SPATIAL DISTRIBUTION OF LEPROSY CASES IN RIBEIRÃO PRETO, BRAZIL, 2004

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This cross-sectional study aimed to describe the spatial distribution of leprosy cases in Ribeirão Preto in 2004. The data collection was performed through compulsory notification records in the Epidemiological Surveillance Service of the Municipal Secretary of Health of Ribeirão Preto. The data were geo-coded through the MapInfo program version 7.8 in order to obtain the thematic map. From the 37 cases found, 62% were automatically coded, which revealed good compatibility between the database and the information in the cartographic base. The remaining 38% of the cases were geo-coded interactively. The thematic map analysis and the geo-referenced cases revealed a concentration of cases in the Northern region of the city, traditionally characterized by poor neighborhoods.

DESCRIPTORS: leprosy; residence characteristics; epidemiologic surveillance

DISTRIBUCIÓN ESPACIAL DE CASOS DE HANSENIASIS EN EL MUNICIPIO DE RIBEIRÃO PRETO PARA EL AÑO 2004

La presente investigación tuvo como objetivo describir la distribución espacial de los casos de hanseniasis en la municipalidad de Ribeirão Preto, para el año 2004. Es un estudio seccional con informaciones del año 2004 recolectadas con el equipo de Vigilancia Epidemiológica de la Secretaria Municipal de Salud de Ribeirão Preto. Fueron utilizadas las fichas de notificación compulsoria, para la obtención del mapa temático; los datos fueron geo-codificados con la ayuda del programa MapInfo, versión 7.8. Con relación a la geo-codificación, de los 37 casos encontrados, 62% fueron geo-codificados automáticamente, mostrando una buena compatibilidad entre la base de datos y las informaciones de la base cartográfica. El resto (38% de casos) fueron geo-codificados de forma interactiva. Del análisis del mapa temático con los casos geo-referenciados se puede percibir que los casos se concentran en la región Norte del municipio, compuesta por los barrios de clases sociales mas carentes de la región.

DESCRIPTORES: lepra; distribución espacial de la población; vigilancia epidemiológica

DISTRIBUIÇÃO ESPACIAL DOS CASOS DE HANSENÍASE NO MUNICÍPIO DE RIBEIRÃO PRETO NO ANO DE 2004

A presente investigação teve como objetivo descrever a distribuição espacial dos casos de hanseníase no município de Ribeirão Preto, no ano de 2004. Trata-se de estudo seccional, com informações referentes ao ano de 2004 coletadas junto à Vigilância Epidemiológica da Secretaria Municipal de Saúde de Ribeirão Preto. Para tal, foram utilizadas as fichas de notificação compulsória, para a obtenção do mapa temático, os dados foram geocodificados com auxílio do programa MapInfo, versão 7.8. Em relação à geocodificação dos 37 casos encontrados, 62% foram geocodificados automaticamente, mostrando boa compatibilidade entre o banco de dados e as informações contidas na base cartográfica. Os 38% dos casos restantes foram geocodificados de forma interativa. Da análise do mapa temático juntamente com os casos georrefenciados pôde-se apreender que os casos concentraram-se na região Norte do município, composta por bairros de classes sociais tradicionalmente mais carentes da região.

DESCRITORES: hanseníase; distribuição espacial da população; vigilância epidemiológica

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INTRODUCTION

Leprosy as a public health problem

Among the 11 countries considered by the World Health Organization (WHO) as of higher incidence of leprosy in number of detected cases[1], India occupies the first place, followed by Brazil. Other countries, such as Myanmar, Indonesia, Nepal, Madagascar, Ethiopia, Mozambique, Democratic Republic of the Congo, Tanzania and Guinea, geographically situated in the tropical belt, also present elevated prevalence coefficients of the disease[2]. WHO defines that leprosy is not a public health problem when the prevalence coefficient is under one case per 10,000 inhabitants.

The Ministry of Health (MH) considered leprosy as endemic in all Brazilian states and regions, with varying prevalence levels, ranging from 0.5 to 17 cases per 10,000 inhabitants. Health services, although available in most cities, greatly vary in terms of problem solving capacity. Likewise, the prevalence of leprosy distribution in the country is very different if we compare macro regions. In 2001, the prevalence rates per 10,000 inhabitants were: North (9.49 cases); Northeast (5.19 cases); Southeast (2.67 cases); South (1.12 cases) and Center East (11.60 cases)[3]. Only two States, Rio Grande do Sul and Santa Catarina, have completely eliminated the disease.

According to the São Paulo Health Secretary, in 2002, 5,378 leprosy cases were notified in the State, which correspond to 1.41 cases per 10,000 inhabitants. Although the prevalence level is considered higher than the goal proposed by WHO, it must be taken into account that significant advances have been made towards the elimination of the disease in comparison with prevalence coefficients from past decades, such as in 1986, with 13.01 cases per 10,000 inhabitants, when 38,958 cases were recorded in the State.

The difficulties appointed in the process of eliminating leprosy in Brazil can be attributed to several factors, such as: complexity of some administrative procedures regarding diagnosis and treatment, which make health agents see leprosy as a complex and difficult disease to treat; centralization and verticalization of the disease control process; no participation of the managers in the control actions at local level; information systems not totally reliable; community's negative perception of the disease; late diagnosis of the disease. The leprosy issue is not limited only to the large number of cases, but also to its disabling power, which can interfere in the patient's work and social life, besides economic losses and psychological traumas. These disabilities have been the cause of the stigma and discrimination of patients[4].

Geographical space as an analytic category

The space, in its classic epidemiologic concept, in the attempt to integrate the biological and the non-biological, is considered static, immutable, a non participative spectator. The acceleration of human intervention in the natural space, with the creation of new patterns of spatial organization, occurred so quickly that the treatment given to space became obsolete, since the natural space almost does not exist anymore. This fact pointed to the need to review the concept of space as a category of analysis, in the perspective of better understanding the health-disease process in groups, through distribution and epidemiological categorization of the occurrence of endemism in urban areas[5]. Space must be considered as a set of relations performed through functions and in a way that they present themselves as a testimony of a written history by past and present processes. That is, space is defined as a set of representative forms of social relation from the past and the present and through a structure represented by social relations that are happening in front of our eyes and are manifested by processes and functions[6].

Space is, therefore, a true field of power whose acceleration is unequal. Thus, spatial evolution does not occur identically everywhere. The concept of space must incorporate not only the geographical, natural and social characteristics of a place, but also "the life that fulfills and animates them, that is, the society in movement"[7]. Therefore, the space theory goes beyond physical environment issues; it also involves social processes. The World Health Statistics Quarterly affirmed that the urban space, an elaborated form of space organization, is and will be the scenario of the main challenges on the path to control infectious and non-infectious diseases[8].

Geographical Information Systems

Geographical Information Systems (GIS), with their integrative capacity, can be defined as a process composed of collection, storage,

transformation, processing, analysis and presentation of georeferenced data related to several factors, and are becoming fundamental instruments for environmental and health studies. It is a set of tools used to deal with spatially presented information, permits mapping the diseases and contributes to the structuring and analysis of socio-environmental risks. The easiness of GIS in processing and integrating a great quantity of data and producing maps in a dynamic way makes it possible to improve the analysis and syntheses of public health information[9].

This requires the geographical localization of events, associating geographical information (maps) to alphanumerical health data base. A georeferenced address, defined as a process of associating it to a terrestrial map, can be made in three basic ways: association to a point, line or area[10].

The application of the GIS in health research provides great possibilities, which allow researchers to apply new methods for the management of spatial information, becoming a powerful tool to connect health and environment.

WHO acknowledges the GIS as a valuable management tool to strengthen national, state and local surveillance abilities. It highlights that surveillance at local level can be better illustrated and analyzed by GIS than by information presented in tables. In the case of leprosy, this system can help to monitor the extension of coverage in multi-chemotherapy treatment, provide a graphical analysis of epidemiological indicators and the spatial distribution of the disease, the distribution of cases with disabilities, indicating areas with high endemism and areas needing extra resources[3].

Studies that involve the spatial distribution of diseases have become more common, due to the integration of epidemiological methods and techniques, emphasizing their importance, because they permit the visualization of epidemiological patterns of health events and processes, and the recognition of the importance of factors that determine such patterns, facilitating decision making on potential public health actions. This integration can support preventive programs and contribute to the decline of morbidity and mortality; help to improve epidemiological surveillance actions; monitor vital statistics and spatial organization of health services and human resources.

This article present preliminary data of the CNPq- Productivity Scholarship titled “Spatial patterns of endemic diseases in Ribeirão Preto”, which aims to establish the spatial distribution of leprosy, dengue and tuberculosis in Ribeirão Preto and thus contribute to the definition of priorities in health actions, allowing for a rationalization of resources.

This work is justified on the assumption that the spatial distribution of leprosy occurs unequally among communities, neighborhoods, cities, states and countries. This process can support health authorities to propose more appropriate actions to diminish or avoid the occurrence of health problems, if more proximity, integration and knowledge of the space in question are considered.

Therefore, this article aimed to identify the prevalence level of leprosy and describe its spatial distribution in Ribeirão Preto in 2004.

METHOD

Geographical study area

The city of Ribeirão Preto is located at 47º48’24’’ W longitude and 21º10’42’’ S latitude, in the Northeast of the State of São Paulo, around 313 km from the capital. There are, according to the Demographical Census 2000, approximately 504.923 inhabitants, all living in urban conditions. It is one of the main financial centers in the country and one of the largest centers of the state of São Paulo and of Brazil.

Study design

This is a cross-sectional study[11]. This kind of study comprehends “investigations that produce a view of the health situation of a population or community, based on the individual evaluation of the health state of each member of a group, producing global health indicators for the study group. It is of great use to reach community diagnoses of the local health situation” .

Data Collection

Information regarding 2004 was collected in the Epidemiological Surveillance Service of the Municipal Health Secretary in Ribeirão Preto, SP, through leprosy compulsory notification files contained in the Brazilian National Disease Notification System (SINAN) database.

Data analysis

To obtain the thematic map, the data were geocodified according to the notified patients' address, with the help of MapInfo version 7.8. Initially, automatic geocodification was used, while the interactive form was used when needed. In this phase, patterns of event points were created.

The notification addresses were disposed to obtain a connection with the digital cartographic base. This procedure demanded a lot of work and time, due to some incomplete addresses and also because the characteristics of the street organization did not allow for the automatic realization of this stage. The addresses were manually identified in phone books, city street guides and an analogical map to permit this transformation.

Ethical procedures

The project was previously submitted to the approval of the Institutional Review Board at the University of São Paulo College of Nursing. Since this study used information exclusively from leprosy compulsory notification files and did not involve patient identification, we requested clearance from the use of the free and informed consent term, as secrecy was guaranteed.

RESULTS AND DISCUSSION

In 2004, Ribeirão Preto presented a total of 37 notified leprosy cases, all residing in the urban area. At the time, the population consisted of about 534,944 inhabitants, corresponding to a prevalence coefficient of 6.9 per 10,000 inhabitants, which is above the State average. Regarding the gender, 56.8% of the leprosy cases were men. As to the clinical form, 37.8% presented the Virchowian form, followed by tuberculoid (35.1%); undetermined (21.6%) and dimorph (5.4).

Undetermined leprosy is considered the first clinical manifestation of the disease and, after a period of time, which varies from few months to years, the disease either evolves to cure or some other clinical form. In the tuberculoid form, there is also a possibility of spontaneous cure. However, the orientation is that these cases must be treated to diminish the time of the disease evolution and risk of neural damage.

The study showed that most cases displayed the Virchowian form, which presents highly positive sputum smears and represents virgin cases of treatment, which are an important focus of infection or disease reservoir, and also indicates late diagnosis. Another worrisome aspect is the hidden prevalence, which are new expected cases that are not being diagnosed or will be tardily.

It is important to emphasize the need for interventions by the Leprosy Control Program, including procedures to supervise contacts of people with Hansen's Bacillus, as well as interventions in endemic areas[12].

According to the MH, the main obstacle in the process of eliminating leprosy in Brazil is the existence of a considerable part of the population without access to diagnosis and treatment of the disease in its initial phase. Data show that, not so long ago, more than 2000 new cases were diagnosed with severe physical disability, representing a tardy diagnosis of the disease.

Of the 37 leprosy cases found, 62% were automatically geodecoded and the remainder was interactively geocoded. The result of the interactive geodecodification showed good compatibility between the data base and the information contained in the cartographic base. Figure 1 presents cases of geocoded leprosy according to the home address for the city of Ribeirão Preto in 2004.

Figure 1 – Geocoded leprosy cases for the city of Ribeirão Preto, 2004

The analysis of the thematic map and the georeference cases showed that leprosy cases are concentrated in the North (20 cases), composed by traditionally poor neighborhoods. Studies show a strong relation between leprosy and socioeconomic conditions in Brazil and the world[13-14], in combination with fast population growth, population movements from rural areas to cities, shantytowns, among others.

The analysis of the spatial distribution of leprosy in the state of São Paulo, in the period from 1991 to 2002, showed high levels of detection in the West, suggesting its contribution to new cases in the Center East regions of the country. In the Northwest of the State, high rates were also observed[15].

An ecological study performed in Recife, PE, Brazil appointed, through the analysis of leprosy distribution, three areas where neighborhoods with high levels of disease detection and low levels of living conditions were concentrated. The study findings confirmed that Recife can be considered an area of high endemicity for leprosy, with an annual detection coefficient of more than 4.0 cases per 10,000 inhabitants[16]. Another study performed in Olinda, PE indicates that the heterogeneous spatial distribution of the disease in the municipality is not random. Instead, the aggregation pattern in the space is associated to the population's living conditions and expressed by a poverty indicator. Thus, the instrument used to stratify the city in risk areas was useful to define priorities of health actions, supporting the planning of different strategies adequate to specific situations[17].

Brazil occupies the uncomfortable second position in the list of endemic countries in the world, preceded only by India. Control actions of endemic leprosy, based on individual measures of early diagnosis and case treatment, are absolutely incapable of containing the transmission process. There is no change in the population's living conditions. Therefore, the infectious agent rapidly recovers its previous strength when the intensity of application of control measures is diminished. In this case, the disease potential has not been reduced, but simply partially neutralized by the presence of health services. Thus, in order to eliminate leprosy in areas that are still considered endemic, like in the case of Brazil, it is important to understand the epidemiology of this disease in countries that have already managed to eliminate it, and well as to precisely situate the critical areas requiring special treatment, that is, to study the cities that have not managed to eliminate the disease, permitting its elimination.

The use of maps allows for the easy visualization of risk situations, coherent with an epidemiological concept of space surveillance, based on the possibility of important interactions, highlighting the importance of inter-setorial actions in the improvement of the quality of information collection, registry and availability which can be useful in the planning and monitoring of health actions.

CONCLUSION

The obtained results contribute to knowledge about the spatial distribution of leprosy in Ribeirão Preto in 2004, highlighting the importance of the space category as a methodological alternative in the planning, monitoring and assessment of health actions, directing interventions to decrease inequities. The non-homogeneous distribution of leprosy in Ribeirão Preto suggests an association with poverty, a variable that is strongly related with the occurrence of the disease.

The use of the GIS, due to its integrative capacity, allowed for the visualization of leprosy cases in the urban space of Ribeirão Preto, contributing to the process of planning actions to eliminate the disease in priority areas of the city, as well as to monitor and evaluate the activities performed. This observation is in agreement with WHO and MH orientations to eliminate leprosy as a public health problem, emphasizing the importance of each city analyzing its own data, planning and developing actions that are appropriate and adjusted to its own epidemiological reality.

We believe that the decision making process in health can be implemented through the graphical referencing of data, because it permits the detection of specificities related to the localization of events, and thus contributes to the formulation of more effective intervention proposals. From this point onwards, a gradual process can start to incorporate and intensify the use of this methodology, useful for the qualitative advancement of health services.

In view of the current context, the importance of disseminating research results in the knowledge production process is highlighted[18]. However, in the

last decade, there has been a concern about the reduced number of studies on leprosy[2]. There is a need to invest in basic and operational-epidemiological knowledge that allow for the reduction of endemicity, with a view to the eradication of infections by *M.leprae*.

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