Epidemiological data on congenital and gestational syphilis in the state of Ceará

Dados epidemiológicos de sífilis congênita e sífilis gestacional no Estado do Ceará

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ABSTRACT

Introduction: Vertical transmission of syphilis can occur at any stage of pregnancy, regardless of the stage of the maternal disease. In Brazil, there is a constant increase in the number of cases of syphilis in pregnant women, congenital and acquired syphilis. **Objective:** To identify epidemiological aspects of cases of congenital and gestational syphilis in the State of Ceará. **Methods:** Retrospective descriptive study, with analysis of data on congenital and gestational syphilis in Ceará using the Notifiable Diseases Information System and dataSUS between 2013 and 2023. **Results:** During the studied period, 17,512 cases of syphilis in pregnant women were reported. Most women were diagnosed in the first trimester of pregnancy with 6,258 cases. Regarding the age group, 9,515 are adult women between 20 and 29 years old and regarding the level of education, 3,779 of the cases have incomplete 5th to 8th grade. Regarding race or color, 13,855 women declared themselves mixed race. The total number of cases of congenital syphilis was 12,000 cases, with diagnosis in children less than 7 days old in 98% of cases. **Conclusion:** Cases of gestational syphilis and congenital syphilis were highly prevalent in Ceará, affecting young, sexually active women with low education, predominantly of mixed race, who underwent prenatal care.

Keywords: Syphilis. Congenital syphilis. Infectious Disease Transmission. Epidemiology.

RESUMO

Introdução: A transmissão vertical da sífilis pode ocorrer em qualquer fase da gestação, independente do estágio da doença materna. No Brasil observa-se um aumento constante no número de casos de sífilis em gestantes, sífilis congênita e adquirida. **Objetivo:** Identificar aspectos epidemiológicos de casos de sífilis congênita e gestacional no Estado do Ceará. **Métodos:** Estudo descritivo retrospectivo, com análise dos dados de sífilis congênita e gestacional no Ceará pelo Sistema de Informação de Agravos de Notificação e data SUS entre 2013 e 2023. **Resultados:** Durante o período estudado foram notificados 17.512 casos de sífilis em gestantes. A maioria das mulheres foram diagnosticadas no primeiro trimestre de gestação com 6.258 casos. Sobre a faixa etária, 9.515 são mulheres adultas entre 20 a 29 anos e acerca do nível de escolaridade, 3.779 dos casos possuem 5ª a 8ª série incompleta. Quanto à raça ou cor, 13.855 mulheres se declararam pardas. O total de casos de sífilis congênita foi de 12.000 casos, com diagnóstico em crianças com menos de 7 dias em 98% dos casos. **Conclusão:** Os casos de sífilis gestacional e sífilis congênita estão presentes no Ceará acometendo, em sua maioria, mulheres jovens, sexualmente ativas, com baixa escolaridade, predominantemente da raça parda, que realizaram pré-natal.

Palavras-chave: Sífilis. Sífilis congênita. Transmissão vertical. Epidemiologia.

INTRODUCTION

Syphilis is a sexually transmitted infection (STI) exclusive to humans, caused by the bacterium *Treponema pallidum*. When untreated, it can progress to more severe stages, affecting various organs and systems in the body. The primary mode of transmission is through sexual contact; however, the infection can also be vertically transmitted to the fetus during pregnancy if the woman has untreated or inadequately treated syphilis[1].

Vertical transmission can occur at any stage of pregnancy, regardless of the maternal disease phase. This can result in complications such as miscarriage, stillbirth, prematurity, and congenital manifestations, both early and late[2]. These outcomes can be prevented through early diagnosis and proper treatment during prenatal carel[3].

Diagnosing syphilis requires an evaluation of clinical data, laboratory tests, the patient's history of previous infections, and recent exposure investigations. Treatment involves benzathine penicillin G, the only proven effective medication during pregnancy[1].

In recent years, Brazil has observed a significant increase in the incidence of syphilis, both in pregnant women and the general population, with a marked rise in congenital syphilis cases[2].

OBJECTIVE

To identify the epidemiological aspects of congenital and gestational syphilis cases in the state of Ceará.

METHODS

This retrospective descriptive study analyzed data related to congenital and gestational syphilis in Ceará. Data were obtained from the Notifiable Diseases Information System (Sinan) and transferred from the State Health Departments to the Production Sector of the Information and Informatics Department of the Unified Health System (DATASUS). Additionally, the "Indicators and Basic Data on Syphilis in Brazilian Municipalities" system was consulted to complement the analysis.

The study analyzed cases reported between 2013 and June 2023, focusing on the following aspects: cases of syphilis in pregnant women, congenital syphilis cases, maternal age, maternal education level, maternal race/color, prenatal care, timing of maternal syphilis diagnosis, maternal treatment protocol, clinical classification of syphilis in pregnant women, and the child's age at diagnosis.

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RESULTS

During the study period, 17,512 cases of syphilis in pregnant women were reported in Ceará, with 2022 being the year with the highest number of notifications 2,838 cases (Graphic 1).

Most women were diagnosed with syphilis in the first trimester of pregnancy 6,258 cases (36%), followed by the third trimester 5,663 cases (32%), and the second trimester 4,878 cases (28%). A total of 713 cases (4%) had no data on gestational age. Regarding age groups, 9,515 women (54%) were aged 20 to 29 years, 4,125 (24%) were aged 15 to 19 years, 3,278 (19%) were aged 30 to 39 years, 336 (2%) were 40 years or older, and 256 (1%) were aged 10 to 14 years. In terms of education, 4,515 cases (26%) lacked information, 3,779 (22%) involved women with incomplete elementary education (grades 5 to 8), 3,234 (18%) had completed high school, 2,351 (13%) had incomplete high school, 1,625 (9%) had completed elementary school, 868 (5%) had incomplete education (grades 1 to 4), 670 (4%) had completed 4th grade, 168 (1%) had incomplete higher education, 150 (1%) had completed higher education, 149 (1%) were illiterate, and three cases were classified as not applicable. As for race or skin color, 13,855 women (79%) identified as mixed-race, 1,825 (10%) as white, 940 (5%) as black, 179 (1%) as Asian, 69 (1%) as Indigenous, and 644 (4%) had no information recorded. Among pregnant women with syphilis, the clinical classification was as follows: 5,173 cases (29%) were primary syphilis, 3,835 (22%) were latent syphilis, 3,494 (20%) were tertiary syphilis, 796 (5%) were secondary syphilis, and 4,214 cases (24%) had no information available. Regarding treatment, between 2019 and 2022, 8,553 women (88%) underwent penicillin treatment, 749 (8%) did not receive treatment, 352 (4%) had no information, and 97 (1%) followed other treatment protocols (Table 1). In the same period, an average of 12,000 congenital syphilis cases were reported annually in children under one year of age. The highest number of cases was recorded in 2021, with 1,575 occurrences (Graphic 2).

Regarding the child's age at diagnosis, 11,589 cases (98%) were identified in children under 7 days old, 169 cases (1%) in children aged 7 to 27 days, and 98 cases (1%) in children aged 28 to 364 days. Eleven cases were diagnosed at 1 year old, 10 cases in children aged 5 to 12 years, and five cases in children aged 2 to 4 years. For congenital syphilis cases, the final diagnosis included: 11,865 cases (93%) of recent congenital syphilis, 495 (4%) of miscarriages due to syphilis, 436 (3%) of stillbirths due to syphilis, and 16 cases of late congenital syphilis. A total of 46 deaths from congenital syphilis were recorded in children under one-year-old between 2013 and June 2023.

Regarding the mother's age group, 6,996 cases (55%) involved women aged 20 to 29 years, 2,742 (21%) were aged 15 to 19 years, 2,376 (19%) were aged 30 to 39 years, 265 (2%) were 40 years or older, 137 (1%) were aged 10 to 14 years, and 296 cases (2%) did not have the mother's age recorded. In terms of maternal education, 4,269 cases (33%) involved women with incomplete elementary education (grades 5 to 8), 2,387 (19%) had no education information available, 2,107 (16%) had completed high school, 1,462 (11%) had

Graphic 1 – Cases of syphilis in pregnant women from 2013 to 2023.

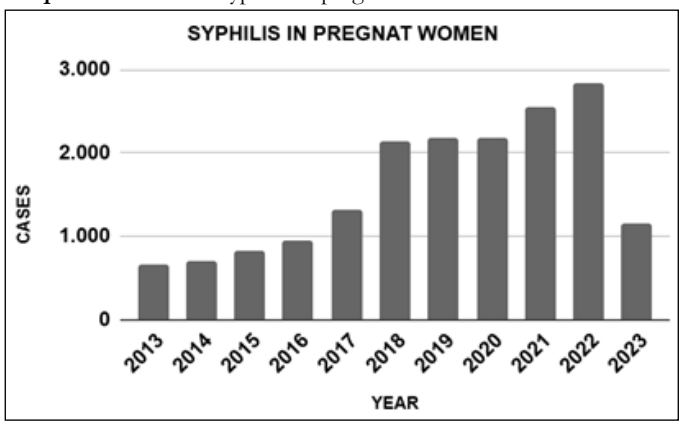

Table 1 – Epidemiological data on pregnant women with syphilis.

Variable	Absolute frequency	Proportion (%)
Gestational age		
1st trimester	6,258	36
2nd trimester	4,878	28
3rd trimester	5,663	32
Unknown gestational age	713	4
Age group (years)		
10 to 14	256	1
15 to 19	4,125	24
20 to 29	9,515	54
30 to 39	3,278	19
40 or older	336	2
Education level		
Illiterate	149	1
1st to 4th grade incomplete	868	5
4th grade complete	670	4
5th to 8th grade incomplete	3,779	22
Elementary school complete	1,625	9
High school incomplete	2,351	13
High school complete	3,234	18
Higher education incomplete	168	1
Higher education complete	150	1
Unknown	4,515	26
Not applicable	3	0
Race or color		
White	1,825	10
Black	940	5
Asian	179	1
Mixed race (Parda)	13,855	79
Indigenous	69	1
Unknown	644	4
Clinical classification		
Primary syphilis	5,173	29
Secondary syphilis	796	5
Tertiary syphilis	3,494	20
Latent syphilis	3,835	22
Unknown	4,214	24
Maternal treatment		
Penicillin	8,553	88
Other regimen	97	1
No treatment	749	8
Unknown	352	4

Source: Authors, 2023.

incomplete high school, 1,030 (8%) had completed elementary education, 799 (6%) had incomplete education (grades 1 to 4), 397 (3%) had completed 4th grade, 93 (1%) had incomplete higher education, 77 (1%) had completed higher education, 153 (1%) were illiterate, and 38 cases were classified as not applicable. For congenital syphilis cases according to the mother's race or skin color, the following data were reported: 11,613 women (91%) identified as mixed race, 652 (5%) as white, 183 (1%) as black, 13 as Indigenous, and 14 as Asian. For 337 cases (3%), information on race was unavailable.

Regarding prenatal care, 84% of the women received prenatal care, 13% did not, and in 3% of the cases, this information was not recorded.Concerning the timing of maternal syphilis diagnosis, 59% of diagnoses occurred during prenatal care, 32% during delivery or curettage, 5% after delivery, and 5% had no diagnosis performed. Additionally, 3% of the cases did not report this information. Finally, regarding maternal treatment, 46% of women received inadequate treatment, 40% did not receive treatment, and 9% had this information unavailable. Only 4% of the women underwent adequate treatment (Table 2).

These data reveal the profile of syphilis patients in Ceará, highlighting the need for appropriate diagnosis, treatment, and follow-up care.

DISCUSSION

Syphilis in pregnant women

In Brazil, 83,034 cases of syphilis in pregnant women were reported in 2022. Of this total, 17,025 cases were reported in the Northeast region, accounting for 20.5% of cases nationwide, second only to the Southeast region, with 38,355 reported cases (46.2%)[4].

In Ceará, 17,512 cases of syphilis in pregnant women were reported between 2013 and July 2023. A significant increase in the detection rate occurred after 2017, rising from 10.3 to 23.6 cases per 1,000 live births in 2022. From 2018 to 2020, the detection rate remained relatively stable, but in 2022, a new peak was observed, with approximately 3,000 reported cases[5].

Analyzing the profiles of affected women, the most prevalent age group for gestational syphilis and for mothers in congenital syphilis cases was 20 to 29 years. Similar findings were reported in a study conducted in São Paulo, which identified this same age

Graphic 2 – Cases of congenital syphilis in children under 1 year of age.

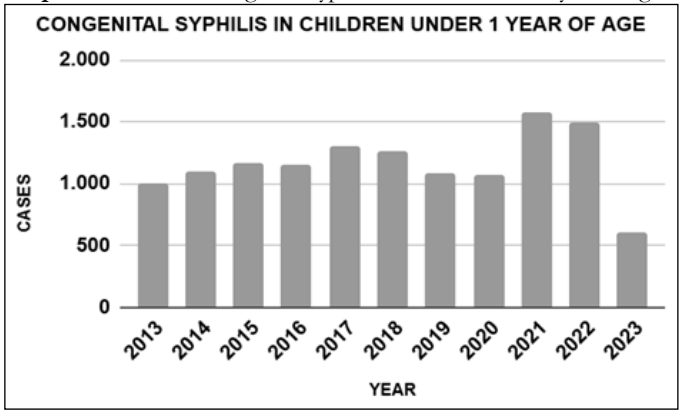

Table 2 – Epidemiological data on congenital syphilis by maternal and gestational aspects.

Variable	Absolute frequency	Proportion (%)
Age of the child at diagnosis		
Less than 7 days	11,589	98
7 to 27 days	169	1
28 to 364 days	98	1
1 year	11	0
2 to 4 years	5	0
5 to 12 years	10	0
Final diagnosis		
Recent congenital syphilis	11,865	93
Late congenital syphilis	16	0
Miscarriage due to syphilis	495	4
Stillbirth due to syphilis	436	3
Maternal age group (years)		
10 to 14	137	1
15 to 19	2,742	21
20 to 29	6,996	55
30 to 39	2,376	19
40 or older	265	2
Unknown	296	2
Race or color		
White	652	5
Black	183	1
Asian	14	0
Mixed race (Parda)	11,613	91
Indigenous	13	0
Unknown	337	3
Maternal education level		
Illiterate	153	1
1st to 4th grade incomplete	799	6
4th grade complete	397	3
5th to 8th grade incomplete	4,269	33
Elementary school complete	1,03	8
High school incomplete	1,462	11
High school complete	2,107	16
Higher education incomplete	93	1
Higher education incomplete	93	1
Higher education complete	77	1
Unknown	2,387	19
Not applicable	38	0
Prenatal care		
Yes	10,77	84
No	1,661	13
Unknown	381	3
Maternal syphilis diagnosis		
During prenatal care	7,597	59
At delivery or curettage	4,079	32
After delivery	676	5
Not performed	56	0
Unknown	386	3
Maternal treatment regimen		
Adequate	542	4
Inadequate	5,713	46
Not performed	4,933	40
Unknown	1,173	9

Source: Author, 2023.

group as predominant[6]. This highlights the need for sexual education and family planning initiatives targeted at women in their most fertile years[7].

Regarding race or skin color, mixed-race women accounted for the majority of cases, a trend similar to the national data, where 52.7% of syphilis diagnoses in pregnant women were among mixed-race individuals[4]. Additionally, research analyzing the epidemiological profile of gestational syphilis in the Northeast found similar data on education and race, with most pregnant women having incomplete elementary education (grades 5 to 8) and identifying as mixed-race[8].

Low educational attainment has been identified as a risk factor for exposure to sexually transmitted infections in studies conducted in Palmas and Macaé[9,10]. Lower education levels are associated with reduced access to information and preventive health measures[11].

The clinical classification revealed that primary syphilis was the most frequent among pregnant women, followed by latent syphilis, corresponding to 5,173 (29%) and 3,835 (22%) cases, respectively. These findings align with Silveira's 2020 study in Minas Gerais[12], which reported primary syphilis as the most prevalent classification among pregnant women. Most pregnant women in this study were diagnosed with syphilis during the first trimester, consistent with national data. In the 2022 national survey, approximately 66.7% of women were diagnosed in the first or second trimester[4]. Ramos et al.[13] suggest that the increasing frequency of syphilis diagnosis in the first trimester may result from improvements in prenatal testing, underscoring its importance. However, weaknesses in prenatal care remain evident due to the persistent rise in congenital syphilis cases.

Early diagnosis is critical to initiating treatment and preventing vertical transmission. Over the years, an increase in the percentage of women diagnosed in the first trimester has been observed, rising from 23.2% in 2012 to 46.1% in 2022[4].

Among the treatment of pregnant women, 8,553 women (88%) received penicillin treatment. Studies report that the provision of penicillin in primary care, when used appropriately, is associated with a reduction in vertical transmission of syphilis[14]. It is important to note that the source used for extracting this data, the "Indicators and Basic Data on Syphilis in Brazilian Municipalities," provides this information only from 2019, which may limit the scope of this analysis.

Congenital syphilis

In 2022, some Brazilian states reported congenital syphilis incidence rates exceeding the national average (cases per 1000 live births). Ceará was among these states, with an incidence rate of 13.3[4].

This study found 12,000 reported cases of congenital syphilis in Ceará between 2013 and July 2023, with the highest incidence rate recorded in 2021.

Historical analysis indicates a growing incidence of congenital syphilis in recent years. Increased access to diagnostic testing, including rapid tests, may contribute to higher detection rates in pregnant women, alongside changes in case definitions. As per the 2017 Informative Note No. 2/2017 DIAV/SVS/MS, any case of syphilis in a pregnant woman during prenatal care, delivery, or postpartum is now classified as gestational syphilis, rather than acquired syphilis[15].

Although most diagnoses in this study were made during prenatal care, ongoing cases of congenital syphilis underscore the need for strategies to raise awareness, engage partners in treatment, and implement effective prevention measures[16].

Approximately 46% of maternal treatments during the study period were deemed inadequate. Adequate treatment is defined as complete treatment with benzathine penicillin G, appropriate to the clinical stage, with the first dose administered at least 30 days before delivery[2].

Torres' study[17] highlights several factors associated with inadequate treatment, including coinfection (syphilis-HIV), low education and income levels, young maternal age, low partner treatment adherence, prenatal care failures, and prescription errors.

Regarding the child's age at congenital syphilis diagnosis, 98% were diagnosed within the first 7 days of life. Similar findings were reported in Rio Grande do Norte, where 97.3% of cases were diagnosed within this period[18].

Despite 84% of pregnant women undergoing prenatal care, 93% of congenital syphilis cases were classified as recent. This aligns with a study conducted in Maranhão, which reported 96.7% of congenital syphilis cases as recent[19]. Partner non-treatment likely contributed to these cases, compromising the treatment of pregnant women and increasing the risk of congenital syphilis[20].

The establishment of Committees for investigating cases of vertical transmission of HIV and syphilis, as well as actions from sexually transmitted infection and maternal-infant programs, contribute to improving the Brazilian response to the fight against congenital syphilis and gestational syphilis[4]. In Ceará, among the surveillance, prevention, and control actions developed, there is the "Strengthening Care Networks for Rapid Response to Syphilis" project, which aims to develop strategic actions to reduce vertical transmission of HIV and syphilis in the proposed municipalities[15].

Disseminating epidemiological data can aid in promoting targeted public health actions to reduce the prevalence of syphilis and its impact.

Strengths

By encompassing a decade of data, this study provides an in-depth analysis of the epidemiology of gestational and congenital syphilis. The temporal scope allows for the identification of trends in disease prevalence and offers detailed insights into diagnostic and treatment processes over the years.

Limitations

The results were derived from data in the Notifiable Diseases Information System (Sinan) and the "Indicators and Basic Data on Syphilis in Brazilian Municipalities" system. These systems are primarily populated through notifications and investigations of diseases and conditions on the national list of mandatory notifications. Therefore, incomplete or missing data in these notifications may affect the study's development and result interpretation.

CONCLUSION

Epidemiological data can help guide programs and action plans to address and inform populations most affected by specific events

or diseases. This study highlights that gestational and congenital syphilis cases in Ceará predominantly affect young women with low educational attainment, mostly of mixed-race, who underwent prenatal care.

Syphilis is a preventable disease, and its elimination can be achieved through effective strategies for early diagnosis and treatment of syphilis in pregnant women and their sexual partners.

There is an urgent need to inform the population and to prioritize early diagnosis and treatment to reduce syphilis cases in Brazil.

Approval by the Human Research Ethics Committee

Not needed as the article obtained results from publicly available data provided in online systems.

Participation of each author

LMSBA: Conceptualization, Formal analysis, Data curation, Writing – original draft. LAC: Data curation, Investigation, Formal analysis. JCCO: Writing – review & editing. RMNE: Project administration, Supervision, Validation.

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Conflict of interests

The authors declare no conflicts of interest.

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