cadernos Saúde Coletiva
ISSN 2358-291X (Online)

ORIGINAL ARTICLE

Risk factors for physical disability due to leprosy: a case-control study*

Fatores de risco para a deficiência física decorrente da hanseníase: estudo de caso-controle

Gerlane Cristinne Bertino Véras[1,2], José Ferreira Lima Júnior[3], Estelita Lima Cândido[4], Evanira Rodrigues Maia[4,5]

*Este artigo compõe a dissertação intitulada: Incapacidade física em Hanseníase: estudo de caso-controle, apresentada ao Programa de Pós-Graduação em Enfermagem da Universidade Regional do Cariri – URCA. – Crato-CE, 2017.

[1]Unidade Acadêmica da Escola Técnica de Saúde de Cajazeiras, Universidade Federal de Campina Grande - Cajazeiras (PB), Brasil
[2]Programa de Pós-Graduação em Enfermagem, Universidade Regional do Cariri - Crato (CE), Brasil.
[3]Unidade Acadêmica da Escola Técnica de Saúde de Cajazeiras, Universidade Federal de Campina Grande - Cajazeiras (PB), Brasil.
[4]Unidade Acadêmica de Medicina, Programa de Pós-Graduação em Ciências da Saúde, Faculdade de Medicina, Universidade Federal do Cariri - Barbalha (CE), Brasil.
[5]Unidade Acadêmica de Enfermagem, Programa de Pós-Graduação em Enfermagem, Universidade Regional do Cariri - Crato (CE), Brasil.

How to cite: Veras GCB, Lima Júnior JF, Cândido EL, Maia ER. Risk factors for physical disability due to leprosy: a case-control study. Cad Saúde Colet, 2021;29(3):411-423. https://doi.org/10.1590/1414-462X202129030182

ABSTRACT

Background: The main consequence of leprosy is physical disability. **Objective**: To identify risk factors of physical disabilities due to leprosy. **Method**: Case-control study carried out at the Notifiable Diseases Information System – Leprosy in the 9th Regional Health District of the state of Paraíba, Brazil, between 2001 and 2014. Cases were individuals who presented degree of physical disability 1 or 2 at diagnosis or discharge; and controls included individuals with degree of physical disability 0 also at diagnosis and discharge. A 1:1 (case:control) proportion was used. Data were analyzed using the Epi Info and BioEstat software packages. **Results**: The following cases and controls (428 each) at risk for physical disability were analyzed: aged ≥15 years (96.5%, OR=0.33, p<0.01), males (59.3%, OR=1.82, p<0.01), low education level (70.4%, OR=2.66, p<0.01), multibacillary classification (72.9%, OR=9.29; p< 0.01), number of lesions ≥5 (34.3%, OR=0.18, p<0.01), and number of nerves affected ≥1 (12.6%, OR=0.05; p<0.01). Late diagnosis, missing/inadequately filled data, absence/non-registration of dermato-neurological evaluation, and low control of contacts were observed. **Conclusion**: The need for active surveillance and early detection of leprosy cases and contacts is highlighted.

Keywords: leprosy; persons with disability; assistance; Primary Health Care.

RESUMO

Introdução: A principal consequência da hanseníase é a deficiência física. **Objetivo:** Identificar fatores de risco para deficiências físicas decorrentes da hanseníase. **Método:** Estudo de caso-controle, realizado no Sistema de Informação de Agravos de Notificação de hanseníase entre 2001 e 2014, presente na 9ª Regional de Saúde da Paraíba. Os casos foram associados às pessoas que apresentaram grau de incapacidade física 1 ou 2 no diagnóstico ou na alta; bem como controles com grau de incapacidade física 0, tanto no diagnóstico quanto na alta. A proporção foi um caso para um controle. Os dados foram analisados nos programas Epi Info e BioEstat. **Resultados:** Foram analisados 428 casos e 428 controles com risco para incapacidade física para pessoas maiores de 15 anos (96,5%; OR = 0,33; p <0,01), gênero masculino (59,3%; OR = 1,82; p < 0,01), baixa escolaridade (70,4%; OR = 2,66; p < 0,01), classificação multibacilar (72,9%; OR = 9,29; p < 0,01), lesões maiores ou iguais a cinco (34,3%; OR = 0,18; p < 0,01)

Study carried out at Setor de Vigilância Epidemiológica da 9ª Gerência Regional de Saúde da Paraíba, Brasil.
Correspondence: Gerlane Cristinne Bertino Véras. E-mail: gerlaneveras2@gmail.com
Financial support: none.
Conflict of interests: nothing to declare.
Received on: Apr. 29, 2019. Accepted on: Jun. 11, 2020

cadernos Saúde Coletiva

e nervos afetados maiores que um (12,6%; OR = 0,05; $p < 0.01$). Observou-se diagnóstico tardio, falta/inadequação no preenchimento dos dados, ausência/não registro da avaliação dermatoneurológica e baixo controle dos comunicantes. **Conclusão:** Ressalta-se a necessidade da vigilância ativa e detecção precoce dos casos e contatos.

Palavras-chave: hanseníase; pessoas com deficiência; assistência; Atenção Primária à Saúde.

INTRODUCTION

Leprosy is an infectious disease with chronic evolution and high incapacitating power[1], as evidenced by the large number of cases with different degrees of physical disability (DPD) at diagnosis. This fact suggests that the efforts made for early detection of leprosy have not been sufficient[2].

Leprosy is characterized as a neglected disease for being prevalent in conditions of poverty and for not being a focus of interest of the world pharmaceutical industry, or a target of financial incentives from research funding agencies, which could support the study of the behavior of this disease. This contributes to the maintenance of the situation of inequality and represents a barrier to the development of a country[3].

India, Brazil, and Indonesia reported together 81% of the new cases worldwide in 2014[4]. In 2015, Brazil had 28,761 new cases, of which 19,813 (68.9%) were multibacillary (MB) cases and 1,880 (6.5%) were cases with DPD 2; the Northeast region had 12,848 (44.7%) new cases, of which 8,347 (65%) were MB cases and 773 (6.0%) were cases with DPD 2; Paraíba had 526 (4.1%) new cases, of which 309 (58.7%) were MB cases and 39 (7.4%) were cases with DPD 2; the 9th Regional Health District of Paraíba, *locus* of the current study, had 54 new cases, of which 33 (61.1%) were MB cases and 2 (3.7%) were cases with DPD 2[5].

Late diagnosis and inadequate treatment are factors that increase the risk of developing physical disability[6], which may occur before, during, and after polychemotherapy (PCT)[7,8].

Physical disability is considered the most serious consequence of leprosy, whether from the economic, social or human point of views[9], and the main causative factor of stigma and prejudice.

Understanding the physical disabilities resulting from leprosy as a public health problem in Brazil, it is fundamental to know the factors that determine its occurrence so that preventive actions towards its elimination can be planned. This study aimed to identify the risk factors for the development of physical disabilities caused by leprosy.

METHOD

This is a unicentric, paired, case-control study based on data from the Epidemiological Surveillance sector of the 9th Regional Health District of the state of Paraíba, composed of 15 municipalities, totaling approximately 168,103 inhabitants distributed in an area of 3,404,072 km^2, with 49.38 inhabitants/km^2[10].

The choice of the 9th Regional Health District of Paraíba as the *locus* of this study was based on its endemic situation for leprosy, with a coefficient of detection of 30.74 new cases/100.000 inhabitants in 2015[11] - a very high parameter for the strength of morbidity and trend and magnitude of the disease[12].

The study sample was composed of 1,239 cases of leprosy registered at the National Notifiable Diseases Information System (SINAN) from 2001 to 2014. The reported cases that had been closed due to diagnosis errors were excluded. A total sample of 1,219 cases was chosen to compose the case-control study.

The cases that presented DPD 1 or 2 in the evaluation performed at diagnosis or discharge were included in the study. The controls were cases that presented DPD 0 at both evaluations. Some exclusions were necessary due to the lack of records or inconsistent information. For this, a systematic random process in which one of every 10 cases was eliminated was used. Thus, the distribution of cases in the control group, according to the variables, was characterized as follows: sex and operational form, 428/428; age, 427/427; education level, 331/331; residence area, 376/376; number of lesions, 309/309; number of affected nerves, 97/97; leprosy reaction, 149/149; smear microscopy 76/76.

The Epi Info 7.2 and Bioestat 5.3 software packages were used for data analysis. A descriptive analysis was carried out to characterize the population profile, the association

between variables (odds ratio), and the test of statistical significance (chi-squared). A significance level of 5% ($p<0.05$) was adopted in all conclusions resulting from the inferential analyses.

The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) research protocol [13] was respected, and the study complied with the Guidelines and Norms Regulating Research Involving Human Beings in accordance with resolution no. 466/2012 of the National Health Council (NHC)[14] under protocol no. 2.259.558.

RESULTS

We analyzed 428 cases and 428 controls. According to the sociodemographic profile shown in Table 1, there was prevalence of physical disability in individuals aged ≥15 years (96.5%), males (59.3%), brown color/race (self-reported) (45.1%), with up to nine years of formal schooling (70.4%), urban residents (78.8%), and housewives (5.4%).

Table 2 presents the description of clinical and epidemiological characteristics of the cases and controls. There was prevalence of physical disability in the clinical form of Dimorphic Leprosy (DL) (42.9%), in the multibacillary (MB) operational mode (72.9%), input into the system as a new case (89.0%), by referral (46.3%), negative smear microscopy (18.4%), leprosy type 1 reaction (5.6%), suspension due to cure (87.1%), with a mean of six lesions, and more than one affected nerve.

The DPD values of the 428 cases, as well as their evolution from diagnosis to discharge are listed in Table 3. It was observed that 7.9% of the cases presented DPD 0 at diagnosis and 23.8% presented DPD 0 at discharge, with a regression of 200% or a 3-fold larger number of individuals with physical disability.

At diagnosis, approximately 90.0% of the cases presented DPD 1 or 2, and this proportion was 39.7% at discharge. Thus, there were reductions of 55.5 and 56.8%, or a 2-fold smaller number of individuals with DPD 1 or 2 at discharge.

Regarding the non-evaluated cases, there was an increase of 2,125%, which means a 22-fold larger number of individuals not evaluated from diagnosis to discharge. Likewise, lack of registration increased by 1,240%, which means a 13-fold larger number of individuals from diagnosis to discharge.

Table 4 shows the contribution level of each characteristic and indication of risk factors for physical disability, estimated through odds ratio. The odds of a person with leprosy aged ≥15 years to develop physical disability was three times greater (OR=0.33, $p<0.01$) compared with that of a younger person; the same was observed for males (OR=1.82, $p<0.01$). As for education level, having up to nine years of formal schooling increased the risk by approximately three times in relation to having more than nine years of formal schooling (OR=2.66, $p<0.01$).

The MB operational mode had a 9-fold increased risk of physical disability (OR=9.29; $p<0.01$). Presence of more than five lesions had a five-fold increased risk (OR=0.18, $p<0.01$). Among people with more than one nerve involved, the risk was 20-fold higher (OR=0.05; $p<0.01$), and presence of leprosy reaction presented a 2.4-fold increased risk (OR=2.42; $p=0.04$).

Residence area presented no significant risk (OR=1.11, $p=0.66$). Although the smear microscopy indicated a risk, there was no strong evidence for considering it a risk factor for the development of physical disability (OR=2 and $p=0.05$).

DISCUSSION

Prevalence of cases of physical disability due to leprosy in people aged ≥15 years has also been observed in studies conducted in Rio de Janeiro, Brazil, and Bogotá, Colombia. Such a finding may be related to the long incubation time of the bacillus and recurrent late diagnosis[9,15].

Leprosy affects people at economically active age, resulting in personal financial losses. This is especially true when there is physical incapacitation that hinders work activities, impeding people to keep their jobs and causing problems of reintegration into the labor market, leading to a possible marginalization of these individuals in the productive chain[16]. Consequently, there is public expenditure to cover the need for healthcare and social services for leprosy patients.

cadernos Saúde Coletiva

Table 1. Sociodemographic profile of cases and controls. 9th Regional Health District of the state of Paraíba, 2001 to 2014. Cajazeiras - PB, 2017

Variables	Cases *f* (%)		Controls *f* (%)	
Age				
<15 years	15	(3.5)	43	(10.0)
≥15 Years	413	(96.5)	384	(89.7)
No record	0	(0.0)	1	(0.3)
Total	**428**	**(100.0)**	**428**	**(100.0)**
Mean ±standard deviation	***49.1***	***(±19.4)***	***41.6***	***(±19.0)***
Minimum and Maximum	***4 - 91***		***3 - 86***	
Sex				
Female	174	(40.7)	238	(55.6)
Male	254	(59.3)	190	(44.4)
Total	**428**	**(100.0)**	**428**	**(100.0)**
Color/race				
Yellow	4	(0.9)	3	(0.7)
White	78	(18.2)	92	(21.5)
Brown	193	(45.1)	169	(39.5)
Black	45	(10.5)	42	(9.8)
Indigenous	0	(0.0)	1	(0.2)
No record	108	(25.2)	121	(28.3)
Total	**428**	**(100.0)**	**428**	**(100.0)**
Education level				
Illiterate	111	(25.9)	67	(15.7)
Incomplete Elementary School	76	(17.8)	67	(15.7)
Complete Elementary School	23	(5.4)	12	(2.8)
Incomplete Junior High School	80	(18.7)	99	(23.1)
Complete Junior High School	11	(2.6)	3	(0.7)
Incomplete High School	20	(4.7)	50	(11.7)
Complete High School	8	(1.9)	7	(1.6)
Incomplete Higher Education	0	(0.0)	3	(0.7)
Complete Higher Education	9	(2.1)	23	(5.4)
Not applicable	3	(0.7)	8	(1.9)
No record	87	(20.3)	89	(20.8)
Total	**428**	**(100.0)**	**428**	**(100.0)**
Residence area				
Rural	40	(9.3)	39	(9.1)
Urban	337	(78.8)	370	(86.4)
No record	51	(11.9)	19	(4.5)
Total	**428**	**(100.0)**	**428**	**(100.0)**
Occupation				
Housewife	23	(5.4)	29	(6.8)
Student	9	(2.1)	13	(3.0)
Farmer	10	(2.3)	5	(1.7)
Retired/pensioner	8	(1.9)	3	(0.7)
Bricklayer	7	(1.6)	1	(0.2)
Salesperson	3	(0.7)	1	(0.2)
Others	11	(2.6)	16	(3.7)
No record	357	(83.4)	360	(84.1)
Total	**428**	**(100.0)**	**428**	**(100.0)**

Table 2. Clinical-epidemiological profile of cases and controls. 9th Regional Health District of the state of Paraíba, 2001 to 2014. Cajazeiras - PB, 2017

Variables	Cases *f* (%)		Controls *f* (%)	
Clinical form				
IL	41	(9.6)	187	(43.7)
TL	69	(16.1)	129	(30.1)
DL	184	(42.9)	67	(15.7)
VL	97	(22.7)	18	(4.2)
Non-classified	6	(1.4)	13	(3.0)
No record	31	(7.2)	14	(3.3)
Total	**428**	**(100.0)**	**428**	**(100.0)**
Operational form				
PB	115	(26.9)	331	(77.3)
MB	312	(72.9)	97	(22.7)
No record	1	(0.2)	0	(0.0)
Total	**428**	**(100.0)**	**428**	**(100.0)**
Input mode				
New case	381	(89.0)	409	(95.6)
Relapse	17	(4.0)	9	(2.1)
Referral from the same municipality	1	(0.2)	0	(0.0)
Referral from other municipalities	5	(1.2)	3	(0.7)
Referral from other states	7	(16.4)	3	(0.7)
Other re-input	15	(3.5)	4	(0.9)
No record	2	(0.5)	0	(0.0)
Total	**428**	**(100.0)**	**428**	**(100.0)**
Mode of detection of new case				
Spontaneous demand	130	(30.7)	150	(3.5)
Referral	198	(46.3)	210	(49.1)
Collective examination	29	(6.8)	28	(6.5)
Contact examination	10	(2.3)	14	(3.3)
Not applicable	42	(9.8)	18	(4.2)
Other modes	10	(2.3)	6	(1.4)
No record	9	(2.1)	2	(0.5)
Total	**428**	**(100.0)**	**428**	**(100.0)**
Bacilloscopy				
Positive	47	(11.0)	17	(40)
Negative	79	(18.4)	60	(60.0)
Not performed	24	(5.6)	32	(7.5)
No record	278	(65.0)	319	(74.5)
Total	**428**	**(100.0)**	**428**	**(100.0)**
Reaction				
Type 1	24	(5.6)	7	(1.6)
Type 2	6	(1.4)	1	(0.2)
No reaction	156	(36.4)	142	(33.2)
No record	242	(56.5)	278	(65.0)
Total	**428**	**(100.0)**	**428**	**(100.0)**
Reason for suspension				
Recovery	373	(87.1)	421	(98.4)
Withdrawal	22	(5.1)	1	(0.2)
Death	9	(2.1)	0	(0.0)

Table 2. Continued...

Variables	Cases *f* (%)		Controls *f* (%)	
Referral from the same municipality	2	(0.5)	3	(0.7)
Referral from other municipalities	1	(0.2)	1	(0.2)
Referral from other states	4	(0.9)	2	(0.5)
Registration error	6	(1.4)	0	(0.0)
No record	11	(2.6)	0	(0.0)
Total	**428**	**(100.0)**	**428**	**(100.0)**
No. of lesions				
≤5	267	(62.4)	374	(87.4)
>5	147	(34.3)	48	(11.2)
No record	14	(3.3)	6	(1.4)
Total	**428**	**(100.0)**	**428**	**(100.0)**
Mean ±standard deviation	***6 (±8.0)***		***2 (±4.2)***	
Minimum and maximum	***0 - 60***		***0 - 40***	
No. of nerves affected				
0	35	(8.2)	86	(20.1)
1	31	(7.2)	8	(1.9)
>1	54	(12.6)	3	(0.7)
No record	308	(72.0)	331	(77.3)
Total	**428**	**(100.0)**	**428**	**(100.0)**
Mean ±standard deviation	***0.4 (±1.5)***			***0 (±0.4)***
Minimum and maximum		***0 - 60***		***0 - 40***
No. of registered contacts	**1,558**	**(100.0)**	**1,485**	**(100.0)**
No. of evaluated contacts	**1,111**	**(71.3)**	**1,042**	**(68.1)**

Table 3. Assessment of the degree of disability at diagnosis and discharge in leprosy cases. 9th Regional Health District of the state of Paraíba, 2001 to 2014. Cajazeiras - PB, 2017

Degree of physical disability	*f (%)*		Evolution (%) and Reason	*p**
	Diagnosis	Discharge		
G0	34 (7.9)	102 (23.8)	↑200 ~3x	<0.0001
G1	290 (67.8)	129 (30.1)	↓55.5 ~2x	<0.0001
G2	95(22.2)	41 (9.6)	↓56.8 ~2x	<0.0001
Not evaluated	4 (0.9)	89 (20.8)	↑2.125 ~22x	<0.0001
No record	5 (1.2)	67 (15.7)	↑1.240 ~13x	<0.0001

**p*-value associated with Binomial test.

Cases of leprosy in children aged ≤15 years have been the object of recent research. An increase in the number of these cases has been detected, and this reflects an increase in the transmission chain and weaknesses in the surveillance and control of this disease, constituting a local indicator of endemicity[17]. It is presumed that transmission in these cases occurs in the home environment and in the first years of life, because the disease has a prolonged incubation period. This, in turn, gives evidence to negligence in the control by primary health care (PHC) services.

A study carried out in the state of Mato Grosso, Brazil, showed a growing trend of cases in children under 15 years of age for the MB operational classification, in the clinical form DL, and DPD 2[18].

Table 4. Association between factors predicting physical disability due to leprosy. 9th Regional Health District of the state of Paraíba, 2001 to 2014. Cajazeiras - PB, 2017

Variables	Cases	Controls	OR (95% CI)	*p*
Age				
<5 years	15	43	0.33 (0.18 – 0.49)	<0.01
≥15 Years	412	384		
Total	**427**	**427**		
Sex				
Male	254	190	1.82 (1.39 – 2.39)	<0.01
Female	174	238		
Total	**428**	**428**		
Education level (completed years)				
≤9 years	294	248	2.66 (1.74 – 4.06)	<0.01
>9 years	37	83		
Total	**331**	**331**		
Residence area				
Rural	40	31	1.32 (0.81 – 2.17)	0.262
Urban	336	345		
Total	**376**	**376**		
Operational form				
MB	313	97	9.29 (6.80 – 12.68)	<0.01
PB	115	331		
Total	**428**	**428**		
No. of lesions				
<5	154	261	0.18 (0.12 – 0.27)	<0.01
≥5	155	48		
Total	**309**	**309**		
No. of nerves affected				
None	27	86	0.05 (0.02 – 0.11)	<0.01
>1	70	11		
Total	**97**	**97**		
Reaction				
1-2	18	8	2.42 (1.01 – 5.76)	0.04
No reaction	131	141		
Total	**149**	**149**		
Bacilloscopy				
Positive	28	17	2.02 (0.99 – 4.13)	0.05
Negative	48	59		
Total	**76**	**76**		

Although the disease affects both sexes, males predominate worldwide, often in a ratio of two to one[19]. National and international studies conducted in the states of Minas Gerais and Maranhão, Brazil, and in French territories in Africa confirmed the predominance of males among leprosy patients[1,20,21].

It is worth noting, though, that prevalence in the male sex is not universal. There are African areas, for example, where the disease predominates in both sexes similarly, or where the incidence is greater in females[19], as observed in studies conducted in the states of Paraíba and Maranhão, Brazil[22,23]

Likewise, prevalence of males in cases of the MB operational classification and DPD 1 and 2 has been evidenced in surveys conducted in Cabo de Santo Agostinho, state of Pernambuco in the state of Paraíba, and in Aracajú, state of Sergipe, Brazil[2,24,25].

The increased creation of Brazilian programs aimed at women, the women's greater preoccupation with corporal esthetics, and the low search for health services by men, added to cultural gender-based and work specificities, have perpetuated the severity of leprosy among males[24,26,27].

As for color/race (self-reported), the findings reported here are similar to those of a study carried out on the evaluation of the epidemiology of leprosy in a northeastern Brazilian state, in which this variable was reported to be associated with the region studied[1]. The composition of the Brazilian population is characterized by a miscegenation of races with considerable regional variations; there is no scientific basis for establishing an association between color/race and prevalence of leprosy or physical disability, particularly for being self-declared.

It is worth mentioning that the classification of the black population gathers black and brown self-declared individuals, who together with indigenous people, have the worst indicators of health, education level, work, and access to goods and social services in Brazil[28], making them more vulnerable to physical disability resulting from leprosy.

A study carried out in an endemic city of the state of Minas Gerais found that having eight years or less of schooling is a risk factor for developing physical disability, which is in line with the findings of this study[16]. The low level of formal education of the population due to the less favored socioeconomic aspects is associated with more precarious medical-sanitary conditions that contribute to the transmission of infectious agents and spread of diseases among people, and sometimes a lower adherence to drug treatment[29] that leads to a greater possibility of worsening of the case and development of permanent physical disabilities.

It has been found that having up to nine years of formal education increases the chance of developing physical disability by approximately 3-fold. The non-identification of risk factors for disease development and the non-recognition of disease severity, poor access to health services and, especially, precarious socioeconomic conditions are suggested as factors that contribute to the endemicity and aggravation of diseases[30,31].

In the state of Paraíba, 52.8% of the people reported having up to seven years of formal education[32], thus placing the state at risk for leprosy and physical disability, identified or not. Low education level is not an exclusive prerogative for the development of leprosy. It is rather a socioeconomic risk factor for health problems in general, especially for neglected diseases.

Prevalence of physical disability correlates with occupations that require more physical effort, making manual workers more likely to develop it[33]. There is a relationship between low socioeconomic level and the consequent impossibility of carrying out the necessary care measures to reduce the neural problem due to the obligatory tasks of the everyday life and individual and family sustenance.

The precarious living conditions of the population and its restricted access to collective goods and education, safety and health services, especially in urban centers, favor population sickness and death[29].

Regarding leprosy, this relationship is indicated by the fact that the affected people are in the strata of social vulnerability and in regions with low Human Development Index (HDI)[34].

In this study, the relationship between residence area and physical disability resulting from leprosy was not confirmed. However, it is important to note that people who have greater access to health services are less prone to physical disabilities, for they are under more active

surveillance by health professionals and have greater availability of resolutive actions when seeking care in the case of complications.

Prevalence of the MB operational classification and DL clinical form was observed in this study. This indicates late diagnosis and calls for the need to improve the quality of PHC in the prevention of physical disabilities. It has been found that the MB form increases by nearly nine times the chance of a person to develop disability. When untreated, MB leprosy is responsible for strengthening the disease transmission chain[35] due to the possibility of patients presenting gram-positive bacilli.

In the controls, indeterminate leprosy or leprosy in the initial phase prevailed, being relevant for the prevention of the disease and of physical disability due to the low expression bacillary load[36]. This confirms that early diagnosis promotes the prevention of disability.

Positive bacilloscopy, presence of leprosy reaction, and involvement of nerves represent significant variables to develop physical disability, as identified in studies conducted in the states of Sergipe[25] and Paraíba [2]. In the present study, no statistical significance was observed for positive smear microscopy to be considered a risk factor for such disability, although it indicated a chance of occurrence.

New cases of leprosy were diagnosed especially by referrals, suggesting passivity of PHC concerning epidemiological surveillance. Furthermore, this also calls for the need to intensify active and passive search actions and collective examinations in a timely and continuous manner, as well as educational actions for the population and health professionals i to promote early diagnosis, timely therapy, and prevention of physical disabilities. We emphasize multi-professional teamwork with interdisciplinarity to systematically and individually assist leprosy patients, including with post-discharge from multidrug therapy (MDT), and their contacts[37].

Most of the people who started treatment were discharged due to cure, but the quality indicator of the parameter service was regular (75-89.9%). Cases of withdrawal are relevant due to maintenance of the bacillus transmission chain, resulting in evolution with individual disorders, physical disability, and pharmacological resistance to the current polychemotherapeutic treatment[38].

Evaluation of the DPD is paramount for the follow-up of cases, and subsidizes the planning of individualized actions to prevent sequelae. DPD 1 and 2 are intrinsically related to late diagnosis, suggesting inefficient attention to disease control[39]. The lack of knowledge and control actions contributes to making leprosy the greatest cause of non-traumatic disability.

There was negligence regarding information on the DPD assessment, mainly at discharge, demonstrating the priority given by healthcare services to evaluation at the diagnosis and the inefficient follow-up of patients, different from what is recommended by the Ministry of Health (MS). At diagnosis, the protocol requires dermatoneurological evaluation to input information about new cases into the system, thus causing a more frequent realization of this action. In the follow-up of the cases, despite the requirement of periodic evaluation in the follow-up report, this is neglected. This indicates flawed surveillance by health professionals regarding the effectiveness of healthcare protocols. This fragility impedes an appropriate analysis of the DPD evolution[40], and calls into question the quality of the healthcare provided.

Although the services did not satisfactorily perform DPD evaluation, there was a clear reduction in the number of degrees 1 and 2 from diagnosis to discharge. However, the percentage of non-evaluated patients is large, and this may cause an underestimation of the actual situation of patients regarding physical disabilities and favor post-discharge complications.

A cross-sectional ecological study conducted in Curitiba, Londrina, and Foz do Iguaçu in the state of Paraná, Brazil, found that the indicator 'proportion of cured people in the year they had physical disabilities' was high in most of the years of the historical series in the three municipalities studied. This indicator suggests failure in the evaluation and prevention of physical disabilities, either at diagnosis or during treatment, possibly due to lack of experience of the professionals responsible for managing these patients, since this is an activity that depends on the qualification of the healthcare team[41].

Regardless of the operational classification, evaluating the contacts of diagnosed leprosy patients is essential to control leprosy[42]. The percentage of realization of this evaluation represents a quality indicator of the healthcare services. This parameter is classified as good when performed in ≥90.0% of the contacts; regular when performed between 75.0 and 89.9%; and precarious when performed in <75.0% of the registered contacts.

Precarious evaluation of the contacts is a reality observed in the context of this study. The same pattern has been observed in investigations carried out in Igarapé-Açu, state of Pará, and in the state of Acre, where 36.8 and 22.3% of the contacts, respectively, had been evaluated[43,44].

When evaluating the contacts of people diagnosed with leprosy, there is a possibility of early detection of new cases, thus breaking the chain of transmission. When contacts are found to be healthy, they are directed to carry out preventive measures such as receiving the BCG vaccine and performing annual follow-ups for five years. After that period, the contacts are released from surveillance and informed about the possible signs and symptoms suggestive of leprosy.

Family or social contacts include all the people who live or have lived close to the index patient for an extended period, presenting higher risk of developing the disease. In the case of contacts of MB patients, the risk increases by approximately 4 to 10-fold. It is assumed that 6 to 8% of household contacts develop the disease within five years[3,43].

In the present study, we observed a significant number of leprosy cases not evaluated for DPD, discrepancies of relevant information to the establishment of the clinical-epidemiological profile, and absence of records. These findings are similar to those reported in studies carried out in the states of Paraíba and Minas Gerais[2,28]. Failure to give continuity to control measures impedes the realization of a real diagnosis of the individual and the collective health situation of the community, consequently hampering the planning of more efficient and effective actions for the local reality[45].

The low quality of records in the information systems of the Unified Health System (SUS) points to failure of the health services responsible for the care, diagnosis, and follow-up of individuals with leprosy, as well as to lack of supervision of the competent sectors. This situation fosters the risk and persistence of physical disabilities due to lack of timely preventive and curative actions.

The need to construct an overview of the concept of health from its social determinants, conditions in which people are born, develop, grow, live, work and grow old, including the health system, stands out. We stress the importance of understanding the different social realities of the Brazilian regions, knowing their beliefs, habits, customs, situations and historical contexts, so that more impactful preventive/curative actions can be taken, thus contributing to reduce the prevalence of leprosy and physical disabilities[46].

It is unacceptable that leprosy, as a millennial disease, continues to cause physical disability in people today, considering the technological and curing advances, and especially because the measures directed to leprosy control can and should be carried out at the local level, which calls attention for the lack of sanitary responsibility of management and health teams.

Leprosy control actions in PHC - the main gateway to the health system in Brazil - are based on the early detection of cases, treatment with MDT, prevention of physical disabilities, contact surveillance, and health education. To do so, it is necessary to reorganize health services so as to promote qualified access to users. However, if professionals do not have the skills and responsibility to develop the actions in a timely manner, or if they do not have adequate working conditions, the goals will not be achieved.

It is evident that management contributes to the perpetuation of leprosy as a neglected disease. This occurs because of the lack of effective public policies, exempting the health authorities from the responsibility of supervising disease control actions, for these occur mostly in the lowest socioeconomic strata of the population, which do not instigate political interest despite the large coverage of services.

Inadequate working conditions, lack of stable employment bonds, and the need to hire trained professionals favor the turnover of healthcare workers and the consequent absence

of bond, accountability, humanization, and continuous care, as established in the national PHC policy[47].

It can be inferred that leprosy is a neglected disease that receives little investment, and that there is a need for studies to apply low-cost diagnostic methods, or even vaccines for disease control[4], as well as for deepening the investigations on the behavior of social determinants for its development, such as the influence of geographic, sociocultural and occupational factors for its endemicity[46].

There is evidence that age ≥15 years, males, low educational level (≤9 years of formal education), clinical form DL and MB operational classification, number of lesions >5, and number of nerves affected >1 are risk factors for physical disability.

This study demonstrated the need for active surveillance and timely follow-up for early detection of leprosy cases and their contacts, as well as dermatoneurological evaluation as recommended, training/supervision of multi-professional teams for adequate data collection, and satisfactory assistance with a view to interrupting the hidden leprosy transmission chain and intervene in the prevalence of physical disabilities.

Limitations to the present study include flawed or missing information of pertinent records for a better analysis of the clinical-epidemiological profile of the sample and association between risk factors for physical disability due to leprosy.

It is recommended that further research be conducted on the work process and socioeconomic, geographic and cultural factors that have repercussions in the maintenance of the epidemiological chain of leprosy that generates physical disability.

AGRADECIMENTOS

Agradecemos aos funcionários da 9ª Gerência Regional de Saúde pela disponibilidade e apoio para a coleta de dados; e a Gustavo Coêlho de Oliveira, Lana Lívia Peixoto Linard, Bruno Neves da Silva e Thaline Ingrid Marques Menezes Pereira, pela colaboração para a efetivação da pesquisa.

REFERENCES

1. Brito KKG, Araújo DAL, Uchôa REMN, Ferreira JDLF, Soares MJGO, Lima JO. Epidemiologia da Hanseníase em um Estado do Nordeste Brasileiro. Rev Enferm UFPE. 2014;8(8):2686-93.
2. Uchôa REMN, Brito KKG, Santana EMF, Soares VL, Silva MA. Perfil clínico e incapacidades físicas em pacientes com hanseníase. Rev Enferm UFPE. 2017;11(Suppl3):1464-72.
3. Departamento de Ciência e Tecnologia, Secretaria de Ciência, Tecnologia e Insumos Estratégicos, Ministério da Saúde. Doenças negligenciadas: estratégias do Ministério da Saúde. Rev Saude Publica. 2010d;44(1):200-2. PMid:20140346.
4. Organização Mundial de Saúde. Estratégia Global para Hanseníase 2016-2020: Aceleração rumo a um mundo sem hanseníase [Internet]. Geneva: WHO; 2016 [cited 2017 July 31]. Available from: http://apps.who.int/iris/bitstream/10665/208824/8/9789290225201-Portuguese.pdf.
5. Brasil. Ministério da Saúde/SVS, Sistema de Informação de Agravos de Notificação – SINAN-NET. Registro ativo: número e percentual, Casos novos de hanseníase: número, coeficiente e percentual, faixa etária, classificação operacional, gênero, grau de incapacidade, contatos examinados, por estados e regiões, Brasil, 2015 [Internet]. Brasília: SINAN-NET; 2016 [cited 2015 Feb 5]. Available from: http://portalarquivos.saude.gov.br/images/pdf/2016/julho/07/tabela-geral-2015.pdf.
6. Corrêa RGCF, Aquino DMC, Caldas AJM, Amaral DKCR, França FS, Mesquita RRBPL. Epidemiological, clinical, and operational aspects of leprosy patients assisted at a referral service in the state of Maranhão, Brazil. Rev Soc Bras Med Trop. 2012;45(1):89-94. http://dx.doi.org/10.1590/S0037-86822012000100017. PMid:22370835.
7. Nardi SMT, Paschoal VD, Chiaravalloti-Neto F, Zanetta DMT. Deficiências após a alta medicamentosa da hanseníase: prevalência e distribuição espacial. Rev Saude Publica. 2012;46(6):969-77. http://dx.doi.org/10.1590/S0034-89102013005000002. PMid:23358621.

8. Monteiro LD, Alencar CHM, Barbosa JC, Braga KP, Castro MD, Heukelbach J. Incapacidades físicas em pessoas acometidas pela hanseníase no período pós-alta da poliquimioterapia em um município no Norte do Brasil. Cad Saude Publica. 2013;29(5):909-20. http://dx.doi.org/10.1590/S0102-311X2013000500009. PMid:23702997.

9. Guerrero MI, Muvdi S, León CI. Retraso en el diagnóstico de lepra como factor pronóstico de discapacidad en una cohorte de pacientes en Colombia, 2000–2010. Rev Panam Salud Publica. 2013;33(2):137-43. http://dx.doi.org/10.1590/S1020-49892013000200009. PMid:23525344.

10. Instituto Brasileiro de Geografia e Estatística. Censo Demográfico 2010 [Internet]. Brasília: IBGE; 2010 [cited 2017 May 30]. Available from: http://censo2010.ibge.gov.br/.

11. Brasil. Ministério da Saúde, DATASUS. Acompanhamento dos dados de hanseníase Paraíba [Internet]. 2017 [cited 2017 Apr 17]. Available from: http://tabnet.datasus.gov.br/cgi/tabcgi.exe?sinannet/hanseniase/cnv/hanswpb.def.

12. Brasil. Ministério da Saúde, Secretaria de Vigilância em Saúde. Departamento de Vigilância das Doenças Transmissíveis. Diretrizes para vigilância, atenção e eliminação da Hanseníase como problema de saúde pública: manual técnico-operacional [Internet]. 2016a [cited 2017 May 31]. Available from: www.saude.gov.br/svs.

13. Malta M, Cardoso LO, Bastos FI, Magnanini MMF, Silva CMFP. Iniciativa STROBE: subsídios para para a comunicação de estudos observacionais. Rev Saude Publica. 2010;44(3):559-65. http://dx.doi.org/10.1590/S0034-89102010000300021. PMid:20549022.

14. Brasil. Ministério da Saúde, Conselho Nacional de Saúde. Resolução nº 466, de 12 de dezembro de 2012. Diário Oficial da União [Internet], Brasília, 12 de dezembro de 2012b [cited 2015 July 20]. Available from: http://conselho.saude.gov.br/resolucoes/2012/Reso466.pdf.

15. Oliveira JCF, Leão AMM, Britto FVS. Análise do perfil Epidemiológico da hanseníase em Maricá, Rio de Janeiro: uma contribuição da enfermagem. Rev Enferm UERJ. 2014;22(6):815-21. http://dx.doi.org/10.12957/reuerj.2014.13400.

16. Ribeiro Júnior AF, Vieira MA, Caldeira AP. Perfil epidemiológico da hanseníase em uma cidade endêmica no Norte de Minas Gerais. Rev Soc Bras Clin Med. 2012;10(4):272-7.

17. Romão ER, Mazzoni AM. Perfil epidemiológico da hanseníase no município de Guarulhos, SP. Rev Epidemiol. Control Infect. 2013;3(1):22-7. http://dx.doi.org/10.17058/reci.v3i1.3344.

18. Freitas BHBM, Cortela DCB, Ferreira SMB. Tendência da hanseníase em menores de 15 anos em Mato Grosso (Brasil), 2001-2013. Rev Saúde Públ. 2017;51:28.

19. World Health Organization. Executive board eb128/16. 128th session. Provisional agenda item 4.13. Leprosy (hansen disease) [Internet]. Geneve: WHO. 2010 [cited 2016 May 30]. Available from: http://apps.who.int/iris/bitstream/10665/3218/1/B128_16-en.pdf.

20. Pacheco MAB, Aires MLL, Seixas ES. Prevalência e controle de hanseníase: pesquisa em uma ocupação urbana de São Luís, Maranhão, Brasil. Rev Bras de Med de Fam e Com. 2013;9(30):23-30. http://dx.doi.org/10.5712/rbmfc9(30)690.

21. Camuset G, Lafarge S, Borgherini G, Gerber A, Pouderoux N, Foucher A, et al. Leprosy on Reunion Island, 2005-2013: situation and perspectives. PLoS Negl Trop Dis. 2016;10(4):e0004612. http://dx.doi.org/10.1371/journal.pntd.0004612. PMid:27082879.

22. Simpson CA, Fonsêca LCT, Santos VRC. Perfil do doente de hanseníase no estado da Paraíba. Hansenol Int. 2010;35(2):33-40.

23. Sousa AA, Oliveira FJF, Costa ACPJ, Santos M No, Cavalcante EFO, Ferreira AGN. Adesão ao tratamento da hanseníase por pacientes acompanhados em unidades básicas de saúde de Imperatriz-MA. Rev SANARE. 2013;12(1):6-12.

24. Alencar L, Cunha M. Doença de Hansen no Brasil: monitorização das incapacidades. Millenium. 2017;2(3):63-73.

25. Santos VS, Matos AMS, Oliveira LSA, Lemos LMD, Gurgel RQ, Reis FP, et al. Clinical variables associated with disability in leprosy cases in northeast Brazil. J Infect Dev Ctries. 2015;9(3):232-8. http://dx.doi.org/10.3855/jidc.5341. PMid:25771459.

26. Ribeiro GC, Lana FCF. Incapacidades físicas em hanseníase: caracterização, fatores Relacionados e evolução. Cogitare Enferm. 2015;20(3):496-503. http://dx.doi.org/10.5380/ce.v20i3.41246.

27. Melão S, Blanco LFO, Mounzer N, Veronezi CCD, Simões PWTA. Perfil epidemiológico dos pacientes com hanseníase no extremo sul de Santa Catarina, no período de 2001 a 2007. Rev Soc Bras Med Trop. 2011;44(1):79-84. http://dx.doi.org/10.1590/S0037-86822011000100018. PMid:21340414.

28. Santos RG, Tocantins FR. Equidade na assistência primária a saúde da população negra: revisão integrativa. Rev Enferm UFPE. 2015;9(Suppl3):7695-701.

29. Barbosa DRM, Almeida MG, Santos AG. Características epidemiológicas e espaciais da hanseníase no estado do Maranhão, Brasil, 2001-2012. Med. 2014;47(4):347-56.

30. Rodrigues-Júnior AL, Ó VT, Motti VG. Estudo espacial e temporal da hanseníase no estado de São Paulo, 2004-2006. Rev Saude Publica. 2008;42(6):1012-20. http://dx.doi.org/10.1590/S0034-89102008000600006. PMid:19009159.

31. Miranzi SSC, Pereira LHM, Nunes AA. Perfil epidemiológico da hanseníase em um município brasileiro, no período de 2000 a 2006. Rev Soc Bras Med Trop. 2010;43(1):62-7. http://dx.doi.org/10.1590/S0037-86822010000100014. PMid:20305971.

32. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios, 2015 [Internet]. 2015 [cited 2017 Aug 30]. Available from: https://cidades.ibge.gov.br/brasil/pb/pesquisa/44/47044.

33. Moura LTR, Fernandes TRMO, Bastos LDM, Luna ICF, Machado LB. Hanseníase em menores de 15 anos na cidade de Juazeiro-BA. Hansenol Int. 2012;37(1):45-50.

34. Basso MEM, Silva RLF. Perfil clínico-epidemiológico de pacientes acometidos pela hanseníase atendidos em uma unidade de referência. Rev Soc Bras Clin Med. 2017;15(1):27-32.

35. Ribeiro GC, Fabri ACOC, Amaral EP, Machado IE, Lana FCF. Estimativa da prevalência oculta da hanseníase na microrregião de Diamantina – Minas Gerais. Rev Eletr de Enf. 2014;16(4):728-35.

36. Vieira MS, Nascimento MVF, Moreira WC, Vera SO, Sousa VXS, Viana MRP. Perfil epidemiológico da hanseníase no município de União-PI no período de 2010 a 2013. Rev Interd. 2015;8(4):120-6.

37. Rodrigues FF, Calou CGP, Leandro TA, Antezana FJ, Pinheiro AKB, Silva VM, et al. Knowledge and practice of the nurse about leprosy: actions of control and elimination. Rev Bras Enferm. 2015;68(2):297-304. http://dx.doi.org/10.1590/0034-7167.2015680216i. PMid:26222174.

38. Araújo AERA, Aquino DMC, Goulart IMB, Pereira SRF, Figueiredo IA, Serra HO, et al. Neural complications and physical disabilities in leprosy in a capital of northeastern Brazil with high endemicity. Rev Bras Epidemiol. 2014;17(4):899-910. http://dx.doi.org/10.1590/1809-4503201400040009. PMid:25388490.

39. Shumet T, Demissie M, Bekele Y. Prevalence of disability and associated factors among registered leprosy patients in all africa tb and leprosy rehabilitation and training centre (ALERT), Addis Ababa, Ethiopia. Ethiop J Health Sci. 2015;25(4):313-20. http://dx.doi.org/10.4314/ejhs.v25i4.4. PMid:26949295.

40. Lana FCF, Carvalho APM, Davi RFL, Davi RFL. Perfil epidemiológico da hanseníase na microrregião de araçuaí e sua relação com ações de controle. Esc Anna Nery. 2011;15(1):62-7. http://dx.doi.org/10.1590/S1414-81452011000100009.

41. Oliveira KS, Souza J, Campos RB, Zilly A, Silva-Sobrinho RA. Avaliação dos indicadores epidemiológicos e operacionais para a hanseníase em municípios prioritários no estado do Paraná, 2001 a 2010. Epidemiol Serv Saude. 2015;24(3):507-16. http://dx.doi.org/10.5123/S1679-49742015000300016.

42. Pagliarini BR, Meotti JN, Barros KL, Campagnolo O, Fronza D. Incidência e características dos casos de hanseníase diagnosticados em Cascavel/Pr no ano de 2015. Rev Thêma et Scientia. 2016;6(esp):234-248.

43. Lobato DC, Neves DCO, Xavier MB. Avaliação das ações da vigilância de contatos domiciliares de pacientes com hanseníase no Município de Igarapé-Açu, Estado do Pará, Brasil. Rev Pan-Amaz Saúde. 2016;7(1):45-53. http://dx.doi.org/10.5123/S2176-62232016000100006.

44. Silva MS, Silva EP, Monteiro FF, Teles SF. Perfil clínico-epidemiológico da hanseníase no estado do Acre: estudo retrospectivo. Hansenol Int. 2014;39(2):19-26.

45. Neves TCCL, Montenegro LAA, Bittencourt SDA. Produção e registro de informações em saúde no Brasil: panorama descritivo através do PMAQ-AB. Saúde Debate. 2014;38(103):756-70. http://dx.doi.org/10.5935/0103-1104.20140069.

46. Silva-Pires FES, Bonatto MPO, Mello MLBC, Trajano VS, Araújo-Jorge TC. As doenças negligenciadas e os determinantes sociais da saúde no contexto da investigação em ensino. RECC. 2017;22(1):51-9.

47. Saltarelli EMF, Seixas DHT. Limites e possibilidades na atenção ao portador de hanseníase no âmbito da estratégia saúde da família. Rev APS. 2016;19(4):613-22.