Chapter 134

Epidemiological study of Congenital Syphilis in the State of Pará from 2010 to 2021

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ABSTRACT

Introduction: Congenital syphilis is an infectious disease responsible for affecting the lives of thousands of Brazilian women and that, perceptibly, has been growing, even with the reality of underreporting in the country, due to the low quality of health care for such women. **Objective:** To evaluate the epidemiological profile of congenital syphilis in the state of Pará from 2010 to 2021. **Methods:** Descriptive and cross-sectional research of notified and confirmed cases of congenital syphilis, through the National System of Notifiable Diseases (SINAN). The variables were analyzed: health region, education, gender, age group, race, the performance of prenatal care, and treatment of the maternal partner. **Results:** Of the total of 7,595 cases, the highest occurrence was in the year 2019 (n = 945). Concepts up to six days old were the most affected age group (95.78%). Regarding the epidemiological characteristics of the genitor, the predominance was of brown color (82.57%) and who had prenatal care (84.6%). Untreated sexual partners totaled 4,663 (61.4%), approximately four times more than treated partners, 1,365 (18.0%). **Conclusion:** The study showed a significant increase in cases of the disease in the state of Pará, being the group of brown mothers with low education the most affected and with previously untreated partners. Moreover, it was evident that even with prenatal care the infection developed, confirming the fragile care system offered to pregnant women. Thus, this study contributes to helping the authorities in the creation and improvement of effective measures, since the relevant obstacles were addressed.

Keywords: Congenital Syphilis, Sexually Transmitted Infections, Prenatal Diagnosis.

1 INTRODUCTION

Congenital syphilis is a bacterial infectious disease caused by the etiological agent *Treponema pallidum*, and transmission occurs through hematogenous dissemination (transplacental route) in untreated or inadequately treated pregnant women and may evolve to, during pregnancy/delivery, miscarriage, stillbirth, and perinatal death (BENITO and SOUZA, 2016; ICOSSOBOCK, 2018).

Despite being an easily preventable disease during prenatal care, with known diagnosis and mode of transmission, it occupies a prominent place in the world, especially in underdeveloped countries, in which infection control remains a major challenge for care services and epidemiological surveillance (FEITOSA et al., 2016; ARRUDA and RAMOS, 2020).

Thus, the number of women who do not yet have access to prenatal care is worrisome, however, among women who have the possibility of performing the consultations, some do not return to seek the results of the tests, those who had a positive diagnosis of syphilis, but are not treated or the treatment is not adequate, and pregnant women who do not have their partners treated concomitantly during pregnancy (MOTA, et al., 2020).

Given this conjuncture, several factors are associated with the continuous infection by the bacterium by many women, among which are: lack of information, limited access to health care (non-performance of prenatal care), low socioeconomic level, co-infection by the human immunodeficiency virus (HIV), teenage pregnancy, the non-treatment of the infected partner, the existence of people infected by the bacterium, but asymptomatic, the lack of condom use and the use of drugs (SILVA et al., 2019; RIBEIRO et al., 2020).

In addition, it is estimated that per year worldwide, about one million pregnancies are affected by syphilis, resulting in more than 350,000 adverse pregnancy outcomes, of which more than 200,000 were stillbirths or neonatal deaths (WHO, 2017). It is noteworthy that, since 1986, congenital syphilis is considered a notifiable disease for epidemiological surveillance purposes, however, in Brazil, up to 67% of cases are underreported annually (PADILHA and CAPORAL, 2020). Between 2008 and 2018, the incidence rate of congenital syphilis was 2/1,000 live births to 9/1,000 live births, evidencing a significant increase in the epidemiological rate in Brazil (BRASIL, 2020).

From this perspective, it can be inferred, then, that due to underreporting, the estimated number of cases of congenital syphilis becomes highly inaccurate. The estimates of syphilis indicators may be higher than those reported, because the quantification of cases depends on the ability of the public service to intervene to reduce vertical transmission, correctly diagnose and treat pregnant women and their respective partners, and identify and notify cases of congenital syphilis (CARVALHO and BRITO, 2014; SIGNOR et al., 2018).

Thus, a low number of cases of congenital syphilis does not necessarily indicate a good program to control vertical transmission, since cases of congenital syphilis may be occurring, but are not being reported (DOMINGUES et al., 2016). However, a high number indicates weaknesses in the care process, with

missed opportunities for intervention. The persistence of inadequacies in the logistics of controlling this disease of compulsory notification is associated with obstacles and failures in prenatal care, very present in Brazil (ALCÂNTARA et al., 2017).

In this scenario, it is extremely important to carry out epidemiological studies in the states of the northern region of Brazil, to enable epidemiological surveillance of diseases, and to direct new control and prevention strategies. Thus, the present study aims to evaluate the epidemiological profile of congenital syphilis in the State of Pará in the period from 2010 to 2021.

2 METHODOLOGY

This is a cross-sectional and descriptive study of the confirmed cases of syphilis and NGOs reported and registered in the National System of Notifiable Diseases (SINAN) for the period between 2010 and 2021, which occurred in the state of Pará (PA).

The study area was the state of Pará, which is located in the northern region of Brazil and has a territorial extension of 1,245,870,707 km2, in addition to a population of approximately 8.7 million inhabitants (INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA, 2020). Thus, from this territorial extension of the state, the specific areas of study were the health regions:

1) Araguaia - Água Azul do Norte, Bannach, Conceição do Araguaia, Cumaru do Norte, Floresta do Araguaia, Ourilândia do Norte, Pau D'Arco, Redenção, Rio Maria, Santa Maria das Barreiras, Santana do Araguaia, São Félix do Xingu, Sapucaia, Tucumã and Xinguara;

2) Lower Amazon - Alenquer, Almeirim, Belterra, Curuá, Faro, Juruti, Monte Alegre, Óbidos, Oriximiná, Prainha, Santarém, Mojuí dos Santos and Terra Santa);

3) Carajás - Abel Figueiredo, Bom Jesus do Tocantins, Brejo Gr ande do Araguaia, Canaã dos Carajás,Curionópolis, Dom Eliseu, Eldorado dos Carajás, Itupiranga, Marabá, Nova Ipixuna, Palestina do Pará, Parauapebas, Piçarra, Rondon do Pará, São Domingos do Araguaia, São Geraldo do Araguaia, and São João do Araguaia;

4) Tucuruí - Breu Branco, Goianésia do Pará, Jacundá, Novo Repartimento, Thailand and Tucuruí;

5) Marajó - Afuá, Anajás, Bagre, Breves, Cachoeira do Arari, Chaves, Curralinho, Gurupá, Melgaço, Muaná, Ponta de Pedras, Portel, Salvaterra, Santa Cruz do Arari, São Sebastião da Boa Vista and Soure;

6) Metropolitan I - Ananindeua, Belém, Benevides, Marituba, Santa Bárbara;

7) Metropolitana II - Acará, Bujaru, Colares, Concórdia do Pará, Santa Isabel do Pará, Santo Antônio do Tauá, São Caetano de Odivelas, Tomé-Açu and Vigia;

8) Metropolitan III - Aurora do Pará, Castanhal, Capitão Poço, Curuçá, Garrafão do Norte, Igarapé-Açu, Inhangapi, Ipixuna do Pará, Irituia, Mãe do Rio, Magalhães Barata, Maracanã, Marapanim, Nova

Esperança do Pará, Paragominas, Santa Maria do Pará, São Domingos do Capim, São Francisco do Pará, São João da Ponta, São Miguel do Guamá, Terra Alta, Ulianópolis;

9) Caetés River - Augusto Corrêa, Bonito, Bragança, Cachoeira do Piriá, Capanema, Nova Timboteua, Ourém, Peixe Boi, Primavera, Quatipuru, Salinópolis, Santa Luzia do Pará, Santarém Novo, São João de Pirabas, Tracuateua and Viseu;

10) Rio Capim - Abel Figueiredo, Aurora do Pará, Bujaru, Capitão Poço, Concórdia do Pará, Garrafão do Norte, Irituia, Mãe do Rio, Nova Esperança;

11) Tapajós - Aveiro, Itaituba, Jacareacanga, Novo Progresso, Rurópolis and Trairão;

12) Tocantins - Abaetetuba, Baião, Barcarena, Cametá, Igarapé Miri, Limoeiro do Ajuru, Mocajuba, Moju, Oeiras do Pará;

13) Xingu - Altamira, Anapu, Brasil Novo, Medicilândia, Pacajás, Placas, Porto de Moz, Senador José Porfírio, Uruará and Vitória do Xingu.

For the analysis of sociodemographic and healthcare information, the following variables were used: health region, schooling, gender, age group, race, prenatal care, and treatment of the maternal partner. This information was tabulated in the Microsoft Excel 2016 program to acquire the frequencies of the data for the construction of graphs and obtaining the disease contention.

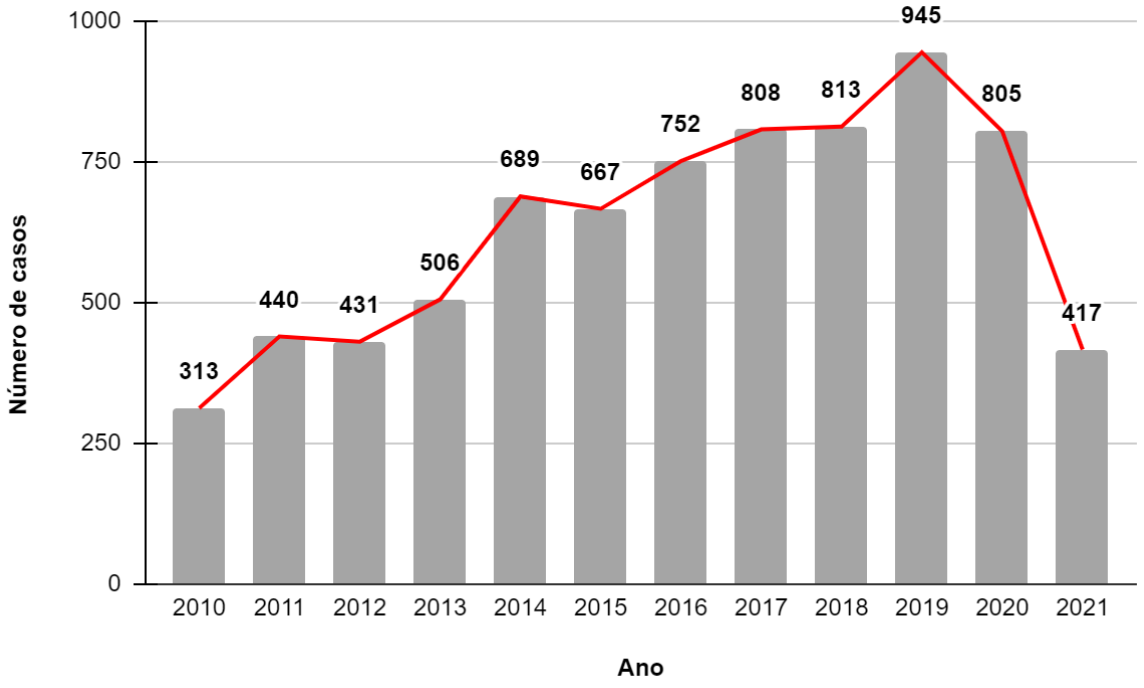
The data used in this study were obtained from secondary sources, that is, in the public domain. Thus, submission and approval by the Research Ethics Committee were not required.

3 FINDINGS

In the present study, between the years 2010 and 2021, it was possible to observe a total of 7,595 reported cases of congenital syphilis in the state of Pará, with 2019 being the year that presented the highest number of cases, with 945 cases registered and 2010 presenting the less, with only 313 cases registered(**Graph 1**).

Given this, there was a trend of varied growth until the year 2020, in the number of new and confirmed cases, with the notification this year of 805 cases. However, as of 2020, a significant number of newly reported cases has been analyzed, with only 417 in 2021.

Graph 1 - Temporal distribution of the number of cases of congenital syphilis in the state of Pará.



Source - Information System on Notifiable Diseases (SINAN), 2022.

In the study period, the health regions with the highest number of cases of congenital syphilis in the state of Pará were: Metropolitan I (n=2,327), located in the northeast of Pará, and Carajás (n=1,828), located in the southeast of Pará (**Table 1**).

Table 1 - Number of cases of congenital syphilis by health region of the state of Pará in the period from 2010 to 2021.

Health Region	n	%
Araguaia	189	2,54
Lower Amazon	646	8,66
Carajás (disambiguation)	1.828	24,48
Lake Tucuruí	285	3,81
Metropolitan I	2.327	31,16
Metropolitan II	22	0,29
Metropolitan III	372	4,99
Caetés River	512	6,86
Tapajós	282	3,77
Tocantins	439	5,87
Xingu	281	3,76
Marajó I	37	0,49
Marajó II	248	3,32

Source - Information System on Notifiable Diseases (SINAN), 2022.

According to Table 2, the fetuses up to six days of life obtained a total of 7,274 (95.78%) cases, representing the most affected age group and reflecting early diagnosis still in the neonatal period. Between 7-27 days and 28 days to 1 week, very reduced proportions of the disease were observed, with values of 180 (2.37%) and 113 (1.49%) cases, respectively. In addition, the age groups of the first year of life, 2-4 and 5-12 years together added up to 28 cases, 0.36% of the total cases. Regarding the biological gender, the male sex presented 3749 (49.36%) cases, a value close to that of the female sex, which presented a total of 3584 (47.18%) records.

Table 2 - Sociodemographic and climactic variables of congenital syphilis cases in the state of Pará from 2010 to 2021.

Characteristic	n	%
Age group		
Up to 6 days	7.274	95,78
7-27 days	180	2,37
28 days to <1 year	113	1,49
1 year (12 to 23 months)	11	0,14
2 to 4 years	11	0,14
5 to 12 years	6	0,08
Sex		
Male	3749	49,36%
Female	3584	47,18%
Ignored	262	3,46%
Mother's schooling		
Ign/White	2.054	27,04
Illiterate	71	0,93
1st to 4th series incomplete EF	678	8,92
4th complete EF series	341	4,48
5th to 8th EF incomplete series	1.838	24,20
Complete elementary school	563	7,41
Incomplete high school	931	12,25
Completed high school	940	12,37
Incomplete higher education	67	0,88
Complete higher education	56	0,73
Not applicable	56	0,73
Race		
Ign/White	817	10.76%
White	362	4.77%
Black	115	1.51%
Yellow	6	0.08%
Brown	6271	82.57%
Indigenous	24	0.32%
Prenatal Care		
Yes	6.426	84,6%
No	961	12,7%

Ignored	208	2,7%
Partner Treatment		
Yes	1.365	18,0%
No	4.663	61,4%
Ignored	1.567	20,6%

Source - Information System on Notifiable Diseases (SINAN), 2022.

It is also noteworthy the predominance of cases in mothers with less than 7 years of schooling, indicating low severe schooling. In addition, brown race was predominant with 6271 (82.57%) of cases, followed by whites with 362 (4.77%), blacks with 115 (1.51%), and with the minimum percentage among the indigenous with only 24 (0.32%) notifications.

Nevertheless, according to Table 2, the prevalence among mothers who underwent prenatal care is observed, being positive in 6,426 (84.6%) and negative in 961 (12.7%) of the patients analyzed. The percentage of untreated sexual partners was significant, with a total of 4,663 (61.4%), approximately four times higher than the numbers for treated partners, 1,365 (18.0%).

4 DISCUSSION

Congenital syphilis is a disease closely associated with certain high-risk groups, such as women with very low or vulnerable socioeconomic characteristics. The occurrence of the disease shreds of evidence failures in health services, especially prenatal care, given that early diagnosis and treatment of pregnant women is relatively simple and very effective measures in the prevention of the disease (SALGUEIRO, 2016).

In the present study, a large number of cases of congenital syphilis have been observed in the state of Pará in recent years. This result is similar to that presented by Mota et al. (2020) in a study conducted in the municipality of Belém from 2007 to 2018 with a total of 2,078 reported cases, showing that the high quantity is present in the northern region of Brazil. This incidence may be related to several factors: relaxation of preventive measures by authorities and health agents; sexual precocity; an increasing number of single mothers; lack of knowledge on the part of the population about the severity of the disease; AIDS and the absence or inadequacy of prenatal care.

Through these data, it was found that the majority of cases of congenital syphilis in the state of Pará continued to grow until 2019, but in 2020 there was a considerable decline in the number of confirmed cases documented in the database provided by the Ministry of Health (MS). Silva et al. (2021) relate this decrease in the number of registered cases to the reduced search for syphilis diagnoses and the focus on the pandemic and SARS-CoV-2 (Coronavirus or Covid-19), and there may be negligence on the part of the population regarding other diseases.

Regarding the health regions of the state of Pará, the ones that were most affected are Metropolitana I, Carajás, Baixo Amazonas, Rio Caetés, and Tocantins. This large number of cases may be related to the

greater number of notifications over time and to the progress in epidemiological observation in the region. However, the information observed indicates that maternal and child care has pending issues in the service provided, whether in the educational, preventive, or diagnostic and treatment areas. These results were also observed in the work of Da Silva et al. (2019) with the same regions worked in this study.

Regarding the biological sex, the male sex showed a similarity in the number of cases of congenital syphilis concerning the female, given that it agrees with what was presented by Salgueiro (2016) and Moreira et al. (2017). Thus, due to the lack of significance of the result, it is suggested that this variable has no relevant association with the incidence of infection.

In addition, in this study, it was found that the number of cases of congenital syphilis prevailed in brown mothers with a low level of education - results that present similarities with other studies, such as the one presented by Conceição et al. (2019). This finding can be explained by the association of this variable with mothers belonging to a less favored social stratum, given that, possibly, they rely not only on the lack of access to the information necessary to avoid this infection and the consequent vertical transmission of *Treponema pallidum* but also on the lack of knowledge of the importance of a complete treatment in case of a positive diagnosis of the disease.

Quality prenatal care is a key element for the reduction of cases of congenital syphilis since there is a diversity of tools that can serve as intervention measures. In the previous study, in 84.6% of the cases prenatal care was performed, but it was not efficient to prevent infection, which thus shows weaknesses in the quality of such care, even though the capture of pregnant women is adequate. Thus, the need for adjustments in the Family Health Strategy in identifying, monitoring, and treating cases is reported (LORENZI and MADI, 2001; ALMEIDA, et al., 2015).

In the present research, most cases of congenital syphilis were diagnosed within 6 days of birth, the same data found in a study conducted by Guimarães et al. (2018) in Maranhão. It is noteworthy that the diagnosis of congenital syphilis is complicated by the presence of asymptomatic cases at birth or by the presence of discrete or nonspecific signs and symptoms, in addition to the need for very expensive tests. It is noteworthy, therefore, that early diagnosis in children is also a measure of great relevance and seems to be being effectively carried out in the state of Pará.

It is important to note that the percentage of untreated sexual partners is mostly higher than those treated. The results may be related to the neglect of the treatment of these individuals, since the assistance focused only on the pregnant woman can generate reexposure to the bacteria, if the partner also does not receive the necessary assistance. Moreover, this scenario may also be associated with the low demand of the male figure for basic health care, as highlighted in the research by Holztrattner et al. (2019), in addition to several previous studies in other regions of the country.

It is worth mentioning that the present study had as a limitation the use of secondary data, which makes it susceptible to failures to fill out and/or incompleteness of information in the notification forms,

which directly interferes with the dissemination of information that truly describes the profile and management of cases of congenital syphilis in the state.

Thus, the importance of conducting epidemiological studies focused on congenital syphilis is highlighted, because, through the elucidation of risk factors that are related, there is a better development of public policies and sanitary surveillance to reduce cases of the disease. Health education should be used because it is a preventable disease, as it allows early diagnosis and the establishment of appropriate treatment for infected pregnant women and their partners.

5 CONCLUSION

The State of Pará included, between the years of 2010 and 2021, a significant number of reported cases of congenital syphilis, especially in 2019, which obtained the highest quantity. The regions of Metropolitana I, Carajás, Baixo Amazonas, Rio Caetés, and Tocantins were responsible for presenting the highest incidence rate of the disease. In addition, the fetuses up to 6 days of life were the most affected, which allows us to infer the early diagnosis in the neonatal period. Another important aspect is that infections were mostly prevalent in brown mothers with low levels of education whose partners did not have treatment before syphilis, and their socioeconomic conditions were very low and/or vulnerable. In addition, infections developed even with the performance of the prenatal in most cases. Thus, this study clarifies for the public health administration authorities the various obstacles that cover the cases of syphilis in the State of Pará and shows the need to create and/or review actions and strategies to improve the quality of care for pregnant women.

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