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CLINICAL AND EPIDEMIOLOGICAL PROFILE OF PATIENTS SUBMITTED TO LOWER LIMB AMPUTATION

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ABSTRACT

Objective: To characterize the clinical and epidemiological profile of patients undergoing lower limb amputation in a public hospital in southern Piauí state, Brazil. **Method:** Retrospective and descriptive study, with document analysis and quantitative approach. Data collection took place in July and August 2021, using an instrument developed by the researchers. Data were processed using the statistical software Statistical Package for Social Sciences, version 20.0. **Results:** The sample consisted of 70 patients with a mean age of 65.59 years, most of them male (61.4%), brown (88.6%), married (48.3%), retired (42.9%), coming from other cities of Piauí (87.1%). Most patients (47.1%) had a comorbidity at the time of amputation, with diabetes mellitus (34.3%) being the most prevalent, followed by systemic arterial hypertension (12.9%). Diabetes was the main cause of amputation (48.6%), being the transfemoral level (42.9%) the most affected. All procedures were performed on an emergency basis, and most hospitalizations (94.3%) progressed to discharge. **Conclusion:** The findings of this study reveal that people with diabetes, males, and the elderly were the individuals who most underwent amputation, with the transfemoral level being the most performed.

DESCRIPTORS: Amputation. Lower extremity. Diabetes mellitus. Enterostomal therapy.

PERFIL CLÍNICO E EPIDEMIOLÓGICO DE PACIENTES SUBMETIDOS A AMPUTAÇÃO DE MEMBROS INFERIORES

RESUMO

Objetivo: Caracterizar o perfil clínico e epidemiológico dos pacientes submetidos à amputação de membros inferiores em um hospital público do sul do Piauí. **Métodos:** Estudo retrospectivo, descritivo, com análise documental e abordagem quantitativa. A coleta de dados ocorreu nos meses de julho e agosto de 2021, sendo realizada por meio de um instrumento elaborado pelos pesquisadores. Os dados foram processados pelo o software estatístico Statistical Package for Social Sciences, versão 20.0. **Resultados:** A amostra foi composta por 70 pacientes com média de idade de 65,6 anos, a maioria do sexo masculino (61,4%), de cor parda (88,6%), casada (48,3%), aposentada (42,9%), advinda de outras cidades do Piauí (87,1%). A maioria dos pacientes (47,1%) apresentava uma comorbidade no momento da amputação, sendo o diabetes mellitus (34,3%) a mais prevalente, seguido de hipertensão arterial sistêmica (12,9%). O diabetes mellitus foi a principal causa de amputação (48,6%), sendo a nível transfemoral (42,9%) a mais predominante. Todos os procedimentos foram realizados em caráter

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de urgência, e grande parte das internações (94,3%) evoluiu para alta. **Conclusão:** Os achados demonstram que pessoas com diabetes mellitus, do sexo masculino e idosas foram as que mais se submeteram a amputação, sendo o nível transfemoral o mais realizado.

DESCRITORES: Amputação. Extremidade inferior. Diabetes mellitus. Estomaterapia.

PERFIL CLÍNICO Y EPIDEMIOLÓGICO DE LOS PACIENTES SOMETIDOS A AMPUTACIÓN DE MIEMBROS INFERIORES

RESUMEN

Objetivo: caracterizar el perfil clínico y epidemiológico de pacientes sometidos a amputación de miembros inferiores en un hospital público del sur de Piauí. **Método:** Estudio retrospectivo y descriptivo, con análisis documental y enfoque cuantitativo. La recolección de datos ocurrió en julio y agosto de 2021, utilizando un instrumento desarrollado por los investigadores. Los datos fueron procesados mediante el software estadístico Statistical Package for Social Sciences, versión 20.0. **Resultados:** La muestra estuvo compuesta por 70 pacientes con una media de edad de 65,6 años, la mayoría del sexo masculino (61,4%), pardas (88,6%), casadas (48,3%), jubiladas (42,9%), provenientes de otras ciudades de Piauí (87,1%). La mayoría de los pacientes (47,1%) presentaba alguna comorbilidad en el momento de la amputación, siendo la diabetes mellitus (34,3%) la más prevalente, seguida de la hipertensión arterial sistémica (12,9%). La diabetes fue la principal causa de amputación (48,6%), siendo el nivel transfemoral (42,9%) el más afectado. Todos los procedimientos se realizaron de forma urgente y la mayoría de las hospitalizaciones (94,3%) progresaron hasta el alta. **Conclusión:** Los hallazgos de este estudio revelan que los diabéticos, del sexo masculino y los ancianos fueron los individuos que más amputaron, siendo el nivel transfemoral el más realizado.

DESCRIPTORES: Amputación. Extremidad inferior. Diabetes mellitus. Estomaterapia.

INTRODUCTION

The process of limb amputation is considered a public health problem, since it is related to high rates of morbidity and mortality. Because it is the loss of a limb, it causes significant impacts on the individual's life, in the social, psychological, and physical contexts. In addition, amputations represent a high financial cost to health[1].

In Brazil, the rate of lower limb (LL) amputation during the years 2010 to 2020 was around 24.4 procedures per 100,000 inhabitants, with the southern, northeastern and southwestern regions having the highest prevalence[2].

Among the most common causes of this outcome are diabetes mellitus (DM), peripheral arterial obstructive disease (PAOD), neuropathy, and trauma[3]. Nevertheless, amputation rates increase with the association between DM and PAOD, and the literature points out that patients with both have 52 times more chances of amputation when compared to those with only DM[4].

Amputation due to complications related to DM is common in all age groups, but when it occurs due to other etiologies it is noted that there is a greater tendency to amputation in individuals over 60 years, while individuals with younger ages tend to amputate due to other causes, including traumatic events[5].

Global estimates on disability burden for diabetes-related lower extremity complications score that in 2016, 6.8 million people had amputations[6] and most have diabetic foot ulcers as the cause of amputation, which makes LL amputation a preventable public health problem[7].

Thus, due to the significant number of patients undergoing amputation and the severity that this procedure entails in the individual's life, generating countless losses for those affected, it is opportune to elucidate the clinical profile of these patients in order to enable the formulation of strategies aimed at preventing amputation. Given the above,

the following question was raised: What is the profile of patients undergoing LL amputation in a public hospital in southern Piauí?

Thus, the study aims to characterize the clinical profile and epidemiology of patients undergoing LL amputation in a public hospital in southern Piauí.

METHODS

This is a retrospective, descriptive study, with document analysis and a quantitative approach, carried out in a reference public hospital in the southern state of Piauí, Brazil, located in the municipality of Floriano. It was conducted using information gathered from the vascular surgery record book and the surgical records of patients who underwent LL amputation during the year 2020.

The sample was constituted observing the inclusion criteria, which concerned medical records and records from the vascular surgery book, referring to the surgeries of LL amputations that were legibly filled in, in the period from January to December 2020. Medical records that had insufficient information and were not archived in the Statistical Medical Records Service were excluded. The final sample consisted of 70 patients.

Data collection took place in July and August 2021, using an instrument developed by the researchers and composed of sociodemographic variables related to age, sex, marital status, color/race, education, occupation and origin, and clinical variables corresponding to data on comorbidities, etiology of the amputation, level of amputation, type of care, and final outcome.

After collecting and checking the instruments, the data were entered into a Microsoft Office Excel spreadsheet and then exported to the software Statistical Package for Social Sciences (SPSS), version 20.0, for the analysis of the results. For statistical treatment, all continuous data were tested for normality by the Kolmogorov–Smirnov test. Descriptive statistics of the data were performed using the means and standard deviations of the quantitative variables scores. The associations between the variables were performed using Pearson's chi-square test. In all inferential statistical analyses, those with $p < 0.05$ were considered statistically significant.

The study was submitted and approved by the Research Ethics Committee of the Universidade Estadual do Piauí (UESPI), under opinion number 4,818,255.

RESULTS

The sample was composed of 70 patients, with a mean age of 65 (± 14.1) years, mostly males (61.4%), brown (88.6%), married (48.3%), retired (42.9%), and coming from other cities in Piauí (87.1%). As for the level of education, it was evidenced that a large part of the records did not have this variable informed (85.7%) as shown in Table 1.

Figure 1 describes the distribution of the number of comorbidities among the patients. It is evident that the majority of patients had one (47.1%) or two comorbidities (38.6%) at the time of surgery.

It was evidenced that the most common etiology at the time of amputation was diabetes (48.6%), followed by infection (27.1%). As for the degree of limb impairment, the transfemoral level (42.9%) was the most common. It is noteworthy that 100% of the hospitalizations were emergency admissions, of which 94.3% of the patients were discharged and only 4.3% died (Table 2).

When comparing the etiology of amputation with comorbidities (Table 3), the chi-square test of independence (Pearson) showed that there was an association between the etiology of amputation and comorbidities ($p = 0.000$).

In the association between comorbidities and the level of amputation, by means of Pearson's chi-square test, there was no significant association ($p = 0.468$) (Table 4).

Table 1. Sociodemographic profile of patients submitted to LL amputation, Floriano/Piauí, 2021.

Variables	N	(%)
Sex		
Male	43	61.4
Female	27	38.6
Race		
Brown	62	88.6
Not informed	7	10.0
Caucasian	1	1.4
Marital status		
Single	34	48.3
Married	18	25.7
Not informed	10	14.3
Widower	8	11.4
Education		
Not informed	60	85.7
Elementary school	6	8.6
Illiterate	3	4.3
High School	1	1.4
Occupation		
Retired	30	42.9
Farmer	17	24.3
Not informed	15	21.4
Self-employed worker	3	4.3
Carpenter	1	1.4
Health agent	1	1.4
Street vendor	1	1.4
Hairdresser	1	1.4
General services assistant	1	1.4
Origin		
Other cities in Piauí	61	87.1
Cities of Maranhão	5	7.1
Floriano/Piauí	4	5.7

Source: Research data.

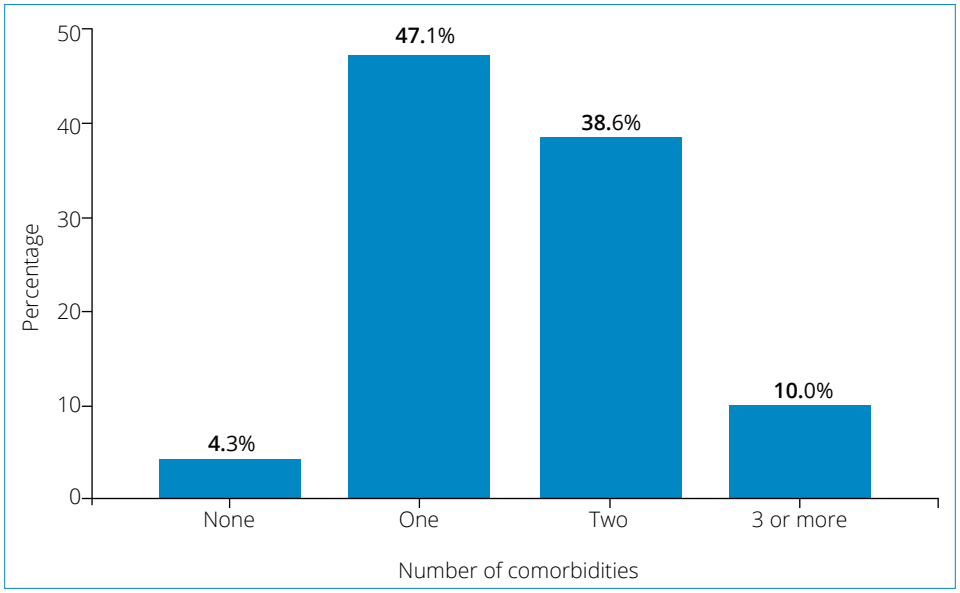

Figure 1. Distribution of comorbidities among patients who had amputation. Floriano/Piauí, 2021.

Table 2. Clinical characteristics of amputations. Floriano/Piauí, 2021.

Variables	N	(%)
Etiology of amputation		
Diabetes	34	48.6
PAOD	14	20.0
Infection	19	27.1
Osteomyelitis	2	2.9
Acute arterial occlusion class III	1	1.4
Amputation level		
Transfemoral	30	42.9
Disarticulation of toes	23	32.9
Partial foot	9	12.9
Transtibial	7	10.0
Suprapatellar	1	1.4
Character of service		
Urgency	70	100.0
Outcome		
Discharge	66	94.3
Death	3	4.3
Others	1	1.4

PAOD: Peripheral arterial obstructive disease. Source: Research data.

Table 3. Relationship between patients' comorbidities and etiology of amputation. Floriano/Piauí, 2021.

Comorbidities	Etiology of amputation					p
	Diabetes n (%)	PAOD n (%)	Infection n (%)	Osteomyelitis n (%)	Acute arterial occlusion class III n (%)	0,000[a]
DM	19 (55.9)	2 (14.3)	3 (15.8)	0 (0.0)	0 (0.0)	
DM and SAH	12 (35.3)	5 (35.7)	10 (52.6)	0 (0.0)	0 (0.0)	
DM, SAH and nephropathy	2 (5.9)	0 (0.0)	1 (5.3)	0 (0.0)	0 (0.0)	
DM, SAH and CHF.	0 (0.0)	0 (0.0)	1 (5.3)	0 (0.0)	0 (0.0)	
Without comorbidities	0 (0.0)	2 (14.3)	0 (0.0)	1 (50.0)	0 (0.0)	
DM, SAH and erysipelas	0 (0.0)	0 (0.0)	1 (5.3)	0 (0.0)	0 (0.0)	
DM and chronic hepatopathy	1 (2.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
SAH	0 (0.0)	5 (35.7)	3 (15.8)	1 (50.0)	0 (0.0)	
DM and cardiopathy	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	

a: Pearson's test, DM: diabetes mellitus, SAH: systemic arterial hypertension, CHF: congestive heart failure.Source: Research data.

Table 4. Correlation between clinical variables with the level of amputation. Floriano/Piauí, 2021.

Comorbidities	Amputation level					p
	Disarticulation of toes n (%)	Partial foot n (%)	Transtibial n (%)	Suprapatellar n (%)	Transfemoral n (%)	0,468[a]
DM	8 (34.8)	3 (33.3)	2 (28.6)	0 (0.0)	11 (36.7)	
DM and SAH	12 (52.2)	5 (55.6)	2 (28.6)	0 (0.0)	8 (26.7)	
DM, SAH and nephropathy	0 (0.0)	0 (0.0)	1 (14.3)	0 (0.0)	2 (6.7)	
DM, SAH and CHF	1 (4.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Without comorbidities	0 (0.0)	0 (0.0)	2 (28.6)	0 (0.0)	1 (3.3)	
DM, SAH and erysipelas	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.3)	
DM and chronic hepatopathy	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.3)	
SAH	2 (8.7)	1 (11.1)	0 (0.0)	1 (100.0)	5 (16.7)	
DM, SAH and cardiopathy	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.3)	

a: Pearson's test, DM: diabetes mellitus, SAH: systemic arterial hypertension, CHF: congestive heart failure.Source: Research data.

DISCUSSION

The mean age found in this study was similar to a Canadian survey that evaluated LL amputations during the years 2006 to 2012, obtaining a mean of 65.7 years[8]. In this sense, an increase in amputation rates with advancing age is evidenced; thus, patients aged 65 years or older present rates up to five times higher[9].

Males were predominant among the individuals who suffered amputation in this investigation, which corroborates other researches[7,10]. The aforementioned findings may be justified by the fact that the male population seeks health services less often, either because of cultural and social factors or because they underestimate health problems, being more vulnerable to suffer complications[11].

As far as skin color is concerned, brown was significant in most of the records. This finding is in line with research conducted in Texas, United States, which showed that minorities, whether black or Hispanic, have a higher risk of amputation10. This can be explained by the fact that minorities have problems with diabetic foot ulcer infections, have more severe comorbidities, and lack access to specialized health services[12].

Regarding comorbidities, DM was the most expressive in the study, reflecting directly on the causes of amputation. These findings are similar to those of another investigation, in which 90.4% of the population had the disease compared to SAH, with 70%[13]. The prevalence of these two comorbidities is due to SAH and DM being noncommunicable chronic diseases (NCDs) more present in the population, and these are important risk factors for the onset of vascular diseases, varying according to gender and degree of development in the various regions of the country. In addition, they are chronic conditions with high prevalence in subjects aged 45 years and older[14,15].

The second most prevalent etiology was infection, accounting for 27.1% of the records. A survey conducted in the United States, which evaluated trends in indications for amputation during the years 2000 to 2016, corroborates the findings of this study, given that infection was the second leading cause of limb loss, accounting for 15% of all surgical indications[16].

Gangrene correlated with infection is one of the main indications for nontraumatic amputation[17]. It is known that gangrene is common in DM patients, occurring 100 times more in DM patients than in the general population, because DM causes hypercholesterolemia, which increases the risk of atherosclerosis and, consequently, of gangrene in the extremities[1]. Thus, the number of amputations caused by DM is thought to be higher, since the causes of infection were not clearly written down in the records, as well as the fact that many patients had DM as their underlying disease.

The most common indication was major amputation (54.3%), corroborating the findings of other studies that obtained respectively 67.9% and 54.8% of the records related to major amputation[1,18]. Among this category, transfemoral amputation was the most common in 42.9% of cases. Differently from this study, another investigation observed a higher number of surgeries at the transtibial level (47.3% of the cases) and, in second place, the transfemoral level (45.8%)[19].

There was unanimity in this study regarding the degree of urgency care, which corroborates the findings of research conducted in Recife and Alagoas, in which the urgency of care in hospitalizations for amputation was present in 96.6% and 88.0% of cases, respectively[1,20].

On the other hand, even though there was a high percentage of urgency to perform surgery in this study, it was evidenced that most patients had a great prognosis, evolving to discharge in 94.3% of the procedures. Similar data was found in research carried out in Recife/PE, where there was a predominance of 67.9% of hospital discharges[1].

In this research it was possible to see the association between etiology and comorbidities; thus, it can be inferred that people diagnosed with DM had higher numbers of amputations caused by complications of the disease. This finding corroborates a study that observed a 10- to 15-fold higher incidence of major and minor amputations in the DM population[21].

In this context, it is notorious that diabetic foot complications are serious, as they cause both mortality and morbidity, inflicting on patients and the general population a physical, psychological and financial burden of great impact[22]. Despite this context, such complications, like amputations, are amenable to prevention and treatment. Thus, health interventions involving combined actions, dedicated and multidisciplinary teams have the ability to halve major amputations and diabetic foot ulcers in people with type 2 DM[23].

The correlation of age with comorbidities and how much these factors influence amputations is quite evident in this research. Through this, it can be determined that the elderly are more vulnerable individuals when undergoing this surgery. Health actions and interventions directed at this population are extremely important so that, through them, a better survival without amputations can be achieved.

There was no significant association between amputation level and comorbidities. However, the literature points out a higher amputation risk related to severe ischemia, anemia, sepsis, advanced age and stroke, while foot and toes amputations are related to diabetic neuropathy and preserved perfusion[24].

This study has the limitations of using secondary data. Because these were data filled out by other people, there was a lack of important information that could better describe the research participants. The difficulty in accessing the medical records is also noteworthy because they are filed incorrectly or because they are still in the billing sector, making it impossible to analyze some records.

CONCLUSION

The findings of this study reveal that people with diabetes, males, and the elderly were those who most underwent amputation, with the transfemoral level being the most performed.

The great impact that the NCDs have on elderly individuals is perceived, especially DM, as it is the leading cause of lower limb amputations. Therefore, health actions on self-management of DM and intensification of foot care, as well as investigating the prevalence of amputations and their characteristics become necessary and urgent to prevent this unfavorable outcome and improve the quality of life of patients. Under this aspect, enterostomal therapy has an extremely relevant role, since it acts in the prevention and treatment of diabetic foot, as well as being able to improve the quality of life of these individuals.

AUTHORS' CONTRIBUTION

Conceptualization: Rodrigues ASA, Silva AP and Cardoso AR; **Methodology:** Silva AP and Rodrigues ASA; **Formal Analysis:** Silva JV; **Writing – First draft**: Rodrigues ASA and Silva AP; **Writing – Review & Editing:** Cardoso AR, Araujo Filho, Arrais KR; Silva JV and Silva MSG; **Supervision:** Silva AP, Cardoso AR, Araujo Filho ACA and RLB Magalhães.

AVAILABILITY OF RESEARCH DATA

The data will be available upon request.

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