

Prevalence of upper and lower limb amputations of SUS patients in the state of Alagoas between 2008 and 2015

Prevalência de amputações de membros superiores e inferiores no estado de Alagoas atendidos pelo SUS entre 2008 e 2015

Prevalencia de amputaciones de miembros superiores e inferiores en el estado de Alagoas atendidos por el SUS entre 2008 y 2015

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ABSTRACT | Amputation is a therapeutic resource used to remove a limb, an appendage of lump from the body, in case of serious injury to nerves, arteries, soft tissues and bones. The objective of this research was to verify the prevalence of limb amputations in the state of Alagoas. This was a study of secondary data, epidemiological and observational approach, conducted from 2008 to 2015. Data were collected from SIHSUS Database. The number of 361,585 limb amputation procedures were registered in Brazil, mainly in the Southeast, Northeast and South regions, accounting for 88.13% of the total of these procedures. Alagoas occupied the 21st place in the number of amputations among Brazilian states, its procedures occurred in six microregions, of these, three were responsible for 95% of cases. The prevalence of amputation in the state of Alagoas was 19.05 amputations/100,000 inhabitants. Three types of procedures have greater predominance: amputation of lower limbs, fingers, foot and tarsus, which represents 95% of the procedures.

Keywords | Amputation; Prevalence; Disarticulation.

RESUMO | A amputação é um recurso terapêutico utilizado para realizar a remoção de um membro, outro apêndice ou saliência do corpo, na ocorrência de lesões graves de nervos, artérias, partes moles e ossos. O objetivo desta pesquisa foi verificar a prevalência de

amputações de membros no estado de Alagoas. Tratou-se de um estudo de dados secundários, com abordagem epidemiológica e observacional, no período de 2008 a 2015. As informações foram coletadas do banco de dados do SIHSUS. Foram registrados 361.585 procedimentos de amputações de membros no Brasil, com predominância nas regiões Sudeste, Nordeste e Sul, responsáveis por 88,13% desse total. Alagoas ocupou o 21^o lugar em número de amputações entre os estados brasileiros: seus procedimentos ocorreram em seis microrregiões, destas, 3 foram responsáveis por 95% dos casos. A prevalência de amputação em Alagoas foi de 19,05 amputações/100 mil habitantes. Três tipos de procedimentos apresentam maior predominância: amputação de membros inferiores, dedos, pé e tarso, o que representa 95% das amputações.

Descritores | Amputação; Prevalência; Desarticulação.

RESUMEN | La amputación es un recurso terapéutico utilizado para realizar la remoción de un miembro, otro apéndice o prominencia del cuerpo, en la ocurrencia de lesiones graves de nervios, arterias, partes blandas y huesos. El objetivo de esta investigación fue verificar la prevalencia de amputaciones de miembros en el estado de Alagoas. Se trató de un estudio de datos secundarios, con abordaje epidemiológico y observacional, en el período de 2008 a 2015. Se recolectaron las informaciones de la base

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de datos de SIHSUS. Se registraron 361.585 procedimientos de amputaciones de miembros en Brasil, con predominancia en las regiones Sudeste, Nordeste y Sul, responsables por el 88.13% de ese total. Alagoas ocupó el 21º lugar en número de amputaciones entre los estados brasileños: sus procedimientos ocurrieron en seis microrregiones, de las cuales 3 son responsables por el

95% de los casos. La prevalencia de amputación en Alagoas ha sido de 19.05 amputaciones/100 mil habitantes. Tres tipos de procedimientos presentan mayor predominio: amputación de miembros inferiores, dedos, pie y tarso, lo que representa el 95% de las amputaciones.

Palabras clave | Amputación; Prevalencia; Desarticulación.

INTRODUCTION

Amputation is a therapeutic resource used to remove a limb, an appendage or lump from the body, in the event of serious injuries of nerves, arteries, soft tissue and bones¹. Amputation can occur at different levels, which are determined by the evaluation of the limb healing potential and of the functionality for the patient. Usually the limb is preserved as much as possible, which facilitates the rehabilitation of the patient with the prosthesis^{2,3}.

Its prevalence has always been high, though associated with military conflict in the past, it was believed that the prevalence would decrease with the end of these conflicts. However, the trauma of military origin has been replaced by the trauma of civil origin, especially as a result of traffic accidents, work accidents and chronic diseases, followed by urban violence. The age group mainly affected are young adults economically active⁴.

The number of amputation victims has grown alarmingly, with the main risk factors being vascular diseases, diabetes mellitus, smoking, hypertension, trauma and congenital malformations^{5,6}. The situation gets even more concerning and with greater socioeconomic impact when injuries have sequelae, such as the loss of labor capacity, socialization and, consequently, of the quality of life, associated with significant morbidity, disability and mortality⁷.

The rehabilitation of these patients must, necessarily, be carried out by a multidisciplinary team, aiming at the improvement of the functionality and quality of life, with or without prosthesis^{2,8}. The health team that treats the amputee must have the overall understanding of the amputation, know the patient's epidemiological profile, the prevalence of associated diseases, average age of involvement, the relationship between the level of amputation and the use of assistive devices, among other variables.

Epidemiological studies are of paramount importance to assist the teams involved in the process

of prevention, treatment and rehabilitation of amputees, contributing to the improvement of the results of their treatments, minimizing their sequelae and optimizing the patients' return to their functions of daily living, both instrumental and professional⁸.

Recently, one of the main data sources in clinical epidemiological research worldwide are the databases originated in health services⁹. In Brazil, the database that provides these data is responsibility of the Hospital Information System of the Brazilian Unified Health System (SIHSUS)¹⁰. This is a public database whose data, of health administrative nature, have national reach. Its operation uses the Hospitalization Authorizations (AIH), document that contains a set of data concerning the identification of the patient and the hospitalization¹¹.

Because of the scarcity of studies addressing this casuistry, this study sought to verify the prevalence of upper and lower limb amputations in the state of Alagoas, considering the Brazilian reality, expanding the knowledge about this phenomenon and contributing to the deployment of new rehabilitation services, production of prosthesis, and mainly for actions to prevent amputations.

METHODOLOGY

This is a study of secondary data, with epidemiological, observational, ecological and descriptive approach, with the main analysis unit being the microrregions of the state of Alagoas, in the period from 2008 to 2015 in the context of the Brazilian reality. The study had as its primary variable the prevalence of cases of limb amputation and as secondary variables the type of amputation procedure and the region where the procedure was registered.

The types of amputation procedures/disarticulation surveyed were: hand and wrist, upper limbs, lower limbs,

foot and tarsus, finger, lower limbs in oncology and upper limbs in oncology, according to the classification adopted by the SIHSUS system.

The research data were obtained from secondary sources available on the Internet. The epidemiological and health information were obtained from the SIHSUS database in March 2016, as well as the demographic and geopolitical information of the Brazilian Institute of Geography and Statistics (IBGE)¹². Data on the number of amputations filtered by month, year, region and procedures were collected for the entire study period.

The total number of amputations in the country was approached, assessing the annual growth rate of these procedures in comparison with the growth of the Brazilian population, as well as the prevalence of amputations per Federation unit, calculated by 100,000 inhabitants, showing its evolution per year in the study period.

In the case of Alagoas State, this collection was separated per microregions and types of amputation. The prevalence of amputations was analyzed in three stages: initially, the classification was held according to the national prevalence per Federation Units; then in more detail, in the state of Alagoas with the identification of the total frequency of the procedures according to the microregions of the state, the type of amputation procedure and nature of the service in the study period, and, finally, the data on the values spent by SUS with these procedures.

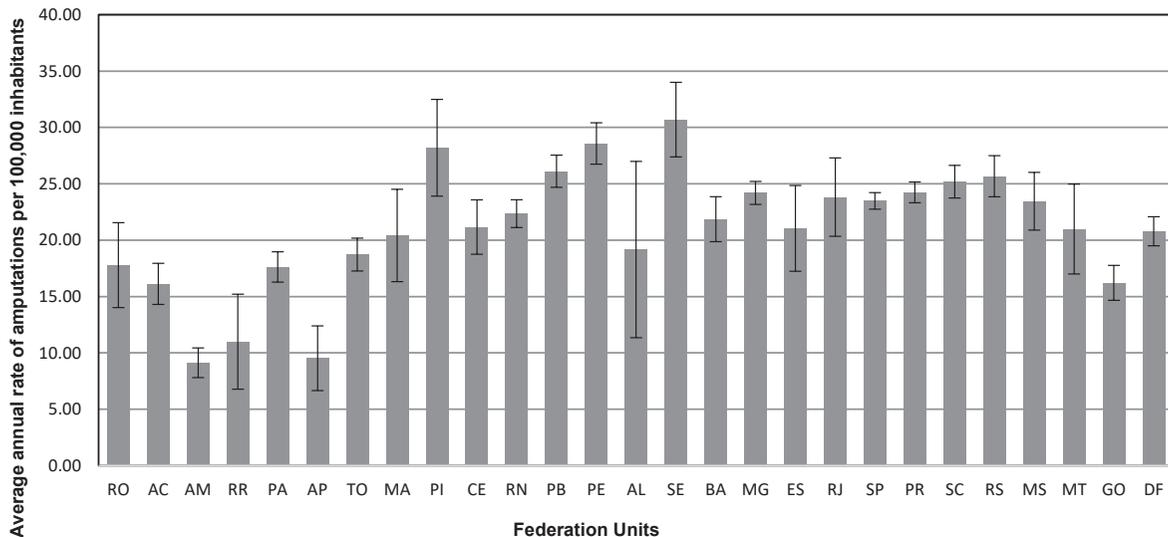
RESULTS

Between 2008 and 2015 a total of 361,585 hospital amputation procedures associated with lower and upper limbs were registered in Brazil, according to the SIHSUS¹⁰ database.

In the same period, the Brazilian population presented a constant annual population growth rate, close to 0.9%, while the annual growth rate for the number of amputations showed variations with values between 0.1% and 5.5%, staying with an average value of 3.8%. As a consequence of these values, in 7 years, the number of annual amputation procedures increased by 30%, while the population increased by 6.7%.

The distribution of these procedures in absolute numbers per Brazilian regions, has been showing, from 2008 to 2015, predominance in the Southeast, Northeast and South, which, together, are responsible for 88.13% of the total of these procedures. The Northern region presents 5.62% and the Central-West 6.25%. When using number of procedures per 100,000 inhabitants, Northeast is rife with 38.5% of cases, and other regions with values close to 15%.

Graph 01 shows the average annual amputation rate per 100,000 inhabitants, with standard deviation, for each Federation Unit (UF) and the Federal District during the study period. We observed that 16 Federation Units (59%) showed average value of amputation procedures above the Brazilian average in the study period, which was 20.7 amputations per 100,000 inhabitants.



Graph 1. Average Annual rate with standard deviation of upper and lower limb amputations per 100,000 inhabitants in each Federation Unit from 2008 to 2015

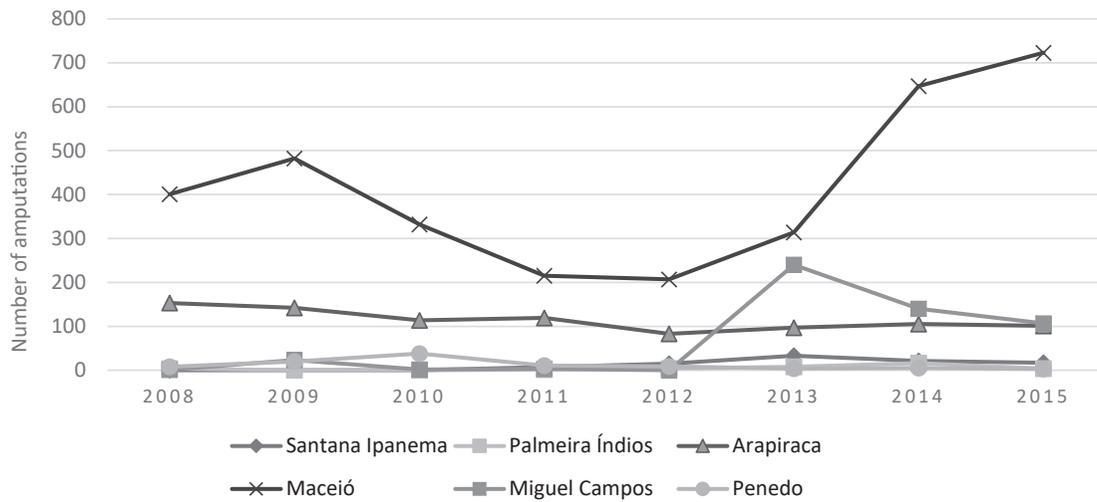
As the clipping of this study is the state of Alagoas, data for this Federation Unit were collected in more detail.

Among the nine UF in the Northeast region, whose average number of amputations during the study period was 24.3 amputations/100,000 inhabitants, the state of Alagoas held the 9th place with the number of 19.05 amputations/100,000 inhabitants. The position occupied by the state of Alagoas considering all the 26 Brazilian UFs plus the DF, is the 21st position.

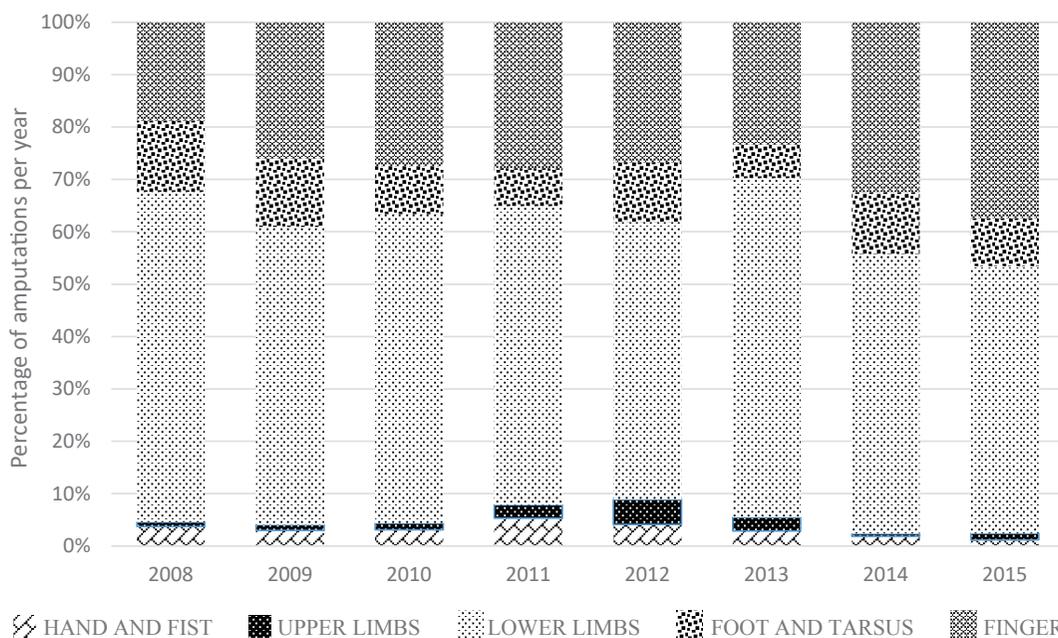
Graph 2 shows the number of amputation procedures performed in six microregions of the state of Alagoas. The other eight microregions are not on the

graph for not carrying out these procedures, in this case, we did not consider isolated cases that occurred during the study period. Three microregions show a higher prevalence of amputations: the capital city Maceió, Arapiraca and São Miguel dos Campos, which together account for 95% of the cases of amputations in the state.

Graph 3 shows the relationship between the five types of procedures carried out in the state of Alagoas, in each year researched. Three types of procedures show predominance: amputation of the lower limbs, amputation of fingers, foot and Tarsus, representing 95% of the procedures.



Graph 2. Number of upper and lower limb amputations per microregions of the state of Alagoas in the period from 2008 to 2015. Microregions with less than three procedures are not on the graph



Graph 3. Relationship between the types of procedures of upper and lower limbs made in the state of Alagoas in the period from 2008 to 2015

Of all procedures performed in Alagoas, in the study period, 88% was performed as emergency procedure, 9% as elective, and the remaining 3% as work accidents or other type of accident.

In addition to the social impacts these procedures cause, there are taxes for the public sector concerning the costs of these procedures.

According to the database consulted, SUS expenses with amputation procedures in Brazil between 2008 and 2015 were R\$ 416,230,667.00, being 86% of this money spent on emergency procedures and 12% on elective procedures. The state of Alagoas spent R\$ 5,054,079.00 of the total, representing 1.2% of the resources. The states that most used the resources of SUS were Pernambuco, Bahia, Minas Gerais, Rio de Janeiro, São Paulo, Paraná and Rio Grande do Sul, which together spent 70% of the total value. In this ranking, the state of Alagoas occupies the 19th position among the 26 states, plus the Federal District.

DISCUSSION

When we analyzed procedures for lower and upper limbs, in absolute numbers, the results show the Southeast region as the one with the highest number of procedures in the country, with 48.6% of the number of cases, followed by the Northeast with 28.8%, and the South with 15.7%. These three regions account for 88.1% of all cases registered in the country in the study period. This behavior is expected, since these are the regions with the largest numbers of inhabitants, according to IBGE. When considering the relative number, the results among the states are close, between 20 and 25 procedures per 100,000 inhabitants, except for North, which shows an average value of 14 procedures per 100,000 inhabitants.

In the specific case of the state of Alagoas, in which the Northeast region showed the lowest average value of amputations per inhabitant, this relationship is not uniform within the state itself, because, of the 13 microregions, three are responsible for 95% of amputation procedures in the state, these are Maceió, Arapiraca and São Miguel dos Campos, which amounted to a total of 4,787 procedures in the study period. Of the procedures performed in Maceió, 44% of them were performed in patients from other microregions, while Arapiraca performed 40% of the procedures.

This behavior has been changing because of the emergence of new hospitals and redistributions of AIHs. This phenomenon has decreased the number of amputations in these major centers and increased in other microregions, as it is the case of São Miguel dos Campos, which from 2008 to 2012 performed isolated cases of amputations, and has spent the last three years answering its own demand, in addition to performing an average of 42% of procedures in patients from surrounding regions. The same occurred in the microregion Santana de Ipanema that now records an increase in the number of procedures since 2011.

Lower limb amputations, for having a higher prevalence among the other types of amputation, is the most discussed in the literature¹³⁻¹⁵. We can also observe this predominance in our studies, as shown in Graph 03. The average prevalence of lower limb amputations in Brazil showed an average of 12.35 procedures per 100,000 inhabitants/year in the period from 2008 to 2015, excluding the amputations of fingers, for not being defined in the SUS database if they were from lower or upper limbs. These numbers are consistent with the data found in studies conducted by Group¹⁵ in regions with more than 200,000 inhabitants in the countries: Japan, Taiwan, Spain, Italy, North America and England, between 1995 and 1997, which presented lower limb amputation rates ranging from 2.8 to 43.9 amputations per 100,000 inhabitants.

For the state of Alagoas, the prevalence showed average annual rate of 12.9 procedures per 100,000 inhabitants, for lower limbs, according to our studies. This is a value close to that Spichler¹⁶ found in his study in Rio de Janeiro, between 1992 and 1994, which indicated a prevalence of 13.9 per 100,000 inhabitants/year in the lower limbs. Another research, using the EMBASE and MEDLINE databases in a review of the literature between 1989 and 2010, obtained a prevalence from 3.6 to 68.4 lower limb amputations for each 100,000 inhabitants¹⁴. It is observed that Brazil, as well as the state of Alagoas, present values that do not distort the reality showed in the literature for lower limbs in other countries.

Although our data do not indicate the reason for the predominance of lower limb amputations, the literature indicates vascular diseases as the main cause, mainly because of diabetes¹⁷⁻¹⁹. When we disregard the procedures of amputations of vascular causes and count only the occupational origin, this relationship appears inverted according to Friedman et al.²⁰, in such a way

that we found that 91.5% of amputations occur in the lower limb, 42.5% in the thumb, and 38.2% in the other fingers of the hand.

Regarding expenses, the more than 400 million dollars paid by SUS to establishments, refer only to the expenses with the procedures. It is estimated that the total amount of costs is higher if we consider the investments with acquisitions and patients' adjustments to the prosthesis, in addition to the benefits and pensions paid to those who left the labor market for temporary or permanent incapacity. The outpatient procedures are also not included in this value, because they are smaller as the number of procedures performed in this environment is small.

The return of these investments of SUS with amputee patients, in order to reintegrate them in the labor market, has not been great. A study in Minas Gerais²¹, between 2002 and 2004, through interview with 26 amputees who have acquired a prosthesis, showed a return to work rate of 34%, and the justification given by users was that the prosthesis did not meet, completely, the needs for the return to activities. A study conducted in São Paulo with unilateral amputees, between 2007 and 2010²², reports a return to work rate of 69%. The literature in other countries presents a value that ranges from 43% to 89% of return to work activities, according to the study conducted by Alvial et al.²³.

The data presented in this study lead us to reflect on the importance of the role of health services as well as traffic and security work, on the educational activities of the population and professionals of these areas concerning prevention of vascular diseases and accidents, which are the main causes of these procedures, thus reducing the number of amputations in the state.

Another relevant factor is preparation of the professionals responsible for the relief and rehabilitation of these patients, who need specific training to facilitate the return to their labor and social functions, whether with the use of prostheses or not, and for this purpose, they must be referred early for rehabilitation services specific to their care.

CONCLUSION

Amputation is an important resource for the society, as it is the removal of a limb, appendage or lump from the body. The aim of this study was to search and verify the prevalence of amputations in the state

of Alagoas, considering the Brazilian context, because of the scarcity of information related to this topic. The source that allowed the data collection in this article was the SIHSUS database, in such a way that it was possible to meet the distributions of the procedures per microregions of the state of Alagoas and Federation Units, separated by types of amputation.

An important phenomenon observed in the data analysis was the migration of the procedures within the state of Alagoas, because of the emergence of new hospitals and redistributions of AIHs; the increase in the relative number of amputees per inhabitant, and the maintenance of the highest percentage of procedures being carried out in the lower limbs.

The dissemination of these data facilitates the planning of actions and programs that provide effective mechanisms to prevent different types of amputation, besides contributing to the rehabilitation and reintegration process of this patient in society and in the labor market.

We believe that many other collections, with this epidemiological characteristic, must be carried out, deepening the knowledge about this phenomenon that is so important for the health of the population, expanding them to other Federation Units, or even within the state of Alagoas, in order to extend actions that aim to reduce costs and raise efforts to increase the patients' return to their labor activities.

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