

Features of Clinical and Epidemiological Reactions of Leprosy Cases in a City of the High Backlands of Paraíba

ORIGINAL

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Abstract

Introduction: the reaction states or leprosy reactions are periods of acute inflammation in the course of a chronic illness, the main cause of damage to the nerves and disabilities caused by leprosy. They are divided into three types: reversal reaction, erythema nodosum leprosum and isolated neuritis.

Objective: To describe the clinical characteristics of cases of leprosy reactions in a city of high backlands of Paraíba.

Method: Utilized a structured and individual questionnaire applied in the homes of patients and former patients of Hansen's disease who developed leprosy reactions, registered in the three Family Health Units with more cases of leprosy in the city of Cajazeiras – PB.

Results: Among the 22 participants, most were male, aged over 61 years old and incomplete primary education. Regarding the classification of leprosy, 90.9% were multibacillary and 77.2% of the blackening clinical form. When evaluated the type of reaction, 68.2% were considered cases of RR or type 1 reaction, 45.5% developed reactions during treatment and 40.9% after discharge by cure.

Conclusion: The study demonstrates the need for qualification of the professionals in the primary health care to a greater and better monitoring of these cases by the Family Health Strategy, so much so that the leprosy reactions are diagnosed early during treatment and after discharge, as mainly for carrying out monitoring conducts of

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neural damage and prevention of physical disabilities, avoiding them from installing deformities that impair daily activities and the interaction of these people in society.

Keywords

Hansen's Disease;
Inflammation; Epidemiological
Profile

Introduction

Leprosy is characterized as a chronic infectious disease potentially incapacitating, with the bacillus *Mycobacterium leprae* as is an etiologic agent, causing lesions on the skin and peripheral nerves of the eyes, upper and lower limbs. It has different clinical forms that are determined by cellular immune response levels of this bacterium, being classified as indeterminate, tuberculoid, dimorphic and Virchow [1].

Even with all the efforts and progress in the integration of leprosy control in the health care area, this disease is still considered a public health problem [2]. According to Lastória and Abreu [3], Brazil is the only country not reaching the goal of eliminating the disease, which is defined by the prevalence of less than 1 case/10,000. In 2011, 33,955 new cases were detected, with the prevalence rate of 1.54/10,000.

After India, Brazil is the second country in the world with the highest number of leprosy cases. [4] Considered a public health problem, the Ministry of Health (MOH) is committed to eliminating leprosy by 2015 that is to achieve less than 1 case per 10,000 inhabitants. For it, it launched the Integrated Strategic Action Plan for the Elimination of Leprosy and other diseases, diseases that are important to public health and increasing early detection and cure of diagnosed cases. Although Brazil records continuous decrease in the prevalence rate and detection of new cases of leprosy, the North, Northeast and Midwest are considered more endemic, with areas of major maintenance of transmission [5-7].

The reaction conditions or leprosy reactions are characterized by immune system reactions to the

patient's bacillus [8]. These reactions are periods of acute inflammation in the course of a chronic disease, a characteristic of leprosy and can affect the nerves of the patient [9]. Individuals with leprosy can be surprised by pictures or reaction States, events in the course of the disease, which is present in about 10-50% of cases, occurring mainly in multibacillary ways. They are important risk factors for leprosy retreatment, as well as responsible for the abandonment of treatment and disability [10].

During the first months of chemotherapy treatment of leprosy, reaction states occur but may occur before or even after curing the patient. These reaction conditions are the major cause of nerve damage and disability caused by leprosy [8]. According to Antonio et al. [11], the leprosy reactions are divided into three clinical forms: reversal reaction (RR), *erythema nodosum* (ENL) and isolated neuritis (NEU). The RR is a cellular immune reaction, caused by a heightened response of the host to antigens released by bacterial destruction. ENL involves humoral immunity linked to the destruction of bacilli with antigen stimulation and exposure to antibody production. The NEU is characterized by inflammation of peripheral nerve trunks, with alteration of sensory, motor and autonomic functions, triggering disabilities.

The interest in the topic arose during the undergraduate course in Nursing, specifically in classes of Clinical Nursing II and during the Supervised Scholarship I in a Basic Health Unit (BHU) in the city of Cajazeiras - PB. From the experiences while monitoring the subject, it was also possible to observe the existence of leprosy cases with leprosy reactions and the association with the emergence of physical

disabilities, as well as how these diseases interfere with activities of daily living of these people and even the belief that the disease has healed, displaying a big problem for the life of these patients.

This work is justified by the lack of studies on the epidemiological and clinical characteristics of cases of leprosy reactions and to recognize the importance of this knowledge for the development of public policies and strategies improving the quality of monitoring and these individuals for health services, especially by the Family Health Units. It is observed that there is still insufficient monitoring of these cases by the Family Health Units (FHU), both during and after treatment with multidrug therapy (MDT).

The study results may also contribute to the awareness of health professionals, including nurses, aimed at more effective monitoring of reaction states and neural functions, which demonstrate recognition of the importance of prevention from physical actions improving the quality of life of people. Thus, this study aims to describe the clinical characteristics of cases of leprosy reactions in a city of high backlands of Paraíba.

Method

This is a descriptive and exploratory study with a quantitative approach, conducted with patients and former patients registered with leprosy in the three FHUs that had the highest number of reported cases of the disease in the city of Cajazeiras, which has high incidence and prevalence of cases of the disease in the state of Paraíba.

The target population was the leprosy cases reported between 2010 and 2014 in the Information System of Municipal Health Secretary of Notifiable Diseases regarding the three selected FHUs, corresponding to a total of 99 cases. The sample selection was intentionally being comprised of carriers and former leprosy patients who developed or were developing leprosy reactions during the study period, totaling 22 participants.

The defined inclusion criteria were: aged 18 years old, using MDT or have completed treatment for leprosy and have leprosy reactions. The study excluded individuals who, although they have been recorded as a case of leprosy reaction.

Data collection was carried out at participants' home, by an interview with a structured questionnaire containing demographic data and information on the clinical characteristics of leprosy and leprosy reactions. Data were compiled in a spreadsheet developed by Microsoft Excel and analyzed by simple descriptive statistics, using frequency and percentage.

This study design was approved by the Research Ethics Committee of the Teacher Training Center/Federal University of Campina Grande under CAAE N° 44860115.8.0000.5575 and opinion 1,171,900.

Results

The study included 22 participants, and the highest frequency of leprosy reactions occurred among males (68.2%) older than 61 years old (40.9%), married (59.1%), skin color/mulatto (54.5%), with incomplete primary education (45.4%), retired (40.9%), Roman Catholics (72.7%) and had a family income of up to one minimum wage (95.5%).

Regarding the characteristics of leprosy, 90.9% of the sample had a multibacillary operational classification, Borderline as the most prevalent clinical form (77.2%), with negative sputum smears at diagnosis (45.5%). About leprosy reactions, 68.2% were type 1, 45.5% occurred during treatment, and 31.8% had no knowledge of the possibility of developing such reactions, as shown in **Table 1**.

Table 1. Distribution of the characteristics of leprosy and leprosy reactions. Cajazeiras - PB, 2015.

Variables	n	%
Operational classification		
Paucibacillary	2	9.1
Multibacillary	20	90.9

Variables	n	%
Clinical form		
Indeterminate	1	4.6
Tuberculoid	1	4.6
Bordeline	17	77.2
Virchow	3	13.6
Smear diagnosis		
Positive	7	31.8
Negative	10	45.5
Not informed	5	22.7
Type of leprosy reaction*		
Type 1	15	68.2
Type 2	7	31.8
Type 1 and 2	2	9.1
Moment of appearance of leprosy reaction		
Before treatment	3	13.6
During treatment	10	45.5
After treatment	9	40.9
Knowledge about leprosy reaction		
Yes	15	68.2
No	7	31.8

Source: Direct research, 2015.
*There was the possibility of more than one answer

Table 2 shows the distribution of cases of leprosy reactions according to nerve damage and evidenced clinical signs. The most affected nerves were the median (40.9%) and ulnar (36.4%). Regarding clinical signs, there was a higher frequency of pain or loss of sensation in the skin and nerves (77.3%), further reduction of visual acuity (63.6%) and pain and redness (59.1%) in the eye, and swelling feet (59.1%).

Table 2. Distribution of cases of leprosy reactions according to nerve damage and clinical signs. Cajazeiras-PB, 2015.

Variables	n	%
Damaged nerves*		
Ulnar	8	36.4
Median	9	40.9
Radial	4	18.2
Fibular	3	13.6
Tibial	4	18.2

Variables	n	%
Clinical signs of the skin and nerves *		
Inflamed lesions	11	50
Subcutaneous nodules	8	36.4
Pain or loss of sensation	17	77.3
New loss of sensation	10	45.5
New muscle weakness	9	40.9
Clinical signs in the eyes *		
Pain and redness	13	59.1
New decreased visual acuity	14	63.6
New muscle weakness in the closure of the eyelids	3	13.6
Clinical signs in the upper limbs		
Swelling hand (s)	6	27.3
Not showed	16	72.7
Clinical signs in the lower limbs		
Swelling feet	13	59.1
Not showed	9	40.9

Source: Direct research, 2015.
* There was the possibility of more than one answer.

Regarding the development of physical disabilities caused by leprosy reactions, as observed in **Table 3** was more prevalent on the level two (54.5%), and its appearance occurred during and after treatment (27.3% for both).

Table 3. Distribution of cases of leprosy reactions according to the development of physical disabilities. Cajazeiras - PB, 2015.

Variables	n	%
Level of current disability		
Zero	7	31.8
One	2	9.1
Two	12	54.5
Not informed	1	4.6
Emergence of physical disabilities*		
Before treatment	2	9.1
During treatment	6	27.3
After treatment	6	27.3
Not informed	8	36.4

Source: Direct research, 2015.
* There was the possibility of more than one answer.

Discussion

The estimated sample consisted of 25 participants, but due to address changes, it was not possible to apply the questionnaire to 3 of them. The final study sample was 22 participants between case patients and former patients of leprosy, with a history of reactions leprosy. Of these participants, 4 had and 18 former patients.

There were many difficulties in the development of research, from obtaining information on the population, especially the location of their homes of the participants during the data collection and even the very identity of these cases on the Notifiable Diseases Information System (SINAN). These difficulties were expected to start a field research, because it was possible to observe the non inadequate filling or to fill the gaps related to leprosy reactions in SINAN notification form, which may indicate a deficiency in the monitoring of these cases by the health services and low concern monitoring, and difficult to do further research with the same information system.

Furthermore, another difficulty was not aware of the disease by the respondents, necessary to clarify some doubts in the course of the interview, because most people do not know or understand what is a leprosy reaction until even some health professionals have demonstrated this difficulty.

As the operational classification, the multibacillary was 90.9% of cases. This finding was in various literature studied, confirming a direct connection with the development of leprosy reactions at any time during the treatment, or for some years after the treatment has been completed. For Silva and Griep [12], this clinical manifestation is the most frequent reactions during and after curing.

A higher rate of MB patients was also found in the study by Araújo et al. [1]. The high percentage of multibacillary demonstrates a delay in diagnosis, allowing for questioning the lack of case detection in the initial phases by the basic health network, reinforcing the importance of training for health workers [13].

People who develop multibacillary who had been presented nerve damage at diagnosis should be followed more closely by the nursing staff to check the rise of new signs that require treatment because these people are more likely with about 65% developing new neuronal injury [14].

By analyzing the clinical form of the participants, the most prevalent was the dimorphic 77.2%, followed by Virchow with 13.6%. This result may demonstrate that the diagnosis of leprosy was performed later, increasing the likelihood of disease transmission, besides being the clinical forms expected to develop neural complications and physical disabilities in the patient.

These findings are also found in the research of Neves et al. [15] held in Palmas/TO during 2005 to 2010 with 1362 cases of leprosy reported in the dimorphic clinical form appears with the percentage of 48.6%, followed by 21.3% of Virchow, as well as the study of Cooke et al. [16]. However, the work of Rodini et al. [17] diverges from this, because the clinical form that got most often was Virchow with 35%.

Regarding the result of sputum smear microscopy, 45.5% of the results were negative, when observed in this study that the highest percentage of patients were multibacillary (MB) (17 dimorphic and 3 Virchow). Since as dimorphic, it is expected that the smear is negative or positive, necessarily positive just being in Virchow. Corroborating studies of Carneiro et al. [13] evaluating the endemic situation of leprosy in a city in the interior of Rio Grande do Sul, the negative sputum smears were performed in the highest percentage of 39.5% of the cases evaluated.

Of all patients with leprosy reactions in this study, 68.2% were type 1 reverse reaction, and 31.8% of type 2 erythema nodosum leprosy. People with leprosy MB can develop both reactions of type 1 and type 2, which in this study is consistent with the literature by presenting the high percentage of patients with both types of reaction.

According to Teixeira, Silveira and França [10] in their study, the highest percentage of cases was type 1 reaction, then type 2 and finally the mixed type. In studies conducted by Nery [18] and Rego [19], the highest percentage was in patients with ENL, since both studies were composed of multi-bacillary individuals, and this type of reaction occurs more often in dimorphic and Virchow forms, diverging data from this research that the highest percentages were of type 1 reaction.

The largest number of leprosy reactions emerged during treatment with 45.5% and 40.9% after treatment. Monitoring the reaction episode should be part of the routine health services network, as this is a measure to prevent the evolution of deterioration of neural function, and reduce the cost of treatment and improve the quality of life of patients.

This is similar to the study of Monteiro et al. [2] where the findings showed an association between the occurrence of leprosy reactions during and after treatment of multidrug therapy. In the study by Souza et al. [20], among patients registered at the dermatology and Leprosy Service of Antonio Carlos Pereira Unit in Juiz de Fora municipality, 52.5% had leprosy reactions during or after MDT multidrug therapy.

It is extremely important to understand the correlation between the clinical forms and reactive states, especially when these states occur after discharge for healing and can be mistaken for relapse [21]. For Teixeira, Silveira and França [10], when the reaction pictures occur late, after the drug discharge, the diagnosis is more difficult because of the need for differentiation of recurrence.

The presence of leprosy reactions after the treatment makes them more prone to developing physical deformities individuals because they are already off the record and are no longer followed. This can lead patients to disregard signs and symptoms as possible complications, making belatedly seek health services. Therefore, the post-discharge monitoring should be part of routine health services. [22]

Because of deformities, people affected by leprosy may suffer a loss in their ability to work and, consequently, the self-sufficiency and family's, generating impact of psychological, social and physical aspects [23, 10].

Although 68.2% of participants have claimed to have a knowledge of the leprosy reaction, they are still confused with leprosy believing its reappearance. This fact makes clear the need for more effective strategies for the dissemination of information difference between the two conditions and telling the population that leprosy rarely relapse when treated properly.

It was found in this study that the dropout rate in the treatment was 68.2%, accounting for 15 of a total of 22 of the patients, thus consider it too high. During the data collection, it was observed that the abandonment was related to disbelief in curing the disease with the completion of MDT, change in skin color and the worsening of symptoms when leprosy reactions emerged.

Study to assess the disability prevention in leprosy supported in a self-care manual, 29 of the 55 patients studied did not join the full intervention of multidrug therapy. This non-adherence can be justified by the socioeconomic and cultural conditions, dependence on transport, low expectations regarding the non-drug treatment and because it is a chronic and stigmatizing disease [17].

Patients with leprosy reactions can develop varied clinical and various types of neural damage. In this study, it was observed the manifestation of clinical signs in every nerve, usually associated with pain complaints. For Almeida et al. [24], injury or impairment of the peroneal and tibial nerves carry sensory loss across the foot. Conti, Almeida and Almeida [25] cite in their study that the nerves usually affected are mixed, that is, have sensory, motor and autonomic fibers and changes happen in all these aspects.

In the skin, the participants had inflamed lesions and subcutaneous nodules. In the eyes, there was uncomfortable regarding eyesight and muscle

strength. There are few studies that address the descriptive aspect of the occurrence of nerve damage in leprosy reactions. Another limitation of the study was self-reported because as in most cases the questionnaire was applied during the treatment of reaction episode, the signs and symptoms have been reported based on previous episodes of stories, which can compromise the reliability of the results.

When evaluated the clinical signs in the limbs, it was found that 59.1% of cases have developed swollen foot. It is observed a lower proportion in the development of clinical signs in the hands, to be a region of early perception and its easy application of self-care measures, reducing the frequency of disabilities.

These findings are consistent with those found by Carvalho and Alvarez [26], the authors found a high frequency of disability in the feet, isolated, compared with the results found in the hands. To Araújo et al. [1], the greater presence and increased the frequency of physical disabilities, especially in the feet, may have been influenced by carelessness in the guidelines related to self-care.

This leads to the question about the development of actions that could have been done to prevent this scenario. For prevention of disabilities in the household level, it is necessary for addition to educational interventions, a close monitoring of the neural function of these patients, both during treatment and after discharge. Croft [27] believes that the degree of disability is directly related to the time of disease progression.

According to the "Enhanced Global Strategy for Further Reducing the Burden of Leprosy: 2011-2015", the current global target for reducing the burden of leprosy defines the reduction of new cases rate diagnosed with grade 2 disabilities per 100 000 inhabitants in at least 35% by the end of 2015 [28].

It is observed that the time to emergence of physical disabilities was the same during and after treatment, with 27.3% being lower frequency before treatment. This percentage may be linked to non-clinical monitoring of patients during the treatment

period or after leaving an active record of leprosy cases. These data agree with the findings in the surveys conducted by Schiapati [29] and Araújo et al. [1], where it was found a lower rate of physical disabilities at the beginning of treatment.

Approximately 23% of patients with leprosy develop disability after discharge [30]. For Goulart, Penna and Cunha [31] evaluation and monitoring of the state in which patients are is necessary to identify early neural complications and disabilities, essential for the preservation of the structure and function of the peripheral nerve.

A higher percentage was related to a variable not informed, with 36.7%. However, it does not mean that these patients developed no neural thickening or pain during treatment. It may indicate a failure in the dissemination of information to the patient, such as lack of evaluation in the disability record.

Health services should concentrate a greater number of activities for qualified monitoring of cases of leprosy, not only at diagnosis and during treatment, but also after discharge of multidrug therapy, as this is the time when the commitment is the neural function, being a determining factor in the development of disability or physical deformity [27].

Conclusion

The results show that leprosy reactions occur more often in multibacillary during or after treatment with MDT, corroborating the literature. This represents a major challenge for leprosy programs at all health care levels, ideal for promoting more effective strategies for the diagnosis, control and treatment of leprosy reactions.

The findings reinforce the need for clinical monitoring by the family health team after the end of treatment, for at least six months to seven years after discharge, since in some patients the neural impairment may occur slowly and silently.

On neural damage, it was observed that the degree of disability 2 was the most noticeable among

these individuals, considering that this disabling potential causes physical injury, impairment in social participation, as well as psychological damage and difficulty in activities of the everyday life of these people. However, it can be seen that they received instructions for self-care and prevention of disabilities, which raises the question of the assimilation of information may have been hampered by the low level of education.

It is understood that the data presented here can provide subsidies for the development of educational strategies for patients and health professionals through courses and training, mainly focusing on the quality of life of patients who complete treatment, with greater attention not only to presenting disabilities already but also those who have not submitted disabilities at discharge.

References

1. Araújo AERA, Aquino DMC, Goulart IMB, Pereira SRF, Figueiredo IA, Serra HO et al. Complicações neurais e incapacidades em hanseníase em capital do nordeste brasileiro com alta endemidade. *Rev bras epidemiol* [Internet], 2014; 17(4):899-910. DOI: 10.1590/1809-4503201400040009
2. 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 Saúde Pública* [Internet], 2013; 29(5):909-20. DOI: <http://dx.doi.org/10.1590/S0102-311X2013000500009>
3. Lastória JC, Abreu MAMM. Hanseníase: diagnóstico e tratamento. *Diagn Tratamento* [Internet], 2012; 17(4):173-9. Available from: <http://files.bvs.br/upload/S/1413-9979/2012/v17n4/a3329.pdf>
4. Maia FB, Teixeira ER. Contributions of assistive technology at rescue of patients' autonomy after-effects of leprosy. *J Nurs UFPE on line* [Internet], 2014; 8(Suppl. 1):2562-4. DOI: 10.5205/reuol.5927-50900-1-SM.0807suppl201449
5. Ministério da Saúde (Brasil). *Guia de vigilância epidemiológica* [Internet], 7. ed. Brasília: Ministério da saúde, 2009. Available from: http://bvsms.saude.gov.br/bvs/publicacoes/guia_vigilancia_epidemiologica_7ed.pdf
6. Moura LTR, Fernandes TRMO, Bastos LDM, Luna IGF, Machado LB. Hanseníase em menores de 15 anos na cidade de Juazeiro-BA. *Hansen Int* [Internet], 2012; 37(1):45-50. Available from: http://www.ils.br/revista/detalhe_artigo.php?id=11779
7. Ministério da Saúde (Brasil). *Plano integrado de ações estratégicas de eliminação da hanseníase, filariose, esquistossomose e oncocercose como problema de saúde pública, tracoma como causa de cegueira e controle das geohelmintíases: plano de ação 2011-2015* [Internet]. 1. ed., 1. reimpr. - Brasília: Ministério da Saúde, 2013. Available from: http://bvsms.saude.gov.br/bvs/publicacoes/plano_integrado_acoes_estrategicas_2011_2015.pdf
8. Souza, L. W. F. Reações hansênicas em pacientes em alta por cura pela poliquimioterapia. *Rev Soc Bras Med Trop* [Internet], 2010; 43(6):737-9. DOI: <http://dx.doi.org/10.1590/S0037-86822010000600029>
9. Secretaria do Estado de Saúde de Minas Gerais. *Como reconhecer e tratar reações hansênicas* [Internet]. 2. ed. - Belo Horizonte: Secretaria do Estado de Minas Gerais, 2007. Available from: http://www.saude.pr.gov.br/arquivos/File/hansenia/public/Reacoes_hansenic.pdf
10. Teixeira MAG, Silveira VM, França ER. Características epidemiológicas e clínicas das reações hansênicas em indivíduos paucibacilares e multibacilares, atendidos em dois centros de referência para hanseníase, na Cidade de Recife, Estado de Pernambuco. *Rev Soc Bras Med Trop* [Internet], 2010; 43(3):287-92. 2010. DOI: <http://dx.doi.org/10.1590/S0037-86822010000300015>
11. Antonio JR, Soubhia RMC, Paschoal VD, Oliveira GB, Rossi NCP, Maciel MG et al. Avaliação epidemiológica dos estados reacionais e incapacidades físicas em pacientes com hanseníase na cidade de São José do Rio Preto. *Arq Ciênc Saúde* [Internet], 2011; 18(1):9-14. Available from: http://repositorio-racs.famerp.br/racs_ol/vol-18-1/IDS%201%20-%20jan-mar%202011.pdf
12. Silva SF, Griep RH. Reação hansênica em pacientes portadores de hanseníase em centros de saúde da Área de Planejamento do Município do Rio de Janeiro. *Hansenol Int* [Internet], 2007; 32(2):155-62, 2007. Available from: http://www.ils.br/revista/detalhe_artigo.php?id=10751
13. Carneiro, M, Possuelo Lg, Valim ARM, Duro L. Situação endêmica da hanseníase em uma cidade do interior do Rio Grande do Sul. *Rev Epidemiol Control Infect* [Internet], 2012; 2(1):10-3. DOI: <http://dx.doi.org/10.17058/reci.v2i1.2627>
14. International Federation of Anti-Leprosy Associations (ILEP). *Como reconhecer e tratar as reações hansênicas*. Grã-Bretanha - Londres, 2002.
15. Neves, TV, Valentim IM, Vasconcelos KB, Rocha ESD, Nobre MSRS, Castro JGD. Perfil de pacientes com incapacidades físicas por hanseníase tratados na cidade de Palmas-Tocantins. *Revista Eletrônica Gestão & Saúde* [Internet], 2013; 4(2):139-48. Available from: http://gestaoesaude.unb.br/index.php/gestaoesaude/article/view/223/pdf_1

16. Corrêa RGCF, Aquino DMC, Caldas AJM, Amaral DKCR, França FS, Mesquita ERBPL. Epidemiological, clinical, and operational aspects of leprosy patients assisted at a referral service in the state of Maranhão, Brazil. *Rev Soc Bras Med Trop* [Internet], 2012; 45(1):89-94. DOI: <http://dx.doi.org/10.1590/S0037-86822012000100017>
17. Rodini FCB, Gonçalves M, Barros ARSB, Mazzer N, Elui VMC, Fonseca MCR. Prevenção de incapacidade na hanseníase com apoio em um manual de autocuidados para pacientes. *Fisioter Pesq* [Internet], 2010; 17(2):157-66. DOI: <http://dx.doi.org/10.1590/S1809-29502010000200012>
18. Nery JAC, Sales AM, Illarramendi X, Duppre NC, Jardim MR, Machado AM. Contribution to diagnosis and management of reactional states: a practical approach. *An Bras Dermatol* [Internet], 2006; 81(4):367-75. DOI: <http://dx.doi.org/10.1590/S0365-05962006000400010>
19. Rego VPA, Machado PRL, Martins I, Trindade R, Paraná R. Características da reação tipo 1 e associação com vírus B e C da hepatite na hanseníase. *Rev Soc Bras Med Trop* [Internet], 2007; 40(5):546-9. DOI: <http://dx.doi.org/10.1590/S0037-86822007000500011>
20. Souza CFD, Slaibi EB, Pereira RN, Francisco FP, Bastos MLS, Lopes MRA et al. A importância do diagnóstico precoce da hanseníase na prevenção de incapacidades. *Hansen Int* [Internet], 2010; 35(2):61-6. Available from: http://periodicos.ses.sp.bvs.br/scielo.php?script=sci_arttext&pid=S1982-51612010000200007&lng=pt
21. Shetty VP, Wakade A, Antia NH. A high incidence of viable *Mycobacterium leprae* in post-MDT recurrent lesions in tuberculoid leprosy patients. *Lepr Rev* [Internet], 2001; 72(3):337-44. PMID: 11715280
22. Orsini MBP. *Estudo da função dos nervos periféricos de pacientes com hanseníase, acompanhados por um período médio de 18 anos após o início da poliquimioterapia*. Dissertação [Mestrado] - Universidade Federal de Minas Gerais, Programa de Pós-Graduação em Ciências da Saúde; 2008.
23. Diffey B, Vaz M, Soares MJ, Jacob AJ, Piers LS. The effect of leprosy-induced deformity on the nutritional status of index cases and their household members in rural South India: a socio-economic perspective. *Eur J Clin Nutr* [Internet], 2000; 54(8):643-9. PMID: 10951513
24. Almeida JA, Almeida SND, Magalhães HM. Avaliação e tratamento dos membros inferiores para prevenção de incapacidades. In: opromolla DVA, Baccarelli R. *Prevenção de incapacidades e reabilitação em hanseníase*. Bauru: Instituto Lauro de Souza Lima; 2003.
25. Conti JO, Almeida SND, Almeida JA. Prevenção de incapacidades em hanseníase: relato de caso. *SALUSVITA* [Internet], Bauru, 2013; 32(2):163-74. Available from: http://www.usc.br/biblioteca/salusvita/salusvita_v32_n2_2013_art_04.pdf
26. Carvalho GA, Alvarez RRA. Avaliação de incapacidades físicas neuro-músculo-esqueléticas em pacientes com hanseníase. *Hansen Int* [Internet], 2000; 25(1):39-48. Available from: http://www.iisl.br/revista/detalhe_artigo.php?id=10575
27. Croft RP, Nicholls PG, Steyerberg EW, Richardus JH, Cairns W, Smith S. A clinical prediction rule for nerve-function impairment in leprosy patients. *Lancet* [Internet], 2000; 6;355(9215):1603-6. PMID: 10821364
28. Organização Mundial da Saúde. *Estratégia global aprimorada para redução adicional da carga da hanseníase: 2011-2015* [Internet]. Diretrizes Operacionais (atualizadas). Organização Mundial da Saúde. Brasília: Organização Pan-Americana da Saúde, 2010. Available from: http://bvsms.saude.gov.br/bvs/publicacoes/estrategia_global_aprimorada_reducao_hanseníase.pdf
29. Schiapati, T. Grau de incapacidade atribuído aos casos novos em hanseníase no momento de sua admissão. *Hansen Int* [Internet], 2005; 30.
30. Gonçalves SD, Sampaio RF, Antunes CMF. Predictive factors of disability in patients with leprosy. *Rev Saúde Pública* [Internet], 2009; 43(2):267-74. DOI: <http://dx.doi.org/10.1590/S0034-89102009000200007>
31. Goulart IM, Penna GO, Cunha G. Imunopatologia da hanseníase: a complexidade dos mecanismos da resposta imune do hospedeiro ao *Mycobacterium leprae*. *Rev Soc Bras Med Trop* [Internet], 2002; 35(4):365-75. DOI: <http://dx.doi.org/10.1590/S0037-86822002000400014>.

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