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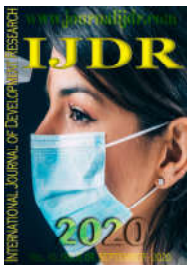

RESEARCH ARTICLE OPEN ACCESS

EPIDEMIOLOGICAL CHARACTERIZATION OF INDIVIDUALS WITH AMPUTATIONS IN NORTHEASTERN BRAZIL

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ABSTRACT

Amputation is the partial or total removal of a limb, which may occur surgically or traumatically. Its causes are related to diverse etiologies: vascular, neuropathic, traumatic, tumoral, infectious, congenital. The present study aimed to analyze the epidemiological profile of 43 persons with amputations, of both sexes, from the city of Aracaju, Sergipe, Brazil. The investigated data were sociodemographic variables and information about the amputation, obtained through questionnaires. Mann-Whitney, chi-square and Fisher exact tests were used to compare age categories (<45 years and>45 years). Results showed a prevalence of 81.4% of amputations for males and 39.5% of the subjects had incomplete high school level. Regarding lower limb amputation levels, 34.9% of the participants had transfemural amputation and for the upper limbs, the transcarpian amputation was the most prevalent (16.6%). Concerning the origin of the amputation, traffic accidents were related to age <45 years, while disease, > 45 years. In this analysis of the epidemiological profile, the majority of amputees were male, lower limbs were the most affected and different causes were related to age.

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INTRODUCTION

Amputation is a surgical procedure and means the total or partial removal of a limb, which may occur in a planned or accidental way (Santos *et al*., 2010; Montiel, Vargas & Leal, 2012; Souza, Santos & Albuquerque, 2019). Indications of amputation procedures have been occurring for a long time, since archaeological studies have identified the use of prostheses in human skeletons in paintings in Europe, dating from 2300 BC (Santos *et al*., 2010). Currently, studies showed that the procedures involving amputation include not only the removal of a part of the body but also rehabilitation process (e.g., use of prostheses), increasing oddsof better adaptation and returningtopatient's social routine (Thorud *et al*., 2016; Monteiro *et al*., 2018).

In this context, amputations related to the lower limbs, can be caused by: vascular, neuropathic, traumatic, tumor, infectious, congenital, iatrogenic accidents (Montiel, Vargas & Leal, 2012; Chamlian *et al*., 2013; Acar & Kacira, 2017). In the upper limbs, traumatic or tumoral etiology are more frequent (Montiel, Vargas & Leal, 2012). According to Carvalho *et al*., (2005) approximately 80% of lower limb amputations in adults are related to peripheral vascular insufficiency, especially due to diabetes mellitus; injuries correspond to 10.6%; and malignant tumors 5.8%. In Brazil, traumatic amputations, in most cases, are due to the high incidence of traffic accidents (Sumiya, 2009). The sequelae resulting from accidents are felt immediately after the incident or evolve and are presented later. Among the complications resulting from limb amputations, edema, ulcerations, phantom pain,

infections and painful neuroma can be mentioned, resulting in impairment of physical, social and psychological aspects of individuals (Dornelas, 2011). Therefore, given the prevalence and diversity of causes of amputation of upper and lower limbs in individuals from different regions of Brazil (Sumiya, 2009); and due to the limited information regarding this population in the northeast region; it is important to recognize locally the profile of amputees. Therefore, specific measures and strategies can be implemented favoring this population. The aim of this study was to analyze the epidemiological profile of individuals with limb amputations in the state of Sergipe, Brazil.

MATERIALS AND METHODS

Participants: The sample was composed by 43 individuals from both sexes, registered in the Sergipe Association of Individuals with Motor Disability (ADM-SE), Brazil. Characteristics of the participants are described in Table 1.

Assessments: Questionnaires were used to investigate sociodemographic variables, including sex, marital status, age, educational level, occupation and occupation sector, living arrangement, need for caregiver and type of caregiver. Specifically, regarding age, the cut-off point of 45 years was used to categorize "adults" (i.e., <45 years) and "middle-aged/older adults" (> 45 years), according to the definition presented by the Medical Subject Headings (NLM/NIH, 2020). Aiming to classify economically each family, the questionnaire proposed by the Brazilian Association of Research Companies (ABEP, 2003) was used. Participants were categorized into high, medium and low socioeconomic status, according to the developer's recommendations. To collect data about the disability, a specific form was applied with questions about the origin of the amputation (causes related to leisure, work, traffic accidents and diseases; level of amputation of upper and lower limbs; time of amputation; use of prostheses; household adaptation; place of adaptation; Barthel Index and diseases).All evaluations were applied individually, without personal identification and when necessary with the help of the researchers.

Procedures: Data collection was carried out in two stages. The first stage, held in January 2019, aimed to identify individuals registered at ADM-SE, through the institution's file. The second stage lasted from February to April 2019. After telephone contact, home visits were scheduled. The aims of this research were explained and participants filled the questionnaires. In some cases, when requested by the participant, data was collected at the Association itself. All subjects were volunteers and signed and informed consent prior study procedures, according to resolution 466/2012 of the Brazilian National Health Council. This study was approved by the Research Ethics Committee of Tiradentes University-SE, protocol #150912R.

Statistical Analysis: The data are presented as absolute (n) and relative (%) frequency or median (minimum - maximum). To check the normality of the data, the Shapiro Wilk test was used. For comparison between age groups (<45 years and>45 years) the Mann-Whitney test was used for continuous variables, while the chi-square test and Fisher's exact test were used for categorical variables. In all cases, the level of significance was established at $p < 0.05$. All analyses were performed using the statistical package SPSS (Statistical Package for the Social Science - IBM, Chicago, IL, USA), version 25.0.

RESULTS

Results regarding sociodemographic and health status are presented in Table 1. A higher prevalence of amputations for male (81.4%) and married (44.2%) individuals were observed. Most subjects lived with a spouse and child (ren) (39.5%). In addition, most of those investigated people had incomplete high school level (39.5%) and did not work at the time of the study (62.8%). Regarding socioeconomic status, 34.9% subjects were classified as high (n=15), 55.8% as medium (n=24) and 9.3% as low (n=4).

Table 1. **Sociodemographic and health characteristics of the study participants**

Variable	Category	n (%)
Sex		
	Male	35 (81.4%)
Marital status		
	Single	13 (30.2%)
	Married	19 (44.2%)
	Widow	3 (7.0%)
	Divorced	8 (18.6%)
Age (years)		
	Total	41 (23 – 65)
	<45	26 (60.5%)
	>45	17 (39.5%)
Educational level		
	Illiterate	3 (7%)
	Incomplete - High school	6 (14%)
	Complete - High school	11 (25.6%)
	Incomplete - Junior High	17 (39.5%)
	Complete - Junior High	3 (7%)
	Incomplete - University	2 (4.7%)
	Complete - University	1 (2.3%)
Occupation		
	Student	4 (9.3%)
	Retired	16 (37.2%)
	Currently working	16 (37.2%)
	Government support	7 (16.3%)
Sector of occupation		
	Does not work	27 (62.8%)
	Autonomous	7 (16.3%)
	Private sector	6 (24%)
	Public sector	3 (7%)
Living arrangement		
	Parents and brother/sister	12 (27.9%)
	Spouse and child(ren)	17 (39.5%)
	Only spouse	7 (16.3%)
	Spouse,child(ren), grandchild(ren)	2 (4.7%)
	Only child(ren)	1 (2.3%)
	Child(ren) and grandchild(ren)	2 (4.7%)
	Alone	2 (4.7%)
Caregiver (yes)		
	Yes	2 (4.7%)
Type of caregiver		
	Family	1 (2.3%)
	Professional	1 (2.3%)
Socioeconomic level		
	High	15 (34.9%)
	Medium	24 (55.8%)
	Low	4 (9.3%)
Disease		
	No	35 (81.4%)
	Diabetes mellitus	4 (9.3%)
	Cancer	2 (4.7%)
	Infections	1 (2.3%)
	Others	1 (2.3%)

Note: Values are n: absolute frequency; %: relative frequency; median (minimum – maximum).
Source: Authors (2020).

Concerning the assistance of a caregiver, only two subjects (4.7%) reported having such assistance, one by a professional caregiver and other by family caregiver. Among the investigated diseases, diabetes was reported by 9.3% of the participants. Table 2 shows the characteristics of the participants regarding amputations. Most of the amputations were of lower limbs and the most frequent cause was traffic accidents (48.8%) followed by diseases (18.6%). Specifically, concerning the cause of the amputation, traffic accidents were more prevalent in individuals under the age of 45 years.

Several authors have identified a higher prevalence of amputations in men than in women (Oliveira & Moreira, 2009; Santos *et al*., 2010; Almeida *et al*., 2013; Schoeller *et al*., 2013). In this context, it is believed that this group is more exposed to physical trauma resulting from accidents (Beaulieu *et al*., 2015; Thorud *et al*., 2016; Hasenoehrl *et al*., 2018). The mean age reported in the literature of amputee individuals is generally higher than 60 years, with an association with vascular diseases, especially due diabetes mellitus.

Table 2. Characteristics of participants amputations according to age (n=43).

Variable	Total (n=43)	<45 anos (n=26)	>45 anos (n=17)	P
Origin of the amputation (yes)				
Leisure	7 (16.3%)	5 (19.2%)	2 (11.8%)	0.685
Work	7 (16.3%)	4 (15.4%)	3 (17.6%)	1.000
Traffic	21 (48.8%)	16 (61.5%)	5 (29.4%)	0.039
Disease	8 (18.6%)	1 (3.8%)	7 (41.2%)	0.004
Time of amputation (years)	10 (2 – 61)	9.00 (3 – 39)	20.0 (2 – 61)	0.247
Category of the amputation				0.392
Lower limbs	26 (61.9%)	15 (57.7%)	12 (70.6%)	
Upper limbs	16 (38.1%)	11 (42.3%)	5 (29.4%)	
Level of amputation – lower limbs				0.731
No	16 (37.2%)	11 (42.3%)	5 (29.4%)	
Transfemural	15 (34.9%)	9 (34.6%)	6 (35.3%)	
Transtibial	4 (9.3%)	2 (7.7%)	2 (11.8%)	
Dislocation of the ankle	7 (16.3%)	4 (15.4%)	3 (17.6%)	
Syme	1 (2.3%)	--	1 (5.9%)	
Level of amputation – upper limbs				0.514
No	27 (62.8%)	15 (57.7%)	12 (70.6%)	
Dislocation of the shoulder	1 (2.3%)	--	1 (5.9%)	
Transumeral	4 (9.3%)	3(11.5%)	1 (5.9%)	
Transradial	2 (4.7%)	1 (3.8%)	1 (5.9%)	
Dislocation of the wrist	2 (4.7%)	1 (3.8%)	1 (5.9%)	
Transcarpian	7 (16.3%)	6 (23.1%)	1 (5.9%)	
Use of prostheses (yes)	16 (37.2%)	12 (46.2%)	4 (23.5%)	0.133
Household adaptation (yes)	2 (4.7%)	1 (3.8%)	1 (5.9%)	1.000
Place of adaptation (bathroom)	2 (4.7%)	1 (3.8%)	1 (5.9%)	--
Barthel Index	100 (85 – 100)	100 (90 – 100)	100 (85 – 100)	0.757
Diseases				0.001
No	35 (81.4%)	25 (96.2%)	10 (58.8%)	
Diabetes mellitus	4 (9.3%)	--	4 (23.5%)	
Cancer	2 (4.7%)	--	2 (11.8%)	
Infections	1 (2.3%)	--	1 (5.9%)	
Others	1 (2.3%)	1 (3.8%)	--	

Note: Values are n: absolute frequency; %: relative frequency; median (minimum – maximum).
Source: Authors (2020).

While disease was more prevalent in people older than 45 years. The other variables showed no statistically significant difference. The average amputation time was 10 years. In relation to assistive technologies, just over a third of the volunteers (37.2%) reported using a prosthesis and a minority reported having adaptations at home (4.7%), when yes, in the bathroom. All research participants showed independence in activities of daily living according to the scores obtained in the Barthel Index.

DISCUSSION

The aim of this study was to analyze the epidemiological profile of individuals with amputations in the state of Sergipe. The main results in this study were the prevalence of amputations associated with traffic accidents in younger individuals (i.e., <45 years old) and disease in middle-aged and older people (i.e.,>45 years old). The highest prevalence of amputations was of lower limbs and in married male individuals.

In this study, 60.4% were under the age of 45, which may associate the risk more with traffic accidents than diseases. Indeed, among the results obtained in this study, there was a large number of amputations associated with traumatic causes, mainly due to traffic accidents, with 61.5% (in people <45 years) and 29.4% (in people>45 years). Santos *et al*. (2010) identified that most of the subjects in his research were male with lower limb amputations, the majority (72.72%) caused by traumatic amputations, associated with the following: automobile, motorcycle, work and train accidents. Among women (n=18), only five cases (27.77%) were traumatic amputations. The research carried out by Cassefo *et al*., (2003) differs from the results found in this study. The authors described the etiologies of amputations related mainly to vascular causes, which occurred in 59.2% of patients, being the predominant cause of lower limb amputation (68.4%). Similarly, Guarino *et al*., (2007), identified 62.8% of amputations related to vascular causes; trauma occurred in 28.2% of cases; infections affected 6.4% of patients and

tumors, 1.3%. Still in this sense, Brasileiro *et al*. (2005) reinforced that on average 85% of amputations occurred in the lower limbs, andperipheral atherosclerotic disease was the main cause: peripheral vascular insufficiency, as a consequence of diabetes, atherosclerosis, embolisms, thrombosis, trauma and tumors. Amputation at the transfemoral level is frequent, accompanied by amputation with dislocation of the ankle (Almeida *et al*., 2013; Souza, Santos and Albuquerque, 2019). For upper limbs, in this study, the most common level was transcarpian amputation, followed by transumeral. In this sense, Cassefo *et al*., (2003) found a higher prevalence of amputation of phalanges, followed by transradial amputation. Regarding the use of prostheses, 46.2% and 23.5% (<45 years and>45 years, respectively) of the subjects reported the use of an implement. Corroborating these data, Cassefo *et al*., (2003) identified that 25% of patients used prostheses. This relatively low data can be associated with financial factors and difficulties encountered in granting prostheses by public agents. It is worth mentioning that in this study, the amputation time for both age groups may have been sufficient to cause the necessary adaptations to independence. As also verified by the results in the Barthel Index. This descriptive and cross-sectional study presented the profile of amputees from an association of people with physical disabilities in the state of Sergipe, northeastern Brazil. The collection of this information can serve as model for other places that attend people with disabilities, as well as for professionals and researchers who work with this population. In addition, the results of this study contribute to supply the lack of diagnostic information about people with physical disabilities in this location. The low number of participants may have been a limiting factor, as well as the comparison with other centers that attendpeople with physical disability.

CONCLUSION

In this study, the majority of amputees were male, and lower limbs were the most affected. The origin of the amputation varied according to age group, with the highest prevalence of amputations in individuals aged <45 years being associated with traffic accidents, and in people aged> 45 years with disease. As both traffic accidents and disease were presented as the most common causes of amputation, it is suggested the development of public policies aiming to prevent traffic accidents and increase awareness about the risks of amputation due to some diseases. In addition, it is expected that further studies address relationships among amputation, rehabilitation process and social well-being. Especially because the problems caused by amputations affect many sectors immediately and in the long term, such as public health and social security.

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