

## Short Communication

# Descriptive analysis of syphilis cases reported in Mato Grosso do Sul, Brazil identifies failure in treatment

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### Abstract

**Introduction:** Syphilis infection remains an alarming public health problem worldwide. **Methods:** This study analyzed syphilis cases listed in the Information System on Diseases of Compulsory Declaration (SINAN) of Mato Grosso do Sul state in Brazil between January 2013 and December 2014. **Results:** Most of the evaluated syphilis cases would have been preventable through public education, particularly congenital syphilis in children of previously diagnosed mothers and infection by untreated sexual partners. **Conclusions:** The incidence rate of syphilis could be reduced by improving prevention through counselling on the risk of infection, improving access to condoms, and increasing the frequency of diagnostic tests.

**Keywords:** *Treponema pallidum*. SINAN. Mato Grosso do Sul. Descriptive analysis. Syphilis.

Syphilis, a chronic multistage disease caused by the spirochete *Treponema pallidum* subspecies *pallidum*, is usual transmitted by sexual contact or through the placenta during pregnancy<sup>1</sup>. Syphilis infection remains a serious public health problem worldwide, with a global prevalence of an estimated 36 million cases and an annual incidence of 12 million cases. According to the World Health Organization (WHO), pregnant women with active syphilis will suffer stillbirth or the neonates contract the infection or die in the perinatal period in half of these cases<sup>2</sup>. Syphilis is among the five most reported infectious diseases worldwide and is the most frequently reported sexually transmitted infection (STI) in Brazil. Sexually transmitted infections in the adult population are estimated at 937,000 cases per year, with a prevalence of 2.6% (range: 1.0% to 4.4%). Because gestational syphilis is often not treated properly, it is a major cause of stillbirth with approximately 2.65 million cases attributed to this disease every year<sup>3</sup>. The infection results in

the formation of lesions that occur particularly in the genital area. Syphilis may also facilitate the transmission of human immunodeficiency virus (HIV) and appears to increase the risk of contracting HIV by up to 4 times<sup>4</sup>.

Brazil has reached an alarming transmission rate of syphilis in the susceptible population, with 21,382 cases in pregnant women and 13,705 cases in children <1 year of age reported in 2013 by the Information System on Diseases of Compulsory Declaration (SINAN), a public health notification system. In this report, the Midwest region had one of the highest syphilis rates in pregnant women in the country (8.5 cases in 1,000 live births)<sup>5</sup> and within this region, the state of Mato Grosso do Sul had the most cases in 2015 (21.9 cases in 1,000 live births)<sup>2</sup>. Although cases of congenital, gestational, and acquired syphilis have been reported in Brazil since 1986, 2005, and 2010, respectively, few studies have evaluated these notifications in recent years. Therefore, the aim of this study was to describe the epidemiological profile of reported syphilis cases in the adult population of Mato Grosso do Sul state. The results of this study will support the implementation of public health strategies to control this infectious disease.

Mato Grosso do Sul is a state with 2.5 million inhabitants in the Western central region of Brazil that borders with

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Paraguay and Bolivia. The state has implemented 547 basic health facilities that serve 735,479 inhabitants. Data pertaining to syphilis notification documented between January 2013 and December 2014 in the SINAN of Mato Grosso do Sul was assessed in this retrospective, observational study. Variables collected included age, race, sex, level of education, treatment of patients and partners, serological tests and tests on the liquor (treponemic/non-treponemic), clinical classification, diagnosis of maternal syphilis, case evolution, and clinical manifestations such as changes in the long bones observed by radiology, osteochondritis, cutaneous lesions, jaundice, anemia, splenomegaly, hepatomegaly, and pseudoparalysis. Extracted data was transferred to Excel sheets (Microsoft, Redmond, WA, USA) and analyzed with the Statistical Analysis System (SAS) version 9.2 software (SAS Institute, Cary, NC, USA) using a simple frequency procedure of the reported syphilis cases. The incidence rate of acquired syphilis cases was calculated using population estimates reported for this period by the *Fundação Instituto Brasileiro de Geografia e Estatística* (IBGE).

In the study period, 2,207 cases of acquired syphilis, 1,497 cases of gestational syphilis and 417 cases of congenital syphilis were reported in the state of Mato Grosso do Sul. The incidence rate of acquired syphilis was 88 cases/100,000 inhabitants, representing 2.4% of all patients reported nationwide<sup>2</sup>. Of these patients, 36% were older than 40 years, 59% were men, 39% were of mixed race, and 45% were only educated up to primary school (**Table 1**). Unfortunately, certain clinical characteristics of these patients such as duration of treatment, sexual behavior, and socio-demographics, could not be evaluated because this information had not been provided with the notification.

Out of 1,497 patients with gestational syphilis, 48% were between 20 and 29 years old, 51% were of mixed race, and 71% had only completed primary education. The disease was diagnosed during the primary stage in 36% of these cases, followed by 22% in the tertiary stage and 11% in the latent stage. Nonetheless, only 71% of these patients were properly treated with 7.2 million IU of penicillin G and only 50% of the sexual partners received concurrent treatment (**Table 2**). Of the patients with congenital syphilis, 52% were boys, with most babies and their mothers being of mixed race (47%/62%). Treponemal and non-treponemal tests were conducted at birth in 37% and 77% of the newborns, respectively. Nonetheless, only 58% of infected newborns had a mother with a confirmed syphilis diagnosis. The most common clinical signs in newborns were jaundice (9%), anemia (3.6%), and changes in the long bones observed in radiological exams (2.64%). Less than 1% of these patients died from syphilis (**Table 3**).

The “great imitator” syphilis is still a serious concern for the sexually active population in the Midwest region of Brazil. In this retrospective, observational study, data from 2,207 adult patients with acquired syphilis, 1,497 women with gestational syphilis, and 417 children with congenital syphilis were collected. Our study showed an increase in gestational syphilis by 1,265 cases in the assessed region within the last decade<sup>6</sup>. A similar increase has been reported for other states but Mato Grosso do Sul had the highest incidence rate (16.7 cases/1,000 live births).<sup>2</sup>

**TABLE 1:** Demographic characteristics of patients with acquired syphilis reported between January 2013 and December 2014.

Variables	Cases	%
Number of syphilis	2,207	
<b>Gender</b>		
Male	1,311	59
Female	895	40
Undefined	1	0.05
<b>Race</b>		
White	574	26
Black	98	4
Asian	19	1
Mixed	851	39
Indigenous	34	1
Data missing	631	29
<b>Age</b>		
≤19	214	9
20-29	688	31
30-39	481	22
≥40	806	36
Data missing	18	0.8
<b>Schooling</b>		
Illiterate	23	1
Primary	990	45
Secondary	88	4
Data missing	1,106	50

Although the guidelines from the Brazilian Ministry of Health recommend a medical follow-up of the sexual partners of STI patients of the preceding 3 months<sup>7</sup>, half of the partners of pregnant women with syphilis were not treated according to our findings. This could potentially result in re-infections and additional cases of latent syphilis and demonstrates the inadequacy of public health programs. Furthermore, 58% of mothers whose sons were born with congenital syphilis had been diagnosed with gestational syphilis. This may indicate either a lack of appropriate treatment of the mother or a failure of the employed treatment regimen and the prenatal follow-up. In addition, social and behavioral risk factors may be associated with gestational syphilis and therefore more studies are needed to identify the reasons for the failure to control syphilis in pregnant women.

There is clear evidence that intra-uterine transmission to children and the ensuing adverse outcomes could be avoided by simple and cheap interventions performed by any physician at a primary care clinic<sup>8,9</sup>. Furthermore, 90% of the treated mothers

**TABLE 2:** Demographic characteristics of patients with gestational syphilis reported between January 2013 and December 2014.

Variables	Cases	%
Total cases	1,497	
<b>Race</b>		
White	470	31
Black	78	5
Asian	12	1
Mixed	775	51
Indigenous	101	6
Data missing	81	5
<b>Age</b>		
≤19	401	26
20-29	733	48
30-39	345	22
≥40	37	2
Data missing	1	0.06
<b>Schooling</b>		
Illiterate	17	1
Primary	1,083	71
Secondary	23	1
Data missing	394	26
<b>Treponemic test reagent</b>		
Reagent	1,115	73
Unrealized	236	15
Data missing	166	12
<b>Non-treponemic test</b>		
Reagent	1,163	77
Non-reagent	106	7
Not performed	172	11
Data missing	76	5
<b>Clinical classification</b>		
Primary	518	34
Secondary	68	5
Tertiary	316	21
Latent	158	10
Data missing	457	30
<b>Treatment</b>		
Penicillin G 2.400.000UI	289	19
Penicillin G 4.800.000UI	28	1
Penicillin G 7.200.000UI	1,054	70
Another antibiotic	20	1
Not treated	72	5
Data missing	54	4
<b>Sexual partner treatment</b>		
Treated	756	50
Not treated	528	35
Data missing	233	15

**TABLE 3:** Demographic characteristics of patients with congenital syphilis reported between January 2013 and December 2014.

Variables	Cases	%
Number	417	
<b>Gender</b>		
Male	218	52
Female	190	45
Undefined	9	2
<b>Race</b>		
<b>Son/Mother</b>		
White	154/101	37/24
Black	7/17	1/4
Asian	1/0	0.2/0
Mixed	195/260	47/62
Indigenous	21/28	5/7
Data missing	39/11	9/2
<b>Diagnosis of maternal syphilis</b>	245	58
<b>Treponemal confirmatory test at birth</b>	156	37
<b>Non-treponemal test at birth</b>	328	77
<b>Non-treponemal test</b>		
<b>Blood/Liquor</b>		
Reagent	295/8	71/1.9
Non-reagent	62/110	15/26
Not performed	39/231	9/55
Data missing	21/68	5/16
<b>Clinical manifestations</b>		
Changes in long bones (radiological tests)	11	2.6
Osteochondritis	5	1.2
Cutaneous lesions	9	2.1
Jaundice	40	9
Anemia	15	3
Splenomegaly	5	1.2
Hepatomegaly	8	1.9
Pseudoparalysis	2	0.48
<b>Case evolution</b>		
Alive	355	85
Death by syphilis	4	0.96
Death by another cause	6	1.4
Abortion	4	0.96
Stillborn	13	3
Data missing	35	8

received penicillin G, thereby decreasing the chance of adverse outcomes for the fetus. Our results also revealed that patients with acquired and gestational syphilis (45% and 71% respectively) had a low level of education which has been linked to unprotected sexual practices in previous studies<sup>10,11</sup>. Of note, teenagers tend to have the first sexual experience during the years at primary school<sup>12</sup>, indicating the need for sexual education in primary school. These observations are corroborated by similar reports on low educational levels and required treatment of sexual partners among syphilis patients in Olinda (Pernambuco state)<sup>13</sup>, Belo Horizonte (Minas Gerais state)<sup>14</sup>, and Sumaré (São Paulo state)<sup>15</sup>. Preventive interventions and sexual education on potential risks of transmission associated with sexual practices would encourage this population to practice safer sexual behaviors.

We assessed syphilis notifications of 2 years only which prevented statistical analysis of the data obtained in this study. Despite this, data on patients with acquired syphilis missing in the SINAN files such as serological tests and socio-demographic characteristics could be identified. The results of our study highlight the shortcomings of the basic health system and point to a substantial revision of practices to manage and prevent syphilis and other STIs. These may include counseling for risk reduction, increased access to condoms, and frequent testing for syphilis, particularly targeting socioeconomic groups that are at higher risk.

In conclusion, this study revealed a substantial increase in new syphilis cases in this part of Brazil. Furthermore, our results demonstrate that most cases of congenital syphilis could be avoided by effective treatment of the pregnant mother and her partner. Thus, public health strategies to prevent and manage syphilis infections need to be reviewed and improved.

### Ethical Considerations

This study was approved by the research ethics committee of the *Universidade Federal da Grande Dourados*, Dourados, MS (Study number 1.372.627).

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