

## PREVALENCE AND ASSOCIATION OF CONGENITAL SYPHILIS IN A CAPITAL IN NORTHEASTERN BRAZIL

PREVALÊNCIA E ASSOCIAÇÃO DE SÍFILIS CONGÊNITA EM CAPITAL DO NORDESTE DO BRAZIL

PREVALENCIA Y ASOCIACIÓN DE SÍFILIS CONGÉNITA EN UNA CAPITAL DEL NOROESTE DE BRASIL

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### ABSTRACT

**Objective:** To estimate the prevalence of congenital syphilis and associated factors in a capital city in Northeastern Brazil. **Methods:** An analytical, quantitative study was conducted with 73 pregnant women diagnosed with syphilis from May 2019 to June 2020. Frequency analysis, chi-square test, and odds ratio were performed. **Results:** The prevalence of congenital syphilis was 30 (41.1%), and the disease was significantly associated with alcohol use ( $p=0.0056$ ). Congenital syphilis prevailed among the children of pregnant women aged 18 to 25 years (16, 53.3%), women with less than 12 years of education (18, 62.1%), those with no paid job (24, 80.0%), and those with no monthly income (21, 70.0%). **Conclusion:** The high rate of congenital syphilis was significantly associated with alcohol consumption, mainly among young women, with low education, without social income or paid work, and with partners. The development of strategies for the control and elimination of gestational syphilis is a priority.

**Descriptors:** Syphilis, Congenital; Pregnancy; Prenatal Care; Prevalence; Association.

### RESUMO

**Objetivo:** Estimar a prevalência de sífilis congênita e fatores associados em uma capital do Nordeste brasileiro. **Métodos:** Pesquisa analítica, de abordagem quantitativa, realizada entre 73 gestantes com diagnóstico de sífilis, de maio de 2019 a junho de 2020. Realizaram-se análise de frequência, teste Qui-quadrado e Odds ratio. **Resultados:** A prevalência da sífilis congênita foi de 30 (41,1%), com associação significativa ao uso do álcool ( $p=0.0056$ ). A sífilis congênita prevaleceu entre os filhos de gestantes com faixa etária entre 18 e 25 anos (16, 53,3%), com menos de 12 anos de estudo (18, 62,1%), sem trabalho remunerado (24, 80,0%) e sem renda mensal (21, 70,0%). **Conclusão:** A elevada taxa de sífilis congênita esteve associada significativamente ao uso de álcool, principalmente, entre gestantes adultas jovens, com baixa escolaridade, sem renda social, sem trabalho remunerado e com parceiros. É prioritário o desenvolvimento de estratégias para controle e eliminação da sífilis gestacional.

**Descritores:** Sífilis Congênita; Gravidez; Cuidado Pré-Natal; Prevalência; Associação.

### RESUMEN

**Objetivo:** Estimar la prevalencia de sífilis congénita y factores asociados en una ciudad capital del Nordeste de Brasil. **Métodos:** Investigación analítica, con enfoque cuantitativo, realizada entre 73 gestantes diagnosticadas con sífilis, de mayo de 2019 a junio de 2020. Se realizaron análisis de frecuencia, prueba de chi-cuadrado y odds ratio. **Resultados:** La prevalencia de sífilis congénita fue de 30 (41,1%), con asociación significativa con el consumo de alcohol ( $p=0,0056$ ). La sífilis congénita predominó entre los hijos de gestantes de 18 a 25 años (16, 53,3%), con menos de 12 años de escolaridad (18, 62,1%), sin trabajo remunerado (24, 80, 0%) y sin ingresos (21, 70,0%). **Conclusión:** La alta tasa de sífilis congénita se asoció significativamente con el uso de alcohol, especialmente entre mujeres adultas jóvenes embarazadas con baja escolaridad, sin ingreso social, sin trabajo remunerado y con pareja. El desarrollo de estrategias para el control y eliminación de la sífilis gestacional es una prioridad.

**Descriptores:** Sífilis Congénita; Embarazo; Atención Prenatal; Prevalencia; Asociación.

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## INTRODUCTION

There are about 376 million new syphilis infections annually, and the disease is highly prevalent in several populations.<sup>1</sup> Syphilis is a systemic infection of compulsory notification caused by *Treponema pallidum*. When not treated early, the disease can evolve chronically, increase the risk of vertical transmission, and cause irreversible sequelae in the long term.<sup>2,3</sup> Congenital Syphilis (CS) is caused by vertical transmission of *Treponema pallidum* from untreated or inadequately treated pregnant women to the fetus. In this way, sexually Transmitted Infections (STIs) can negatively affect pregnancy and the fetus's health.<sup>4,5</sup>

Even in the face of the recommendations of the World Health Organization (WHO) for the reduction of CS, cases are increasing in the world and Brazil, where there are records of approximately two million gestational syphilis per year, resulting in more than half a million (approximately 661 thousand) of cases in the world.<sup>6</sup> Furthermore, in 2020, 22,065 cases were reported in Brazil.<sup>7</sup>

A study carried out in New Zealand from April 2018 to May 2020 found that 32 CS cases were reported, consisting of 25 infants born to women with positive prenatal serology for syphilis (five developed congenital syphilis) and seven infants diagnosed with congenital syphilis after birth, in which syphilis was not diagnosed during pregnancy. The same study presents an incidence rate of 9.4 cases per 100,000 live births.<sup>8</sup>

On the national scenario, a spatial analysis showed that, from 2007 to 2018, CS incidence rates increased in all Brazilian regions. CS expanded into the countryside of Brazil, with the highest number of records between 2015 and 2018.<sup>9</sup> When analyzing the incidence rate of CS per four-year period for each Brazilian region, it is observed that, in the Northeast Region, there was an increase in the incidence rate in the states of Rio Grande Norte and Ceará throughout the analyzed period, as well as in the countryside of Sergipe, Piauí, Alagoas, and Bahia.<sup>9</sup>

Given the high prevalence of syphilis, the difficulty of coping with gestational syphilis in Brazil and worldwide is notorious. Low adherence to treatment by the pregnant woman, non-adherence to treatment by the partner, and social vulnerability increase the risk of vertical transmission in about 70% to 100% of reported cases.<sup>10,2</sup> Researchers call attention to the best

investment in early diagnosis through rapid testing and monitoring until delivery, with treatment for all infected pregnant women through benzathine penicillin.<sup>11,3</sup>

The adequate treatment of gestational syphilis is made through the administration of benzylpenicillin up to 30 days before delivery following each diagnosed case, namely: primary syphilis, secondary recent latent syphilis, late syphilis, and tertiary syphilis. Lack of trained health professionals, difficulty adhering to care protocols, delay in test results, failure to value low Venereal Disease Research Laboratory (VDRL) titles, and difficulty in treating sexual partners are factors related to the low quality of prenatal care.<sup>12</sup>

Concerning CS monitoring, the literature indicates the incipience of studies on this theme, and there is a record of inadequate CS monitoring.<sup>13</sup> Still, there are gaps in knowledge about this serious public health problem. Thus, this study may increase the visibility of the problem to define strategies for coping with gestational syphilis better, reduce CS, and better monitor this condition.

## OBJECTIVE

To estimate the prevalence of congenital syphilis and associated factors in a capital city in Northeastern Brazil.

## METHOD

An analytical, quantitative study was conducted in Primary Healthcare Units (UBS in Portuguese) in Teresina - Piauí, Brazil, registered at the Family Health Strategy (eSF in Portuguese), from May 2019 to June 2020. It is important to note that the study adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations. The municipality's Primary Health Care (PHC) network coordinates 262 eSF teams, with support from four Health Regions: North, East, South, and Southeast. Each eSF team has the support of one of the 90 UBS to provide prenatal care.

The number of pregnant women diagnosed with syphilis in 2019 in the urban area at the study site was 127, according to information from E-SUS. Based on this survey, the study included 73 pregnant women recruited on the day of the prenatal appointment, which constituted the first stage of the study. The following inclusion criteria were considered: having a diagnosis of syphilis at any gestational age, being linked to one of the urban area's eSF teams, and being 18 or over. Pregnant women who did not attend the scheduled prenatal appointment after three attempts were excluded, as well as those known to be diagnosed with a mental disorder, given the difficulty of answering questions and monitoring the outcome of the pregnancy. Convenience sampling was adopted to obtain the sample size.

In this study, every child born to a mother diagnosed with syphilis during pregnancy that was not treated or treated inappropriately, as defined by the Brazilian Ministry of Health, was considered a case of CS.<sup>14</sup>

Data were collected in the UBSs previously selected by the E-SUS system, considering UBSs that had scheduled appointments for pregnant women with syphilis. In this sense, data collection occurred in three distinct and complementary moments and three stages, as presented below.

First stage: Survey and selection of UBS with records of cases of gestational syphilis

Initially, a survey was carried out on the number of pregnant women with syphilis in each eSF in the capital's urban area with the support of the Municipal Surveillance Secretariat. Subsequently, initial face-to-face or telephone contact was made with the nurses and members of each eSF, and the date of the visit was scheduled to present the study objectives, define the number of pregnant women with syphilis, and collect data on the day of the prenatal appointment. After this presentation, a schedule was created using the data collection date and time for each UBS with records of gestational syphilis.

Second stage: Applicability of the data collection instrument in the eSF teams

For the data collection instrument application, the pregnant women were approached individually, at opportune times for each one, on the day of the prenatal appointment at the UBS so as not to compromise the service's activities. In the first contact with the patient, the instrument related to sociodemographic, behavioral, and clinical data was applied, and the need for new contact after delivery was explained, to find out about the pregnancy outcome concerning syphilis.

Third stage: Data collection regarding the pregnancy outcome, up to 42 days postpartum

A prior contact was scheduled via telephone, and the data collection occurred at the UBS on the day of the puerperal appointment. Data collection took place through the application of the instrument constructed and validated in terms of form and content by five experts with mastery of the subject<sup>15</sup>, which included: sociodemographic and behavioral aspects (age, years of education, paid work, monthly income, number of people living in the same household, marital status, age at first sexual intercourse, use of condom at first intercourse, currently use of condom during sexual intercourse during the current pregnancy, knowledge about female condoms, alcohol consumption, planned pregnancy, number of pregnancies, number of births, and number of abortions); prenatal care (vertical transmission, guidance on the treatment of syphilis at the UBS, period of pregnancy in which the diagnosis of syphilis occurred, result of the first VDRL, wounds or spots in the first evaluation, started treatment after diagnosis, non-treatment due to lack of medication, and result of the first VDRL after the first injection), clinical, outcome and diagnostic factors (health monitoring at the UBS before becoming pregnant, syphilis quick test, prenatal care, number of prenatal consultations, history of STIs, guidance on syphilis treatment outside the UBS, guidance on syphilis treatment at the UBS, professional who usually performs the prenatal consultation, month of pregnancy in which the diagnosis of syphilis occurred, type of delivery, and maternity of delivery).

For data organization and analysis, the dependent and independent variables were considered. The variables of the data collection instrument were organized and coded in a codebook. Data were organized with double typing and exported to the SAS statistical program version 9.4 (SAS Institute, Cary, NC, USA) for treatment and generation of results. An  $\alpha = 0.05$  was adopted for all tests of statistical significance. Initially, the data were submitted to descriptive statistics to calculate frequencies and percentages. Then, based on the results of the descriptive analysis, variables were selected for bivariate analysis, with the occurrence of congenital syphilis as the dependent variable (yes/no).

Some variables were recategorized to cover a larger number of participants. First, the chi-square test, or Fisher's test, was applied for cases in which the chi-square was not indicated

to explore possible associations between the variables. The odds ratio (OR) calculation with confidence interval was performed using binary regression between variables with at least five observations per cell.

The study was approved by the Research Ethics Committee of the Federal University of Piauí, according to opinion number 2,975,828. The participants signed the Informed Consent Form to ensure respect and guarantee their full exercise.

RESULTS

Of the total 127 pregnant women diagnosed with gestational syphilis, the final sample consisted of 73. Most were aged between 26-38 years (39, 53.4%), and 62 (84.0%) reported having a partner. Of the total, 42 (57.5%) had less than two years of study, 56 (76.7%) had no paid work, and 48 (65.8%) lived with more than five people in the same household. Regarding behavioral characteristics, 26 (35.6%) had their first sexual intercourse under the age of 14, and the use of condoms in the first sexual intercourse was reported by 33 (45.0%) (Table 1).

The prevalence of CS was 30 (41.1%), with a statistically significant association with alcohol consumption ( $p=0.0056$ ). Eleven (15.1%) participants reported alcohol consumption, and among those who consumed alcohol, nine (30.0%) had CS. CS cases prevailed in pregnant women aged between 18 to 25 years (16, 53.3%), women with less than 12 years of education (18, 62.1%), those with no paid job (24, 80.0%), and those with no monthly income (21, 70.0%) (Table 1).

Table 1. Sociodemographic and behavioral factors associated with congenital syphilis, considering mothers diagnosed with syphilis (n=73), Teresina, Piauí, Brazil, 2019-2020.

| Variables                            | n(%)     | Congenital syphilis |          | <i>p</i> * | <i>Odds ratio</i><br>(95% CI) |
|--------------------------------------|----------|---------------------|----------|------------|-------------------------------|
|                                      |          | Yes                 | No       |            |                               |
| <b>Age (years)</b>                   |          |                     |          |            |                               |
| 18-25(ref.)                          | 34(46.6) | 16(53.3)            | 18(41.9) | 0.33       | -                             |
| 26-38                                | 39(53.4) | 14(46.7)            | 25(58.1) |            | 0.63 (0.25-1.61)              |
| <b>Years of educa-<br/>tion**</b>    |          |                     |          |            |                               |
| <12                                  | 42(58.3) | 18(62.1)            | 24(55.8) | 0.60       | 1.30 (0.50-3.39)              |
| ≥12 (ref.)                           | 30(41.7) | 11(37.9)            | 19(44.2) |            | -                             |
| <b>Paid job</b>                      |          |                     |          |            |                               |
| Yes (ref.)                           | 17(23.3) | 6(20.0)             | 11(25.6) | 0.58       | -                             |
| No                                   | 56(76.7) | 24(80.0)            | 32(74.4) |            | 1.38 (0.45-4.24)              |
| <b>Having a mon-<br/>thly income</b> |          |                     |          |            |                               |

|                                                      |          |          |          |           |                  |
|------------------------------------------------------|----------|----------|----------|-----------|------------------|
| Yes (ref.)                                           | 28(38.4) | 9(30.0)  | 19(44.2) | 0.22      | -                |
| No                                                   | 45(61.6) | 21(70.0) | 24(55.8) |           | 1.85 (0.69-4.65) |
| <b>Number of people living in the same household</b> |          |          |          |           |                  |
| ≤4 (ref.)                                            | 25(34.2) | 10(33.3) | 15(34.9) | 0.90      | -                |
| ≥5                                                   | 48(65.8) | 20(66.7) | 28(65.1) |           | 0.93 (0.35-2.50) |
| <b>Marital status</b>                                |          |          |          |           |                  |
| Partner (ref.)                                       | 62(84.9) | 25(83.3) | 37(86.0) | 0.75      | -                |
| no partner                                           | 11(15.1) | 5(16.7)  | 6(14.0)  |           | 1.23 (0.34-4.48) |
| <b>Age at first sexual intercourse (years)</b>       |          |          |          |           |                  |
| ≤14 (ref.)                                           | 26(35.6) | 11(36.7) | 15(34.9) | 0.88      | -                |
| ≥15                                                  | 47(64.4) | 19(63.3) | 28(65.1) |           | 1.08 (0.41-2.86) |
| <b>Use of condom at first intercourse</b>            |          |          |          |           |                  |
| Yes                                                  | 33(45.2) | 15(50.0) | 18(41.9) | 0.49      | 1.39 (0.54-3.55) |
| No (ref.)                                            | 40(54.8) | 15(50.0) | 25(58.1) |           | -                |
| <b>Alcohol consumption</b>                           |          |          |          |           |                  |
| Yes                                                  | 11(15.1) | 9(30.0)  | 2(4.7)   | 0.0056*** | -                |
| No                                                   | 62(84.9) | 21(70.0) | 41(95.3) |           | -                |

Note: \*Chi-square test; \*\*Data not available for all participants, total n≠73; \*\*\* Fisher's exact test.

Two professionals (physician and nurse) performed the prenatal appointment in 24 (32.9%) cases. Nearly half of the women were diagnosed with syphilis in the first trimester of pregnancy, 33 (45.2%). Treatment was initiated after the diagnosis of syphilis by 62 (85.0%) women (Table 2).

Table 2. Data on prenatal care and syphilis outcomes (n=73), Teresina, Piauí, Brazil, 2019-2020.

| Variables                    | n | % |
|------------------------------|---|---|
| <b>Vertical transmission</b> |   |   |

|                                                                                 |    |      |
|---------------------------------------------------------------------------------|----|------|
| Yes                                                                             | 30 | 41.1 |
| No                                                                              | 43 | 58.9 |
| <b>Who conducted the appointment?</b>                                           |    |      |
| Nurse                                                                           | 38 | 52.1 |
| Physician                                                                       | 23 | 31.5 |
| Did not know                                                                    | 12 | 16.4 |
| <b>Pregnancy period in which the diagnosis of syphilis occurred (trimester)</b> |    |      |
| First                                                                           | 33 | 45.2 |
| Second                                                                          | 26 | 35.6 |
| Third                                                                           | 14 | 19.2 |
| <b>Have you started the treatment after the diagnosis?</b>                      |    |      |
| Yes                                                                             | 62 | 85.0 |
| No                                                                              | 9  | 12.3 |
| Did not know                                                                    | 2  | 2.7  |
| <b>Result of the first VDRL after the first injection</b>                       |    |      |
| 1/1                                                                             | 7  | 9.6  |
| 1/2                                                                             | 5  | 6.8  |
| 1/4                                                                             | 6  | 8.2  |
| 1/8                                                                             | 7  | 9.6  |
| 1/16                                                                            | 5  | 6.8  |
| 1/32                                                                            | 7  | 9.6  |
| 1/64                                                                            | 1  | 1.4  |
| Not performed                                                                   | 15 | 20.5 |
| Not received                                                                    | 1  | 1.4  |
| Not informed                                                                    | 19 | 26.0 |

Note: UBS - Primary Healthcare Unit; VDRL - Venereal Disease Research Laboratory.

Concerning clinical factors, outcome, and diagnosis,16 (72.6%) had a rapid test for syphilis, 27 (90.0%) had prenatal care, 25 (83.3%) had five more prenatal consultations, and five (16.7) reported a history of IST (Table 3).

Table 3. Clinical, outcome, and diagnostic factors associated with congenital syphilis, considering mothers diagnosed with syphilis (n=73), Teresina, Piauí, Brazil, 2019-2020.

| Variables                               | n(%)     | Congenital syphilis |          | p*   | Odds ratio(95% CI) |
|-----------------------------------------|----------|---------------------|----------|------|--------------------|
|                                         |          | Yes                 | No       |      |                    |
| Was the rapid test for syphilis done?** |          |                     |          |      |                    |
| Yes (ref.)                              | 41(71.9) | 16(76.2)            | 25(69.4) | 0.58 | -                  |



|                                                                           |          |          |          |                     |                  |
|---------------------------------------------------------------------------|----------|----------|----------|---------------------|------------------|
| No                                                                        | 16(28.1) | 5(23.8)  | 11(30.6) | 0.71 (0.21-2.43)    |                  |
| <b>Was the prenatal care done?</b>                                        |          |          |          |                     |                  |
| Yes                                                                       | 65(89.0) | 27(90.0) | 38(88.4) | 1.00*<br>**         | -                |
| No                                                                        | 8(11.0)  | 3(10.0)  | 5(11.6)  |                     |                  |
| <b>Number of prenatal appointments</b>                                    |          |          |          |                     |                  |
| ≤4 (ref.)                                                                 | 16(21.9) | 5(16.7)  | 11(25.6) | 0.37                | -                |
| ≥5                                                                        | 57(78.1) | 25(83.3) | 32(74.4) | 1.72 (0.53-5.59)    |                  |
| <b>History of STI</b>                                                     |          |          |          |                     |                  |
| Yes (ref.)                                                                | 10(13.9) | 5(16.7)  | 5(11.9)  | 0.56                | -                |
| No                                                                        | 62(86.1) | 25(83.3) | 37(88.1) | 0.68 (0.18-2.58)    |                  |
| <b>Professional who usually performed the prenatal appointment**</b>      |          |          |          |                     |                  |
| Nurse                                                                     | 38(62.3) | 16(64.0) | 22(61.1) | 0.82                | 1.13 (0.39-3.25) |
| Physician (ref.)                                                          | 23(37.7) | 9(36.0)  | 14(38.9) | -                   |                  |
| <b>Trimester of pregnancy in which the diagnosis of syphilis occurred</b> |          |          |          |                     |                  |
| 1 (ref.)                                                                  | 33(45.2) | 11(36.7) | 22(51.2) | 0.31                | -                |
| 2                                                                         | 26(35.6) | 11(36.7) | 15(34.9) | 1.47 (0.51-4.24)    |                  |
| 3                                                                         | 14(19.2) | 8(26.7)  | 6(13.9)  | 2.67 (0.74 to 9.21) |                  |
| <b>Type of delivery</b>                                                   |          |          |          |                     |                  |
| Vaginal (ref.)                                                            | 33(45.2) | 12(40.0) | 21(48.8) | 0.45                | -                |
| Cesarean section                                                          | 40(54.8) | 1(60.0)  | 22(51.2) | 1.43 (0.56-3.68)    |                  |

Note: UBS – Primary Healthcare Unit; \*Chi-square test; \*\* Data not available for all participants, total n=73; \*\*\* Fisher's exact test.

DISCUSSION

The study showed a high prevalence of CS, which demonstrates the persistence of syphilis among young pregnant women, with low education, impoverished, with shared housing with other people, indicating greater social vulnerability and a high prevalence of CS. The findings corroborate other studies by showing that the problem of syphilis is more complex among pregnant women.<sup>16-17</sup>



The investigation reiterates the behavior of the disease in young adults at the peak of the reproductive phase and with low education.<sup>18</sup> A study carried out at *Hospital das Clínicas do Brasil*, using medical records of hospitalized pregnant women diagnosed with syphilis between 2007 and 2016, showed that low educated young women were predominant in their first pregnancy and with a diagnosis of STI.<sup>16</sup>

Research carried out in the South Region of Brazil, with data similar to our findings, reveals the profile of pregnant women positive for syphilis, in which the predominant age group (75.0%) was between 20 and 34 years, and the majority (60.0%) had more than eight years of schooling; regarding marital status, 80% lived with a partner; and 75% performed domestic activities.<sup>17</sup>

Internationally, as in Japan and the United States of America, the increase in CS notifications and rates of new infections has become a public health concern,<sup>19-20</sup> which is consistent with this study. Another study carried out in the United States points out that, in the last decade, cases of syphilis in pregnant women have increased substantially, as well as the proportion of early syphilis, which is worrying because they represent more recent infections with higher titles and a greater risk of vertical transmission. Therefore, current recommendations for universal screening of syphilis in the first prenatal consultation and the need to adapt this management to the peculiarities of the assisted population are emphasized.<sup>21</sup>

Research carried out with incarcerated women in Brazil also revealed high rates of mother-to-child transmission of syphilis, estimated at 66.7% (95% CI: 44.7-83.2), and CS incidence of 58.1 per 1,000 live births (95% CI: 40.4-82.8).<sup>22</sup> When analyzing the temporal trend of CS incidence and characterizing the disease in the state of Minas Gerais (MG), Brazil, a study revealed that the incidence rate ranged from 0.61 to 5.08 per 1,000 live births (LB), with an increase in the temporal trend of the CS incidence coefficient, in the period from 2007 to 2015, with an annual rate variation of 30.6% (95% CI: 21.0 - 41.0).<sup>23</sup>

The literature findings reinforce and legitimize those of this study, with a high number of CS cases, so it is necessary to expand the testing of pregnant women and sexual partnerships, ensure adequate treatment within the recommended time, and ensure maternal and child care follow-up. Identifying clusters of municipalities at high risk for CS and growing trends of CS infection across the country, even in the presence of prenatal care, suggest the need to improve public health actions in the fight against this disease.<sup>24</sup>

In this study, alcohol consumption was significantly associated with CS. Although data that corroborate these findings are not found in the literature, other studies, such as those carried out at the national hospital-based level, revealed that these cases are associated with low maternal education, black skin color, and a higher proportion of risk factors for prematurity, as well as with the late initiation of prenatal care, fewer appointments and poor performance of serological tests.<sup>25</sup> Another study carried out in Belo Horizonte, Brazil, showed that of the 14 pregnant women who consumed alcohol during pregnancy, seven had a case of CS.<sup>26</sup> It is necessary to identify and recognize that social, behavioral, and vulnerability factors can influence the gestational outcome, fetal viability, and healthy birth.

In this study, attending prenatal appointments and having more than five appointments revealed more CS cases. Research carried out in Bahia on the association between the incidence rates of gestational and congenital syphilis and prenatal coverage from 2007 to 2017 observed that, in the multivariate analyses, prenatal coverage showed a statistically significant positive association with an incidence rate of gestational syphilis. However, no relationship was found with the incidence rate of congenital syphilis.<sup>27</sup>

Another survey carried out in the clinical Hospital of the Federal University of Triângulo Mineiro contrasts these findings by revealing that 74.2% of children had CS, data with potential correlation with inadequate or incomplete prenatal care, prematurity, and low birth weight.<sup>28</sup> It is increasingly necessary to improve prenatal care coverage, as well as provide opportunities for the early detection of these pregnant women, with timely screening and treatment for syphilis, in order to avoid damage to maternal and child health.

Pregnant women diagnosed with syphilis had more CS in the first and second trimesters. A study with pregnant women in Louisiana and Florida opposed these findings, concluding that screening for syphilis, both early and in the third trimester, prevented many pregnant women with syphilis from having a baby with CS and that prevention of CS would likely require prevention of entire syphilis among women.<sup>29</sup> It is reinforced that the expansion, access, and screening of STIs, especially syphilis, among all women of reproductive age and pregnant women are essential measures to prevent, reduce and reduce damage to child health and, consequently, the number of cases from SC.

Most pregnant women started treatment soon after the diagnosis of syphilis. It is reinforced that pregnant women with untreated syphilis are more likely to have pregnancies complicated by stillbirths, prematurity, low birth weight, and early infant death. Besides, their children may develop clinical manifestations of CS, such as hepatosplenomegaly, bone abnormalities, developmental delays, and hearing loss.<sup>30</sup> It is urgent to ensure timely, adequate treatment concerning the clinical stage of the disease and at the ideal time for all pregnant women who need it.

A retrospective cohort study in the city of Coimbra, Portugal, with pregnant women and newborns, showed that inadequate treatment was observed in 12 women (44.4%): seven of them with the recommended treatment but less than four weeks before delivery (three needed a second treatment session due to insufficient serological response), four had no treatment during pregnancy, and one was treated with erythromycin. Among the 15 women who were adequately treated, eight had documented partner treatment.<sup>31</sup>

The importance of ensuring early detection of infection is emphasized, as well as good adherence to treatment and follow-up, to avoid treatment failure. Factors contributing to this failure include the maternal stage of syphilis (early stage), advanced gestational age at treatment, higher titers at treatment and delivery, and the short interval between treatment and delivery.<sup>31</sup>

As a limitation of this study, it should be noted that, given the COVID-19 pandemic, access to the healthcare service for continuity of data collection was unfeasible, which may have contributed to the non-confirmation of some diagnoses. Underreporting of cases of gestational syphilis is estimated in the city of Teresina, Brazil.

The findings reinforce the need to identify syphilis early, treat and monitor cases, and develop strategies that promote monitoring children with CS for 18 months to avoid sequelae and ensure healthy growth and development.

## CONCLUSION

A high rate of congenital syphilis was verified in this study, with a significant association with alcohol consumption, mainly among young adult pregnant women with low education, no social income, no paid work, and with partners.

## CONTRIBUTIONS

The authors also contributed equally to the design of the research project, data collection, analysis and discussion, as well as to the writing and critical review of the content, with intellectual contribution, and to the approval of the final version of the study.

## CONFLICT OF INTERESTS

None to declare.

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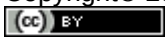
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