, 12.8%, 9.9%, 7.8%, and 2.4%, respectively. In the present study, on the contrary, it can be said that the size of the injury cannot be controlled after the skin integrity is broken. In addition, the fact that patients with unstageable and suspected deep tissue injuries are mostly on the heels/toes may be related to the supine positioning. The fact that most patients had neurological deficits may have prevented the planned application of position changes at least every 2 hours. Another reason for PI may be that insufficient precautions are taken due to the low Braden Scale scores of the patients. In addition, approximately half of the patients with pressure sores in this hospital were referred from another institution. The PI stages of these patients were similar to those of the research hospital. Perhaps the number of patients per nurse was high, which was decisive in the pressure ulcer characteristics of patients with multiple chronic diseases. As reported in a study conducted in acute care institutions in the USA, that while preventive interventions could reduce stage I and II PI, more serious pressure injuries could not be reduced.[4]

The data in this study show that the prevalence of PI in hospitalized elderly patients is high. Patients had some strong PI risk factors, including age, the prognosis of the disease leading to bedridden and prolonged hospitalization, multiple and prolonged invasive interventions that limit the movement of patients, limitation of movement, incontinence, treatments that may affect wound healing, and history of pressure ulcers.

The prevalence can be reduced if care interventions are planned and implemented by identifying the risk factors of PI for the elderly by nurses.Pressure ulcer stages demonstrate that stage I PI was much lower than other stages. This may be because the hospital only uses the Braden Scale. Similar studies can be performed using other scales besides the Braden Scale in patients with neurological deficits. Future research on PI risk factors specific to the elderly may provide more data in this area.

Study Limitations

The limited data collection period prevented us from reaching more patients. Only the Braden Scale was used to determine the hospitalized patients' PI risks. It can be said that Braden Scale scores were not a good predictor of PI in this study.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Koç University (Date: July 23, 2020, Number: 325.IRB.115).

Informed Consent: Written and verbal informed consent was obtained from patients who participated in this study.

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