

Congenital syphilis distribution in the State of Tocantins, Brazil, 2007-2015*

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Maria José Neres da Silva¹ -  orcid.org/0000-0003-1120-487X

Florisneide Rodrigues Barreto² -  orcid.org/0000-0002-9404-2740

Maria da Conceição Nascimento Costa² -  orcid.org/0000-0001-7275-4280

Martha Suely Itaparica de Carvalho² -  orcid.org/0000-0003-2546-6846

Maria da Glória Teixeira² -  orcid.org/0000-0003-3318-3408

¹Secretaria de Saúde do Estado do Tocantins, Núcleo de Vigilância Epidemiológica Hospitalar, Guaraí, TO, Brazil

²Universidade Federal da Bahia, Instituto de Saúde Coletiva, Salvador, BA, Brazil

Abstract

Objective: to describe the epidemiological profile of congenital syphilis (CS) in Tocantins, from 2007 to 2015. **Methods:** this was a cross-sectional descriptive study conducted with data from the Notifiable Health Conditions Information System (SINAN) and the Live Birth Information System (SINASC). **Results:** 1,029 CS cases were reported; mean CS incidence was 4.6/1,000 Live Births (LB), increasing from 3.1/1,000 LB in 2007 to 9.8/1,000 LB in 2015 (increase of 216.1%); municipalities located in the central and northern regions of the state had the highest rates; the majority of mothers of newborn babies were 15-24 years old, had elementary school education, started prenatal care in the third trimester of pregnancy, and received inadequate prenatal care. **Conclusion:** high occurrence of congenital syphilis in Tocantins requires immediate intensification of CS surveillance and improved prenatal care quality, especially in municipalities with higher incidence.

Keywords: Syphilis, Congenital; Prenatal Care; Epidemiology, Descriptive.

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Correspondence:

Florisneide Rodrigues Barreto – Av. Orlando Gomes, Condomínio Parque Costa Verde, Rua L, Casa 16C, Piatã, Salvador, BA, Brazil. Postcode: 41650-010
E-mail: florisneide@gmail.com

Introduction

Congenital syphilis (CS) is a Public Health problem, even though it can be prevented: control of mother-to-child syphilis transmission is feasible and includes diagnostic tests and effective low-cost treatment.¹ Infection of pregnant women by *Treponema pallidum*, the etiological agent of syphilis, results in unfavorable outcomes and serious perinatal sequelae such as deafness, blindness, mental disability, premature childbirth and miscarriage, among others.

The Brazilian Pact for Health includes actions aimed at overcoming difficulties in controlling syphilis, such as lack of treating partners and the predominance of pregnant women with incomplete prenatal health care.

Since 2010, occurrence of CS has been growing in Latin America and the Caribbean. Estimates indicate that 22,400 babies were born with syphilis in the region in 2015.² In Brazil, in 2016, the acquired syphilis detection rate was 42.5/100,000 inhabitants, the incidence rate among pregnant women was 12.4/1,000 live births (LB) and congenital syphilis incidence was 6.8/1,000 LB.³

The Brazilian Pact for Health includes actions aimed at overcoming difficulties in controlling syphilis, such as lack of treating partners⁴ and the predominance of pregnant women with incomplete prenatal health care.⁵ Between 2010 and 2016, 1,021 CS cases were notified in the state of Tocantins, accounting for 1.04% of total cases detected in Brazil in the same period. In 2016, the incident rate of the disease was 9.9/1,000 LB, this being higher than the country's mean rate of 6.8/1,000 LB.⁶ It is important to monitor this indicator and to raise the awareness of health service managers as to the need for interventions intended to enhance congenital syphilis prevention and control, especially with regard to the quality of prenatal care.

The objective of this study was to describe the epidemiological profile of congenital syphilis in the state of Tocantins, Brazil, between 2007 and 2015.

Methods

This is a descriptive study relating to the period 2007-2015. Tocantins is located in the southeast of Brazil's

Northern region and covers an area of approximately 277,621km². In 2010, the state had 1,383,445 inhab., and demographic density of 4.98 inhab./km².⁷

The study population was comprised of live births in the period 2007-2015. The Notifiable Health Conditions Information System (SINAN) and the Live Birth Information System (SINASC) were the study's data sources.

The following variables were analyzed:

- a) Variables relating to pregnant women
 - zone of residence (rural; urban);
 - schooling (illiterate; elementary education; high school education; higher education);
 - race/skin color (brown; non-brown);
 - age group (in years; <15; 15-24; 25-34; ≥35);
 - prenatal care received (yes; no);
 - period in which prenatal care was begun (1st trimester; 2nd trimester; 3rd trimester);
 - period in which maternal syphilis diagnosed (prenatal; childbirth/curettage; postpartum); and
 - adequacy of treatment of pregnant women (adequate; inadequate);
- b) Variables relating to partners
 - treatment provided (yes; no);
- c) Variables relating to the newborn
 - clinical diagnosis (asymptomatic; symptomatic; no information available);
 - laboratory diagnosis of peripheral blood and cerebrospinal fluid;
 - cerebrospinal fluid change (venereal disease research laboratory [VDRL]); and
 - treatment regimen (crystalline penicillin; procaine penicillin; benzathine penicillin; other; no information available).

Adequacy of care provision was based on the criteria established by the Ministry of Health.⁶ The proportions in each stratum of the variables of interest were calculated excluding cases with missing information.

Annual CS incidence coefficients per 1,000 LB between 2007 and 2015 were calculated. Cumulative mean incidence coefficients per municipality for the period were used in the analysis of spatial distribution. This indicator was represented on a map of the state of Tocantins, prepared with the aid of TabWin 4.14.

The study project was approved by the Tocantins State Health Department, as per Ordinance No. 796/2014, and was approved by the Federal University of Bahia Public Health Institute Research Ethics Committee (CEP/ISC/UFBA): Opinion No. 1.990.883, dated March 28th 2017.

Results

Between 2007 and 2015, 1,029 CS cases were notified in the state of Tocantins, corresponding to a mean annual incidence rate of 4.6/1,000 LB. During the period, this indicator increased from 3.1/1,000 (2007) to 9.8/1,000

LB (2015), representing an increase of 216.1%. This increase was not linear, given that between 2007 and 2009, CS incidence reduced from 3.1 to 2.6%, while between 2011 and 2015 it increased by 157.9%, from 3.8 to 9.8%.

The mothers of the majority of newborns with CS were aged 15-24 (57.6%) and 25-34 years old (34.2%),

Table 1 – Distribution of live births reported as having congenital syphilis (N=1,029) according to maternal clinical and sociodemographic characteristics, 2007-2015

Variables	N	%
Age group (in years)		
<15	18	1.8
15-24	586	57.6
25-34	348	34.2
≥35	65	6.4
Schooling^a		
Illiterate	11	1.2
Elementary education	696	75.2
High school education	203	21.9
Higher education	15	1.6
Zone of residence		
Urban	926	91.4
Rural	87	8.6
Race/skin color^b		
Brown	885	86.3
Non-brown	140	13.7
Prenatal care		
Yes	891	89.1
No	109	10.9
Start of prenatal care		
1 st trimester	189	21.2
2 st trimester	294	33.0
3 st trimester	408	45.8
Diagnosis of syphilis		
Prenatal	507	50.8
Childbirth/curettage	417	41.7
Postpartum	75	7.5
Adequacy of maternal syphilis treatment		
Adequate	108	16.1
Inadequate	562	83.9
Partner treated for syphilis		
Yes	160	17.0
No	783	83.0

a) 925 valid observations.

b) 1,025 valid observations.

had elementary education (75.2%), lived in the urban zone (91.4%) and were of brown race/skin/color (86.3%). Among the 891 (89.1%) mothers who had prenatal care, 21.2% started care in the 1st trimester of pregnancy, 33.0% in the 2nd and 45.8% in the 3rd trimester. It was found that 50.8% of maternal syphilis cases were diagnosed during prenatal care and 41.7%

at the time of childbirth/curettage; and that for 83.9% of the 670 pregnant women submitted to treatment, treatment was considered to be inadequate. Mothers whose partners were treated or not treated for syphilis, corresponded to 17.0% and 83.0% of the 943 reported cases, respectively (Table 1). Information was unknown/not recorded in relation to 34.9% of the 'adequacy of

Table 2 – Distribution of live births reported as having congenital syphilis (N=1,029) according to laboratory tests, type of diagnosis and treatment regimen, Tocantins, 2007-2015

Variables	N	%
VDRL^a peripheral blood		
Information available	990	96.2^b
Test performed	861	86.7 ^c
Reactive	742	86.2
Non-reactive	119	13.8
Test not performed	129	13.0 ^c
No information available	39	3.8^b
VDRL^a cerebrospinal fluid		
Information available	938	91.2^b
Test performed	370	39.4 ^c
Reactive	22	5.9
Non-reactive	348	94.1
Test not performed	568	60.6 ^c
No information available	91	8.8^b
Cerebrospinal fluid changes		
Information available	963	93.6^b
Examined	419	43.5 ^c
Changes present	9	2.1
No changes	410	97.9
Not examined	544	56.5 ^c
No information available	66	6.4^b
Clinical diagnosis		
Information available	746	72.5^b
Asymptomatic	648	86.9
Symptomatic	98	13.1
No information available	283	27.5^b
Treatment regimen		
Information available	859	83.5^b
Crystalline penicillin	634	73.8
Procaine penicillin	57	6.6
Benzathine penicillin	71	8.3
Other	97	11.3
No information available	170	16.5^b

a) VDRL: venereal disease research laboratory.

b) Percentage in relation to total live births.

c) Percentage in relation to total cases with available information.

maternal treatment for syphilis' variable; with regard to the other variables, this percentage varied between 0.4% for race/skin color and 10.2% for schooling.

With regard to reported cases of newborns with CS, 86.7% were tested using peripheral blood VDRL and 39.4% using cerebrospinal fluid VDRL, whereby 86.2% and 5.9% were reactive, respectively. Among those indicating cerebrospinal fluid change, 43.5% were examined and change was found in 2.1% of the cases. In relation to clinical diagnosis, 86.9% were asymptomatic; and for the 859 for whom information about treatment was available, the most used drug (73.8%) was crystalline penicillin (Table 2).

Of the 139 municipalities existing in Tocantins, two – one in the central region and the other in the northern region of the state – had mean incidence ranging from 5.0 to 11.0/1,000 LB. A further two municipalities, also located in the central region, had incidence ranging from 1.0 to 5.0/1,000 LB. In the majority of the municipalities (74.8%), the incidence rate was up to 1.0/1,000 LB; in the remaining municipalities (22.3%), there were no records of the disease (Figure 1).

Discussion

Evidence was found of intense increase in CS incidence in the state of Tocantins between 2007 and 2015. The majority of mothers were of childbearing age, had low levels of schooling, were of brown race/skin color, began their prenatal appointments in the 3rd term of pregnancy and approximately half of them received diagnosis of syphilis during those appointments. Treatment was inadequate for over 80% of pregnant women and a similar proportion was found regarding treatment of their partners.

The growth in CS incidence in the state may result both from an increase in the real number of cases and also from improved structuring of the health service network. Considering the expansion of the Family Health Strategy and adherence to the Stork Network (*Rede Cegonha*), these Public Health initiatives may possibly have contributed to improved case notification. It is noteworthy that CS has been seen to have increased in Brazil as a whole,⁵ suggesting that progress achieved through the Family Health Strategy and the Stork Network

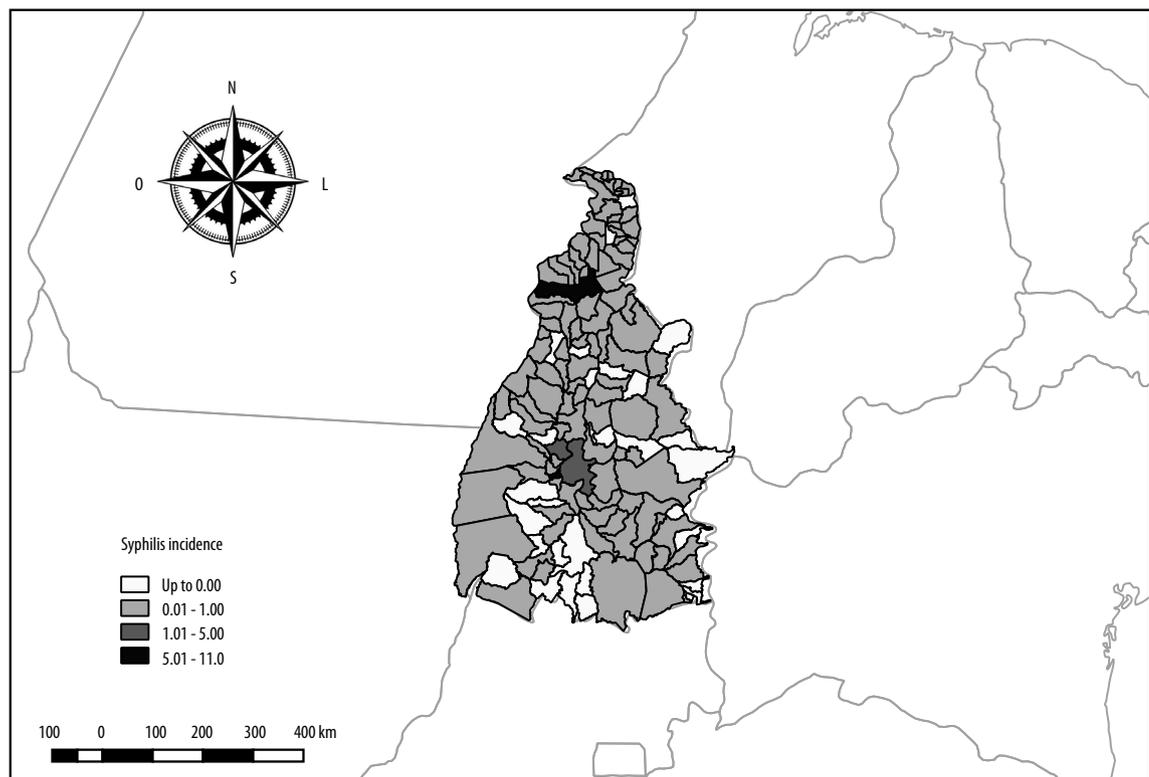


Figure 1 – Congenital syphilis incidence distribution (per 1,000 live births) per municipality, Tocantins 2007-2015

is increasing sensitivity with regard to CS detection, although such progress has not shown itself to be sufficient to prevent infections during pregnancy or even early detection – and treatment – of pregnant women and their partners in the sense of avoiding new CS cases.

As in other studies,^{8,9} the majority of pregnant women had prenatal health care, and this must have contributed to improving detection of syphilis. Some authors have found low percentages of pregnant women starting prenatal care late;^{10,11} that result is different to the one found in Tocantins, where these percentages were high. This finding is of concern for the state, since delay in starting prenatal care is associated with greater risk of occurrence of CS.¹²⁻¹⁴

Considering that starting prenatal follow-up in the first trimester of pregnancy is an indicator of the quality of maternal health care,^{9,5} the hypothesis can be raised that in Tocantins such care is still insufficient. In this study, the majority of mothers diagnosed with syphilis were not submitted to treatment or treatment was inadequate. The same situation was found in Belo Horizonte.¹⁵ This is made worse by the fact that 83.0% of the partners of these pregnant women were not treated for syphilis.

Standing out in Tocantins is the low proportion of live births with CS who underwent the cerebrospinal fluid examination including VDRL, this test being fundamental for decision making on the intravenous use of crystalline penicillin instead of procaine penicillin. The latter is not an option in the event of the possibility of the newborn baby having neurosyphilis.^{16,17}

One of the explanations for the CS spatial distribution pattern found in this study, according to which CS incidence was concentrated in just 8.6% of the state's municipalities, may be the fact that they are the most populous municipalities and are more likely to have a health service network that is better structured and trained for performing diagnosis. Consideration must also be given to a possible weakness in the

information systems of the remaining municipalities and the complexity involved in diagnosing CS in the newborn, given that the majority of babies infected with *Treponema pallidum* may be asymptomatic at birth, with VDRL titers lower than maternal titers, in addition to the difficulty in performing the cerebrospinal fluid examination.

As this study was conducted using secondary data and was concerned with a disease that is hard to diagnose in the newborn, its results need to be interpreted with caution in view of case underreporting. Nevertheless, this limitation points to the possibility of the epidemiological situation in Tocantins being even more serious than that shown in the profile described here. Moreover, data aggregated over a long period may not necessarily reflect the current distribution pattern of the disease.

Initial conduct for congenital syphilis detection and treatment is not completely in agreement with Ministry of Health guidelines:³ the majority of cases have been diagnosed late and this may cause adverse consequences for affected children. From this perspective, it is important to highlight the importance of intensifying syphilis surveillance, prevention and control actions, including improved prenatal care.

Authors' contributions

Silva MJN and Barreto FR contributed to the study conception and design, database organization, results analysis and interpretation, and writing the manuscript. Costa MCN contributed to data analysis and interpretation and writing the manuscript. Carvalho MSI contributed to organizing and analyzing the database and writing the manuscript. Teixeira MG contributed to the analysis and interpretation of the results and writing the manuscript. All the authors have approved the final version and declare themselves to be responsible for all aspects of the work, guaranteeing its accuracy and integrity.

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Associate Editor: Maryane Oliveira Campos - orcid.org/0000-0002-7481-7465