Characterization of Congenital Syphilis Cases Reported in a Brazilian Region

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Abstract: Congenital syphilis is a challenge for health services and its characteristics is an important area of study. This study identified the profile of congenital syphilis cases reported in an inland region of the state of Minas Gerais, Brazil, from 2012 to 2016. This is a descriptive historical cohort study from 2012 to 2016, and the data were from documentary sources. The study involved detailed analysis of the compulsory notification forms registered in the Information System on Diseases of Compulsory Declaration (SINAN). For data collection, researchers created a form for subsequent quantitative data analysis approach. The data obtained were tabulated and analyzed using simple descriptive statistics and shown in tables. The data were organized into five charts and separated based on: (1) number of cases notified; (2) information about mothers whose newborns have syphilis; (3) pregnancies that culminated in the birth of newborns with congenital syphilis, diagnosis and treatment of these mothers; (4) information about newborns with syphilis; (5) diagnosis, treatment, and outcome of these newborns. The researchers of this study believe that, by enabling the identification of the profile of congenital syphilis cases reported in a Brazilian region, the results may contribute to the development of health strategies to prevent and control syphilis in mothers and their children.

Keywords: Pregnancy, Syphilis, Syphilis, Congenital, Maternal-Child Health Services.

INTRODUCTION

Syphilis is a sexually transmitted infection (STI) of chronic evolution caused by the bacterium *Treponema pallidum*. It is an ancient disease, which one can prevent, treat, and cure. Based on prevalence data from 2009 to 2016, the World Health Organization (WHO) estimated 6.3 million cases of syphilis worldwide [1] presenting a challenge for health systems. Although preventable, syphilis is the second most common infectious cause of stillbirths worldwide [2] and has a considerable participation in infant morbidity and mortality [3].

During pregnancy, syphilis leads to more than 300,000 fetal and neonatal deaths per year worldwide and increases the risk of premature death in other 215,000 children [4]. Although data show congenital syphilis decreased worldwide between 2012 and 2016, maternal prevalence is still stable [5], which becomes a risk potential for congenital syphilis cases.

According to the most recent data, the detection rate for acquired syphilis in Brazil increased from 59.1 cases per 100,000 inhabitants in 2017 to 75.8 cases per 100,000 inhabitants in 2018 [6]. Thus, with a syphilis detection rate in pregnant women in the latter year of 21.4/1,000 live births and incidence rate of congenital syphilis of 9.0/1,000 live births, the mortality rate from congenital syphilis was 8.2/100,000 live births [6].

In 2007, WHO launched the global initiative for congenital syphilis elimination, and Cuba became the first country to achieve the elimination of mother-to-child transmission of syphilis and HIV infection in June 2015 [7]. The purpose of this strategy for elimination of congenital syphilis is that the number of cases are below 50 per 100,000 live births [7].

Since syphilis is a preventable disease, the occurrence of one case represents a failure of the public health system [8]. It is noteworthy that most low- and middle-income countries have policies for universal screening for syphilis during pregnancy for secondary prevention of congenital syphilis [4]. Therefore, understanding the epidemiological characteristics related to congenital syphilis in a region may contribute to the development of new strategies to control this disease according to the goals recommended by WHO. Therefore, this study sought to identify the profile of congenital syphilis cases reported in an inland region of the state of Minas Gerais, Brazil, from 2012 to 2016.

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METHODOLOGY

This is a descriptive historical cohort study from 2012 to 2016, and the data came from documentary sources. The study seeks to describe and study characteristics from a particular group or population [9]. The data analysis approach was quantitative, allowing the quantification of information related to the phenomenon under study; in this approach, health problems are analyzed numerically [10]. The study analyzed compulsory notification forms registered in the Health Information System for Notification Disease (SINAN). The variables surveyed from these documents characterized the profile of cases of congenital syphilis notified in a region. They consisted of 24 municipalities, from the inland of Minas Gerais, Brazil, from 2012 to 2016.

For data collection, the researchers created a form addressing the following central topics: number of newborns with congenital syphilis; characterization of mothers; characterization of pregnancy, diagnosis of syphilis and treatment of mothers; characterization of newborns; and syphilis diagnosis, treatment and evolution of the newborn's condition. The data were tabulated and analyzed using simple descriptive statistics and shown in tables. [The Research Ethics Committee, opinion number, approved the research: 2.077.035].

RESULTS

The data were organized into five charts and analyzed according to: (1) number of notified cases; (2) information about the mothers of newborns with syphilis; (3) pregnancies that culminated in the birth of newborns with congenital syphilis, diagnosis and treatment of these mothers; (4) information about newborns with syphilis; (5) diagnosis, treatment and outcome of these newborns. [See Table **1** for the Number of Newborns with Congenital Syphilis].

Table 1: Number of Newborns with Congenital Syphilis Notified in an Inland Region of the State of Minas Gerais, Brazil, from 2012 to 2016

Number of Newborns with Congenital Syphilis		
Year of Notification – Congenital Syphilis	**N**	**%**
2012	8	8.60
2013	12	12.90
2014	7	7.52
2015	43	46.23
2016	23	24.73

This table shows 93 cases were reported from 2012 - 2016, with no linearity in the number of reported cases in these years. However, in 2015 the number of cases reported was significant, which differed from the other years. This table also shows a decrease in cases reported in 2016; however, this number exceeds the cases reported in 2012, 2013 and 2014, reaching more than the sum of the number notified in two of these years.

Table **2** shows the characterization of the mothers of the newborns with congenital syphilis notified.

Table 2: Characterization of the Mother of the Newborn with Congenital Syphilis in an Inland Region of the State of Minas Gerais, Brazil, from 2012 to 2016

Mothers' characterization		
Age	**N**	**%**
14 to 25 years	57	61.29
26 to 35 years	22	23.65
36 to 45 years	9	9.67
Blank	5	5.37
Skin Color		
White	48	51.61
Black	13	13.97
Brown	25	26.88
Unknown	7	7.52
Educational Level		
Incomplete 1st to 4th grade	2	2.15
Complete 4th grade	2	2.15
Incomplete 5th to 8th grade	16	17.20
Complete elementary school	8	8.60
Incomplete high school	18	19.35
Complete high school	8	8.60
Unknown	38	40.86
Not applicable	1	1.07
Zone Resident		
Urban	87	93.54
Rural	6	6.45

This table shows a predominance of adolescent and young mothers who are white and from the urban area. Regarding the educational level of these mothers, the highest percentages were incomplete 5th to 8th grade and incomplete high school, when the significant percentage of "Unknown" (40.86%) was disregarded.

Table **3** shows the characterization of pregnancies that culminated in the birth of newborns with congenital syphilis, how and when the diagnosis of syphilis occurred, and the treatment of mothers of newborns with congenital syphilis.

Table 3: Characterization of Pregnancy, Diagnosis of Syphilis and Treatment of Mothers of Newborns with Congenital Syphilis Notified in an Inland Region of Minas Gerais State, Brazil, from 2012 to 2016

Characterization of Pregnancy, Diagnosis of Syphilis and Treatment of Mothers		
Prenatal Care in Pregnancy	**N**	**%**
Yes	84	90.32
No	8	8.60
Unknown	1	1.07
DIAGNOSIS OF SYPHILIS		
During prenatal care	57	61.29
At birth/curettage	23	24.73
After birth	10	10.75
Unknown	3	3.22
Nontreponemal Test at Birth/Curettage		
Reactive	85	91.39
Nonreactive	5	5.37
Not performed	3	3.22
Treponemal Confirmatory Test at Birth/Curettage		
Reactive	60	94.51
Nonreactive	3	3.22
Not performed	27	29.03
Unknown	3	3.22
Treatment Schedule		
Adequate	22	23.65
Inadequate	45	48.38
Not performed	20	21.50
Unknown	6	6.45
Partner Treated with The Mother		
Yes	25	26.88
No	50	53.76
Unknown	18	19.35

This table shows pronounced differences between the percentages presented. According to the results, most mothers had prenatal care and had their diagnosis during prenatal care. Furthermore, these mothers performed the non-treponemal test and the treponemal confirmatory test at birth; had inadequate treatment for their syphilis; and their partner was untreated concomitantly with them.

Table **4** shows the characterization of the newborns with congenital syphilis.

Table 4: Characterization of Newborns with Congenital Syphilis Notified in an Inland Region of the State of Minas Gerais, Brazil, from 2012 to 2016

Characterization of Newborns		
Sex	**N**	**%**
Male	41	44.08
Female	46	49.46
Unknown	6	6.45
Skin Color		
White	54	58.06
Black	8	8.60
Brown	20	21.50
Unknown	8	8.60
Blank	3	3.22

This table depicts data regarding newborns with syphilis and reveals that most were white (58.06%) and there is no great predominance in relation to sex (females, 49.46%; and males 44.08%).

Table **5** shows how and when the diagnosis, treatment and evolution of the condition of the newborn with congenital syphilis occurred.

This table demonstrates that the main laboratory test used to diagnose syphilis in these newborns was the nontreponemal test, performed from the peripheral blood, and that there was asymptomatic clinical diagnosis. It also shows the most widely used treatment was Penicillin G Crystalline 100,000 to 150,000 IU/kg/day for 10 days, and most newborns survived syphilis.

Besides, the tables show professionals who reported congenital syphilis cases ignored a significant number of responses.

DISCUSSION

This study allowed identifying the profile of congenital syphilis cases reported in a Brazilian region, from 2012 to 2016. Thus, the results are the number of reported cases and the characterization of newborns with congenital syphilis; the characterization of mothers, pregnancy, diagnosis and treatment; as well as the diagnosis, treatment and outcome of the newborn's condition.

Table 5: Diagnosis of Syphilis, Treatment and Evolution of the Condition of Newborns with Congenital Syphilis Notified in an Inland Region of Minas Gerais State, Brazil, from 2012 to 2016

Syphilis Diagnosis, Treatment and Evolution of the Newborns' Condition		
Nontreponemal Test/Peripheral Blood	**N**	**%**
Reactive	78	83.87
Nonreactive	5	5.37
Not performed	6	6.45
Unknown	2	2.15
Blank	2	2.15
Nontreponemal-Cerebrospinal Fluid Test		
Reactive	2	2.15
Nonreactive	15	16.12
Not performed	67	72.04
Unknown	7	7.52
Blank	2	2.15
Asymptomatic Clinical Diagnosis		
Yes	57	61.29
No	5	5.37
Not applicable	5	5.37
Unknown	24	25.80
Blank	2	2.15
Radiological Diagnosis of the Child – Examination of Alteration of Long Bones		
Yes	4	4.30
No	25	26.88
Not performed	54	58.06
Unknown	8	8.60
Blank	2	2.15
Treatment Schedule		
Penic. G Crystalline 100,000 to 150,000 IU/kg/day – 10 days	35	37.63
Penic. G Procaine 50,000 IU/kg/day – 10 days	7	7.52
Penic. G Benzatin 50,000 IU/kg/day	11	11.82
Another scheme	25	26.88
Not performed	11	11.82
Unknown	2	2.15
Blank	2	2.15
Case Evolution		
Alive	85	91.39
Death from congenital syphilis	6	6.45
Stillbirth	1	1.07
Unknown	1	1.07

The number of cases of newborns with congenital syphilis reported highlights this problem as a challenge to be faced [11]. Cases of congenital syphilis should be identified and reported [12], ensuring comprehensive and resolute care. Study emphasized underreporting of congenital syphilis cases reveals weaknesses in the health system [13].

Regarding the characterization of mothers of newborns with congenital syphilis, this study identified a predominance of the age group from 14 to 25 years (61.29%), white skin color (51.61%), incomplete high school (19.35%) and residence in the urban area (93.54%). Here, it is important to stress that in 40.86%, education appeared as ignored. One study [12] revealed women aged from 20 to 34 years have a greater chance of congenital syphilis outcome. Regarding education, the literature indicates the higher occurrence of syphilis and congenital syphilis is associated with lower education of women [12]. Another investigation also found that low education and maternal age <20 years were factors associated with congenital syphilis [14].

As for skin color, results of a study [12] showed a higher proportion of black or brown color in women identified with syphilis, which does not corroborate the findings of this investigation. The predominance of urban residence was also identified in another study [15].

The characterization of pregnancy with congenital syphilis outcome indicates prenatal care (90.32%) and diagnosis of syphilis during prenatal care (61.29%). In the congenital syphilis outcome, a study [16] found that the diagnosis of syphilis in pregnant women occurred predominantly during prenatal care (74%), followed by childbirth (18%), which corroborates the results of this study. Prenatal care can have gaps [14] that constitute vulnerabilities to the woman and child's health. Congenital syphilis outcome may be associated with factors present in prenatal care [12].

Thus, factors associated with congenital syphilis may be related to prenatal care, such as late onset and number of consultations <6 [14]. In the first trimester, not performing the nontreponemal test (Venereal Disease Research Laboratory – VDRL), as well as higher titration (≥1:8) of the first and last VDRL also appear as factors associated with congenital syphilis [14]. Therefore, prenatal issues, such as later onset, lower adequacy in the number of consultations, and lower registration on the prenatal syphilis serology card were in the scholarly literature [12]. Failures in prenatal

care and social vulnerabilities may be associated with congenital syphilis [12]. In prenatal care, missed opportunities for early diagnosis of syphilis may reflect weaknesses in eliminating congenital transmission, which points to the need for improvements in service organization [17].

This study found inadequate treatment regimen in 48.38% of these women. Other disturbing data refer to the treatment schedule not performed in 21.50%, and the partner not treated concomitantly with the pregnant woman in 53.76% of cases. In Primary Health Care (PHC), syphilis management failures may occur during pregnancy [18]. Difficulties in access to examination and treatment point to weaknesses in prenatal care [18]. In addition, the partner not adhering and undergoing treatment is another difficulty [15]. Treatment of pregnant women and partners should be early and appropriate [15]. Health educations that address safe-sex practices are also important. For partner notification, the importance of standardized strategies emerges [18]. Thus, to reduce vertical transmission, services should be prepared to identify cases and timely treat pregnant women and their partners [12]. Prenatal care services should be qualified seeking the development of prevention, screening and early treatment actions [15]. Thus, actions should seek to strengthen access to prenatal care, with early diagnosis and appropriate treatment of syphilis [19].

Regarding the diagnosis of newborns in this study, is necessary to highlight the nontreponemal test/reactive peripheral blood in 83.87%, and its non-performance of the test in 6.45% is necessary. In addition, the nontreponemal-cerebrospinal fluid test was not performed in 72.04%, and the radiological diagnosis (examination of alteration of long bones) was not performed in 58.06%. In a study conducted in a U.S. city, VDRL was performed in only 63% of newborns [20]. A study conducted in a medium-sized Brazilian city showed that in pregnant women with positive VDRL, a significant percentage (25.8%) of newborns was not tested for VDRL [13]. The lack of information about performing VDRL was also found [13]. In addition, regarding the long bone X-ray, blood count and cerebrospinal fluid exams, none of these complementary exams was in 45.2% of the cases [13].

Data from this study revealed no treatment performed on 11.82% of newborns and death from congenital syphilis occurred in 6.45% of newborns in this study. Some unfavorable outcomes, such as neonatal ICU admissions, were apparent in newborns with congenital syphilis [12]. Another issue of importance is the follow-up of children with congenital syphilis [21]. The non-referral of newborns of pregnant women with syphilis for pediatric follow-up [13] appears as a gap in health care. Primary Health Care (PHC) may present weaknesses in the follow-up of these children, which may reflect in missed opportunities for evaluation measures [21] and continued care. Here, it is important to reinforce the importance of organizing the care network to follow up the child with congenital syphilis, as well as orientation actions directed to the mother [21] or to the child's caregivers.

The results found showed the importance of sensitizing health professionals and improvements in the organization of care services to pregnant women [16] and children. New strategies should be developed to reduce the incidence of congenital syphilis [14]. Here, one can highlight educational strategies directed at professionals [19-20], such as continued education, seeking the qualification of health professionals [18] and actions aimed at strengthening epidemiological surveillance [14]. Emphasis should be given to community-directed educational measures for congenital syphilis [19], as conversation circles for prevention and management orientation.

In PHC, for example, educational moments with health professionals, seeking prevention of congenital syphilis, emerge as important for the qualification of care [22]. Awareness about condom use in sexual relations, early diagnosis, and treatment of pregnant women and their partners also appear as important strategies [11]. There is also a need for qualification of records on the monitoring of pregnant women [15], puerperal women and children. This information is important for the development of coping strategies for possible weaknesses found in the care of maternal and child clients.

LIMITATIONS OF THE CURRENT STUDY

The absence of some information in the compulsory notification forms registered with SINAN was one limitation of this study.

DIRECTIONS FOR FUTURE RESEARCH

Further work should identify and evaluate the care network for children with congenital syphilis.

CONCLUSION

By enabling the identification of the profile of congenital syphilis cases reported in a Brazilian region, the results of this study may contribute to the

development of health strategies to prevent and control syphilis in the maternal and infant public. To control syphilis in the general population, the author strongly recommends the management and treatment of partners during prenatal care.

REFERENCES

[1] Rowley J, Vander Hoorn S, Korenromp E, Low N, Unemo M, Abu-Raddad LJ, *et al*. Chlamydia, gonorrhoea, trichomoniasis and syphilis: global prevalence and incidence estimates, 2016. Bull World Health Organ 2019; 97(8): 548-62P. https://doi.org/10.2471/BLT.18.228486

[2] Lawn JE, Blencowe H, Waiswa P, Amouzou A, Mathers C, Hogan D, *et al*. Stillbirths: rates, risk factors, and acceleration towards 2030. Lancet 2016; 387(10018): 587-603. https://doi.org/10.1016/S0140-6736(15)00837-5

[3] Gomez GB, Kamb ML, Newman LM, Mark J, Broutet N, Hawkes SJ. Untreated maternal syphilis and adverse outcomes of pregnancy: a systematic review and meta-analysis. Bull World Health Organ 2013; 91(3): 217-26. https://doi.org/10.2471/BLT.12.107623

[4] Unemo M, Bradshaw CS, Hocking JS, de Vries HJC, Francis SC, Mabey D, *et al*. Sexually transmitted infections: challenges ahead. Lancet Infect Dis 2017; 17(8): e235-e279. https://doi.org/10.1016/S1473-3099(17)30310-9

[5] Korenromp EL, Rowley J, Alonso M, Mello MB, Wijesooriya NS, Mahiané SG, *et al*. Global burden of maternal and congenital syphilis and associated adverse birth outcomes-Estimates for 2016 and progress since 2012. PLoS One 2019; 14(2): e0211720. https://doi.org/10.1371/journal.pone.0211720

[6] Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Boletim epidemiológico - Sífilis 2019. Brasília: Ministério da Saúde 2019.

[7] World Health Organization (WHO). Global health sector strategy on sexually transmitted infections 2016-2021. Geneva: World Health Organization 2016.

[8] Cooper JM, Michelow IC, Wozniak PS, Sánchez PJ. Em tempo: a persistência da sífilis congênita no Brasil – Mais avanços são necessários! Rev Paul Pediatr 2016; 34(3): 251-3. https://doi.org/10.1016/j.rpped.2016.06.001

[9] Gil AC. Como elaborar projetos de pesquisa. 5th. ed. São Paulo: Atlas 2010.

[10] Luz ALA, Oliveira EAR, Torres CRD, Carvalho KM, Monteiro CFS, Moura MEB. Quantitative and qualitative approaches in health research. Rev Enferm UFPI 2015; 4(1): 129-34. https://doi.org/10.26694/reufpi.v4i1.3134

[11] Costa CV, Santos IAB, Silva JM, Barcelos TF, Guerra HS. Sífilis congênita: repercussões e desafios. Arq Catarin Med 2017; 46(3): 194-202.

[12] Domingues RMSM, Leal MC. Incidência de sífilis congênita e fatores associados à transmissão vertical da sífilis: dados do estudo Nascer no Brasil. Cad Saude Publica 2016; 32(6): e00082415. https://doi.org/10.1590/0102-311X00082415

[13] Lafetá KRG, Martelli Júnior H, Silveira MF, Paranaíba LMR. Maternal and congenital syphilis, underreported and difficult to control. Rev Bras Epidemiol 2016; 19(1): 63-74. https://doi.org/10.1590/1980-5497201600010006

[14] Nonato SM, Melo APS, Guimarães MDC. Syphilis in pregnancy and factors associated with congenital syphilis in Belo Horizonte-MG, Brazil, 2010-2013. Epidemiol Serv Saude 2015; 24(4): 681-94. https://doi.org/10.5123/S1679-49742015000400010

[15] Dantas LA, Jerônimo SHNM, Teixeira GA, Lopes TRG, Cassiano AN, Carvalho JBL. Epidemiologic profile of acquired syphilis diagnosed and notified at a maternal-child university hospital. Enferm Glob 2017; 16(46): 237-45. https://doi.org/10.6018/eglobal.16.2.229371

[16] Saraceni V, Pereira GFM, Silveira MF, Araujo MAL, Miranda AE. Vigilância epidemiológica da transmissão vertical da sífilis: dados de seis unidades federativas no Brasil. Rev Panam Salud Publica 2017; 41: e44. https://doi.org/10.26633/RPSP.2017.44

[17] Freitas CHSM, Forte FDS, Roncalli AG, Galvão MHR, Coelho AA, Dias SMF. Factors associated with prenatal care and HIV and syphilis testing during pregnancy in primary health care. Rev Saude Publica 2019; 53: 76. https://doi.org/10.11606/s1518-8787.2019053001205

[18] Rocha AFB, Araújo MAL, Miranda AE, Leon RGP, Silva Junior GB, Vasconcelos LDPG. Management of sexual partners of pregnant women with syphilis in northeastern Brazil - a qualitative study. BMC Health Serv Res 2019; 19(1): 65. https://doi.org/10.1186/s12913-019-3910-y

[19] Wang Y, Wu M, Gong X, Zhao L, Zhao J, Zhu C, *et al*. Risk factors for congenital syphilis transmitted from mother to infant - Suzhou, China, 2011-2014. MMWR Morb Mortal Wkly Rep 2019; 68(10): 247-50. https://doi.org/10.15585/mmwr.mm6810a4

[20] Stafford IA, Berra A, Minard CG, Fontenot V, Kopkin RH, Rodrigue E, *et al*. Challenges in the contemporary management of syphilis among pregnant women in New Orleans, LA. Infect Dis Obstet Gynecol 2019: 2613962. https://doi.org/10.1155/2019/2613962

[21] Cavalcante ANM, Araújo MAL, Nobre MA, Almeida RLF. Factors associated with inadequate follow-up of children with congenital syphilis. Rev Saude Publica 2019; 53: 95. https://doi.org/10.11606/s1518-8787.2019053001284

[22] Lazarini FM, Barbosa DA. Educational intervention in Primary Care for the prevention of congenital syphilis. Rev Lat Am Enfermagem 2017; 25: e2845. https://doi.org/10.1590/1518-8345.1612.2845

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