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Original Research Article
Incidence of nontreponemal reactive test in women at childbirth in a maternity facility in the central region of Rondonia state, Brazil

ABSTRACT

Background: Syphilis is an infectious sexually transmitted disease caused by the spirochaeta *Treponema pallidum*. This disease is still a problem in public health, particularly in developing countries.

Aims: This study aimed to analyze the incidence of syphilis and congenital syphilis in a maternity facility in the city of the Ji-Paraná and compare it with official data provided by the Brazilian government.

Study design: An analytical, cross-sectional, prospective study.

Place and Duration of Study: Department of Pharmaceutical Sciences (CEULJI/ULBRA) and the public maternity facility of the Ji-Paraná city, between August 2 to October 2, 2014.

Methodology: We investigated a total of 300 pregnant women at childbirth. When VDRL test was positive a semi-structured interview was administered. The data obtained were compared with secondary data provided by DATASUS¹.

Results: A total of 50,657 cases of syphilis were reported in Brazil from 2005 to 2011. The highest incidence was in 2011 (5 cases per 1000 live birth) and the lowest in 2006 (0.3 cases per 1000 live birth), with an average of 7,237 cases per year. In 2007, a major change was observed in the incidence rate. Regarding congenital syphilis a total of 45,683 cases were reported in the same period. The highest incidence was in 2011 (3.3 cases per 1000 live birth) and the lowest in 2005 (1.9 cases per 1000 live birth), with an average of 6,526 cases per year. We found 5 women (16.6 per 1000 live births) with VDRL positive tests, however only one newborn, whose mother did not perform prenatal or therapy care, had a significant serology titration according Brazilian diagnostic guidelines. Diagnosed women in this research were all adults with an average of 21.8±2.8 years of age, with basic education, in stable union, and low income.

Conclusion: The results found in this study show that Brazilian Unified Health System needs significant changes in the notification system for syphilis. Also the current numbers are far from the established goal for 2015 regarding to syphilis control, and strongly suggest that it may not be reached.

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Keywords: Congenital Syphilis; Venereal Disease Research Laboratory (VDRL); Unified Health System (SUS); Childbirth; Brazil.

1. INTRODUCTION

Syphilis is a Sexually Transmitted Disease (STD), caused by the spirochaeta *Treponema pallidum* in a systemic way [1]. When untreated or treated improperly, the disease evolves compromising the skin, internal organs, and central nervous system. Syphilis is still a problem in public health, especially in developing countries. The World Health Organization (WHO) estimated that in 2008, 12 million people, including about 2 million pregnant women

¹ www.datasus.gov.br

were infected by *T. pallidum*. In addition, there is an increasing trend in the incidence of syphilis and congenital syphilis (CS) worldwide [2,3].

Congenital syphilis occurs with the transmission and hematogenous dissemination of *T. pallidum* **in** pregnant women untreated or treated inadequately to the fetus through the placenta. When infection **happens** in the first 6 months of pregnancy, vertical transmission in untreated women **occurs in** 70 to 100% of the cases, and in approximately 30% of the cases, for infection after the 6th month of pregnancy [3-8].

In places funded by the Brazilian Unified Health System (SUS), pregnant women during prenatal and birth must perform the screening for syphilis through the nontreponemal test (VDRL - Venereal Disease Research Laboratory). The screening must be performed in the first prenatal medical appointment, in the third trimester of pregnancy, and at childbirth or curettage [6-8].

Until the year of 2013, the nontreponemal test VDRL was used for CS screening, therapeutic follow-up and control. After this date, the rapid treponemal test which is target-specific was introduced, but it is still not available in all country regions. In the facilities where only VDRL is available, laboratory confirmation with treponemal tests for reactive VDRL, even though being decisive is not mandatory according to SUS police [4,6,9-11]. In cases when the mother is reactive in the VDRL test, the newborn must also be submitted to the test, if the result is also reactive, with clinical evidence or not, the treatment proceeds according to WHO guidelines [2,4,6].

In this context, considering that this disease is still a challenge in Brazil, this study aimed to analyze the incidence of syphilis and CS in a maternity **facility** in the city of Ji-Paraná and compare **it** with official data **made available** by the Brazilian government.

2. METHODS AND MATERIALS

2.1 Study area

This study was conducted in the city of Ji-Paraná, Rondônia, Brazil, located in the North region of the country (Geographic coordinates: 10°53'07" S - 61°57'06" W). The estimated population for the year 2014 is 129,242 inhabitants and the Human Development Index (HDI) is 0.714, according to the census of the Brazilian Institute of Geography and Statistics (IBGE) in 2010. The maternity **facility** of the public Hospital was chosen because it serves the majority of women in the central area of the State.

2.2 Study Design

An analytical, cross-sectional, prospective study with qualitative and quantitative approach was carried out in a two-month period from August 2 to October 2 in 2014.

2.3 Sources of Data

2.3.1 Epidemiological data

This study used secondary data obtained from DATASUS (www.datasus.gov.br). The database includes only confirmed cases of syphilis and congenital syphilis reported in the Notifiable Diseases Information System (SINAN) in the period from 2005-2011. Population

statistics were obtained from the Brazilian Institute of Geography and Statistics (www.ibge.gov.br).

2.3.2 Data collection

2.3.2.1 Sample method

We investigated 300 pregnant women attending the public maternity facility for childbirth, covering the entire sampling space. Data collection was performed every day of the week during the study period, regardless of childbirth type (natural or C-section).

2.3.2.2 VDRL Test

Blood samples of all participants were obtained by peripheral venous puncture, collecting 3 mL of mother's blood. Newborn blood sample were collected for VDRL test only when the mother sample was reactive. All investigations were carried out according to manufacturers' instructions. VDRL test (Record Nº.10009010223; Labtest Diagnostica SA, Lagoa Santa, MG, Brazil) in newborn was considered significant when the titration was at least four times mother titration [6].

2.3.2.3 Interviews

A semi-structured interview was administered for collection of demographic and clinical information in women with reactive VDRL test. The studied variables in the interview are presented in Table 3.

2.3.2.4 Incidence rate

The Incidence rate was calculated dividing the number of new cases in a given period of time by the number of exposed women in the same period, per 1000 live birth.

3. RESULTS AND DISCUSSION

3.1 Epidemiological distribution

A total of 50,657 cases of syphilis were reported in Brazil from 2005 to 2011. The highest incidence was in 2011 (5 cases per 1000 live birth) and the lowest in 2006 (0.3 cases per 1000 live birth), with an average of 7,237 cases per year. In 2007, a major change was observed in the incidence rate (Table 1). Regarding CS, a total of 45,683 cases were reported in the same period. The highest incidence was in 2011 (3.3 cases per 1000 live birth) and the lowest in 2005 (1.9 cases per 1000 live birth), with an average of 6,526 cases per year (Table 2). Since 2005, the Brazilian Ministry of Health considers syphilis a notifiable disease. Previous works have reported flaws in the notification system, and it is known that the disease frequency actually is higher than shown by official data [6,8]. This discrepancy can be seen in Table 1 for the year of 2007 in comparison with 2005 and 2006. The results of this study as well as the data for subsequent years, suggests that instead of an actual increase in number of cases, the notification system was improved, resulting in more cases being reported than before.

The WHO [21] estimated that developing countries had between 10 and 15% of pregnant women infected by *T. pallidum*. Research works on syphilis in Brazil reported that each year about three million women give birth and syphilis prevalence rate is estimated in 1.6%, corresponding to approximately 49,000 infected women and 12,000 live births with CS [3,

12-15]. Epidemiological data provided by the maternity facility where the study was carried, showed that only two cases of CS were confirmed in 2012. Another research work in a hospital in Brazil found that, out of 28 cases of CS, only 10 were reported. It was noticed an obvious inconsistency of data, due to underestimation or overestimation periods [16].

Table 1. Incidence of syphilis in pregnant women per region and year, Brazil, 2005 – 2011

Place	Year of notification						
	2005	2006	2007	2008	2009	2010	2011
Brazil	0.6	0.3	2.3	2.7	3	3.6	5
North	0.8	0.3	3.9	4.2	4.6	4.6	5.5
Northeast	0.7	0.3	2.3	2.2	2.5	3	4
Southeast	0.2	0.1	1.7	2.4	2.8	3.7	5.8
South	1.2	0.4	1.9	2	2.4	2.8	3.9
Midwest	1	0.7	3.5	5.3	5.3	5.4	6
Rondonia	0.2	0	1.7	0.9	1.2	1.6	2.8

Table 2. – Incidence of congenital syphilis in children with less than one year of age per region of residence and year of diagnosis, Brazil, 2005-2011.

Place	Year of notification						
	2005	2006	2007	2008	2009	2010	2011
Brazil	1.9	2	2	2	2.1	2.4	3.3
North	1.6	2	2.4	2.3	2.2	2.1	2.6
Northeast	2.2	2.5	2.3	2.2	2.4	2.8	3.8
Southeast	2.2	2	2	2.1	2.2	2.7	3.6
South	0.8	0.9	1.1	1.1	1.5	1.8	2.5
Midwest	1.7	1.7	1.2	1.4	1.4	1.6	1.8
Rondonia	0.1	0.4	0.3	0.4	0.3	0.4	1.1

3.2 VDRL test

We analyzed 300 pregnant women in this study, and in 98.33% of the cases VDRL tests were non-reactive. Table 3 presents the risk factors for CS diagnostic. In the interviews we found that four women with positive reaction for VDRL had prenatal care and only one discovered syphilis due to the VDRL test performed in childbirth.

Similar works have shown that the chance of a child being diagnosed with CS is higher when children are born from brown or black mothers without prenatal care which points out social inequality as a relevant factor for contagion [17]. In the interviews, we noted that patients had some knowledge on STDs, however they were unaware of the associated risks. Among the five pregnant women, only three reported to have knowledge obtained from lectures and/or radio programs about STDs upon initiation of sexual activity. Lack of knowledge and prenatal care were reported to be intrinsically associated with CS, the need to improve this care is evident [18-21]. Adolescence is a risk factor for syphilis [30], but mothers in this research were all adults (aged 18-25 years, average = 21.8±2.8). Studies have observed a

correlation between reactive VDRL in young women with low education and low income [18,21].

Out of five women with protein serum reagin, four had stable partners; only one of them was married. Syphilis has been reported to be more common in single women with active sex life which suggests that number of sexual partners is more significant than frequency of sexual intercourse for this disease [3].

Table 3. Profile of patients positive for VDRL

Variables	Woman 1	Woman 2	Woman 3	Woman 4	Woman 5
Age	20	22	25	18	24
Color	White	Brown	White	Brown	White
Marital status	Stable union	Married	Stable union	Stable union	Stable union
Education	Basic	High School	Basic	Basic	Basic
Income ²	234.50	469.00	> 234.50	234.50	469.00
Number of pregnancy	2	2	2	1	1
Age of 1 st sexual relationship	17	18	17	15	18
Used condom?	No	No	No	No	No
Number of sexual partners	2	3	1	2	2
If condom is always used	No	Sometimes	No	Sometimes	No
Knowledge about STD	Yes	Yes	No	No	Yes
Communication method	Lecture	Radio	-	-	Radio
When syphilis was diagnosed?	Prenatal care	Prenatal care	Pre childbirth	Prenatal care	Prenatal care
If during pregnancy, which trimester?	1 st	2 nd	3 rd	2 nd	1 st
Medical treatment	Yes	Yes	No	Yes	Yes

The results of serological tests were reported in Figure 1. We found that only the newborn from Woman 3, who did not receive prenatal care or therapy, had significant serology titration (1:16) associated with syphilitic characteristics. Previous works have shown that titrations 1:02 should be considered suspect and the treponemal test should be performed. This is because neonates may be in immunologic window period in which low titrations occur, even false negative or false positive due to the presence of maternal antibodies and/or cross-reactivity [22-25].

² US\$ per month

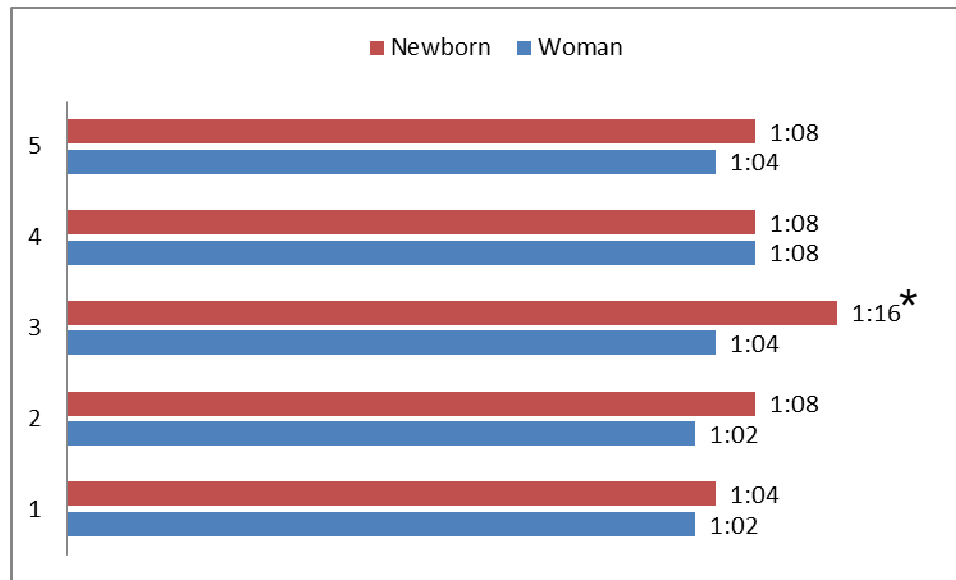


Fig. 1. Patients' titration. *Significant value according Brazilian Ministry of Health.

The Brazilian Ministry of Health had joined efforts to eradicate syphilis in Brazil. The official goal was set to reach eradication (0.5 cases per 1000 live births) in 2015. As can be seen in Table 1, the number of reported cases had actually increased in 2011, signaling that the goal may not be reached. In order to eradicate the disease, the government had intensified awareness campaigns and treatment programs, as well as improving the notification system. In a first analysis such actions seems to have negative effect. Our result of 16.6 cases per 1000, of infants is alarming. It suggests a huge flaw in the notification system as previously reported [8]. Also, the increasing in number of cases after the beginning of the eradication program suggests that more cases than before are being notified and that syphilis in Brazil is a bigger problem than initially thought.

4. Conclusion

The analysis of official data as well as previous works related to syphilis allows concluding that the Brazilian notification system needs serious reformulation. The results of our test suggest an incidence rate even bigger than reported in the latest years. The overall conclusion is that in order to control and eradicate syphilis needs to implement a systemic and integrated set of actions that goes from the reformulation of the notification system to introduction of more specific diagnostic methods and disease treatment.

CONSENT

All authors declare that "written informed consent" was obtained from the patients for publication of this research. The original copies are archived in the Department of Biomedicine, CEULJI/ULBRA. The questionnaires were kept separated from the written consent, making it impossible to know which data belongs to a particular participant.

ETHICAL APPROVAL

The authors have obtained ethical approval from the Research Ethic Committee (CEP-CEULJI/ULBRA: 79.807/2014) and Legal authorization from the Hospital manager.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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