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This manuscript comes from a residency monograph entitled "Perfil sociodemográfico, clínico e nutricional de pacientes com lesão por pressão", authored by Thaís Manuella Moraes dos Santos and supervised by Maria Goretti Pessoa de Araújo Burgos, presented in December 2022, at the Universidade Federal de Pernambuco (Federal University of Pernambuco), Recife-PE, Brasil.

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Associate Editor
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Sociodemographic, clinical and nutritional profile of patients with pressure injury

Perfil sociodemográfico, clínico e nutricional de pacientes com lesão por pressão

Abstract

Introduction: Inadequate nutritional status has been increasingly linked to the incidence and frequency of pressure injuries, given its pivotal role in the wound healing process. Extreme conditions, such as malnutrition and obesity amplify the risk of injury development. **Objective:** In this perspective, our study aimed to assess the sociodemographic, clinical, and nutritional characteristics of patients with pressure injuries. **Method:** This is a cross-sectional, descriptive, and observational study, conducted between February to September 2022, including hospitalized patients. Data collection encompassed medical records review and direct interviews with patients/caregivers. Several sociodemographic, clinical, nutritional, and biochemical parameters were evaluated. Thirty-seven patients with mean age of 65 years were included. They were mostly admitted to medical clinic wards. **Results:** Nutritional risk, as assessed by the Nutritional Risk Screening-2002, was found in 81.1%; meanwhile, 27% were classified as overweight, while 24.3% as underweight, based on body mass index. 56.7% exhibited malnutrition based on arm circumference (AC), 94.6% had anemia, and 86.5% hypoalbuminemia. In terms of nutritional intervention, 45.9% were undergoing oral nutritional therapy. The sacral region was the most frequent site of injuries (81%), with 64.8% classified as stage 2. **Conclusion:** Elevated nutritional risk was detected, with measurements of circumferences suggestive of muscle depletion and oral nutritional supplements was the first treatment choice in nutrition therapy. Our study underscores the importance of formulating comprehensive care plans, and implementing monitoring protocols for such patients within the hospital setting.

Keywords: Nutritional risk. Nutritional status. Pressure injuries. Nutritional therapy.

Resumo

Introdução: O estado nutricional inadequado vem sendo relacionado com a incidência e frequência de lesão por pressão, uma vez que desempenha papel fundamental no processo de cicatrização. Condições extremas, como a desnutrição e a obesidade, potencializam o risco de desenvolvimento de lesão. **Objetivo:** Nesta perspectiva, o presente estudo teve como objetivo avaliar o perfil sociodemográfico, clínico e nutricional de pacientes com lesão por pressão. **Método:** Trata-se de um estudo transversal, descritivo, do tipo observacional, realizado entre fevereiro e setembro de 2022, com pacientes hospitalizados. Os dados foram coletados através de prontuários e entrevista direta a pacientes/acompanhantes. Foram analisadas variáveis sociodemográficas, clínicas, nutricionais e bioquímicas. Foram avaliados 37 pacientes, com média de idade de 65 anos, admitidos principalmente nas enfermarias de clínicas médicas. **Resultados:** O risco nutricional pela *Nutritional Risk Screening* - 2002 foi de 81,1%; 27% apresentavam excesso de peso e 24,3% magreza, segundo o Índice de Massa Corporal; 56,7% com desnutrição pela circunferência do braço (CB); 94,6% com

anemia e hipoalbuminemia em 86,5%. Quanto à terapia nutricional, 45,9% estavam com terapia nutricional oral. A região sacral foi a mais acometida por lesões (81%) e 64,8% no estágio 2. **Conclusão:** Detectou-se elevado risco nutricional. As medidas das circunferências foram sugestivas de depleção muscular e a terapia nutricional mais frequente foi a oral. O estudo fortalece a importância do plano de cuidado e monitorização nutricional destes pacientes no ambiente hospitalar.

Palavras-chave: Risco nutricional.Estado nutricional.Lesão por pressão. Terapia nutricional

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INTRODUCTION

Pressure injury (PI) is characterized by localized damage to the skin and/or underlying soft tissues, typically occurring over bony prominences. The condition can lead to various complications and exacerbate the patients' clinical illness. PI develop due to prolonged or intense pressure, often in combination with shear forces. Tissue tolerance to pressure and shear may also be influenced by factors such as inadequate nutrition or perfusion, comorbidities, and the patient's overall clinical status.^{1,2}

Recognized as a worldwide public health challenge, PI have become an escalating and persistent concern, especially within hospital environments. According to the National Healthcare-Related Incident Report,³ notifications on PI constituted 20.30% of the reported adverse events between 2014 and 2022, amounting to 223,378 notifications. Throughout this period, the condition ranked as the second most commonly reported event by patient safety units within the country's healthcare facilities.³

The risk factors for PI development can be divided into intrinsic (related to the patients' vulnerability) and extrinsic (resulting from environmental factors and exposures during hospitalization).¹ Among the most prevalent intrinsic factors, advanced age, presence of comorbidities, immobility, nutritional deficiencies, anemia, and hypoalbuminemia are noteworthy. In terms of extrinsic factors, increased pressure on bony prominences and shear forces are notable.⁴

Biochemical and hematological markers can be concurrently utilized to enhance assessment and aid in determining nutritional status. Low levels of albumin are linked to tissue edema and reduced resistance to infection, exacerbating the chronicity of lesions.⁴ Hemogram's deficiencies are common in these patients, likely due to the effects of inflammatory cytokines resulting from the consequences of the injury. This circumstance impairs blood perfusion and diminishes the transport of nutrients and oxygen to the wounds⁵.

Poor nutritional status has been linked to the incidence and frequency of PI, given its crucial role in the healing process. Extreme conditions like malnutrition and obesity exacerbate the risk of developing such injuries.²

In cases of malnutrition, there is an increase in the exposure of the individual's bony prominences, and a decrease in available nutrients for tissue repair and maintenance. Simultaneously, nutritional deficits lead to a range of serious alterations, including reduced protein synthesis, diminished immune response, and impaired wound healing, rendering patients more susceptible to infection.⁶ On the other hand, obesity can impede the patient's ability to change positions and exacerbate shear and friction during movement in bed, thereby heightening the risk of developing PI.^{2,4}

A recent systematic review and meta-analysis, which included long-term care facilities for older adults, suggested that overweight may serve as a protective factor against the occurrence of PI. This finding has been attributed, in part, to the higher amount of body fat and muscle mass, which can be considered protective against catabolism and provide better nutrient reserves.⁷ However, it is observed that the incidence and frequency decrease when guideline-based protocols are implemented.⁸

In a cohort study across public and private hospitals in São Paulo, variations in the prevalence and incidence of PI were noted. These variances were associated with factors such as nutrition, age, comorbidities, and length of hospital stay, with a higher prevalence observed among hospitalized patients.⁹ Research conducted in South Brazil also underscores the correlation between PI incidence and disease severity, along with adverse outcomes and mortality in intensive care units.⁸

Assessing nutritional risk and status is deemed pivotal in managing these injuries, especially among patients presenting with heightened catabolic state.⁸ Given the scarcity of literature on the nutritional profile of this population in our region, conducting this research becomes essential. From this perspective, the present study aimed to evaluate the sociodemographic, clinical, and nutritional profiles of patients with pressure injuries.

METHODS

This is a cross-sectional, descriptive, and observational study. Consecutive hospitalized adult and older patients were conveniently included. They were admitted to clinical, surgical and intensive care wards at the *Hospital das Clínicas – Universidade Federal de Pernambuco*, Recife, Pernambuco, Brazil. Data collection occurred between February to September 2022.

The study was approved by the institutional Research Ethics Committee, in compliance with the Declaration of Helsinki, and the Resolutions 466/2012 and 510/2016 of the National Health Council (approval number: 5.582.066).

Inclusion criteria were patients ≥ 19 years old, from both sexes, diagnosed with the presence of one or more PI, at any stage and location of the body. Exclusion criteria encompassed being pregnant, patients with dementia without a caregiver, unable to undergo anthropometry, with psychiatric conditions, terminally ill, with ascites, severe edema, and anasarca. All participants signed the Informed Consent Form (ICF). In the case of unresponsive individuals or those unable to communicate, an invitation was extended to their caregiver, who had to accept the invitation and sign the ICF.

Data were collected through medical records and direct interviews with patients or their caregivers. Sociodemographic, clinical, nutritional, and biochemical variables were assessed. Sociodemographic variables included information on sex, age, family income, place of origin, and self-reported race. Clinical variables included location, stage, and quantity of PI, clinical diagnosis and comorbidities, ward setting, length of hospital stay, and clinical outcome, which addressed information on the presence of PI at discharge or death. Lesions' stage was collected with the Hospital Infection Control Committee (CCH), with classification according to the National Pressure Ulcer Advisory Panel (NPUAP).¹⁰ Nutritional variables included weight (kg), height (m), arm circumference (AC, in cm), and its classification according to Blackburn et al.¹¹ Calf circumference (CC) was measured in older adults, and classified with cutoff points of ≤ 34 cm for men and ≤ 33 cm for women.¹² Additional nutritional assessments included percentage (%) and classification of weight loss, nutritional risk score and classification through the Nutritional Risk Screening (NRS-2002),¹³ as well as information on oral and enteral (standard or specialized) or parenteral nutritional therapies.

Anthropometric assessment, conducted at hospital admission, included the measurements of weight and height for calculating BMI (kg/m^2). For adults, BMI was categorized according to the World Health Organization classification.¹⁴ For older adults, the Lipschitz reference was adopted,¹⁵ recommended by the Ministry of Health for Brazilian seniors,¹⁶ aiming to standardize the reference population and avoid underestimation of overweight in this group. In cases which weight and height measurements were not possible, an estimate was made using the equations of Chumlea et al.^{17,18} which account knee height, sex, race, and patients' age (for height estimation). Classification of the percentage of weight loss relative to habitual weight was performed according to Blackburn et al.¹⁹

Biochemical variables included hemoglobin (Hb), hematocrit (Ht), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and albumin. Anemia was identified when serum Hb was $<12\text{g/dL}$ for

women and <14 g/dL for men, MCV between 80.0-98.0 fL, MCH between 27.0-33.0 pg. Low serum albumin was identified with values <3.5g/dL.

Collected data underwent statistical analysis. Categorical variables were described using absolute and percentage frequencies (%). Numerical variables were summarized with mean, standard deviation (mean $\pm$ SD), minimum value, first quartile (Q1/P25), median, third quartile (Q3/P75), and maximum value. Pearson's chi-square test for a single-sample was employed to assess differences between the percentages of categories in the total group. Additionally, Pearson's chi-square test was employed to verify associations between two categorical variables. A significance level of 5% was utilized for all statistical tests. Statistical analyses were performed using IBM SPSS version 25.

RESULTS

Thirty-seven patients, with an average age of 65 years, were included in the study. Most of them were older adults (67.6%), mainly admitted to medical clinics wards, originating from the metropolitan region of Recife, and had the income range of 1-3 minimum wages (Table 1). The average length of hospital stay was 52.68 ± 42.03 days, with a mean BMI of 23.61 ± 7.03 kg/m². Patients presented with mean 1.43 ± 0.83 lesions over a period of 1.08 months. Nutritional risk score assessed by NRS-2002 was 3.54 ± 1.61 , and the percentage of weight loss over 2.4 months was 6.2%.

Table1. Sociodemographic and clinical characteristics of patients with pressure injury, HC/UFPE, 2022 (N = 37).

Variables	Total (37; 100%)
<i>Age</i>	
Adults	12 (32.4)
Older adults	25 (67.6)
<i>Sex</i>	
Men	20 (54.1)
Women	17 (45.9)
<i>Race/Ethnicity</i>	
White	6 (16.2)
Non-white	31 (83.8)
<i>Income</i>	
< 1 minimum wage	3 (8.1)
1 a 3	27 (73.0)
> 3	7 (18.9)
<i>Origin</i>	
Recife	12 (32.4)
Metropolitan region of Recife	14 (37.8)
Inland	11 (29.7)
<i>Ward</i>	
Medical clinic	24 (64.9)
Surgery	6 (16.2)
Intensive care unit	7 (18.9)

Table1. Sociodemographic and clinical characteristics of patients with pressure injury, HC/UFPE, 2022 (*N* = 37). (Continues)

Variables	Total (37; 100%)
<i>Length of hospital stay (days)</i>	
Up to 30	16 (43.2)
> 30	21 (56.8)
<i>Hospital admission with PI</i>	
Yes	17 (45.9)
No	20 (54.1)
<i>PI duration (in months)</i>	
< 6	34 (91.9)
> 6	3 (8.1)
<i>PI</i>	
One	26 (70.3)
Multiple	11 (29.7)
<i>Clinical diagnoses</i>	
2DM	10 (27.0)
Cancer	8 (21.6)
Critical illness	7 (18.9)
Orthopedics	4 (10.8)
Neurologic	3 (8.1)
Other	5 (13.5)
<i>Outcome</i>	
Discharge/Deathwith PI	32 (86.5)
Discharge/Deathwithout PI	5 (13.5)
<i>Related diseases</i>	
One	12 (32.4)
Multiple	25 (67.6)

Abbreviations: 2DM: type 2 diabetes mellitus; PI: pressure injury.

In Table 2, the results of the NRS-2002, anthropometric assessments, and biochemical evaluations are described. There was a predominance of patients with nutritional risk according to the NRS-2002, normal nutritional status based on BMI, CC indicating muscle depletion, malnutrition by AC (56.7%), 94.6% of patients with anemia, and 86.5% with hypoalbuminemia.

Table 2. Anthropometric and nutritional characteristics of patients with pressure injury, HC/UFPE, 2022 (*N* = 37).

Variables	Total (37; 100%)
<i>NRS 2002 classification</i>	
At risk	30 (81.1)
No risk	7 (18.9)

Table 2. . Anthropometric and nutritional characteristics of patients with pressure injury, HC/UFPE, 2022 (N = 37).(Continues)

Variables	Total (37; 100%)
<i>BMI</i>	
Underweight	9 (24.3)
Normal range	18 (48.7)
Excess weight	10 (27.0)
<i>CCin older patients</i>	
With depletion	21 (56.8)
No depletion	4 (10.8)
<i>AC</i>	
With depletion	21 (56.7)
No depletion	16 (43.2)
<i>Weight loss %</i>	
None	23 (62.2)
Severe	13 (35.1)
Significant	1 (2.7)
<i>Anemia</i>	
Absence	2 (5.4)
Presence	35 (94.6)
<i>Albumin status</i>	
Hypoalbuminemia	32 (86.5)
Normal	5 (13.5)

Abbreviations: AC: arm circumference; BMI: body mass index; CC: calf circumference; NRS - *Nutritional Risk Screening*.

Source: Authors, 2022.

Nutritional therapy (NT) was offered in the form of oral nutritional supplements (ONS), 2-3 times a day (45.9%); enteral nutrition (EN) (27%) of standard or specialized characteristics, and parenteral nutrition (PN) in 8.1% of cases. However, it was observed that 18.9% of the group did not receive any form of nutritional therapy. In terms of the location and stage of PI, the sacral region (81%) was predominant, with stage 2 ulcers being the most common (64.8%). There was no statistically significant difference between adults and older regarding PI location and stage.

DISCUSSION

Evaluating nutritional risk and nutritional status in patients with PI is crucial for preventing their occurrence and halting their progression, as well as for implementing specialized NT earlier.²⁰ This study, predominantly involving older patients, with an average hospital stay of 52.68 ± 42.03 days and a BMI of 23.61 ± 7.03 kg/m², revealed an average of 1.43 ± 0.83 ulcers over a period of 1.08 months. The nutritional risk assessed by the NRS-2002 was 3.54 ± 1.61 , with a percentage of weight loss of 6.2% over 2.4 months.

Studies on the sociodemographic characteristics of individuals with PI in Brazil's Northeast region have shown a male predominance ranging from 41.27% to 58% across different populations studied.²¹⁻²³ Additionally, a higher incidence was noted among hospitalized older individuals in intensive care units (ICUs),²² contrasting with our findings where patients from medical clinic wards were predominant. However, a study conducted in a public hospital in the south region of the country reported a 40% incidence rate in medical clinic wards,²³ while another research conducted in a university hospital in the NE region found a prevalence of 83.9%.²⁴ These values are considerably higher when compared to our group, likely due to the larger patient volume in such clinics.

In Norway, authors²⁵ found a lower nutritional risk of 12.4%, contrasting with the higher rates reported in Southeast Brazil, where values reached 57.2%.⁹ Still, these values remain notably lower than those observed in our study. This discrepancy is likely attributed to the lower socioeconomic status prevalent in the population of the Recife Metropolitan Region, assisted by the *Sistema Único de Saúde* (SUS), which is often associated with lower educational attainment.²⁶ Additionally, Eglessner et al.²⁷ in Austria reported a nutritional risk of 36% by MUST among hospitalized individuals over 80 years old ($N = 71$) with a normal BMI (25.7 kg/m^2), which aligns with our findings indicating a predominantly normal BMI status among participants.

In contrast to our findings, Kahl et al.²³ found significant weight loss in 73% of older male participants, with 23.9% showing significant weight loss and 59% experiencing severe weight loss over a three-month period at a University Hospital in Santa Catarina, Brazil. Similarly, Thumé et al.²⁸ reported a prevalence of weight loss in 72.2% of their population over a period of less than three months. These results underscore the importance of early nutritional screening and weekly nutritional assessment to prevent weight loss during hospitalization.

Evidence reports that individuals with extreme BMI values present a heightened risk for developing PI²⁴, contrasting with our findings, which didn't observe such frequency in extreme BMI categories. This discrepancy may be partially explained by the research duration and single-moment data collection. Contrastingly, authors from Germany²⁹ identified malnutrition by BMI in 28.7% of older patients (mean age 65.2 years). However, Batista et al.²² showed a higher frequency of overweight by BMI both in adults (47%) and older patients (56%), reinforcing that patients with higher BMI present a risk for PI, especially due to diminished mobility and higher frequency of associated comorbidities.

Research²⁸ conducted in the South region of the country revealed a high prevalence of malnutrition assessed by AC, with values in the range of 48.4% in older individuals, similar to those found in this group of seniors. When analyzing CC measurements in older individuals (with a mean age of 63 years) in a general hospital, Khal et al.²³ noted that the majority (52%) exhibited muscle depletion. Similarly, a study conducted in an ICU revealed that 56% of adults with a mean age of 54 years²² had this condition, findings consistent with our observations in seniors with a mean age of 65 years.

In terms of PI location, the sacral anatomic region is the most described, with prevalence varying from 46.4% to 100%.²²⁻²⁵ This anatomic site is commonly susceptible to PI development, particularly due to the dorsal position, which patients often rest in bed.²¹ Such findings regarding PI locations are similar to ours.

Accounting the NPUAP classification¹⁰, studies reported similar frequencies of PI within stage 2.³⁰ The study by Brito et al.³⁰ reported a frequency of 32.9%, while Ortiz et al.³¹ reported a frequency of 56.8%. These findings corroborate to ours, despite we found an even higher frequency.

It is consensus that nutritional therapy contributes to the prevention of malnutrition and tissue healing improvement¹. A study conducted in Mato Grosso³², evaluating NT used in individuals with PI at ICU, found 32% administered orally and 68% through EN. These results are similar to other authors^{23,31}, which reported

EN usage rates of 72.5% and 60%, respectively. However, our findings differ from these authors, as oral administration was significantly more frequent compared to Perrone et al.'s study³², while EN usage was lower than that found by Costa et al.²¹. Compared to Costa et al.²¹, who showed a 9.8% PN usage rate, and Eglesser et al.²⁷, with 3%, PN usage rates were quite similar in the studied group.

In terms of nutritional formula, both national and international guidelines suggest that the adoption of high-protein oral nutrition warrants consideration for patients at elevated risk of PI who rely exclusively on oral intake.¹The optimal quantity and quality of nutrients for effective healing remain a topic of debate. However, most studies report favorable outcomes when employing specific enteral nutrition formulas rich in high biological value proteins, along with key elements such as arginine, zinc, selenium, and vitamins A, C, and E.^{1,10}This observed physiological mechanism serves as a facilitator in the healing process by mitigating the overproduction of free radicals typically found in LP-afflicted tissues.^{1,10}Notably, Khal et al.²³ report enteral nutrition usage in 34.5% of cases, surpassing the figures from Costa et al.²¹ (15.7%) and Eglsesser et al.²⁷ (8.5%), all of which are lower than the rates identified in this study. These findings underscore the pivotal role of nutritionists/dietitians in developing care plans for such patients, thereby aiding in the mitigation of PI progression risks.

In the examination of biochemical parameters, it becomes apparent that the prevalence of anemia is an anticipated finding, given the numerous challenges confronted by individuals in the hospital setting, including inadequate dietary intake, and infections, both of which can lead to reduced serum levels of Hb.^{28,33}Anemia's potential contribution to the development of PI lies in its ability to compromise oxygen availability to fibroblasts, consequently impeding collagen synthesis and heightening tissue vulnerability to PI and other forms of lesions.³³Notably, a study²¹ conducted at a university hospital in Recife revealed an 86.3% prevalence of anemia in intensive care, a value lower than the frequency observed in this investigation.

As noted by Costa et al.,²¹ hypoalbuminemia is associated with the onset of PI due to its effect on oncotic pressure, leading to edema formation and subsequently impairing the diffusion of oxygen and nutrients within tissues. Similar findings of hypoalbuminemia prevalence, ranging from 88.2% to 100%, have been reported in other studies²³, mirroring our own results. However, it's important to emphasize that reduced albumin levels may also be indicative of both chronic and acute inflammatory states.²¹

The study's limitations include the small sample size and short data collection period, potentially compromising the statistical analysis power, in addition to being a cross-sectional study. Nonetheless, the results are adequate to stimulate discussions regarding nutritional care for these patients, emphasizing the necessity for further research involving larger patient cohorts across various clinical settings. Such endeavors aim to implement updated protocols based on current guidelines

CONCLUSION

Elevated nutritional risk was detected, with measurements of circumferences suggestive of muscle depletion, particularly prevalent among older patients in medical clinic wards. This was observed alongside anemia and hypoalbuminemia, extended hospital stays exceeding 30 days, multiple comorbidities, and stage 2 sacral region lesions, with oral nutrition being most frequent NT via. Further studies are required to validate these findings with more representative sample sizes across various hospital settings.

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Contributors

Santos TMM project author, participated in project design, data collection, writing of results, and article drafting; Burgos MGPA: participated in critical review and final approval of the project; Escoteiro FKRS, Silva GMMR, and Santos AMS: contributed to the writing support of the article.

Conflict of Interest: The authors declare no conflict of interest.

Received: March 15, 2023

Accepted: March 15, 2024