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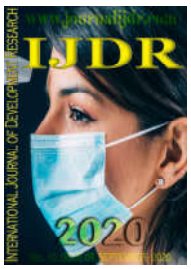

RESEARCH ARTICLE OPEN ACCESS

THE PREVALENCE OF SKIN TEARS AMONG THE ELDERLY POPULATION LIVING IN THE COMMUNITY OF A NEOTROPICAL REGION

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ABSTRACT

This article seeks to identify the prevalence of skin tears and associated risk factors in from the elderly population living in a community in the neotropical Region of Central-Western Brazil. This is a cross-sectional study of 281 older people. Skin tears were found in 14 (5%; 95%CI: 2.8 – 8.2) of the participants. Age ≥75 (PR: 1.03; 95% CI: 1.00-1.06), caucasian (PR: 1.04; 95% CI: 1.01-1.07), being overweight (PR: 1.07; 95%CI: 1.01 – 1.14), urinary incontinence (PR: 1.03;95% CI: 1.00-1.08), prior history of skin tears (PR: 1.21;95% CI: 1.10-1.34), Tinetti with no dysfunction (PR: 1.22; 95% CI: 1.05-1.48) and Tinetti with high risk of altered gait and balance (PR: 1.21;95% CI: 1.00-1.48), ADL-dependent (PR: 1.03; 95% CI: 1.00-1.08), presence of ecchymosis (bruising) (PR: 1.11;95% CI: 1.03-1.18), decreased turgor (PR: 1.03; 95% CI: 1.00-1.05), rough texture (PR: 1.04;95% CI:1.00-1.10), dry skin (PR: 1.04;95%CI:1.00-1.08) and edema (PR: 1.04;95% CI: 1.00-1.08) were independently associated with the presence of skin tears. Skin tears in the elderly population need to be better understood in different climatic conditions in order to prevent and treat these wounds.

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INTRODUCTION

Longevity is increasing, even in underdeveloped countries. In Brazil, the number of older adults has risen by almost 700% in less than 50 years [1]. The aging process triggers several changes in biological systems, including the skin and subcutaneous tissue. Age-related skin changes include thinning skin, with reduced elasticity and mobility, and flattening of the dermoepidermal papillae, affecting the adhesion of these layers, thereby reducing the skin's resistance to tension [2-3]. These characteristics put the aging person's skin at higher risk for wounds, such as skin tears (STs). An ST is a specific type of skin laceration that affects individuals with fragile skin, and may affect only the epidermis (partial thickness wound) or epidermis and dermis (full thickness wound), with or without a skin flap; caused by friction alone or combined with shear force, and/or blunt trauma [4-7]. Individuals at the extremes of age, such as newborns and older adults, the critically ill and those dependent on others for personal care, presenting with fragile skin, are vulnerable to this injury [4,6]. In addition to fragile skin, other clinical features, often present in older people, increase the risk of STs, such as a decline in functional capacity, impaired mobility, and decreased sensation and cognition [6,8-9]. STs are complex acute wounds that have a high risk of becoming chronic wounds. The most prevalent risk factor is old age, followed by impaired mobility, falls and accidental injuries, previous skin tears, cognitive deficit/dementia, dependence in transfers, and upper limbs [10]. Skin tears are often minimized and underappreciated wounds, despite being the most frequently reported wound type in long-term care (LTC) settings and more common than pressure ulcers and burns [11-13]. This is an important assumption because wounds in the aging population are often used to assess the quality of nursing care. In addition, STs generate significant increases in nursing workloads and healthcare costs [14]. Prevalence and incidence studies on STs are needed to help in resource allocation and the development

of comprehensive ST prevention and management programs [15]. Despite the above mentioned assumption, global epidemiological studies involving STs are limited [7], with most of the literature focusing on STs in institutionalized older adults [16-22]. In a long-term care (LTC) setting, the prevalence of STs is between 2 [24] and 22% [22]. Carville and Lewin and Carville and Smith conducted an ST prevalence study and reported a prevalence of 5.5 to 19.5% among community-dwelling individuals [4, 23]. There are few Brazilian epidemiological studies pertaining to STs [20, 25-26]. Peres [20] reported a prevalence of 11.6% among individuals living in LTC (n= 69) and Amaral, Pulido & Santos [25] demonstrated an ST prevalence of 3.3% among hospitalized cancer patients (n=157). A 7.02% incidence of STs was reported in cardiopneumology intensive care units (n= 370) [26]. No Brazilian ST prevalence study has been conducted in a community setting. Understanding the national situation may contribute to decision making aimed at preventing and controlling these injuries. Brazil is located in a Neotropical region, characterized by biodiversity and endemism, with its own subdivisions [27-28]. Thus, it is important to carry out studies on the epidemiology of ST in community-dwelling older adults from different regions of the country. The aim of this study was to identify the prevalence of STs, their characteristics and associated risk factors in the elderly population living in a community in the Neotropical region of the Central-Western Brazil.

METHODS

A cross-sectional prevalence study of STs was conducted in 2015 among consenting older residents living near primary care units in Jataí, Goiás, Brazil. Jataí encompasses an area of 7.174,228 Km2, located at 51.71° longitude and 17.88° latitude, and belongs to the Midwest Region of the country and Microregion of Southwest Goiás. Its economy consists predominantly of agriculture and livestock breeding, with a Human Development Index of 0.75 [29]. The climate is mesothermal tropical, with a rainy season between October and April, and a dry season from May to September. The maximum temperature ranges from 35º to 37ºC, and the minimum from 12º to 15ºC, sometimes reaching as low as 5ºC [30]. The service network of the National Health System (SUS) of Jataí has 31 facilities, 15 of which are primary care units, representing the city's primary health care [31]. These units are staffed with Family Health Strategy teams, consisting of physicians, nurses, dentists and community health agents [32]. The estimated population of the municipality in 2015 was 95.998 inhabitants. According to the latest demographic census of the Brazilian Institute of Geography and Statistics [29], the older adult population (individuals aged ≥ 60 years) was 9.247, accounting for 7% of the total population. The study population consisted of individuals of both sexes aged ≥ 60 years [33], living in the municipality of Jataí in the areas covered by the primary care units, located in the urban area, who gave their written informed consent or were accompanied by a legal guardian who authorized their participation. In order to select the primary care units, the territorial map of the municipality was divided into four quadrants. Nine primary care units were selected, according to the population density around these facilities (two from the first quadrant, two from the second, three from the third and two from the fourth). Once the collection areas were defined, visits were made to the households located in these areas, to identify the older residents. To define the probability sample, a calculation was performed accepting a sample error of 5%, a confidence level of 95%, and a prevalence of 22%, based on epidemiological data on STs [7], resulting in 263 older adults. About 8% more subjects were included, considering the percentage of possible losses or non-responders, but none occurred. Data collection was performed by the researcher and a staff member previously trained and under his supervision, using interview techniques and physical examination, and a data collection instrument developed for the study. The interview was conducted with the older adults and/or guardians, when the former exhibited physical or cognitive limitations. The physical examination consisted of visual inspection of the skin, except for the genital area. The data collection instrument was composed of sociodemographic, clinical and nutritional variables, including skin evaluations, independence or dependence status for the execution of basic and instrumental activities of daily living (ADL and IADL), using the Katz Index [34] and the Lawton Scale [35], assessment of balance and gait applying the Tinetti scale, auditory acuity by the whisper test, close visual acuity using the Jaeger Card, and cognitive function with the Mini Mental State Examination (MMSE). These multidimensional assessment instruments for older people are recognized and sanctioned by the Ministry of Health [36].

In order to evaluate and classify STs, we used the Simplified Classification System® of the International Skin Tear Advisory Panel, which classifies STs as: "Type 1 - No skin loss: linear or flap that can be repositioned to cover the wound bed; Type 2 - Partial flap loss: partial flap loss that cannot be repositioned to cover the wound bed; Type 3 - Total flap loss: total flap loss exposing the entire wound bed" [7]. For the purposes of this study, prevalence was defined as the total number of individuals with skin tears at a single point in time for each patient. To that end, the following formula was used: prevalence coefficient = number of people with skin tears/number of older adults evaluated in the study period x 100 [37]. The data were analyzed using Statistical Package for the Social Sciences for Windows®, version 17.0. Simple descriptive statistics and percentages were used to describe the sociodemographic and clinical-nutritional characteristics of the subjects and the type of STs. In order to evaluate the association between exposure variables and ST outcome, the chi-squared or Fisher's exact test and prevalence ratio (PR) were calculated, using robust Poisson regression and its respective 95% confidence intervals ($p \leq 0.05$). The project was approved by the Research Ethics Committee of the Federal University of Goiás, under Protocol No. 821.326 / 2014.

RESULTS

The study included 281 older people of both sexes and found an ST prevalence of 5% (95%CI: 2.8 – 8.2; n = 14). The socio-demographic data are presented in Table 1. There was a predominance of non-caucasian (60.1%), women (62.6%) and aged 60-74 years (65.1%), with an average age of 71.69 ± 7.77 years. The majority (56.9%) reported having no romantic partner at the time of the study, being literate (69.4%), unemployed (88.3%), and receiving less than two minimum monthly wages (1 minimum wage ≈USD200.00) for their subsistence (94%). Among the sociodemographic variables, age ≥75 (PR: 1.03; 95%CI: 1.00-1.06), p = 0.018 and self-reported white skin color (PR: 1.04;95%CI: 1.01-1.07), p=0.002 (Table 1) were associated.

Table 1. Distribution of sociodemographic variables according to the prevalence of skin tears, Jataí, Goiás, Brazil, 2015

Variables	Total (n=281)		*Skin tears* (n=14)		PR** (95%CI)	p*
	N	%	N	%		
Sex						
Male	105	37.4	4	28.4	1	
Female	176	62.6	10	71.4	1.00 (0.98-1.03)	0.485
Age						
60-74	183	65.1	5	35.7	1	
≥75	98	34.9	9	64.3	1.03 (1.00-1.06)	0.018
Race						
Caucasian	112	39.9	11	78.6	1.04 (1.01-1.07)	0.002
Non-Caucasian	169	60.1	3	21.4	1	
Conjugal Status						
Romantic partner	121	43.1	7	50.0	0.99 (0.96-1.02)	0.591
No romantic partner	160	56.9	7	50.0	1	
Education						
Literate	195	69.4	12	85.7	0.98 (0.95-1.00)	0.174
Illiterate	86	30.6	2	14.3	1	
Occupation						
Unemployed	248	88.3	13	92.9	1.01 (0.97-1.04)	0.583
Employed	33	11.7	1	7.10	1	
Income						
Up to 2 minimum monthly wages	264	94.0	13	92.9	0.99 (0.93-1.05)	0.591
> 2 minimum monthly wages	17	6.0	1	7.10	1	

**Pearson's Chi-squared or Fisher's exact test. PR= Prevalenceratio. **CI = 95% confidenceinterval.*

Table 2 shows the clinical and nutritional data related to the occurrence of STs, demonstrating a number of associations. Thus, being overweight (PR: 1.07; 95%CI: 1.01 – 1.14), p= 0.001; urinary incontinence (PR: 1.03; 95%CI: 1.00-1.08), p= 0.031; having a previous history of skin tears (PR: 1.21;95%CI: 1.10-1.34), p= <0.000; Tinetti Performance Oriented Mobility Assessment (POMA) with no dysfunction (PR: 1.22; 95%CI: 1.05-1.48), p= 0.034 and Tinetti with a high risk of altered gait and balance and marginal significance (PR: 1.21;95%CI: 1.00-1.48), p=0.050; and ADL dependence (PR: 1.03;95%CI: 1.00-1.08), p= 0.028 were associated. We found STs in 14 (5%) participants. There was one lesion per person in seven (50%) cases and up to five lesions in one (7.1%), with an average of 1.93 STs (SD 1,269) per person, totaling 27 STs. Table 3 presents the characteristics of the STs, most classified as type I, located in the leg or forearm, and caused by collisions / bumps. When assessing the skin conditions of the older adults, ecchymosis, (PR: 1.11; 95%CI: 1.03-1.18), p= 0.000; decreased turgor (PR: 1.03; 95%CI: 1.00-1.05), p=0.014; rough texture (PR: 1.04;95%CI:1.00-1.10), p=0.022; dry skin (PR: 1.04;95%CI:1.00-1.08), p=0.003; and edema (PR: 1.04; 95%CI: 1.00-1.08), p=0.010 (Table 4) exhibited a statistical association.

DISCUSSION

Considering an analysis of the best ST prevention and management practices, which describe community studies with rates between 4.5 and 19.5%, the prevalence of STs observed in this study (5%) is low [38]. The prevalence of STs among community-dwelling older people in the present study was lower than that found in those living in long-stay institutions in Brazil, where a study conducted with 69 older adults reported an ST prevalence of 11.6% [20]. This difference may be related to the characteristics of the study participants, whose average age was 81 years, and especially to their health conditions, where 84.06% exhibited gait problems and 73.6% cognitive impairment. In Denmark, a study involving 128 older people from long-term institutions, with an average age of 83 years (SD 8.6), found an ST prevalence of 4.6%, considered low [39]. The authors highlight the variation in ST prevalence in different scenarios and countries, demonstrating the need for each region or institution to carry out its own survey [4,10,39]. Data are limited in acute care settings, but in Singapore, ST prevalence in a sample of 144 adults aged 70-89 years (78%) was6.2% [40]. In the present study, an association was found between STs and a number of sociodemographic characteristics. This was not the case in two studies conducted in Singapore and Brazil [20,40] and another in Denmark, considering similar variables, that is, sex and age, which exhibited no significant association [39]. Clinical injuries with low prevalence require epidemiological studies involving a larger number of people, in order to assess the causality of the explanatory variables. Thus, although sample calculation was performed, as well as rigorous follow-up of the criteria recommended in the study protocol, the number of participants was one of the limitations of the study, since it made it difficult to analyze associations that could occur, except for adjusted regression analysis. From an epidemiological standpoint, additional studies with people at risk of STs are suggested, such as population-based and cohort investigations in places or institutions that house a larger number of older adults, thereby making it possible to explorethe causality of the injuries. Despite this limitation, this is the first study to evaluate ST prevalence in a community as a whole, characterizing STs in the older residents of a city in MidwestBrazil. The occurrence of STs in older people has been explained by the natural changes in their skin, which gradually becomes thinner andless elastic [6,41]. The present study found an association with white-skinned individuals, and non-white people are known to have a greater amount of melanin, the pigment responsible for the absorption and diffusion of ultraviolet radiation [42]. However, the amount of melanocyte is similar between races, differing only in the number, size, shape and arrangement of melanosomes, according to genetic determinants, and found in greater amounts and size in dark-skinned individuals [3,42]. The greater the amount of melanin, the greater the protective factor against the action of ultraviolet radiation, meaning that skin aging is delayed in non-white individuals, who generally have firmer skin when compared to their fair-skinned counterparts of the same age [42]. There is also a difference in lipid content in the epidermis, which is higher in non-white people, explaining in part the greater cellular cohesion and resistance

Table 2. Distribution of clinical and nutritional data for the prevalence of skin tears, Jataí, Goiás, 2015

Variables	Total (n=281)		*Skin tears* (n=14)		PR (95%CI) **	p*
	N	%	N	%		
Food Acceptance						
Preserved	178	63.3	8	57.1	1	
Impaired	103	36.7	6	42.9	0.99 (0.96-1.02)	0.621
Water Intake						
≤ 2 L	207	73.7	10	71.4	1	
> 2 L	74	26.3	4	28.6	1.00 (0.97-1.03)	0.528
BMI***						
Underweight	45	16.0	7	50.0	1	
Normal weight	118	42.0	5	35.7	1,06 (0.99-1.12)	0.053
Overweight	118	42.0	2	14.3	1.07 (1.01 – 1.14)	0.015#
Hypertension						
Yes	204	72.6	9	64.3	1,01 (0,97-1,04)	
No	77	27.4	5	35.7	1	0.474
Diabetes Mellitus						
Yes	58	20.6	5	35.7	1.02 (0.98-1.06)	
No	223	79.4	9	64.3	1	0.138
ND[a]						
Yes	28	10	2	14.3	1.01 (0.96-1.06)	
No	253	90	12	85.7	1	0.638
CVI[b]						
Yes	17	6	1	7.10	1.00 (0.94-1.06)	
No	264	94	13	92.9	1	0.591
Hypothyroidism						
Yes	23	8.2	1	7.1	1.00 (0.96-1.04)	
No	258	91.8	13	92.9	1	0.884
Urinary incontinence						
Absent	224	79.7	8	57.1	1.03 (1.00-1.08)	0.031
Present	57	20.3	6	42.9	1	
Comorbidities						
≤ 1	102	36.3	3	21.4	1	
≥ 2	179	63.7	11	78.6	1.01 (0.99-1.04)	0.271
Medication						
≤ 4	170	74.9	6	60	1	
≥ 5	57	25.1	4	40	1.01 (0.98-1.05)	0.275
Previous skin tear						
Yes	36	12.8	13	92.9	1.21 (1.10-1.34)	<0.000
No	245	87.2	1	7.1	1	
Hearing						
Preserved	210	74.7	8	57.1	1	
Impaired	71	25.3	6	42.9	2.21 (0.79-6.17)	0.120
Vision						
Preserved	83	29.5	5	35.7	1	
Impaired	198	70.5	9	64.3	0.75 (0.261-2.18)	0.603
MMSE						
Preserved	245	87.2	10	71.4	1	
Compromised	36	12.8	4	28.6	0.36 (0.12-1.11)	0.089
Tinetti						
No dysfunction	252	89.7	9	64.3	1.22 (1.05-1.48)	0.034
High Fall Risk	19	6.8	1	7.1	1.21 (1.00-1.48)	0.050
Not applicable[c]	10	3.6	4	28.6	1	
ADL						
Independent	225	80.1	8	57.1	1	0.028
Dependent	56	19.9	6	42.9	1.03 (1.00-1.08)	
IADL						
Independent	172	61.2	7	50.0	1.01 (0.98-1.03)	
Dependent	109	38.8	7	50.0	1	0.377

*[a]Neurodegenerative diseases. [b]Chronic venous insufficiency. * Pearson's chi-squared or Fisher's exact test. PR= Prevalence ratio. **CI =95% confidence interval. # Chi squared linear trend. [c] Bedridden older people.*

Table 3. Characteristics of skin tears observed in older residents of Jataí, Goiás, Brazil, 2015

Variables	*Skin tears* (F=27)	
	F	%
Category of skin tears observed		
I	13	48.1
II	5	18.5
III	9	33.3
Location		
Hand	1	3.7
Forearm	9	33.3
Arm	6	22.2
Leg	11	40.7
Cause		
Collision / Bumps	21	77.8
Mobilization / routine care	3	11.1
Applying and removing stockings	3	11.1

of dark skin [43]. With respect to the stratum corneum, people with non-white skin have more layers, albeit not related to skin thickness, which is similar between races. This factor has been related to the greater resistance of the stratum corneum to superficial lesions [44]. The relationship between the occurrence of STs and the presence of comorbidities and impaired vision, as well as other clinical deteriorations in older people's health, has been investigated and are considered risk factors [6,20,39,45], but in the present study we found an association only with overweight and urinary incontinence. Other risk factors were also observed, such as the risk of falling and activities of daily living (ADL). These are included in best practices for ST management, which recommend holistic assessment of the patient, since their skin integrity and general health status are important for ongoing management. Studies have shown that people with a history of STs have a higher risk of new lesions, due to the fragile characteristics of older people's skin, associated with reduced scar tissue resistance [6,39,41,45-46]. This study found an association with prior history of STs, as did the investigation conducted in Denmark [39]. Thus, the proportion of recurrent cases was high, indicating the need for appropriate measures to prevent these lesions from recurring.

Type I and III skin tears in the lower extremities were the most common. This was also reported in other epidemiological studies [39-40] as well as the association between people with drier skin and ecchymosis, the latter considered a particularly important factor [48-50]. The influence of aging on skin barrier function is a controversial subject in the literature, but a commonly described alteration in the skin of older adults is dryness or cutaneous xerosis [51]. In addition to the relationship with physiological changes in the skin of older individuals, genetic predisposition and environmental and climatic factors have also been related to dry skin [52]. People with dry skin commonly experience pruritus (itching), contributing to skin trauma caused by scratching and friction from clothing. Hands, forearms, arms and legs were the regions affected by STs in the older subjects of this investigation and are most commonly affected by dryness [52]. Another important feature is edema, because it reduces the skin's resistance to trauma, and is a risk factor for STs [17,47]. In the present study, ecchymosis, turgor, rough texture, dry skin and edema were associated with STs in analysis of proportions and are considered risk factors related to the skin characteristics described in other studies [38]. Research carried out in the south of Brazil also found dry skin, age spots, ecchymosis, and edema to be potential risk factors for STs [53]. Ecchymosis was also identified in other investigations [10, 20]. Thus, future studies are suggested to investigate the association between the clinical characteristics of older skin and climatic and environmental factors.

Conclusion

The prevalence of skin tears in community-dwelling older adults in a Neotropical region was 5% (95%CI : 2.8 – 8.2), and independently associated with age ≥75 (PR: 1.03;95%CI: 1.00-1.06), white skin color (PR: 1.04;95%CI: 1.01-1.07), being overweight (PR: 1.07; 95%CI: 1.01 – 1.14), urinary incontinence (PR: 1.03; 95%CI: 1.00-1.08), prior history of skin tears (PR: 1.21; 95%CI: 1.10-1.34), Tinetti with no dysfunction (PR: 1.22; 95%CI: 1.05-1.48) and Tinetti with a high risk of altered gait and balance (PR: 1.21; 95%CI: 1.00-1.48), ADL dependence (PR: 1.03;95%CI: 1.00-1.08), presence of ecchymosis (PR: 1.11; 95%CI: 1.03-1.18), decreased turgor (PR: 1.03; 95%CI: 1.00-1.05), rough texture (PR: 1.04; 95%CI:1.00-1.10), dry skin (PR: 1.04; 95%CI:1.00-1.08) and no edema (PR: 1.04; 95%CI: 1.00-1.08). There was a predominance of STs (mostly type I), in legs and forearms, caused by collision/bumps, extreme age, low weight, history of STs, smooth textured skin, decreased turgor, dry skin, presence of ecchymosis, and more than two comorbidities, in people with STs, demonstrating the need for prevention strategies that reach community-dwelling older people in their homes.

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