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Original Article

The consequences of the Sars-CoV-2 pandemic on medical education in the fight against leprosy

As consequências da pandemia de Sars-CoV-2 sobre a educação médica no combate à hanseníase

Las consecuencias de la pandemia de Sars-CoV-2 en educación médica en combate à lepra

Henrique Ziembowicz[1] ORCID 0000-0001-9670-9353
Irene Souza[1] ORCID 0000-0002-5343-5222
Jordana Vargas Peruzzo[1] ORCID 0000-0001-9665-9237
Larissa de Camargo Subtil[1] ORCID 0000-0002-6486-6490
Lorenzo Garcia Onófrio[1] ORCID 0000-0002-3379-0999
Manoela Badinelli Vaucher[2] ORCID 0000-0003-3876-5466

[1] Universidade de Santa Cruz do Sul (UNISC), Santa Cruz do Sul, RS, Brazil
[2] Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSPA)

Email: henriqueziembowicz@gmail.com
Address: Santa Vitória street, 50, Universitário, Santa Cruz do Sul, RS, Brazil.

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ABSTRACT

Background and objectives: Leprosy is an infectious disease in which early diagnosis is a decisive factor in preventing impairment and disabilities. This study sought to analyze the panorama of leprosy between 2016 and 2021 in the state of Rio Grande do Sul, revealing the importance of medical education in the context of Neglected Tropical Diseases during the Sars-CoV-2 pandemic. **Methods:** Cross-sectional study using the database of the State Health Surveillance Center of Rio Grande do Sul. Data collection included leprosy data in individuals living in the state of Rio Grande do Sul (RS), from 2016 to 2021. The variables analyzed were confirmed cases of leprosy, reported cases, number of cases regarding the operational classifications of leprosy, the therapeutic regimen and the number of cases according to the degrees of physical disability. **Results:** In the analyzed period, 725 cases of leprosy were confirmed, 70% in 2016, 2017 and 2018. Of the total number of cases, 88% were the multibacillary form of the disease, 50% had some degree of physical disability at the time diagnosis and 80% performed the standard therapeutic regimen. **Conclusion:** There is a delay in the diagnosis of leprosy and there is underdiagnosis of the disease in the state of Rio Grande do Sul, which highlights the need to reaffirm educational practices on mycobacteriosis.
Descriptors: *Neglected Tropical Diseases. Leprosy. Diagnostic Errors. Medical Education. Research on Health Care Provision.*

RESUMO

Justificativa e objetivos: A hanseníase é uma doença infectocontagiosa na qual o diagnóstico precoce é fator decisivo para prevenir incapacidade e deficiências. O presente estudo buscou analisar o panorama da hanseníase entre os anos de 2016 e 2021 no estado do Rio Grande do Sul, desvelando a importância da educação médica no contexto das Doenças Tropicais Negligenciadas durante a pandemia da Sars-CoV-2. **Métodos:** Estudo transversal por meio da base de dados do Centro Estadual de Vigilância em Saúde do Rio Grande do Sul. Na coleta de dados, foram incluídos os dados de hanseníase em indivíduos residentes do estado do Rio Grande do Sul (RS), no período de 2016 a 2021. As variáveis analisadas foram os casos confirmados de hanseníase, os casos notificados, o número de casos quanto às classificações operacionais de hanseníase, o esquema terapêutico e o número de casos de acordo com os graus de incapacidade física. **Resultados:** No período analisado, foram confirmados 725 casos de hanseníase, sendo 70% nos anos de 2016, 2017 e 2018. Do número total de casos, 88% eram a forma multibacilar da doença, 50% apresentaram algum grau de incapacidade física no momento do diagnóstico e 80% realizaram o esquema terapêutico padrão. **Conclusão:** Existe atraso no diagnóstico de hanseníase e há subdiagnóstico da doença no estado do Rio Grande do Sul, o que evidencia a necessidade de reafirmação das práticas educacionais sobre a micobacteriose.
Descritores: *Doenças Tropicais Negligenciadas. Hanseníase. Erros de Diagnóstico. Educação Médica. Pesquisa sobre Prestação de Cuidados de Saúde.*

RESUMEN

Justificación y objetivos: La lepra es una enfermedad infecciosa en la que el diagnóstico precoz es un factor decisivo para prevenir la incapacidad y las discapacidades. Este estudio buscó analizar el panorama de la lepra entre 2016 y 2021 en el estado de Rio Grande do Sul y develar la importancia de la educación médica en el contexto de las Enfermedades Tropicales Desatendidas durante la pandemia Sars-CoV-2. **Métodos**: Estudio transversal con datos del Centro Estatal de Vigilancia en Salud de Rio Grande do Sul. La recolección de datos incluyó datos sobre lepra en individuos residentes en el estado de Rio Grande do Sul (RS), de 2016 a 2021. Las variables analizadas fueron casos confirmados de lepra, casos notificados, el número de casos en términos de clasificaciones operativas de lepra, el esquema terapéutico y el número de casos según los grados de discapacidad física. **Resultados:** En el período analizado se confirmaron 725 casos de lepra, 70% en los años 2016, 2017 y 2018. Del total de casos, 88% fueron la forma multibacilar de la enfermedad, 50% tenían algún grado de discapacidad física en el momento del diagnóstico y el 80% realizó el régimen terapéutico padrón. **Conclusiones:** Hay un retraso en el diagnóstico de la lepra y hay un infradiagnóstico de la enfermedad en el estado de Rio Grande do Sul: lo que pone de relieve la necesidad de reafirmar las prácticas educativas sobre micobacteriosis.
Palabras clave: *Enfermedades Desatendidas. Lepra. Errores Diagnósticos. Educación Médica. Investigación sobre Servicios de Salud.*

INTRODUCTION

Leprosy is an infectious, granulomatous and chronic disease caused by the bacillus Mycobacterium leprae, an intracytoplasmic etiologic agent that affects macrophages and Schwann cells. Predominantly, it presents cutaneous manifestations, in the peripheral nerves, in the mucosa of the upper respiratory tract, which can result in neuropathy and associated long-term consequences. It is transmitted through respiratory droplets in the air during contact with untreated patients. Depending on the number of skin lesions, they are classified as

paucibacillary (PB) or multibacillary (MB) - operational classification used in the national territory.[2] The classification may vary according to other criteria used, such as the number of skin lesions, the presence of neuropathy and bacilli in the skin biopsy.[2,3] As it is a curable disease, treatment in early stages can prevent impairment, disabilities and stigma caused by morbidity.

Reducing the burden of the disease is promoted through early diagnosis and comprehensive treatment with multidrug therapy (MDT). The therapeutic standard involves the drugs Rifampicin, Clofazimine and Dapsone, and the duration of treatment depends on the type of leprosy and the dose depends on the patient's age. The most effective measures to combat leprosy include vaccination and/or the use of prophylactic antibiotics among exposed people as a preventive form of care,[2,3] although chemoprophylaxis is not yet in effect in Brazil.

Recent articles demonstrate the persistence of the incidence of infection: new cases continue to occur, especially in caregivers of institutionalized people, which persist despite the elimination of leprosy as a public health problem – a goal defined by the WHO of reaching a point prevalence below 1 case per 10000 inhabitants.[4-9] In 2016, more than 200 000 new cases of leprosy were reported. Annually, 210 000 new cases are reported worldwide, of which 15 000 are in children.[2] Based on the 178 371 cases at the end of 2019, the prevalence corresponds to 22.9 per million people.[10] About 3 to 4 million people have already been healed but have some degree of disability. India, Brazil and Indonesia have, among populous countries, the highest incidences, [11] representing 81% of new confirmed cases globally. In this scenario, 8.8% of notifications (18 869 patients) were, in 2014, of children detected.[3] More than 2000 patients diagnosed that year had visible deformities caused by leprosy.

Thus, It is noted that early diagnosis and treatment are crucial to mitigate the Global Burden of leprosy. Neglected Tropical Diseases (NTDs) are a set of 20 diseases, including leprosy, that affect more than 1 billion people, with devastating socioeconomic consequences and health impacts.[10,12] NTDs are major causes of morbidity, disability, and mortality in populations. poor and vulnerable in several countries around the world, including Brazil.[3,8,9]

Furthermore, in the context of the Sars-CoV-2 pandemic, the quality of education was negatively affected, with implications for medical education and reflections on the skills needed for proper management in the face of a clinical suspicion of the condition.[13] In Rio Grande do Sul, similar results are expected with regard to medical education. Therefore, this study sought to analyze the current panorama of the disease between 2016 and 2021 in Rio Grande do Sul in order to unveil the importance of medical education in the context of NTDs during the Sars-

CoV-2 pandemic, through analysis based on a secondary database in view of the epidemiology of leprosy in this Brazilian state.

METHODS

This is an observational, retrospective study with a quantitative approach. For this study, public, freely accessible data were used, collected on the website of the State Health Surveillance Center of Rio Grande do Sul (RS), in the area of epidemiological surveillance tabulations. With regard to updating data from the Notifiable Diseases Information System (SinanNet), the last changes were inserted on July 8, 2021, corresponding to the partial numbers of the year in question, with the analysis carried out at from the weighting of this addendum.

Thus, confirmed cases of leprosy in individuals living in the state of Rio Grande do Sul (RS) were analyzed, from 2016 to 2021. In addition, notifications of leprosy cases (confirmed and discarded) in people living in the state, from 2016 to 2021, were analyzed. Subsequently, a quantitative comparison was made between confirmed and discarded cases, in order to measure possible diagnostic errors. According to the same criteria, the analysis was extended to the prevalence of operational classifications of leprosy in paucibacillary and multibacillary and to the prevalence of degrees of physical disability, in order to explore the early diagnosis and the effectiveness of epidemiological control activities of the pathology. This writing did not need to be analyzed by the research ethics committee, since it uses publicly accessible data, as stated in resolution No. 510 of April 7, 2016 held by the plenary of the national health council at its fifty-ninth extraordinary meeting.

RESULTS

From the analysis of the number of reported cases in people living in the state of Rio Grande do Sul, which include confirmed and discarded cases, it is observed that, of the 768 reported cases, 725 were confirmed, which represents a proportion of 94% of the sample of cases reported as being confirmed for leprosy (Table 1). In total numbers of reported cases, 153 occurred in 2016, 170 in 2017, 184 in 2018, 147 in 2019, 82 in 2020 and 32 up to July 2021. Of the confirmed cases, 70% occurred in the first three years analyzed. The number of confirmed diagnoses started to decrease in 2018, which presented 185 confirmations, while 2019, 2020 and 2021 presented, respectively, 112, 78 and 27 cases diagnosed as leprosy.

Table 1. New cases of leprosy notified and confirmed (frequency of diagnosis) according to the year of notification on SinanNet in the state of Rio Grande do Sul, from 2016 to 2021.

Notification year	Notification/Diagnostic frequency
TOTAL	768/725
2016	153/150
2017	170/173
2018	184/185
2019	147/112
2020	82/78
2021	32/27

Regarding the classification of the type of leprosy, MB was the most frequent, totaling 639 cases, which corresponds to about 88% of the sample of confirmed cases, while PB was responsible for the remaining 12% (Table 2). Regarding the therapeutic regimen used in this period, MDT was used in about 80% of the cases diagnosed with MB and PB leprosy, lasting 12 months and 6 months, respectively. Other substitutive treatment regimens were used in 128 cases, corresponding to 17.6% of diagnosed cases. The remaining percentage corresponds to cases classified by SinanNet as not informed, ignored or blank (Table 3).

Table 2. Confirmed cases reported according to current operational classification on SinanNet in the state of Rio Grande do Sul, from 2016 to 2021.

Diagnostic year	Paucibacillary	Multibacillary	Total
TOTAL	84	639	723
2016	12	137	149
2017	17	156	173
2018	17	168	185
2019	20	91	111
2020	12	66	78
2021	6	21	27

Table 3. Confirmed cases reported according to current therapy regarding the year of diagnosis on SinanNet in the state of Rio Grande do Sul, from 2016 to 2021.

Diagnostic year	Blank /Ign	Grade Zero	Grade I	Grade II	Not rated	Total
TOTAL	45	274	207	156	43	725
2016	7	52	58	24	9	150
2017	7	68	51	37	10	173
2018	6	80	43	45	11	185
2019	10	42	29	25	6	112
2020	10	25	18	19	6	78
2021	5	7	8	6	1	27

Table 4. Confirmed cases notified according to disability assessment regarding the year of notification on SinanNet in the state of Rio Grande do Sul, from 2016 to 2021.

Diagnostic year	Blank/Ign	MDT/PB 6 doses	MDT/MB 12 doses	Substitute Schemes	Total
TOTAL	15	68	514	128	725
2016	1	12	110	27	150
2017	5	10	125	33	173
2018	1	15	131	38	185
2019	4	19	74	15	112
2020	3	7	57	11	78
2021	1	5	17	4	27

In the classification according to the Degree of Physical Disability (DPD), which can be used as an epidemiological indicator of the precocity of diagnoses, of the total of 725 new cases of leprosy diagnosed, reported on Sinan and confirmed, 637 were evaluated regarding the DPD, at the time of the diagnosis, meaning 87.9%. Of the 637 evaluated, 274 (43%) were Grade 0, 207 patients (32.5%) were Grade 1 and 156 (24.5%) were Grade 2. Therefore, 57% of the evaluated cases already had disability or deformity at the time of the diagnosis. Of the patients, 88 (12.1%) were not evaluated (Table 4).

DISCUSSION

This study found that, in the state of Rio Grande do Sul, there is evidence of underdiagnosis and delay in the diagnosis of leprosy, as evidenced in other similar studies.[4,14,15] This is indicative of the predominance of multibacillary forms and with DPD in a federative unit with low prevalence, compared to national levels.[14,16] These indicators make it possible to understand that medical education on the knowledge of leprosy, a disease in which clinical

assessment is crucial, is fundamental for epidemiological control in the area addressed, allowing us to consider that in the Sars-CoV-2 pandemic, education was negatively affected, with repercussions on medical training and reflections on the skills necessary for proper management in the face of a suspicion situation. Therefore, it is necessary to understand the consequences of the pandemic in maintaining the neglected character of the disease.

The diagnosis of leprosy is made when the patient has at least one of three cardinal signs: definite loss of sensation in an area of whitish (hypopigmented) or reddened skin, a thickened/enlarged peripheral nerve with loss of sensation, or the presence of alcohol-acid bacilli resistant in intradermal smears.[3] Thus, a qualified clinical examination, a consequence of a good medical education, is crucial for an accurate and early diagnosis.

The southern region of Brazil has a high concentration of errors in the diagnosis of leprosy.[14] This fact can be explained by the low number of cases and the high proportion of patients with disabilities, also related to late diagnosis. Still on this analysis, it should be noted that the state follows the reduction in the detection coefficient of new cases in the South region, with a decrease of 59.74% between 2005 and 2015.[16] In addition, the decrease in diagnoses in Rio Grande do Sul, since 2018, it makes leprosy less prevalent in the state, which requires a limited number of specialized professionals and centralization of services, favoring more diagnostic errors.

From this perspective, a study carried out in three large leprosy treatment centers in Brazil showed that 42.6% of patients reported an error in diagnosis, reinforcing, once again, the importance of approaching this topic during medical training. Even if the incidence of cases decreases, there must be attention and preparation, especially in endemic regions, since there is a tendency for professionals to neglect low-prevalence pathologies.[17]

The analysis of data on the DPD classification of diagnosed patients shows that 57% had Grade 1 or Grade 2 of motor/neurological disability, that is, half of the diagnosed patients manifested loss of protective sensitivity and/or visible deformity as a result of neural injury and/or blindness. This indicates that these diagnoses were carried out in more advanced stages, indicating failure of practices that advocate interruption in the transmission chain.[6,9]

This study found that 94% of the sample of reported cases were confirmed for leprosy – of the 768 reported cases, 725 were confirmed –, a fact that reveals great accuracy of diagnoses in the face of suspicion. In other words, the profile of multibacillary and disabled patients facilitates diagnostic confirmation. However, it indicates failure in early diagnosis.

A limitation of this study was the use of a secondary database, which was collected through the Notifiable Diseases Information System (Sinan). The tool allows a broad analysis

of the epidemiological data of the disease. However, it restricts the individual analysis of the patients, limiting the analysis of the differential diagnoses and the causes of misdiagnosis,[18] which would make it possible to broaden the understanding of the problem faced. In addition, the data corresponding to the year 2021 are partial and do not reveal the exact situation of the year in question. However, the information analyzed did not change the objective of the work, and it is still possible to adequately understand the repercussions of the pandemic on medical education in the fight against leprosy.

It is essential that Primary Health Care professionals are trained, in order to enable an adequate and fast management of symptomatic patients and, when necessary, make the correct referral to a specialist. Thus, medical education is a strong ally in the fight against leprosy neglect, as it provides understanding and security in confirming the diagnosis, especially in cases of complex or poorly elucidating symptoms.[14,19]

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Author contributions:

Henrique Ziembowicz, Irene Souza, Jordana Vargas Peruzzo, Larissa de Camargo Subtil, Lorenzo Garcia Onófrio, and Manoela Badinelli Vaucher contributed to the conception, design of the article, analysis and writing of the article;

Henrique Ziembowicz, Irene Souza, Jordana Vargas Peruzzo, Larissa de Camargo Subtil, Lorenzo Garcia Onófrio, and Manoela Badinelli Vaucher contributed to the planning and design of the article, review and final approval of the article;

All authors have approved the final version to be published and are responsible for all aspects of the work, including ensuring its accuracy and integrity.