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RESEARCH

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THE TREND OF LEPROSY EPIDEMIOLOGICAL INDICATORS IN THE ELDERLY POPULATION FROM THE CEARÁ STATE (2002 TO 2014)

Tendência de indicadores epidemiológicos da hanseníase em idosos no Ceará de 2002 a 2014

Tendencia de indicadores epidemiológicos de la hanseníase en ancianos en el Ceará de 2002 a 2014

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ABSTRACT

Objective: To describe the epidemiological indicators of leprosy in the elderly in Ceará from 2002 to 2014.

Methods: Ecological study of an exploratory time series performed with secondary data from the Information System of Notifiable Diseases of Ceará. **Results:** A total of 8,641 cases were recorded, of which 88.29% were new cases and 3.56% were leprosy recurrences. The detection of new cases remained hyperendemic (63.3 / 100,000 inhabitants). The prevalence of leprosy remained high (7.3 / 10,000 inhabitants), and the percentage of GIF cases 1 or 2 at diagnosis was 29.55%, and the proportion of elderly individuals with GIF 2 of 8.46%. **Conclusion:** It is concluded that leprosy in the elderly in Ceará decreased during the analyzed period, but continues with a hyperendemic index for the studied population.

Descriptors: Health of the Elderly, Public Health, *Mycobacterium leprae*, Epidemiology.

RESUMO

Objetivo: Descrever os indicadores epidemiológicos da hanseníase em idosos no Ceará de 2002 a 2014. **Métodos:** Estudo ecológico de série temporal exploratória realizado com dados secundários do Sistema de Informação de Agravos de Notificação do Ceará. **Resultados:** Registrou-se 8.641 casos, destes, 88,29% casos novos e 3,56% recidivas de hanseníase. A detecção de casos novos permaneceu hiperendêmica (63,3/100.000 habitantes). Durante a série analisada, a prevalência de hanseníase manteve-se com valor considerado alto (7,3/10.000 habitantes), e, o percentual de casos GIF 1 ou 2 ao diagnóstico foi de 29,55%, sendo a proporção de idosos com GIF 2 de 8,46%.

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Conclusão: Conclui-se que a hanseníase em idosos no Ceará diminuiu ao longo do período analisado, porém continua com índice hiperendêmico para a população estudada.

Descritores: Saúde do idoso, Saúde pública, *Mycobacterium leprae*, Epidemiologia.

RESUMEN

Objetivo: Describir los indicadores epidemiológicos de la lepra en ancianos en Ceará de 2002 a 2014. **Métodos:** Estudio ecológico de serie temporal exploratoria realizado con datos secundarios del Sistema de Información de Agravios de Notificación de Ceará. **Resultados:** Se registraron 8.641 casos, 88,29% casos nuevos y 3,56% recidivas de lepra. La detección de casos nuevos permaneció hiperendémica (63,3/100.000 habitantes). La prevalencia de la lepra se mantuvo con un valor considerado alto (7,3 / 10.000 habitantes), y el porcentaje de casos GIF 1 o 2 al diagnóstico fue del 29,55%, siendo la proporción de ancianos con GIF 2 de 8,46%. **Conclusión:** Se concluye que la hanseniasis en ancianos en Ceará disminuyó a lo largo del período analizado, pero continúa con índice hiperendêmico para la población estudiada. **Conclusión:** Se concluye que la hanseniasis en ancianos en Ceará disminuyó a lo largo del período analizado, pero continúa con índice hiperendêmico para la población estudiada.

Descriptores: Salud del anciano, Salud pública, *Mycobacterium leprae*, Epidemiología.

INTRODUCTION

Hansen's Disease, also known as leprosy, is an infectious disease caused by the bacillus *Mycobacterium leprae*, which affects the skin and peripheral nerves, often related to unfavorable living conditions. This is part of the group of neglected diseases in Brazil along with diseases such as dengue, Chagas disease, rabies, trachoma, malaria and tuberculosis.¹⁻²

Epidemiological surveillance, through the analysis of predefined indicators, plays an important role in the evaluation of the leprosy control program as a compulsory notification disease and favors directing actions and strategies for controlling the disease.³⁻⁴ According to the World Health Organization (WHO), the country with the highest case detection is India, followed by Brazil and Indonesia, where together these countries are responsible for more than 80% of new leprosy cases worldwide.⁴

The elderly population in Brazil has rapid growth, a phenomenon that is known as population aging worldwide, which has as triggering factors the decrease in mortality and fertility.⁵⁻⁶ The elderly population in Brazil (over 60 years old) reached a proportion of 9.9% in 2016, with a projected increase to 18.62% in 2030.⁷

Given the aging scenario in Brazil, issues such as health spending and the depletion of funding sources arise, making it urgent to create and implement strategies for aging to occur with the delay in the evolution of diseases and preservation of functional capacity.^{6,8-10}

Although leprosy has decreased in recent years in Brazil, studies indicate that in the elderly population this disease has increased considerably.¹¹⁻² It was also found that in Brazil during the period from 2001 to 2013 men and the elderly population were twice as likely to have multibacillary leprosy

than women and younger cases (OR=2.36, CI95%=2.33-2.38; OR=1.99, CI95%=1.96-2.02, respectively).¹³

Immunosenescence is a positive factor for the onset of leprosy in elderly people. Among the changes that occur physiologically with the aging process, there is a decrease in the production of cytokines IL2 and IL12 and a substantial reduction in TLR1/2 important components to initiate the protective response against *Mycobacterium leprae*, the etiological agent of leprosy.¹⁴⁻⁶

It is necessary to have a different look at the elderly population who are suffering from this pathology due to the peculiarities of this phase of life. The elderly population with leprosy feels rejected by the family and society due to the disease that is still stigmatizing and segregating, adding to this aging with the adaptations inherent to this process and the devaluation of this group in our society.¹⁷ Furthermore, elderly people bearing leprosy have little understanding about the disease.¹⁸ These factors can lead to a worsening of the clinical condition with the abandonment of treatment, failure to perform self-care to prevent disabilities, and not calling home contacts for examination at the health unit.

Given the aforesaid, it is seen that leprosy in this period of life can present even more challenges concerning early diagnosis, treatment, prevention of disabilities, and relapses, due to the characteristics of the elderly population.

Bearing in mind that there was an increase in leprosy cases in the elderly population in Brazil, the importance of analyzing the leprosy case detection scenario is verified to propose actions aimed at controlling the manifestation of the disease in this portion of the population. Hence, the study's goal was to describe the trend of leprosy epidemiological indicators in the elderly population from the Ceará State over the period from 2002 to 2014.

METHODS

It is an ecological study of an exploratory time series, covering epidemiological and operational indicators of leprosy control in the Ceará State. Such State is located in the northeast region of Brazil, having the city of Fortaleza as its capital. The estimated population, in 2014, was 8,842,791 inhabitants and demographic density of 56.76 inhabitants/km².¹⁹ The period studied comprised a thirteen-year historical series: from 2002 to 2014. There were included all cases of both diagnosed and reported elderly people bearing leprosy in the Ceará State, using data generated by completing the standard investigation form and compulsory notification of the SINAN (*Sistema de Informação de Agravos de Notificação*) [Brazil's Information System for Notifiable Diseases].

The variables used in the study were the same as those of the Department of Informatics of the Brazilian Unified Health System named DATASUS, as follows: detection rate and prevalence rate, mode of entry into treatment, Degree of Physical Disability (DPD) in the diagnosis and municipality of residence. The data were stored and analyzed in a Microsoft Office Excel 2010[®] database, where they were presented in graphs and spreadsheets. The leprosy detection rate per

100,000 inhabitants/year was calculated based on the absolute elderly population residing in the Ceará State, according to the Instituto de Pesquisa e Estratégia Econômica do Ceará (IPECE) [Economic Research and Strategy Institute of the Ceará State] from 2002 to 2014.²⁰

Aiming to evaluate the indicators related to the detection rate, prevalence, and DPD at diagnosis, there were considered the WHO parameters as recommended by the Brazilian Ministry of Health for the general population, since there are no specific parameters for this population, they are as follows: annual case detection rate new leprosy per 100 thousand inhabitants (Hyperendemic: > 40.0/100 thousand inhab. Very high: 20.00 to 39.99/100 thousand inhab. High: 10.00 to 19.99/100 thousand inhab. Medium: 2.00 to 9.99/100 thousand inhab. Low: <2.00/100 thousand inhab.); Annual leprosy prevalence rate per 10 thousand inhabitants (Hyperendemic: ≥20.0 per 10 thousand inhab. Very high: 10.0 to 19.9 per 10 thousand inhab. High: 5.0 to 9.9 per 10 thousand inhab. Medium: 1.0 to 4.9 per 10 thousand inhab. Low: <1.0 per 10 thousand inhab.); Proportion of leprosy cases with grade 2 physical disability at the moment of diagnosis among the new cases detected and evaluated in the year (High: ≥10% Medium: 5 to 9.9% Low: <5%).²¹

As this study addresses official secondary data of public domain with no subject identification, there was no need for appreciation by the Research Ethics Committee. The study followed the recommendations of the National Health Council addressed in the Resolution No. 466, on December 12th, 2012.²²

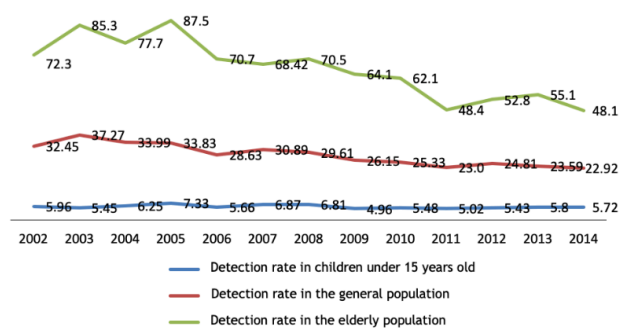
RESULTS

Over the period from 2002 to 2014, 8,641 cases of leprosy were recorded in the elderly population in the Ceará State; of these 88.29% were reported as a new case and 3.56% as a leprosy relapse. The number of absolute cases ranged from 580 in 2011 to 751 in 2013, but without much variation over the historical series, generating an average of 444 cases per year in the considered period.

The detection rate of new cases of elderly people bearing leprosy per 100,000 inhabitants, throughout the series analyzed, remained with a hyperendemic parameter (>40/100,000 inhabitants), although it showed a downward trend from 85.3/100,000 inhabitants in 2003 to 48.1/100,000 inhabitants in 2014. The detection rate found in this study is higher than the detection rate in the general population and

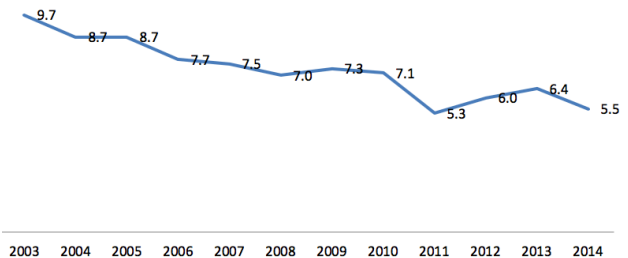
children under 15 years old in the same place and period. It is observed that there is a tendency to reduce the rates under analysis (Figure 1).

Figure 1 - Detection rate in the elderly population, in the general population and in children under 15 years old, over the period from 2002 to 2014. Ceará State, Brazil.



The prevalence rate of leprosy throughout the series analyzed remained at a value considered high (5.0 to 9.9 per 10,000 inhabitants) by the Brazilian Ministry of Health. Reaching a peak in 2003 with 9.7/10,000 inhabitants and concluding the series with 5.5/10,000 inhabitants (Figure 2).

Figure 2 - Leprosy Prevalence Rate in the elderly population from the Ceará State over the period from 2002 to 2014.



The number of elderly people diagnosed with leprosy throughout the series studied was 8,641, but of these, only 7,384 (85.4%) were assessed for DPD at the moment of diagnosis. The percentage of appraised remained from the beginning of the historical series until 2013 with values above 80%, falling in 2014 to 74.4%

Considering the cases assessed for DPD at the moment of diagnosis, the year 2007 stands out since 42.46% of those evaluated had either DPD 1 or 2 in the diagnostic evaluation. During the historical series, the percentage of DPD 1 or 2 cases when diagnosed was 29.55% (Table 1).

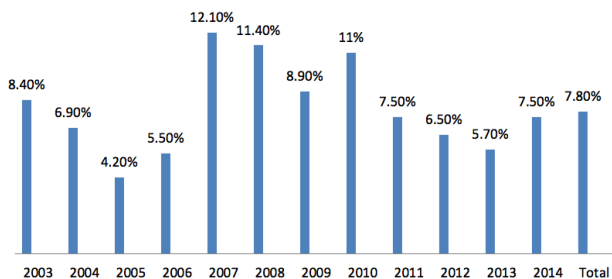
Table 1 - Assessment of the DPD at the moment of diagnosis from 2002 to 2014. Ceará State, Brazil.

Period	Assessed	DPD			Total diagnosed with DPD 1 and DPD 2	
		Zero	1	2		
2002	556	420	99	37	136	24.00%
2003	649	449	145	55	200	30.81%
2004	587	444	102	41	143	24.36%
2005	609	490	93	26	128	21.00%
2006	544	426	90	30	120	28.16%
2007	577	332	175	70	245	42.46%
2008	549	356	130	63	193	35.15%
2009	558	363	145	50	195	34.94%
2010	545	338	147	60	207	37.98%
2011	517	355	123	39	162	31.33%
2012	581	420	123	38	161	27.71%
2013	606	455	116	35	151	24.91%
2014	506	356	112	38	150	29.64%
Total	7,384	5,204	1,600	582	2,182	29.55%

Source: Research data, 2016.

The proportion of leprosy cases with grade 2 physical disability at the moment of diagnosis among the diagnosed and evaluated cases per year in the studied population ranged from low (<5%) to high (≥10%). The studied series have started as medium (5 to 9.9%), becoming low (<5%) in 2005 (the only year with low percentage), reaching high values in 2007, 2008, and 2010, ending the historical series with a percentage considered medium (5 to 9.9%) (Figure 3).

Figure 3 - Proportion of elderly people considered to have DPD 2 at the moment of diagnosis.



DISCUSSION

It was observed that there were no great variations in the number of elderly people reported with leprosy during the analyzed period. The detection rate and prevalence decreased significantly. This is due to the increase in the elderly population residing in the Ceará State since the annual detection and prevalence rates were determined using the number of elderly residents in the Ceará State.

The increase in the elderly population tends to continue in the Ceará State as well as throughout Brazil, as population aging is a global reality, generating greater demand for health services as well as adaptations in working conditions,

housing, public safety, and transport.^{6,8-9,23} In other studies, there has been an increase in the detection of leprosy in the elderly population in Brazil.¹¹⁻²

Due to the long incubation period of leprosy, the moment of infection of the patient is questioned, if as an adult, and because he has not been treated, he now receives treatment in this age group, with high rates of disability in the diagnosis.

Considering the leprosy cases notified, most were classified as new cases (88.29%) and only 3.56% of cases as relapses. Several factors contribute to leprosy relapse, among them: poor housing conditions, lifestyle, organization of health services, clinical forms and therapeutic schemes.²⁴

In a study carried out with elderly people in Colombia, the percentage of recurrence was 9.2%, whereas in a study carried out in the city of Fortaleza the rate of leprosy relapse in the elderly population was 16.9%, both higher than that found in this study.²⁵⁻⁶ As they have higher relapse rates than in other age groups, the following question arises: Have today's elderly people undergone monotherapy treatment and for this reason they have more relapses?

Other studies point out the difficulty in differentiating late leprosy reactions, in other words, after treatment, showing leprosy relapses.²⁷⁻⁸ The differential diagnosis between leprosy reaction and relapse is based on the association of clinical and laboratory tests. The leprosy reaction usually differs clinically from the relapse in terms of the period of occurrence, appearance, characteristics of old lesions, the appearance of new lesions, ulceration, regression, and neural impairment, and the post-treatment leprosy reaction should be classified as another re-entry in filling the mode entry in the notification form.^{21,29}

During the historical series under analysis, there was a significant decrease in the detection of leprosy in the elderly population, in agreement with the data related to the detection of leprosy in the general population in the Ceará State and Brazil.²⁸⁻⁹ This decrease is due to strategies to reduce the burden of leprosy that are based on the increase of the early detection and the cure of the diagnosed cases, as it is also related to the social programs launched in the last years in Brazil, as the income transfer program *Bolsa Família*, implanted in 2003. The Brazilian program named *Bolsa Família* favored the reduction of poverty and inequality, factors related to leprosy, directly influencing the reduction of leprosy cases.^{2,30-1}

The National Plan for Mobilization and Intensification of Actions for the Elimination of Leprosy and the Control of Tuberculosis in Brazil,³² although it did not achieve its objective of eliminating leprosy as a public health problem, it succeeded through actions based on the decrease in the detection rate of leprosy, according to the study's data. Data indicate that even with a decrease in the detection of leprosy in the elderly population, the Ceará State is still hyperendemic in leprosy for the elderly population according to parameters adopted by the Brazilian Ministry of Health.²¹

The prevalence rate is higher when compared to the general population, showing the magnitude of leprosy in the elderly population in the Ceará State, indicating that we are still having difficulty reaching the national goal of less than 1 case per 10,000 citizens, outlined in 1999.³²

Some factors permeate the scenario of leprosy manifestation in the elderly population, among which the social class and low education stand out; precarious housing conditions and limited access to health services.³³⁻⁴ Low education and the predominance of retirees are prevalent in elderly people with leprosy.^{17,26-34} This factor is not different from the profile of the elderly population in the Ceará State, who have low education, with a decreasing illiteracy rate in recent years and low family income, especially among inactive people, which favors the transmission of leprosy in a highly endemic place such as the Ceará State.³⁵

Although there is no specific public policy for the control of leprosy in the elderly population, the elimination of risk factors for leprosy that is extrinsic to the elderly population, such as living conditions, education, and income, are achievements ensured by public policies for the elderly population, such as the National Policy for Elderly People, which ensures health care and places public authorities in charge of developing actions to meet the basic needs of the elderly population. Moreover, the Elderly Statute that regulates the rights guaranteed to the elderly population and the Social Assistance Organization Law that ensures elderly people the benefit of continued provision.³⁶⁻⁸

Considering the notified cases of elderly people with leprosy in the Ceará State, the evaluation of DPD at the moment of diagnosis was performed in 85.45% of cases. Regarding the data considering that the assessment of disability and neural function must be performed at the moment of diagnosis, during treatment, and at hospital discharge. The DPD evaluation is performed using light

technology using the Semmes-Weinstein monofilaments, which can be replaced by a ballpoint pen, if the professional is not available for the sensitivity assessment, and for the motor, strength assessment is performed the manual test of muscle strength. Therefore, the DPD determination can be performed at any institution by a trained professional.²¹

In an evaluation of leprosy management and assistance in 16 Brazilian states, it was found that health professionals who treat leprosy in the inspected units had a low percentage of training.³⁹ Qualifying Family Health Strategy's professionals for the development of leprosy controlling actions is one of the important strategies established in the Ceará State in recent years. Nonetheless, there is still a centralization of care in the referral unit of such State.⁴⁰⁻²

Even with training carried out with primary health care professionals, there is still a centralization and overcrowding of secondary care units to treat leprosy cases. Primary care must assume its role in the investigation and treatment of the disease, which is a strategy capable of controlling leprosy, given ensuring accessibility to care through the capillarity of the system.⁴³⁻⁴

During the historical series, the percentage of DPD 1 and 2 cases at the moment of diagnosis was 29.55%. It is important to raise the question about the fidelity of performing the simplified neurological assessment, since in some parameters the changes in sensitivity and strength inherent in aging can be considered confounding and not directly related to the manifestation of leprosy.²⁶

People bearing DPD 2, in other words, with visible disabilities due to leprosy in the eyes and/or hands and/or feet, was 7.88%, a value considered medium according to parameters of the Brazilian Ministry of Health. In a study conducted in São Luís city, Maranhão State, 62% had either DPD 1 or 2 at the moment of diagnosis, where 17 % had DPD 2.³⁶ In 2013, the percentage of people diagnosed with DPD 2 in the general population in the Ceará State was 7.7%, therefore similar to that found in the present study.⁴¹

In another study, it was concluded that the physical disabilities caused by leprosy are associated with dependence on the elderly's IADL, favoring a decrease in quality of life and increasing demands for health and social assistance services.⁴⁵

Only in 2005 during the historical series analyzed, the DPD 2 indicator at the moment of diagnosis had a value considered low. Indicating that in the Ceará State the diagnosis of leprosy in the elderly population has been late. It is noteworthy that the diagnosis of leprosy can take up to one year from the onset of symptoms to diagnosis.⁴⁶ There was an average of 2.7 consultations for diagnosis in the public health service and up to double in private services.

The importance of the present study is reaffirmed, as there was a hyperendemic event of leprosy in the elderly population of the Ceará State, together with high percentages of elderly people diagnosed with DPD 2. In other words, the diagnosis of leprosy in the elderly population has been made late, therefore, compromising functional capacity and contributing to dependency vis-à-vis activities of daily living.

CONCLUSIONS

Concerning the elderly population from the *Ceará* State, leprosy has decreased over the historical series analyzed, but the State remains hyperendemic for the addressed population, showing low relapse rates. The assessment of DPD at the moment of diagnosis indicates a late diagnosis in the elderly population.

Empowerment of primary care in the diagnosis and treatment of leprosy cases is recommended, as well as health actions performed by the Family Health Strategy aimed at the elderly population, pursuing to reduce the late diagnosis of leprosy and also the continuing education of professionals for the management disease. Similar studies are recommended in other scenarios for further dimensioning of leprosy in the elderly population.

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