Spotted fever: An epidemiological analysis in Brazil

Febre maculosa: Uma análise epidemiológica no Brasil

Fiebre maculosa: Un análisis epidemiológico en Brasil

RESUMO

Objetivo: Caracterizar o perfil epidemiológico da febre maculosa no Brasil, no período de 2007 a 2017. Métodos: Estudo transversal, descritivo, retrospectivo e qualiquantitativo, de 2007 a 2020, e os dados coletados a partir das informações disponíveis no TABNET/DATASUS. Os dados coletados foram: ano, mês, município, incidência de casos, faixa etária, sexo, zona de residência, critério de confirmação e evolução da doença. Resultados: Foram notificados 2.295 casos de febre maculosa no Brasil, apresentando prevalência de 1,07/100.000 hab. Dentre os casos, 71,5% concentraram-se na Região Sudeste e 25,1% na Sul. Os indivíduos acometidos se destacaram por ser a maioria do sexo masculino e faixa etária de 40 a 59 anos. Evoluíram para óbito 34,4% dos casos. Conclusões: Devido à alta letalidade desta zoonose, ações de controle e prevenção da doença voltadas as regiões com maior prevalência devem ser realizadas a fim de reduzir a ocorrência de casos e principalmente de óbitos.

DESCRITORES: Amblyomma; Monitoramento Epidemiológico; Rickettsia rickettsii.

ABSTRACT

Objective: To characterize the epidemiological profile of spotted fever in Brazil from 2007 to 2017. Methods: A cross-sectional, descriptive, retrospective and qualitative-quantitative, 2007 to 2020, consisting of data collected from the information available in TABNET/DATASUS. The following data were collected: year, month, municipality, incidence of cases, age group, sex, area of residence, confirmation criteria and disease evolution. Results: Were reported in Brazil 2,295 cases of spotted fever, with a prevalence of 1.07/100,000 inhabitants. Among the cases, 71.5% were concentrated in the Southeast and 25.1% in the South. The affected individuals stood out for being mostly male and aged between 40 and 59 years. Regarding the criterion for case confirmation, 89.4% were by laboratory diagnosis. As for evolution, 34.4% to death. Conclusions: Due to the high lethality of the zoonosis, disease control and prevention actions aimed at regions with the highest prevalence should be carried in order to reduce the occurrence of cases and mainly deaths.

DESCRIPTORS: Amblyomma cajennense. Epidemiological monitoring. Rickettsia rickettsii.

RESUMEN

Objetivo: Caracterizar el perfil epidemiológico de la fiebre maculosa en Brasil, de 2007 a 2017. Métodos: Estudio transversal, descriptivo, retrospectivo y cualiquantitativo, 2007 a 2020, y los datos recolectados a partir de la información disponible en TABNET / DATASUS. Los datos recogidos fueron: año, mes, municipio, incidencia de casos, grupo de edad, sexo, zona de residencia, criterios de confirmación y evolución de la enfermedad. Resultados: Se notificaron 2.295 casos de fiebre manchada en Brasil, con una prevalencia de 1,07 / 100.000 hab. Entre los casos, el 71,5% se concentraron en el Sudeste y el 25,1% en el Sur. Los afectados destacaron por ser en su mayoría hombres, y con edades comprendidas entre los 40 y los 59 años. La evolución, el 34,4% a muerte. Conclusiones: Debido a la alta letalidad de esta zoonosis, las acciones de control y prevención de enfermedades dirigidas a las regiones con mayor prevalencia deben realizarse con el fin de reducir la ocurrencia de casos y principalmente muertes.

DESCRIPTORES: Amblyomma cajennense. Seguimiento epidemiológico. rickettsia rickettsii

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INTRODUCTION

Rocky Mountain spotted fever is an endemic zoonotic disease in Brazil, caused by the gram-negative bacterium Rickettsia rickettsii, an intracellular coccobacillus. Transmission occurs through the bite of a tick infected by Rickettsia, the main vector being the species Amblyomma cajennense, but for transmission to occur, the tick must remain attached to the host for a period of over 4 hours. The infected vector can transmit the disease throughout its life, which lasts from 18 to 36 months. [1,2]

Human beings do not participate in the spread of the disease, they only accidentally become infected when living in areas with the presence of the infected vector. [3]

The disease presents nonspecific clinical symptoms at the beginning, such as headache, fever and myalgia, and after 3 to 4 days of evolution, the exanthema usually appears. This fact is very important, as the disease can be fatal if not diagnosed early, and if not properly treated, it can progress to limb edema, hepatosplenomegaly, renal, gastrointestinal, hemorrhagic, pulmonary and neurological manifestations, progressing to death in approximately 6 days. [4]

Rocky Mountain spotted fever is considered an important public health problem, as its transmission area increases annually, reaching urban centers, in addition to presenting a high risk due to its high lethality. [5]

The lethality rate of the disease in Brazil is related to the delay in diagnosis, which ends up compromising the therapeutic treatment. Brazil has a case fatality rate of 20 to 30% due to spotted fever. [6]

In Brazil, the disease is notifiable, according to Ordinance No. 1943, of October 18th, 2001[7]. That is why it is notified in SINAN (National System of Notifiable Diseases), with the completion of the notification and investigation form, which becomes an important source of information and surveillance that assists in decision-making regarding public policy actions and disease control and prevention measures. [8]

Studies related to the collection of information about a given disease is essential to help in its control, as it allows the knowledge of its epidemiological profile, enabling the development of public policy actions aimed at prevention. [9]

Even with the implementation of actions by the Unified Health System (SUS) to prevent the disease, there are still many challenges to be overcome. Decision making in face of a problem must always take into account social, cultural and epidemiological contexts, in addition, access to information is fundamental for the effectiveness of prevention and control actions. [10] In this context, this research aimed to characterize the epidemiological profile of spotted fever in Brazil, from 2007 to 2020, aiming to indicate action strategies with the objective of controlling and preventing the occurrence of this disease.

METHODS

For this research, a cross-sectional, descriptive, retrospective, qualitative-quantitative and epidemiological study was carried out, using the Brazilian states as units of analysis.

The sample was limited to the period from 2007 to 2020, and data were obtained during the months of January and February 2022, based on information available on the Ministry of Health's TABNET/DATASUS website, without identifying the subjects. As it used public data, the research was exempted from evaluation by the Research Ethics Committee, according to Resolution No. 510/2016 of the National Health Council (CNS).

The variables collected and analyzed were: year, month, municipality, inci-

$$\text{Prevalence Coefficient} = \frac{\text{number of reported cases}}{\text{estimated population}} \times 100.000$$

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dence of cases, age group, sex, area of residence, confirmation criteria and disease evolution. The variables were tabulated in Microsoft Office Excel® software spreadsheets and only those that were within the study period were analyzed.

Data referring to the total population were obtained by consulting the website of the Brazilian Institute of Geography and Statistics (IBGE).

After collecting the data and calculating the indexes, the results were analyzed using simple descriptive statistics and presented in the form of graphs and tables.

RESULTS

During the study period, 2,295 cases of spotted fever were reported in Brazil, with a prevalence of 1.07/100,000 inhab. The distribution of cases by region is described in Figure 1.

Among the reported cases, 71.5% were concentrated in the Southeast region (prevalence of 1.97/100,000 inhab) and 25.1% in the South (prevalence of 1.92/100,000 inhab). The other regions had few cases and this fact may be related to underreporting and not the absence of cases, so studies related to the diagnosis of this zoonosis in these regions should be carried out.

The occurrence of spotted fever in Brazilian states during the period studied is shown in Figure 2.

The states that stood out in terms of number of notifications were São Paulo (44.1%), Santa Catarina (21.3%), Minas Gerais (16.6%) and Rio de Janeiro (8.2%).

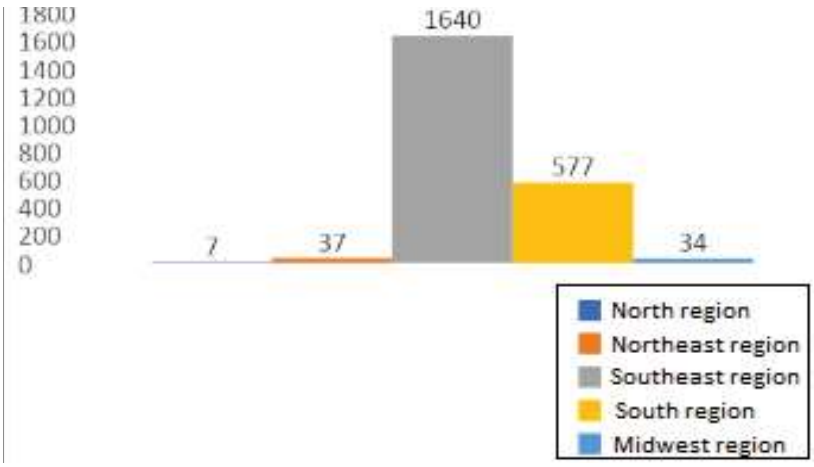
The prevalences found were 2.2/100,000 inhab. in São Paulo, 6.79/100,000 inhab. in Santa Catarina, 1.78/100,000 inhab. in Minas Gerais and 1.08/100,000 inhab. in Rio de Janeiro.

Regarding the profile of the affected individual, the data collected are described in Table 1.

The affected individuals stood out for being the majority male, white, having basic education and age range from 40 to 59 years.

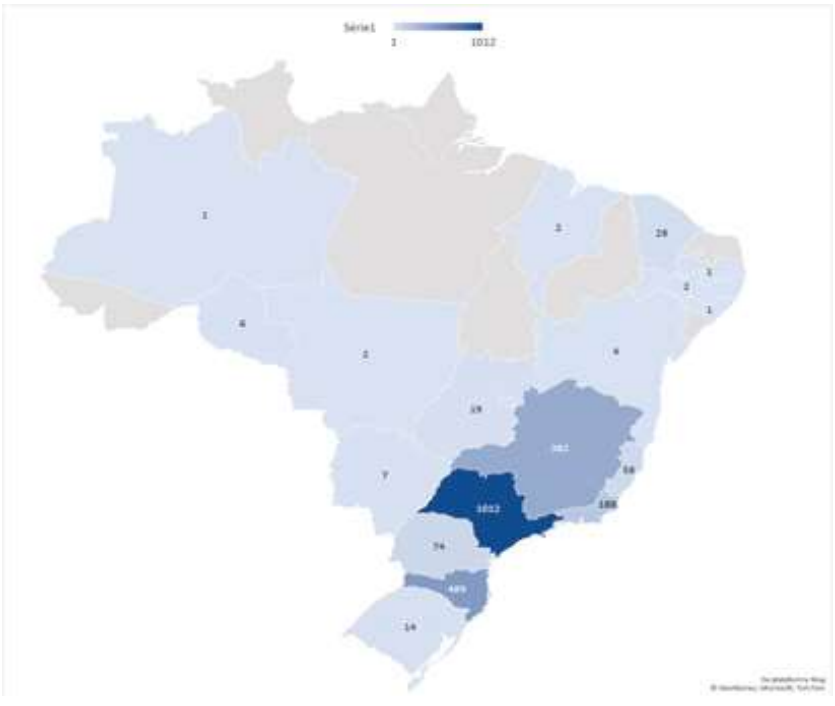
This finding in this research may indicate that in rural and peri-urban environments the workforce is predominantly male, which promotes greater contact between this public and the vector. Another factor that corrobora-

Figure 1. Distribution of spotted fever cases in Brazil, according to regions of the federation, from 2007 to 2020



Source: Own Author

Figure 2. Distribution of spotted fever cases in Brazil, according to states, from 2007 to 2020



Source: Bing, ©GeoNames - Microsoft, TomTom

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tes this hypothesis is the fact that there are more cases of infection in such areas (Figure 3). The data available from this index were only up to 2017.

Most cases occur in rural areas, but it was noted in this research, a high number of cases also in urban areas.

When analyzing the monthly distribution of cases, the results are described in Figure 4.

There were notifications of cases during all months, but there was an increase in the number of cases from June to October and the beginning of a decline in November.

In addition, the high occurrence of rainfall impairs the reproduction of the vector, so from November onwards, as shown in Figure 3, there is a decrease in cases, due to the lower proportion of vectors present, as this is the period that starts the highest rate of rainfall in Brazil.

Regarding the criterion for confirming the case, 89.4% were through laboratory diagnosis, 8.8% clinical epidemiological and 1.8% ignored. And as for the evolution, 63.5% evolved to a cure, 34.4% to death, 5% ignored and 1.2% died from another cause.

DISCUSSION

The high occurrence of spotted fever cases in these states is related, in addition to the high density of vectors and reservoirs they have, the proximity between them, the high population density, the increase in deforestation that facilitates the dissemination of plants for consumption in the reservoirs, such as the capybara. [11]

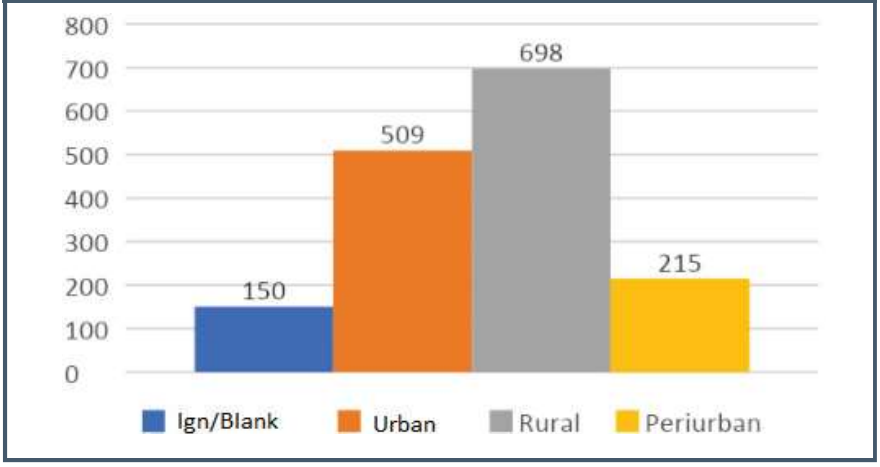
In Campinas, São Paulo, a municipality with a high prevalence of the disease, capybara (Hydrochoerus hydrochaeris) plays a fundamental role in the epidemiological chain of the disease, as it acts as a reservoir, providing an increase in the number of infected vectors, because it has the ability to maintain high levels of the pathogen in the bloodstream. Thus, the increase in cases of the di-

Table 1. Profile of individuals affected by spotted fever in Brazil, 2007 to 2020

GENDER	RACE	EDUCATION	AGE GROUP
Female – 29,8%	White – 62,4%	Illiterate – 0,9%	0-9 – 11%
Male – 70,2%	Black – 4,8%	Basic Education – 16,6%	10-19 – 10,9%
	Yellow – 0,4%	Elementary School – 16,9%	20-39 – 30%
	Brown – 22,4%	High School – 17,2%	40-59 – 34,8%
	Indigenous – 0,3%	Higher Education – 5,5%	Over 60 – 13,2%
	Ignored – 9,7%	Doesn't apply – 8,2%	
		Ignored – 38,8%	

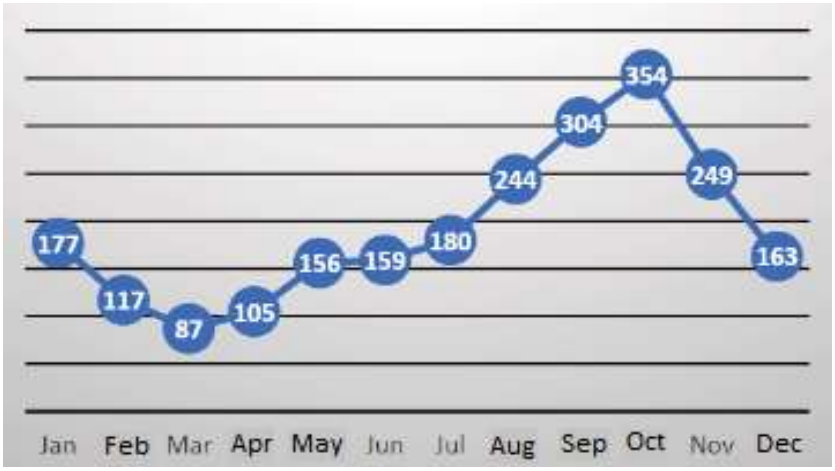
Source: Own Author

Figure 3. Spotted fever infection zone in Brazil, 2007 to 2017



Source: Own Author

Figure 4. Mean monthly distribution of spotted fever cases in Brazil, 2007 to 2020



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sease in humans is related to the increase in the population of this rodent. [5,12]

Data from research carried out in Brazil, in the state of São Paulo and by the Ministry of Health corroborate those found in the current one, reinforcing that most cases occurred in male individuals in an economically active age group, between 20 and 59 years of age. [13-15]

Most of those affected had a low level of education and this fact may be related to the vulnerability of the population being greater in people with a lower level of knowledge and information. [16]

The present research also corroborated a study carried out in the United States, whose incidence and risk of mortality from Rocky Mountain spotted fever was higher in adult men who practiced work activities in rural areas. In addition to occupational exposure, males may also have a greater chance of dying from the disease due to the tendency to not seek medical help in a timely manner, as usually when they seek the case it has already worsened. [17]

Another issue that accentuates the risk of contagion by spotted fever is the practice of ecotourism, exploration of areas of dense woods/forests and also the construction of houses in these risk areas, since it is usually in these places that reservoirs and vectors are found. [18]

It is important to point out that the risk of contagion only exists if the etiological agent (Rickettsia ricketsii), the vector (Amblyomma cajennensee), combined with the presence of reservoirs (capybaras, skunks and small rodents) and amplifying hosts (horses and dogs). [19]

In addition, rural and peripheral populations are generally vulnerable to social and environmental determinants, being even more exposed to the risk of contagion. [16]

The increase in the number of cases of spotted fever in urban areas may be related to the increase in the area of transmission of the disease, which makes it an important public health problem, because it affects urban centers, in addition to presenting high risk due to its high lethality. [5] The number of cases in urban areas has increased due to the availability of pastures and riparian forests of rivers and lakes that serve as shelter and food for reservoirs of the agent and vector (mainly capybaras). [21]

The lethality rate of the disease in Brazil is related to the delay in diagnosis, which ends up compromising the therapeutic treatment. Brazil has a case fatality rate of 20 to 30% due to spotted fever.

There was an increase in cases from June to October and the beginning of a decline in November. This fact is justified because the tick's reproductive cycle occurs throughout the year, but has its peak of development in hot months, which provides greater presence of ticks in the months of August onwards. In the colder months the development processes of each phase can be delayed or even paused momentarily. [21,22]

Brazil had a case fatality rate of 20 to 30% from spotted fever as early as 2009 9, and this data corroborates those found in this research (34%). It is suggested that this high fatality rate is related to the delay in diagnosis, which seriously compromises the effectiveness of the therapeutic treatment, since the disease causes death about six days after the onset of symptoms. [4,18]

Thus, when admission and initiation of treatment are delayed, the outcome will certainly be negative. Diagnostic errors also compromise treatment, and some studies reveal that the first suspicion of a case of spotted fever is confused with dengue, a highly disseminated arbovirus in the country, and these cases progressed to death due to incorrect clinical suspicion. [4,18]

CONCLUSION

In this research, it can be observed that the highest prevalence of cases of spotted fever in Brazil occurred in male individuals, with low education and aged between 20 and 59 years. In addition, most cases were concentrated in the Southeast and South regions, with emphasis on the states of São Paulo, Santa Catarina, Minas Gerais and Rio de Janeiro.

Due to the high lethality of this zoonosis described in this research, disease control and prevention actions aimed at the regions with the highest prevalence should be carried out with a focus on awareness, addressing the identification of signs and symptoms of the disease, vector control measures and prevention of contamination, in order to reduce the occurrence of cases and especially deaths.

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