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Analysis of tuberculosis and leprosy in the pedagogical projects of Medicine courses and the spatial relationship between cases

Análise da tuberculose e hanseníase nos projetos pedagógicos das faculdades de Medicina e a relação espacial dos casos

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ABSTRACT

Introduction: Medical education is crucial for the training of healthcare professionals. In Brazil, medical training has advanced, focusing on the Unified Health System and primary care. The inclusion of tuberculosis and leprosy in the medical curriculum is essential due to the impact of these diseases on public health. Medical schools should ensure that students learn about these diseases to improve health outcomes in the country.

Objective: This study aims to analyze how the topics of leprosy and tuberculosis are included in the pedagogical projects of medicine courses at university institutions in the Southern region of Brazil.

Method: A documentary and exploratory study with a qualitative approach was conducted. Pedagogical projects were collected between January and August 2023. The analysis of the pedagogical projects focused on identifying the keywords "leprosy" and "tuberculosis" and evaluating how these diseases were addressed in the documents, both in theoretical contexts and in practical teaching intentions. Content units were identified and grouped into two main categories: Theoretical Learning and Clinical-Practical Learning.

Results: The results indicated that references to tuberculosis were more frequent than leprosy in the analyzed pedagogical projects. Most institutions prioritize teaching these diseases in the early years of medical school, with little emphasis during the clinical internship phase. Furthermore, the analysis revealed that the teaching of these diseases tends to be more theoretical, with few references to clinical practice. A spatial distribution of leprosy in Santa Catarina was also conducted, correlating the presence of medical courses in certain municipalities with the number of leprosy cases diagnosed in those areas.

Conclusion: This study highlights the importance of reviewing and improving the pedagogical projects of medical courses in Santa Catarina to enhance the teaching of leprosy and tuberculosis. This includes incorporating practical approaches and considering the epidemiological relevance of these diseases in the regions where courses are conducted. The study also emphasizes the need to rethink how these topics are taught and how medical students can play an active role in detecting and managing these diseases in the community.

Keywords: Medical Education; Tuberculosis; Leprosy; Curriculum.

RESUMO

Introdução: *A educação médica é essencial para formar profissionais de saúde. No Brasil, houve avanços na formação médica, com foco no Sistema Único de Saúde e na atenção primária. A inclusão da tuberculose e da hanseníase no currículo médico é crucial devido ao impacto dessas doenças na saúde pública. As faculdades de Medicina deveriam garantir que os estudantes aprendessem sobre essas doenças para melhorar os resultados de saúde no país.*

Objetivo: *Este trabalho buscou analisar como estão incluídos os temas de hanseníase e tuberculose nos projetos pedagógicos do curso (PPC) de Medicina nas instituições de ensino superior da Região Sul do Brasil.*

Método: *Foi realizado um estudo documental e exploratório, de abordagem qualitativa. Os projetos pedagógicos foram coletados entre janeiro e agosto de 2023. A análise dos PPC se concentrou em identificar as palavras-chave "hanseníase" e "tuberculose", e avaliar como essas doenças eram abordadas nos documentos, tanto no contexto teórico quanto nas intenções de ensino prático. As unidades de conteúdo foram identificadas e agrupadas em duas categorias principais: aprendizado teórico e aprendizado clínico-prático.*

Resultado: *Os resultados indicaram que as referências à tuberculose eram mais frequentes do que à hanseníase nos PPC analisados. Foi observado que a maioria das instituições prioriza o ensino dessas doenças nos primeiros anos do curso de Medicina, com pouca ênfase na fase de internato médico. Além disso, a análise revelou que o ensino dessas doenças tende a ser mais teórico, com poucas referências à prática clínica. Também foi realizada uma distribuição espacial da hanseníase em Santa Catarina e feita sua correlação entre a presença de cursos de Medicina em certos municípios e o número de casos de hanseníase diagnosticados nesses locais.*

Conclusão: *O estudo destaca a importância de revisar e aprimorar os PPC dos cursos de Medicina em Santa Catarina, a fim de melhorar o ensino de doenças negligenciadas. Isso inclui a incorporação de abordagens práticas e a consideração da relevância epidemiológica dessas doenças. O estudo também destaca a necessidade de repensar a forma como esses temas são ensinados e como os estudantes de Medicina podem desempenhar um papel ativo na detecção e no manejo dessas doenças na comunidade.*

Palavras-chave: *Educação Médica; Tuberculose; Hanseníase; Currículo.*

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INTRODUCTION

University medical education serves as the basis for future health professionals, providing them with the knowledge and skills necessary to diagnose, treat and prevent diseases[1]. It is a dynamic field that has evolved with the progression of medical research, technological advances, and the ever-changing scenario of global healthcare challenges[2].

Medical training in Brazil has undergone significant advances in recent years. From 2001 onwards, with the introduction of the National Curricular Guidelines (DCN, *Diretrizes Curriculares Nacionais*) for medical education, the Ministry of Health played a central role in the training of human resources in the area. In 2002, a partnership was established between the Ministries of Health and Education to implement these new guidelines through the Program of Incentive to Curricular Changes in Medical Courses (Promed, *Programa de Incentivo às Mudanças Curriculares dos Cursos de Medicina*). In 2008, the Education through Work for Health Program (PET-Saúde) was established, representing another milestone in this process. In 2013, the *Mais Médicos* Program also played an important role in transforming medical training. All these advances culminated in the review of the DCN for the Medical Course in 2014[3].

Based on the new DCN for Brazilian medical education, the guiding axis is focused on the Brazilian Unified Health System (SUS – *Sistema Único de Saúde*) aimed at training generalist physicians with a view to the family health strategy[4]. Thus, professionals can effectively meet the health needs of populations, both locally and globally.

Considering that some problems affecting human health, even with advances in medicine, still persist and affect the population, the importance of considering these problems together with basic medical training stands out. Tuberculosis and leprosy are considered public health problems in Brazil and worldwide[5–7]. Tuberculosis is a contagious disease that mainly affects the lungs and is caused by *Mycobacterium tuberculosis* and, if left untreated, it can lead to death. Leprosy, a chronic infectious disease caused by *Mycobacterium leprae*, has been associated with social stigma and has led to the marginalization of individuals with this disease, whose evolution is slow, in which diagnostic delay due to lack of suspicion is one of the main problems in controlling the disease in Brazil[7,8]. The epidemiology of these diseases highlights the need for robust public health interventions, early detection and comprehensive treatment strategies[9]. According to data from the last two infectious disease bulletins of the state of Santa Catarina, southern Brazil, the country registered 18,318 new cases of leprosy in the general population, corresponding to a general detection rate of 8.58 per 100,000 inhabitants, a parameter of average endemicity, while the state of Santa Catarina contributed with 136 new cases, corresponding to a general detection rate of 1.85 cases per 100,000 inhabitants[10]. As for tuberculosis cases in 2022, the records show 1,898 new cases, with an incidence coefficient of 26.7 cases per 100,000 inhabitants[11].

The inclusion of leprosy and tuberculosis in the medical curriculum is essential. Medical schools are responsible for ensuring that future health professionals are informed about the clinical manifestations, diagnosis, treatment and prevention of these pathologies[12,13]. Given the significant public health implications of leprosy and tuberculosis in Brazil, medical students must know how to manage these conditions effectively. By integrating these topics into the curriculum, higher education institutions (HEIs) offering medical courses can play a key role in reducing the burden of disease and improving overall health outcomes in the country[9].

Considering the importance of tuberculosis and leprosy in the Brazilian epidemiological scenario, this study aimed to analyze how the topics of leprosy and tuberculosis are included in the pedagogical projects of the medical course in HEIs in the South region of Brazil.

METHODS

This is a documentary, exploratory study with a qualitative perspective. The documentary analysis technique is found within qualitative research, either complementing information obtained through other techniques, or revealing new aspects of a topic or problem[14].

Thus, this study analyzed the Pedagogical Course Projects (PPC, *Projetos Pedagógicos do Curso*) of each educational institution under study, detailed by the Ministry of Education (MEC) website, between January and August 2023 (year of the data collection). The PPCs were obtained from the website of the respective Universities. In the case of institutions that did not make the PPC available on their website, they were asked to send them by email, which was available on those same websites. At the end of data collection, 12 PPCs were grouped for evaluation, whereas 4 documents were not provided by the universities, even after three requests by email. It is important to highlight that all PPCs were published after the change in the National Curricular Guidelines (DCN) in 2014.

After the PPCs were collected, the documents were read to identify the descriptors "leprosy" and "tuberculosis". When analyzing the PPC content, we sought evidence of approaches related to the teaching of leprosy and tuberculosis, both in context and intentions, and in the period intended for learning. They were searched using a PDF reading application and the frequencies of the search keywords were recorded. The study

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focused on the critical analysis of the pedagogical project of the undergraduate medical course at the universities of Santa Catarina, taking as reference the following documents: a) Curricular Guidelines for the Medical Course (BRASIL, 2022); b) National strategy to combat leprosy[15]; c) National Tuberculosis Control Program[16].

To carry out the PPC analysis, it was initially necessary to develop subcategories and, based on the analyzed documents, the content units (CU) for each subcategory. After this moment, the subcategories were grouped into two more comprehensive categories. Category 1: Theoretical learning. Category 2: Clinical-practical learning. The data were discussed from the perspective of content analysis, using references on leprosy and tuberculosis, from diagnosis to suspicion.

After the curricular analysis, a second stage of analysis was initiated to identify the problem of leprosy in Santa Catarina. Municipal epidemiological data were collected through DATASUS for the years 2010 to 2021. The analyzed period was divided into four-year periods for better evaluation. A table was created using the Excel® program with the municipal variables: a. Total number of municipal cases; b. Number of cases in children under 15 years of age; c. Average leprosy detection rate for the period; d. Proportion of Physical Disability Degree 2 (PDD2) at diagnosis; e. Presence of a medical school at the site; f. Presence of a leprosy reference outpatient clinic at the site. To evaluate the correlation between variables, the *t* test and the Mann-Whitney test were used in the JAMOVI® statistical program (version 2.3.18.0).

It is noteworthy that the PPCs are public domain documents in accordance with MEC Normative Ordinance N. 40, of December 12, 2007, as well as data on the number of leprosy cases in DATASUS. Therefore, there was no need to submit this research to the approval of the Research Ethics Committee, in accordance with Resolution N. 510, of April 7, 2016, of the National Health Council.

RESULTS

Santa Catarina has 16 medical courses distributed in medium to large cities in the state. To systematize the information obtained in this research, Table 1 summarizes the information about the location of each university and the presence of the evaluated PPCs.

It can observed that the term "leprosy" appears in 50% of the medical Pedagogical Projects, while "tuberculosis" is mentioned in 80% of them (Table 2). The syllabuses of the two campuses of UFSC and UNISUL were grouped for better analysis.

Medical courses are traditionally divided into teaching cycles, with the first four semesters accounting for the basic cycle, the 5th to 8th semesters for the clinical cycle and the last four for the medical internship. It is clear that leprosy and tuberculosis teaching is distributed mainly in the initial years of medicine, with no mention of leprosy during the medical internship. In comparison, tuberculosis is more evenly distributed across the training. The only two universities that described the introduction of leprosy and tuberculosis in the basic cycle were the two federal universities in the state (Table 3).

Table 1. Description of universities in Santa Catarina, their location and presence of PPC evaluated in the study.

University (Acronym)	Location	PPC
Fundação Universidade Regional de Blumenau (FURB)	Blumenau	Evaluated
Universidade do Extremo Sul Catarinense (UNESC)	Criciúma	Evaluated
Centro Universitário para o Desenvolvimento do Alto Vale do Itajaí (Unidavi)	Rio do Sul	Evaluated
Universidade da Região de Joinville (UNIVILLE)	Joinville	Evaluated
Fundação Universidade Educacional de Brusque (UNIFEBE)	Brusque	Evaluated
Universidade do Planalto Catarinense (UNIPLAC)	Lages	Evaluated
Universidade do Vale do Itajaí (Univali)	Itajaí	Evaluated
Universidade Federal da Fronteira Sul (UFFS)	Chapecó	Evaluated
Universidade Federal de Santa Catarina (UFSC)	Florianópolis	Evaluated
Universidade Federal de Santa Catarina (UFSC)	Araranguá	Evaluated
Universidade Comunitária da Região de Chapecó (Unochapecó)	Chapecó	Not evaluated
Universidade do Sul de Santa Catarina (UNISUL)	Tubarão	Evaluated
Universidade do Sul de Santa Catarina (UNISUL)	Palhoça	Evaluated
Universidade do Oeste de Santa Catarina (UNOESC)	Joaçaba	Not evaluated
Universidade Do Contestado (UnC)	Mafra	Not evaluated
Faculdade Estácio De Jaraguá Do Sul (Estácio)	Jaraguá do Sul	Not evaluated

Source: Prepared by the authors.

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Table 2. Frequency of keywords searched in PPCs according to the institution of origin.

University (Acronym)	Researched term	
	Leprosy	Tuberculosis
Fundação Universidade Regional de Blumenau (FURB)	0	3
Universidade do Extremo Sul Catarinense (UNESC)	0	1
Centro Universitário para o Desenvolvimento do Alto Vale do Itajaí (Unidavi)	2	4
Universidade da Região de Joinville (UNIVILLE)	0	0
Fundação Universidade Educacional de Brusque (UNIFEBE)	1	2
Universidade do Planalto Catarinense (UNIPLAC)	0	0
Universidade do Vale do Itajaí (Univali)	0	1
Universidade Federal da Fronteira Sul (UFFS)	1	4
Universidade Federal de Santa Catarina (UFSC)	2	5
Universidade do Sul de Santa Catarina (UNISUL)	1	3

Source: Prepared by the authors.

Table 3. Frequency of keywords searched in PPCs according to the course semester.

	Semester of Topic Application											
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
Leprosy	0	0	0	1	3	1	0	1	0	0	0	0
Tuberculosis	0	0	1	3	7	5	1	0	1	0	2	0

Source: Prepared by the authors.

After the descriptive analysis of the patterns found through the distribution of keywords, we aimed to understand how PPCs qualitatively approached these topics in their written content. For this purpose, all passages in which the topics of leprosy and tuberculosis were mentioned were read. Initially, the content units (CUs) were identified, which were grouped into subcategories and then into two larger categories.

From the CUs, two categories were created on the teaching of leprosy and tuberculosis in the state of Santa Catarina: a. Theoretical Learning; B. Clinical-Practical Learning. From the outset, it was observed the focus on the teaching of tuberculosis and leprosy as a pathology to be discussed within a medical specialty and as pathologies of compulsory notification for data collection in primary care. It can be observed that, given the topics, there is a predilection for theoretical discussion, with no practical clinical applicability:

> *"Characterization of the raised proposals and problems and/or projects not carried out with the respective BHU and allow the implementation through specific actions at the BHU. Study of the types of treatments and reference and counter-reference equipment available at the BHU for pain therapy. Characterize home visits to patients with chronic pain and observe the patient's relationship with the caregiver.* ***Survey with the FHS of the occurrence of compulsorily notifiable infectious diseases (tuberculosis, viral hepatitis, leprosy, leptospirosis, rubella, measles, STIs, AIDS).*** *Survey of the incidence of diarrheal diseases". (CU 13)*
>
> *"Analysis and discussion of the tuberculosis control program in the region" (CU 15)*
>
> *"Pulmonology (54 hours):*
>
> *Upper respiratory tract infections...*
>
> *... Tuberculosis" (CU 7)*

Additionally, Infectious Diseases was found to be an optional teaching subject, which would cover tuberculosis as one of the theoretical topics. Other passages in the PPC do not mention how the researched topics are taught, they only provide bibliographies within the theoretical framework that cover the issue:

> *"Optional Subject: Infectious Diseases. Syllabus: Diarrhea and pulmonary diseases caused by infectious and parasitic agents. Acquired immunodeficiency syndrome (AIDS). Serodiagnosis in diseases caused by viruses, bacteria, fungi and protozoa. Immunization against: diphtheria, tetanus, pertussis, measles, rubella, mumps, polio, hepatitis B and tuberculosis." (CU 18)*

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> *"LYON, Sandra. Leprosy. Rio de Janeiro: Medbook, 2013" (CU 19)*

However, content units were also found that showed tuberculosis as a "Practical learning and management subject", and it is important to highlight that within this subcategory no CU was found related to leprosy:

> *"Curricular Component: Outpatient Practices I. Syllabus:* ***Supervised training in outpatient practice in internal and surgical medicine in primary and secondary care, allowing students to recognize and develop a therapeutic plan for the most prevalent conditions in the community using knowledge acquired in the other phases of the course in primary care.*** *Infectology: Exanthematous diseases. Viral hepatitis. Systemic mycoses. Staphylococci and streptococci. Sexually Transmitted Infections. Salmonellosis. Leptospirosis. Dengue fever. Yellow fever. Meningitis. Febrile adenomegaly. Toxoplasmosis. Cytomegalovirus. Tuberculosis." (CU 3)*

With the analysis of the content units, it was observed that there was little mention of the topic of leprosy in the PPC evaluated at the universities of Santa Catarina. According to Ribeiro (2005), the greatest role of the university is the social change it can bring about; additionally, the author quotes: "For society, the university is limited to the mere training of students, but it is up to us to show that it is much more than that, also being research, extension, change".

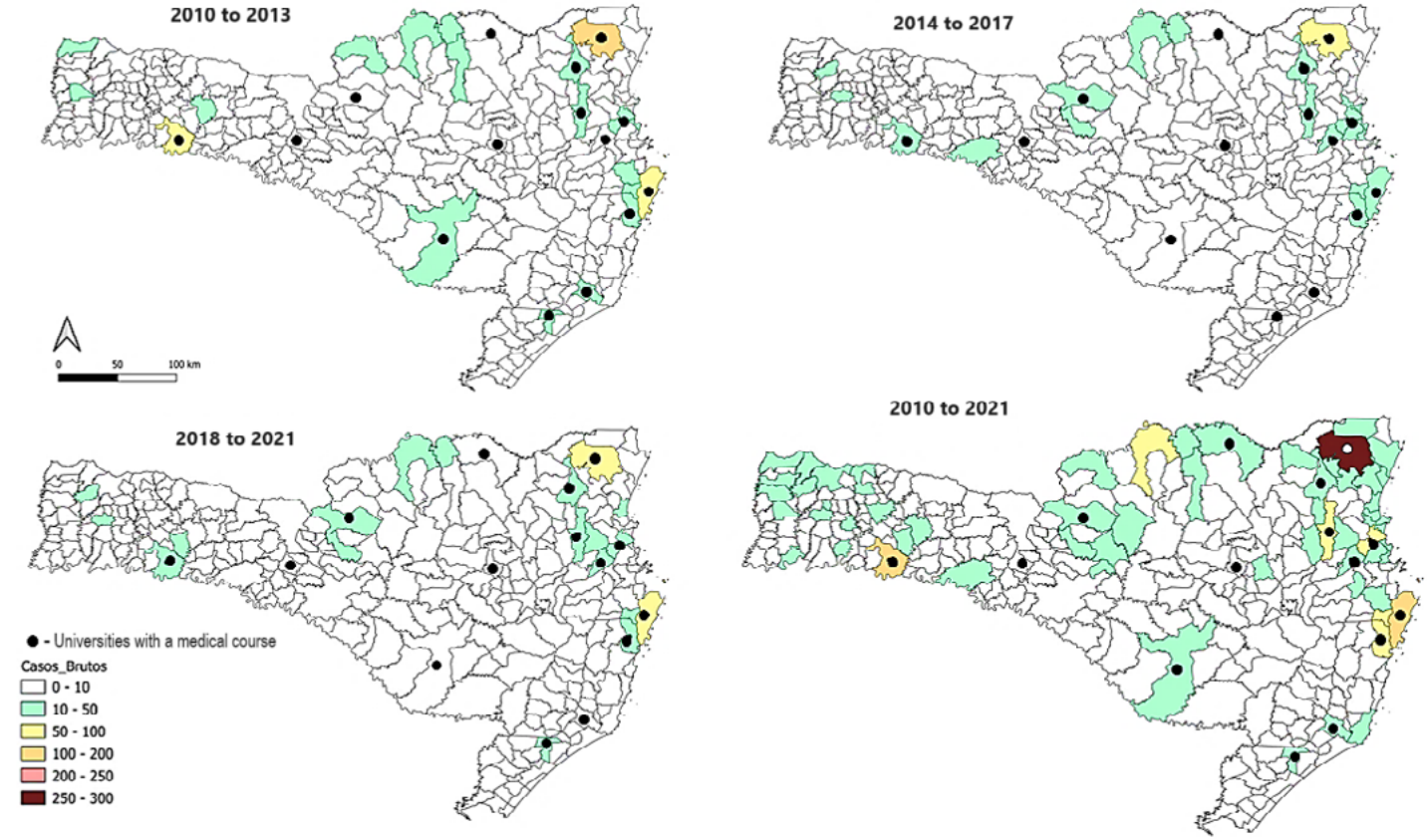
Regarding the data analysis regarding the spatial distribution of leprosy cases by municipality and related to the presence of the medical university in the location, as many municipalities have a population of less than 100,000 inhabitants, it was decided to illustrate the presentation of cases using the total number of leprosy cases diagnosed and the presence of a university in the location (Figure 1).

To identify whether there was a correlation between the presence of the HEI and the epidemiological and operational indicators of leprosy, a comparison test was carried out between the variables, as shown in Figure 2. A significant correlation can be observed between the presence of the HEI and the number of cases diagnosed in the general population and in children under 15 years of age.

DISCUSSION

All evaluated PPCs were in accordance with the new teaching recommendations based on the active methodology, making the student the protagonist of their learning. However, the study showed the scarcity of basic education on the studied pathologies, such as microbiology and pathophysiology, during medical education. Only the two federal universities

Figure 1. Relationship between the number of raw cases distributed spatially and the presence of a university with a medical course.



Source: Prepared by the authors.

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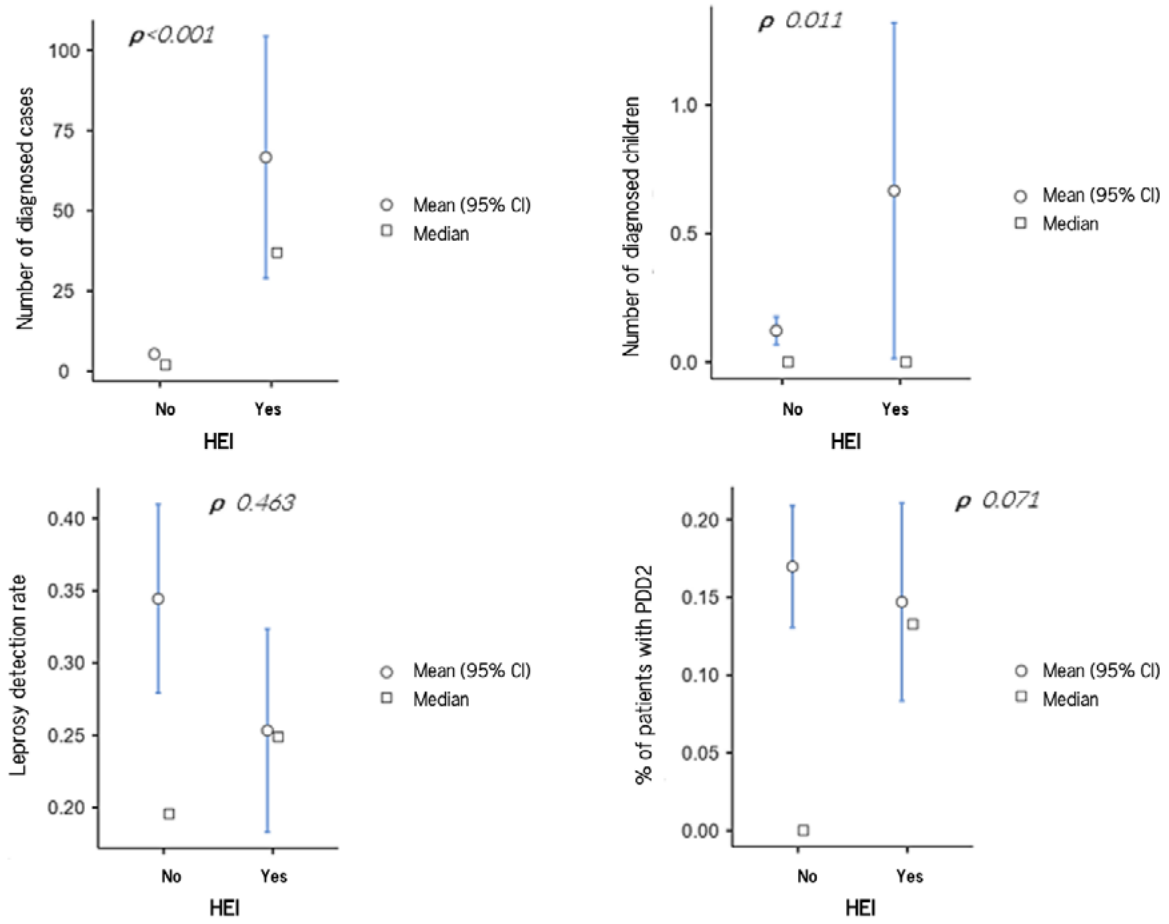
Figure 2. Comparison test between the variable presence of university and the epidemiological variables of leprosy.



Source: Prepared by the authors.

in the state maintained the pathologies being discussed in the basic curriculum. Furthermore, through the analysis of knowledge units we observed the prioritization of topics in theoretical activities and epidemiological discussions only. In some universities, only a bibliographic reference on the topic is indicated.

By prioritizing curricular analysis on leprosy, we observe a more precarious teaching and learning scenario, without any practical teaching proposal during the medical internship, for example. However, when crossing epidemiological data with the presence of a medical course in the municipality, a positive correlation was seen between the high number of cases in these places, highlighting the potential of local teaching.

The National Curricular Guidelines (DCN) for the undergraduate medical course published in 2014, refer to the mandatory implementation of active teaching methodologies. However, several studies have shown resistance from teachers towards this obligation[17,18]. The main criticisms are related to the students' lack of prior knowledge on topics such as pathology and anatomy and the lack of training of teachers who provide basic education to the students[18]. In this context, it is essential to highlight that the development of theoretical thinking requires not only access to content, but also the ability to master it. This capacity involves the ability to operate with the content, generating abstractions and generalizations and this has often been left aside, to give way to a discourse about student autonomy and protagonism[19].

Furthermore, there is criticism regarding the way students are assessed, where only empirical knowledge is assessed[17]. In our study, we observed this empirical dilution of knowledge on leprosy and tuberculosis in theoretical disciplines, without clinical applicability in the medical internship. This can result in future doctors with a gap in knowledge of the pathologies assessed in this study, as shown in the Indian study with medical students in their final year of medical training, in which despite having good knowledge about the identification and clinical signs of tuberculosis, less than half of the students knew vulnerable populations and the means of disease transmission in the community[20].

The new vision towards directing Brazilian medical education to a generalist profile of Primary Health Care is an innovation compared to other global schools, in which the hospital-centric model still resonates[21]. However, criticism of the teaching model seen in HEIs in Santa Catarina is necessary.

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The reading of the PPC is in line with an evaluation study on the students' perception of internships in Primary Care, in which field activity is seen as a moment of responsibility, teamwork, autonomy and clinical decision-making[22]. However, proposals for active search and other behavioral approach methodologies in the community are not discussed in the syllabuses. The community referred to both in the syllabuses and in the medical internship evaluation studies is the community that attends the basic health unit[23]. Leprosy is found in the community itself, often hidden in general neurological symptoms, little valued in clinical practice. We realized that teaching about leprosy is carried out passively and on demand, that is, the student delves deeper into the topic if there is a case to be discussed in the clinical cycle. The teaching staff is responsible for creating an environment for education and implementation of medical skills and must go beyond training and individual assessments[24]. Given this scenario, and due to the scarcity of diagnoses regarding the pathology, it can be suggested that the structures of the PPC regarding the topic could be revised.

Santa Catarina is among the states with the lowest leprosy detection rate in Brazil; however, as we can see, the majority of cases are found in cities with medical courses, or in locations within 100 km from the municipality. This is the first time that a positive and significant correlation between leprosy cases and the presence of a medical course appears in the literature, highlighting the potential that the university can show within its territory, changing the local reality.

Taking into account a study developed with three universities and the evaluation of the integration of other disciplines concomitantly[25], we corroborate their concept in the sense that working throughout the academic training in a complementary way, involving all cycles and integrating them with group activities, active methodologies, discussions with cases and realistic situations can help with training and reduce this fragility regarding the pathologies mentioned herein.

This study has some limitations. The analyzed results were obtained through tertiary data. This fact may imply theoretical generalizations on the topic. Therefore, new studies involving neglected diseases should be carried out in the state of Santa Catarina to understand the situation between the theoretical framework of the PPCs and the practice carried out within HEIs.

CONCLUSION

This study showed several gaps in the teaching of tuberculosis and leprosy in the state of Santa Catarina, the latter being more of concern. The curricular change recommended by the DCN did not change the neglect of these topics in medical curricula. It is also necessary to problematize the teaching of these topics during the clinical practice of students in the medical internship, making them not merely prescribers of treatment, but also as instructors in the active search for such pathologies in the community. The complexity of the work performed in Primary Health Care needs to be better disseminated and developed in medical curricula, especially on the topic of neglected diseases.

AUTHORS' CONTRIBUTION

Bruno Vitiritti: Study concept, investigation, analysis, methodology, writing of the original draft. Pedro Paulo Baruffi: Methodology, review and editing. Paula Brustolin Xavier: Methodology, review and editing.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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