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IDENTIFICATION OF FACTORS RELATED TO THE DEGREE OF DISABILITY OF PATIENTS WITH LEPROSY IN THE MUNICIPALITY OF CUIABÁ-MT

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Abstract: **Introduction:** Leprosy is a chronic infectious disease, transmissible and non-fatal, endemic in tropical countries and prevalent in underdeveloped countries. Brazil is considered the country with the highest incidence of leprosy in the world, with a rate of approximately 13 new cases per 100,000 inhabitants during 2019. In total, 27,800 notifications of new cases were registered in the year, 4,224 of which in the state of Mato Thick, characterized as hyperendemic. Thus, it is of interest to recognize factors that are associated with the limitation resulting from leprosy lesions. **Methodology:** Descriptive observational cross-sectional study based on public domain data related to leprosy cases in Cuiabá in the state of Mato Grosso, obtained through the review of notification forms attached to the information system of the health department of the State of Mato Grosso - DwWeb| SES-MT during the period from 2015 to 2020. **Results:** There is a higher prevalence of disability among the age group from 20 to 64 years in grade zero (79.4%), grade I (70.7%) and grade II (77.5%), occurring mainly in males, this fact is confirmed when analyzing the data referring to females between the ages of 20 and 64 years, which is presented as the grade zero (47.73%), grade I (35.54%) and grade II (39.08%). Conclusion: The main factors related to the degree of disability in leprosy patients in Cuiabá were the borderline clinical form, the number of affected nerves and skin lesions.
Keywords: Leprosy; Disability and health; *Mycobacterium leprae*.

INTRODUCTION

Leprosy is a chronic contagious infectious disease that persists as a public health problem in Brazil. Its etiologic agent is the *Mycobacterium leprae* (M.Leprae), a bacillus that mainly affects the peripheral nerves, eyes and skin. The disease affects both genders and

all age groups, and can be slow and progressive and, when left untreated, can cause deformities and physical disabilities, often irreversible[1].

The bacillus initially affects the peripheral nervous system (PNS); to then reach the skin (non-contagious, paucibacillary group); and, in most Brazilian patients, it also affects other organs and systems, except the central nervous system (contagious group, multibacillary)[2].

In 2020, 127,396 new cases of the disease were reported to the World Health Organization (W.H.O.). Of these, 17,979 were reported in Brazil, which corresponds to 93.6% of the number of new cases in the Americas. In 2020, Mato Grosso was the federative unit with the highest overall detection rate, 71.44 new cases per 100,000 inhabitants; its capital, Cuiabá, recorded a rate of 29.78 cases per 100,000 inhabitants[1].

Leprosy is classified into three main forms, which are the Madrid, Ridley and Jopling classification and, finally, operational, based on clinical and bacilloscopic characteristics [3], such classifications help define the therapeutic proposal, epidemiological control and pathology studies.

The Madrid classification divides leprosy into four groups, two of which are unstable (indeterminate and borderline) and two stable (tuberculoid and lepromatous). Ridley and Jopling's classification is more used for scientific purposes, divided into five groups, namely tuberculoid, dimorpho-tuberculoid, dimorphic, dimorpho-virchowian, lepromatous and indeterminate[3].

The operational classification, designed for therapeutic purposes, classifies leprosy into two main groups according to its bacilloscopic index, number of lesions and nervous involvement. The paucibacillary form is represented by the presence of up to five skin lesions, a thickened nerve and a negative bacilloscopic index, whereas the multibacillary form is presented as more than six skin lesions, two or more thickened nerves or a positive bacilloscopic index[3].

The clinical suspicion of leprosy is based on the presentation of dermatological and neurological signs and symptoms. Skin lesions characteristically course with changes in sensitivity, hypoesthetic or anesthetic, susceptible to any body region, varying in extent and number. Among the most common dermatological lesions we can mention: hypochromic, brownish or reddish spots; formations in plaques, papules, tubercles and nodules; and infiltrated lesions. Another important characteristic is the autonomic alteration present in the lesions, evolving with hair loss and a decrease in local sweating[4,5].

Neurological manifestations are characterized by irreversible injuries to peripheral nerves that lead to physical disability and deformities when not properly treated. The main signs and symptoms include pain and thickening of the affected nerves, loss of sensitivity in the innervated path and paresthesia in the muscles innervated by them. This picture is known as neuritis and is the result of the inflammatory process of the nerves, initially settling with edema and intense pain in the acute phase and in the chronic phase it leads to functional impairment, with loss of sensitivity, numbness, change in muscle strength and skin dryness[4,5].

Indeterminate leprosy is the initial phase of the disease and will be present mainly in children and adolescents. In these patients, the dermatological manifestation is usually a single hypochromic spot with loss of thermal and pain sensitivity, but with preservation of tactile sensitivity[3,4]

Tuberculoid leprosy can also be present in children. The most common manifestation is the formation of a single anesthetic plaque, with loss of thermal, painful and tactile sensitivity, or the presence of a thickened nerve with loss of sensitivity along its path.[3]

In borderline leprosy, the patient may have several patches of skin on the body. These spots can be hypochromic, reddish, with raised or ill-defined borders, have altered sensitivity and autonomic function. In addition, the nerves are asymmetrically affected and bacilloscopy tends to be positive.

Finally, there is Virchowian leprosy, one of the multibacillary forms of the disease and the most contagious of all manifestations. The spots are no longer visible and patients have infiltrated skin in an "orange peel" appearance due to pore dilation, in addition to being dry, reddish. These alterations spare the warmer dermatological areas, such as the scalp, armpits and lumbar region, and commonly accompany the appearance of hardened papules and nodules, known as hansenomas. The patient may present the typical leonine facie, with madarosis and infiltrations, and there may be nasal obstruction. Nerve involvement is symmetrical, unlike the borderline presentation.[3,4]

Confirmation of the diagnosis is made by the physician through clinical examination of the skin, eyes, nerve palpation, evaluation of superficial sensitivity and muscle strength of the upper and lower limbs[5]. Nerves must be palpated, looking for pain, thickening and adherence to adjacent planes. Hypoesthesia must be evaluated in the following sequence: thermal, painful and, finally, tactile. The most frequently affected nerves are: radial, ulnar, median, common peroneal, posterior tibial, large auricular, facial and trigeminal nerves[6]. The results obtained must be recorded in a standardized form by the Ministry of Health, which must be included in the patient's medical record for the purposes of clinical follow-up and case notification.

Bacilloscopy is a complementary exam performed with the aim of detecting bacilli in intradermal scrapings from four sites - right and left earlobes, right elbow and lesion. The result of this exam is described as the Bacilloscopic Index and varies from 0 to 6+. This index has quantitative characteristics (number of bacilli, regardless of their state) and qualitative characteristics (takes into account the morphological aspect of the bacillus). A positive bacilloscopy classifies the patient as multibacillary, and in case of negative, it does not exclude the diagnosis.[3,4]

In short, with the aim of epidemiological purposes and also for diagnosis, treatment direction and, when possible, the patient's prognosis, through neurological propaedeutics, the loss of neural function is evaluated, be it autonomic, sensitive or motor of the eyes, hands and feet. Thus, the classification is established regarding the degree of disability and the number of members affected, according to the norms of the Ministry of Health[7]:

- Grade 0 - There is no presence of neural involvement;
- Grade 1 - Decrease or loss of sensitivity;
- Grade 2 - Presence of disabilities and deformities.

Based on this, Ordinance No. 149 of February 3, 2016, considers a case of leprosy to be a person who presents one or more of the following cardinal signs, who requires treatment with multidrug therapy (MDT):

- Lesion(s) and/or area(s) of the skin with alteration in thermal and/or painful and/or tactile sensitivity; or
- Peripheral nerve thickening, associated with sensory and/or motor and/or autonomic changes; or
- Presence of M. leprae bacilli, confirmed by bacilloscopy of intradermal smear or skin biopsy[8]

Comprehensive treatment of a case of leprosy comprises specific chemotherapy treatment - single multidrug therapy (MDT-U), its follow-up, with a view to identifying and treating possible intercurrences and complications of the disease and the prevention and treatment of physical disabilities.[3.]

Thus, it is pertinent to evaluate the factors that influence the prognosis of affected patients in the city of Cuiabá. Therefore, the present study aimed to identify the factors related to the degree of disability of leprosy patients in the city of Cuiabá-MT from 2015 to 2020.

METHODOLOGY

This is a descriptive observational cross-sectional study, based on public domain data related to leprosy cases in the state of Mato Grosso. The database was obtained by reviewing notification forms issued during the period from 2015 to 2020 in the municipality of Cuiabá, attached to the Notifiable Disease Information System (SINAN) - Leprosy of the Mato Grosso State Health Department - DwWeb| SES-MT.

The variables used include residents of Cuiabá, year of diagnosis between 2015 and 2020, case notification in Cuiabá, year of initiation of treatment between 2015 and 2020, year of notification between 2015 and 2020, assessment of current disability (grade 1, grade 2, grade 3 and grade zero), current operational classification (multibacillary (MB) or paucibacillary (PB)), current therapeutic regimen (Multibacillary Polydrug Therapy (MDT-MB) with 12 doses; Paucibacillary Polydrug Therapy (MDD-PB) with 6 doses and others schemes), age range (1 year old to 64 years old) clinical forms (borderline, Virchowian, indeterminate and tuberculoid), month of diagnosis and beginning of treatment between January and December, patient gender (female and male) and region of notification. As exclusion criteria, patients who do not live in Cuiabá, younger than 1 year of age and patients treated early were used.

According to the National Policy for Comprehensive Child Health Care[9], developed by the Ministry of Health, considers children up to 12 years old, from 12 to 18 years old they identify themselves as adolescents. However, in order to make the research viable, children and adolescents were placed in a single group. However, it was categorized as elderly, over 60 years of age[10] and, consequently, the interim from 20 to 59 years old, as an adult population.

The study population comprised 584 patients who had leprosy registered in the notification forms and who were accessible for analysis on the virtual platform at research addresses in the public domain. Data were included in a Microsoft Software Excel 2019® spreadsheet, containing absolute frequency (n) and relative frequency (%) for descriptive statistical analysis.

As it performs analysis of public domain data with unrestricted access from the DwWeb SES-MT where the personal data of the records are not informed, according to Resolution 510/2016, Law nº 12.527/2011, it was not necessary to submit this research for evaluation of the CEP-CONEP system.

RESULTS

Among the 584 patients analyzed during the study, there was a higher prevalence of disability between the ages of 20 and 64 years in grade zero (79.4%), grade I (70.7%) and grade II (77. 5%), occurring mainly in males, as shown in Table 1.

N (%)	0	I	II
Age range of patients			
1-19 years	27 (7,69)	4 (3,77)	3 (3,75)
20-64 years	279 (79,49)	75 (70,75)	62 (77,50)
65 years +	45 (12,82)	27 (25,47)	15 (18,75)
Sex			
Feminine	179 (47,73)	43 (35,54)	34 (39,08)
Masculine	196 (52,27)	78 (64,46)	53(60,92)

TABLE 1: Frequency of cases with grade 0, I and II of disability in patients in the city of Cuiabá by age group and sex between 2015-2020.

Source: Mato Grosso State Secretariat Information System – Dw web | SEP- MT

Regarding the frequency of cases with degree zero of disability, there is a higher prevalence in the clinical form Dimorphous (80.00%), with involvement of 8 to 12 nerves (69.23%) and 1 to 5 skin lesions (60.11%), as shown in Table 2.

	N	(%)
Clinical form		
D (Dimorphic)	300	80,00
I(Indeterminate)	26	6,93
T(tuberculoid)	21	5,60
V(Virchowiana)	28	7,47
Number of nerves affected		
0 nerves	60	17,09
1 nerves	33	9,40
2-7 nerves	1	0,28
8-12 nerves	243	69,23
14 or more nerves	14	3,99
Number of skin lesions		
0 lesions	72	20,51
1-5 lesions	211	60,11
6-10 lesions	59	16,81
11-15 lesions	7	1,99
16 or more injuries	2	0,57
Total	351	100,00

TABLE 2: Frequency of cases with degree zero of disability in patients in the city of Cuiabá by clinical form, number of affected nerves, number of skin lesions between 2015-2020.

Source: Mato Grosso State Secretariat Information System – Dw web | SEP- MT

There is a prevalence of grade I disability between the borderline clinical form (89.30%), with involvement of 2 to 7 nerves (84.91%) and 1 to 5 skin lesions (48.11%), as shown in Table 3.

	N	(%)
Clinical form		
D (Dimorphic)	95	89,30
I(indeterminate)	1	0,94
T(Tuberculóide)	4	3,77
V(Virchowian)	11	10,34
Number of nerves affected		
0 nerves	10	9,43
1 nerves	4	3,77
2-7 nerves	90	84,91
8-12 nerves	2	1,89
14 or more nerves	0	0,00
Number of skin lesions		
0 lesions	24	22,64
1-5 lesions	51	48,11
6-10 lesions	24	22,64
11-15 lesions	3	2,83
16 or more injuries	4	3,77
Total	106	100,00

TABLE 3: Frequency of cases with grade I disability in patients in the city of Cuiabá by clinical form, number of affected nerves and number of skin lesions between 2015-2020.

Source: Mato Grosso State Secretariat Information System – Dw web | SEP- MT

Regarding the degree II of disability, there is a higher prevalence in the clinical form Dimorphous (81.25%), involvement of 2 to 7 nerves (75.0%) and 1 to 5 skin lesions (46.25%), according to Table 4.

	N	(%)
Clinical form		
D (Dimorphic)	65	81,25
I(Indeterminate)	3	3,75
T(tuberculoid)	2	2,50
V(Virchowian)	10	12,50
Number of nerves affected		
0 nerves	10	12,50
1 nerves	2	2,50
2-7 nerves	60	75,00
8-12 nerves	8	10,00
14 or more nerves	0	0
Number of skin lesions		
0 lesions	16	20,00
1-5 lesions	37	46,25
6-10 lesions	21	26,25
11-15 lesions	1	1,25
16 or more injuries	5	6,26
Total	80	100,00

TABLE 4: Frequency of cases with grade II disability in patients in the city of Cuiabá by clinical form, number of affected nerves, number of skin lesions between 2015-2020.

Source: Mato Grosso State Secretariat Information System – Dw web | SEP- MT

DISCUSSION

The findings showed a high frequency of participants who developed degree zero or 1 of physical disability in Cuiabá, even presenting in the borderline form, as also found by other studies[11]. This fact is related to early diagnosis and treatment in the state of Mato Grosso, which is carried out in all basic health units in the state.

Leprosy alone is not responsible for the increase in morbidity; however, its consequences, such as nerve dysfunction and the appearance of important lesions, can lead to a worsening of the patient's quality of life, leading to the appearance of malnutrition, the appearance of of opportunistic infections and poverty[12].

The main factors associated with the development of these degrees of disability were the borderline clinical form, the number of affected nerves and the number of skin lesions. Other studies show the same factors acting on the degree of disability, mainly according to the degrees of nerve injuries, varying in rates from 18.7% to 55.5% according to the data analyzed [13,14].

Nerve injuries are considered the most serious complication of leprosy, responsible for the emergence of irreversible physical disabilities, conferring a high degree of disability among those affected by the disease. Due to the expressive degree of debilitation, which can be caused by nerve injuries, to the bearer of the bacillus, there are consequences that also affect their family members.

Furthermore, it is extremely important to mention relapses, a condition that may arise after discharge from the multidrug therapy program (MDT), called leprosy reactions. These are characterized as acute and rapidly evolving outbreaks, resulting from an inflammatory response to some stressor to the immune system before, during or after MDT. It is possible to classify them into two groups: Type 1 reaction or reverse reaction, mediated by cellular immunity, and type 2 reaction, also called leprosy erythema nodosum reaction, common to multibacillary forms[15].

Reverse reactions generally appear during the six months of initiation of treatment and are configured as infiltrative lesions with phlogistic signs (heat, erythema and edema), edema of the face and/or limb, absence of fever and hypersensitivity to palpation and loss of of function of the affected nerve. Leprosy erythema nodosum, on the other hand, usually appears within the first three years after the start of MDT, the nodules are erythematous and painful to the touch and affect mostly the upper and lower limbs. However, in addition to recognizing and differentiating the types of reactions, it is essential to immediately start treating possible neural damage[4,15].

The presence of severe physical disabilities is related to a late diagnosis and treatment and the appearance of leprosy reactions, therefore, an effective strategy to avoid such complications would be the early detection and treatment, using the multidrug therapy scheme currently recommended according to the specific shapes.

The greater demand for attention, which must be given by them to the patient with the disease, requires greater help and availability, due to the disabilities and impairments that interfere with the patient's daily life and care, which often requires physical and mental adaptations. psychosocial factors in family dynamics. Among international studies, it is noted that patients with injuries to three or more nerves are more likely to develop disabilities[16].

In addition, when analyzing the results of Table 1, which considers gender as a possible predictor of vulnerability, since when compared to females, males present a higher percentage of prevalence of injuries in grades 0, I and II, fundamentally. whether virchowian predominance in men and possible hormonal relationship[17].

Multidrug therapy (MDT-U) employs schemes based on operational classification. Considering the implementation of Technical Note nº 16/2021-CGDE/DCCI/SVS/MS, by the Ministry of Health in 2021, the treatment for both paucibacillary and multibacillary diseases consists of the combination of drugs: rifampicin, dapsone and clofazimine. The therapy differs in the dose administered for children and adults and in the time of administration, with a 6-month scheme for paucillary and 12 months for multibacillary[18].

PAUCIBACILLARY SCHEME (PB):

- Rifampicin: a monthly dose of 600 mg (2 capsules of 300 mg) with supervised administration.
- Clofazimine: monthly dose of 300mg (3 capsules of 100mg) with supervised administration and a daily dose of 50mg self-administered.
- Dapsone: a supervised monthly dose of 100mg and a self-administered daily dose.

6 monthly supervised doses of Rifampicin must be given. As a discharge criterion, 6 supervised doses must have been performed within 9 months.

MULTIBACILLARY SCHEME (MB):

A combination of rifampicin, dapsone and clofazimine, packaged in a pack, must be used in the following scheme:

- Rifampicin: a monthly dose of 600 mg (2 capsules of 300 mg) with supervised administration.
- Clofazimine: a monthly dose of 300 mg (3 capsules of 100 mg) with supervised administration and a daily dose of 50 mg self-administered.
- Dapsone: a supervised monthly dose of 100mg and a self-administered daily dose.

12 supervised monthly doses of rifampicin must be given. As a discharge criterion, 12 supervised doses must have been performed within 18 months.

Recommended dosage for children:

PAUCIBACILLARY SCHEME (PB):

- Rifampicin: a monthly dose of 450mg (1 capsule of 150mg and 1 capsule of 300mg) with supervised administration).
- Clofazimine: monthly dose of 150mg (3 capsules of 50mg) with supervised administration and a dose of 50mg self-administered every other day.
- Dapsone: monthly dose of 50mg (1 tablet of 50mg) supervised and a daily dose of 50mg self-administered.

6 monthly supervised doses of Rifampicin must be given. As a discharge criterion, 6 supervised doses must have been performed

within 9 months.

MULTIBACILLARY SCHEME (MB):

A combination of rifampicin, dapsone and clofazimine, packaged in a pack, must be used in the following scheme:

- Rifampicin: a monthly dose of 450mg (1 capsule of 150mg and 1 capsule of 300mg) with supervised administration)
- Clofazimine: monthly dose of 150mg (3 capsules of 50mg) with supervised administration and a dose of 50mg self-administered every other day.
- Dapsone: monthly dose of 50mg (1 tablet of 50mg) supervised and a daily dose of 50mg self-administered.

In reactions, PQT is maintained. For neuritis, rest the affected limb, and prednisone, 1-1.5 mg/kg/day, monitoring neural function. Randomized controlled trials show no significant long-term effect of corticosteroids.[13,19,20]

During the monthly intake of medication, the patient is evaluated to monitor the evolution of their skin lesions, their neural impairment, checking for the presence of neuritis or reactional states[4].

Thus, the importance of drug therapy for leprosy to cure the disease is noted. The non-acceptance of the use of multidrug therapy promotes the continuity of the transmissibility of the disease, which may cause irreversible damage to the patient's daily quality of life.

Regarding the maintenance of a safe environment, the use of MDT and the continuity of self-care represent factors that contribute to the safety of patients and their families. Thus, the treatment done correctly, walks towards the cure of the disease. Currently, there is a greater concern among professionals to advise on the importance of medication as a tool to obtain a cure for leprosy, adopting the method of supervised administration of medication doses as a way to guarantee that complete therapeutic efficacy is achieved.

This measure was instituted because in the past, sometimes, some patients abandoned the treatment due to the adverse effects caused. The most common in the first six weeks are hemolytic anemia, methemoglobinemia, agranulocytosis, thrombocytopenia, drug-induced hepatitis, pseudoflu syndrome, dapsone syndrome, erythroderma and exfoliative dermatitis[21].

This study makes a significant contribution to highlighting the need for early diagnosis and treatment of the disease, with a view to preventing disabilities. In addition, it adds to the physician's clinical knowledge the relationship between the patient's risk factors that correlate to the development of a greater degree of disability.

With regard to the limitations found for the development of the study, the low availability of articles that address the same subject studied stands out, which creates difficulties in its development and analysis, through the comparison of information. In addition, there is a significant divergence of data between existing studies, which can lead to misleading results. Another limiting aspect is the wide age ranges established within the databases, generating low specificity in the results obtained, making it difficult to distinguish the prevalence of impairments in each age range.

These situations show the need for new scientific works, in order to provide a larger, more specific and more comprehensive database, due to the expressive and relevant prevalence of the disease in our state.

CONCLUSION

The study carried out allowed us to identify that the main factors related to the degree of disability in leprosy patients in Cuiabá were the borderline clinical form, the number of affected nerves and skin lesions. Therefore,

greater knowledge of the factors related to the severity of these patients is necessary, since, based on this information, therapeutic management becomes more effective when performed early.

The importance of early diagnosis of leprosy is also evident, aiming at the early initiation of treatment, as a way of preventing possible negative socioeconomic effects that the degree of involvement has on its carriers.

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