INCIDENCE OF CONGENITAL SYphilIS IN A MetROPOLitan REgION OF BRO DE JANEIRO State: Social INequalities

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ABSTRACT

Introduction: congenital syphilis remains a public health matter, with no perspective of reaching governmental reduction goals. There are few studies about social inequalities and its relation with this disease in Brazil. Objective: describe occurrence of congenital syphilis in a reference hospital in a Metropolitan Region of Rio de Janeiro State, according to socioeconomic and clinical-laboratorial variables as well. Methods: cross-sectional study, based on interviews, review of medical records and prenatal cards. Population: all women admitted to a maternity ward during a trimester in 2011. Maternal variables: age, schooling, skin color, income, prenatal visits. Fetus/neonate variables: birth weight, gestational age, clinical and laboratory outcomes. Incidence of congenital syphilis (Brazilian Ministry of Health criteria) was calculated for all live births and for each social and economical variable. Results: there were 666 eligible women, comprehending 576 deliveries – 558 live births and 18 stillbirths. We identified 22 CS cases: 18 live births, three fetal deaths and 1 abortion. One of the neonates died in the third day of life. The incidence of CS was of 39.4/1,000 live births. Socioeconomic variables – low education, low income and black skin – were related to a greater incidence. Only 13 out of 22 cases were identified in prenatal care. Conclusion: our results pointed to social inequalities in the congenital syphilis incidence. As prenatal care is also related to socioeconomic variables, investments in quality of maternal assistance should be directed to more vulnerable women.

Keywords: congenital syphilis; incidence; perinatal mortality; prenatal care; social inequalities.

INTRODUCTION

Congenital syphilis (CS) is the infectious disease that results from the vertical Treponema pallidum transmission of the non treated or inadequately treated infected mother, to her child. CS is an important cause of perinatal morbidity and mortality, leading to negative outcomes, such as spontaneous abortion, natimortality, neonatal mortality, low weight and prematurity, according to the stage of infection in the woman and the moment of the mother-to-child transmission. Most newborn cases are asymptomatic; when symptomatic, cases can present low birth weight, prematurity, fetal hydropsy, vesicular-bullous rash on palms and plants, hepatosplenomegaly and sepsis.

Syphilis during pregnancy contributes to 650,000 fetal and neonatal deaths per year in developing countries. Based on these data, World Health Organization (WHO), in 2009, released an initiative aiming at the improvement of maternal and newborn health by decreasing the number of cases of congenital syphilis for at least 80% in five years.

Additionally, Pan American Health Organization (PAHO) has developed, also in 2009, the “Regional Initiative for the Elimination of mother-to-child transmission of HIV and congenital syphilis in the Latin America and Caribbean”, which was approved in 2010 by the member States of PAHO with the purpose of reducing the incidence of CS to less than or equal to 0.5 per thousand live births by 2015.

In Brazil, despite advances in the diagnosis and effective treatment of the disease, the vertical transmission rates remain very high. Between January 1998 and June 2012, 80,041 cases of congenital syphilis in children under 1 year of age were notified. The Southeast region recorded 45.9% of these cases. The incidence rate of congenital syphilis, in 2011, was of 3.3 cases per 1,000 live births, while in the Southeast, the value was a little higher – 3.8 per 1,000 live births. The State of Rio de Janeiro was prominent, with the highest rate of 2011 (9.6 per 1,000 live births).

According to SINAN (Information System for Reportable Diseases), most CS cases occur in Rio de Janeiro State capital, followed by Baixada Fluminense and two cities of the Metropolitan Region II: Niterói and São Gonçalo.

The objective of the present study is to describe the occurrence of the disease in a reference maternity ward located in the Metropolitan Region II in the State of Rio de Janeiro. The social and the demographic profiles, and the assistance to recent mothers, as well as clinical and laboratory characteristics of fetuses and neonates were taken into consideration.

METHODS

A cross-sectional study was performed with interview, medical records review and prenatal cards of all mothers and their newborn babies in the State Hospital Azevedo Lima (HEAL) maternity, from September to November, 2011. Located in the city of Niterói, Rio de Janeiro State, this is a reference hospital of the Unified Health System (SUS - Sistema Único de Saúde) for the Metropolitan Region II, including the cities of Itaboraí, Maricá, Niterói, Rio Bonito, São Gonçalo, Silva Jardim and Tanguá with an estimated population around 1,957,936 in 2011 according to DATASUS.

This study is a subproject of the “Maternal and perinatal morbidity-mortality in the cities of Rio de Janeiro and Niterói: the role of race, schooling, and social level in the access to health services” accomplished in a partnership between the Community Health Institute (ISC-UFF), Collective Health Studies Institute (IESC-UFRJ), Fernandes Figueira Institute (IFF-FIOCRUZ), and Public Health School (FSP-USP). The FSP original project, named “Mother-child Binomial Study: a necessity commanded to meet the needs of the millennium development”, was adapted to the State of Rio de Janeiro reality.

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In order to attend to the multiple outcomes of the research, the sample size was based on the livebirth number at the maternity included in the study, foreseen the collecting data for a period of three months, according to a similar WHO study(8).

A congenital syphilis case definition of the National STD and Aids Program of the Health Ministry was adopted(9) as follows: every child, or abortion, or stillbirth of mother with clinical evidence for syphilis serology and/or with non-treponemal reagent for syphilis with any titration, in the absence of confirmatory test held at treponemal prenatal care or at delivery time or curettage, which had not been treated or had received inadequate treatment.

Total and specific perinatal mortality rates were calculated for CS per thousand births, and also the incidence rates of total congenital syphilis: new congenital syphilis cases, including miscarriages, stillbirths and live births divided by the total number of live births in the quarter in question, multiplied by 1,000(5) – and according to socioeconomic characteristics (skin color, average income per capita and schooling). Despite the cross-sectional feature of the study, the calculation of CS incidence is recommended because it considers all possible outcomes during pregnancy.

The maternal characteristics assessed for the study population in general, and in particular the cases of CS were: age (19 years, 20-34 years, ≥ 35 years); schooling (low < 8 years of study, and high ≥ 8 years of study); skin color, as declared by woman; per capita family income; number of prenatal visits and adequacy of prenatal care. The criterion of adequacy considered the following number of visits: for women with 37 or more weeks, seven visits or more, for those between 32 and 36 weeks, five visits; between 28 and 31 weeks, four visits; between 22 and 27 weeks, three visits; and at least two visits for women with less than 22 weeks(9). The month of the beginning of prenatal care was also taken into consideration, and considered adequate if the first consultation occurred until 16 weeks of pregnancy. For CD cases, non-treponemal tests – VDRL – during prenatal care and laboratory test held at treponemal prenatal care or at delivery time or curettage were analyzed.

Gestational age and birth weight were evaluated for the neonates, as well as changes in blood count and VDRL in the blood or liquor. An algorithm was used for the calculation of gestational age, in the attempt of the best estimate, prioritizing the date of last menstruation and/or ultrasonography of the first quarter. When both were absent, the evaluation of the newborn by Capurro method(10) or Ballard(11) were applied, and registered by the pediatrician. To assess suitability of the weight to the gestational age, the standards established for Brazilians neonates were used(12).

The data were processed and analyzed by SPSS® statistical software, version 17. For continuous variables, average and standard deviation were calculated, where applicable. To verify the association between categorical variables, the Chi-square (χ²) was used; T-test was applied for the average difference, considered a statistical significance level less than 0.05.

The research project was approved by the Research Ethics Committee of IESC-UFRJ (approval n° 35/2011). Informed consent was requested to all eligible pregnant women or to their respective responsible when they were under 18 years of age.

**RESULTS**

A total of 666 women were eligible for the study, of whom there were 576 births, 52 miscarriages, and 12 ectopic pregnancies. Only four refused to participate in the study.

Of the total births, 558 were live births (four twins) and 18 fetal deaths. Perinatal mortality in the period studied was of 50 per 1,000 births.

The user population of HEAL showed unfavorable socioeconomic conditions, with a high percentage of adolescents (30%) and women with incomplete elementary school (35%). The average per capita income was of R$ 300.00. About prenatal care, less than half reported having done seven or more visits (Table 1).

A total of 22 cases of CS was verified, of whom 18 livebirths, three stillbirths, and one miscarriage. Thirteen cases of women resident in the city of Niterói, seven from São Gonçalo, one from Maricá, and one from Itaboraí. The incidence found in CS was of 39.4 per 1,000 live births for the quarter reviewed. Congenital syphilis was responsible for four of the 29 deaths during the perinatal period with a CS perinatal mortality rate of 6.9 per 1,000 births, being the fetal component of 5.2 per 1,000 births.

Through the analysis of the 22 women whose fetuses or newborn babies (NB) had a diagnosis of CS, it was observed an age between 15 and 33 years, with an average of 20.5 years and a percentage of adolescent mothers of 40.9%.

<table>
<thead>
<tr>
<th>Variable</th>
<th>HEAL* women N = 553</th>
<th>CS Subgroup N = 22</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 19 years</td>
<td>29.8</td>
<td>40.9</td>
<td></td>
</tr>
<tr>
<td>20-34</td>
<td>62.4</td>
<td>59.1</td>
<td></td>
</tr>
<tr>
<td>≥ 35 years</td>
<td>7.8</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td><strong>Color (%)</strong></td>
<td></td>
<td></td>
<td>0.017</td>
</tr>
<tr>
<td>White</td>
<td>27.5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>24.7</td>
<td>40.9</td>
<td></td>
</tr>
<tr>
<td>Mulatto</td>
<td>46.5</td>
<td>54.6</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>1.3</td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td><strong>Schooling (%)</strong></td>
<td></td>
<td>&lt; 0.0001</td>
<td></td>
</tr>
<tr>
<td>&lt; 4 years</td>
<td>2.7</td>
<td>9.1</td>
<td></td>
</tr>
<tr>
<td>4-7 years</td>
<td>30.4</td>
<td>72.7</td>
<td></td>
</tr>
<tr>
<td>8-11 years</td>
<td>63.6</td>
<td>18.2</td>
<td></td>
</tr>
<tr>
<td>12 years or more</td>
<td>3.1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Per capita income (R$)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>R$ 401.00</td>
<td>R$ 245.00</td>
<td>0.0001</td>
</tr>
<tr>
<td><strong>Prenatal visits (%)</strong></td>
<td></td>
<td></td>
<td>0.562</td>
</tr>
<tr>
<td>≤ 3 visits</td>
<td>16.2</td>
<td>22.7</td>
<td></td>
</tr>
<tr>
<td>4-6 visits</td>
<td>36.7</td>
<td>39.9</td>
<td></td>
</tr>
<tr>
<td>7 or more</td>
<td>47.1</td>
<td>36.3</td>
<td></td>
</tr>
</tbody>
</table>

*Total of women whose children have not had congenital syphilis.
In relation to socioeconomic characteristics, the percentage of incomplete elementary education was of 81.8%, and the average per capita income was of R$ 250.00; 21 of them reported family income less than one minimum wage at the time (Table 1). Twenty-one (95.4%) declared to be black or mulatto, and one was of Asian origin. There were no cases among white women nor in those with more than 11 years of education. Table 1 shows the differences between the subgroup of women with CS and the total of recent mothers (live births and deaths) without syphilis studied in the maternity ward of HEAL.

The 22 women had at least one prenatal visit. However, according to the parameters used to assess the adequacy of prenatal, 59.1% received an inadequate prenatal. Only 13 (59.1%) of 22 mothers with syphilis were identified in prenatal care; seven cases (31.8%) of syphilis were diagnosed only at time of delivery, and two (9.1%) cases were not aware of information about laboratory tests performed during the prenatal period. The VDRL collected at the maternity ward ranged from 1:1 (a patient HIV+) to 1:256 (Table 2).

Regarding live births with CS, three of them weighed less than 2,500 g and five had less than 37 weeks. Two babies were small considering the gestational age, one term newborn and one pre-term newborn, which evolved into death. Serum VDRL was positive in 16 cases (88.9%), and there were four cases (22.2%) of neurosyphilis. The neonates VDRL ranged from 1:1 to 1:256 (Table 2).

Blood evaluation tests showed anemia in five newborn (27.8%) and thrombocytopenia in four (22.2%). Two neonates showed hepatic alterations: one of them with hepatic hyperbilirubinemia, and the other one with hepatomegaly. One newborn presented a serious blood dyscrasia, leukopenia, sepsis, kidney failure, and pancytopenia, evolving into death. His mother had five prenatal visits and was identified 1:8 VDRL. She did not receive treatment, as this serology was erroneously considered a “serological scar”. On admission, the patient presented an upward titration (1:16) and the final outcome was the newborn death.

The incidence of congenital syphilis was significantly higher in black women with low schooling and low income (Table 3).

**DISCUSSION**

Since the 90’s, WHO and other health organizations have been striving to control the congenital syphilis in the world. In Brazil, transmission rates remain very high and it seems unlikely to achieve the goal of global elimination of the disease(1). In our study, it was identified an incidence rate (39.4‰) much higher than the target set to us and higher than in other national studies(13-20) with the same CS criteria(21). It is worth noting that there were diverse methodology studies, with primary data, as well as data from SINAN, population and hospitals.

From 2002 to 2004, a study performed in HEAL(13) presented an incidence of 21.9‰; however, after 10 years it was observed an incidence of congenital syphilis almost twice greater.

We have observed a high percentage of adolescent mothers, data presenting similarity in the same hospital between 2002 and 2004(13). Some studies have found links between adolescence and occurrence of congenital syphilis(16,19); however Lima et al. (2013) did not demonstrate this association in the city of Belo Horizonte, State of Minas Gerais.

The user population of the HEAL maternity has unfavorable socioeconomic conditions, and we have observed that the subgroup of women whose fetuses had CS proved even a greater disadvantage, particularly in relation to income, race and education, and these data were confirmed in other national studies(14-16,19,22,23).

Another factor probably related to the disease is the race issue, yet little studied in our country(16,18,19). In our research, the incidence rate of congenital syphilis in black women was very high, 62.5‰, and there were no cases, in that period, among white women. The black population is socially more vulnerable, which may in part explain this association.

The twenty-two mothers with an outcome of CS had at least one prenatal visit, however, more than 60% had insufficient amount of visits. However, the number of visits is not the only factor contributing to the perpetuation of congenital syphilis; the quality of prenatal care offered by the health services regarding the timely diagnosis and treatment of the disease must also be examined. We have identified a considerable portion of the population studied (36.3%) that even performing appropriate prenatal visits failed to prevent the unwanted outcome. This proves the quality deficiency of prenatal care, which has been one of the main factors for the high rates of congenital syphilis, confirmed in many national studies(15-20).

In general neonates infected by *Treponema* are asymptomatic at birth, a result observed in our study. Nevertheless, complications such as prematurity, low birth weight, liver and hematological changes are expected in these newborn babies(23-25). Prematurity and low birth weight due to congenital syphilis are causes that raise the risk of perinatal mortality(26). Even in the presence of negative VDRL, as noted in two newborn babies, the thorough investigation of congenital syphilis should be performed, since this finding is not unusual(26).

The perinatal mortality rate for congenital syphilis found in our study was greater than the one observed in the city of Rio de Janeiro(23) in 2002 (0.89%), the same occurring with the fetal mortality for syphilis(26), which was twice the mortality found in the same city in 2004 (2.55%). These studies also used primary data and were not based on SINAN. The negative impact of the disease on fetal viability justifies the intensification of preventive measures of syphilis vertical transmission.

As a limitation of our study, we point out the small number of cases and the short period of time (a quarter). This was due to the

**Table 2** Number of patients (recent mothers and neonates) with positive VDRL collected at time of delivery, cases of congenital syphilis (CS), State Hospital Azevedo Lima (HEAL) maternity ward, Niterói, Rio de Janeiro, September to November, 2011

<table>
<thead>
<tr>
<th>VDRL/ Patients</th>
<th>1:1 a 1:2</th>
<th>1:4 a 1:8</th>
<th>1:16</th>
<th>1:32</th>
<th>1:64</th>
<th>1:128</th>
<th>1:256</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Live births</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>14</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Critical point for the elimination of congenital syphilis

prenatal care, either due to the difficulty of access of users, or by being fully followed by health professionals. The bankruptcy of nostic and treatment guidelines on pregnancy, it seems this is not of syphilis. Despite protocols are clear as to the appropriate diag-

It should also be noted that the risk of congenital syphilis is directly related to the health service provided. The lack or preca-
rion of prenatal care is a risk factor for vertical transmission of syphilis. Despite protocols are clear as to the appropriate diag-

CONCLUSION

Despite the simple, effective and affordable technology for diagnosis and treatment, congenital syphilis remains high in Rio de Janeiro women users of SUS, its higher incidence being emphasized among those with social vulnerability features.

Our results showed socioeconomic factors – low income, low education and black/mulatto race – as predictors of the occurrence of congenital syphilis, which may reflect inequalities in self-care, access and continuity of health services. We believe that a differentiated attention to these most vulnerable groups would be an important strategy to be considered for the disease control guidelines.

It should also be noted that the risk of congenital syphilis is directly related to the health service provided. The lack or precari-

methodology of the original research, based on the outcomes of neonatal morbidity. However, a strong point was the daily collection data, using various sources: interview, prenatal card, medical records and lab tests. In studies using the Information System for Reportable Diseases (SINAN) as a source, although there is the advantage of being able to cover longer periods, there is a risk of underreporting and poor quality of data.[27,28].

**Table 3 – Syphilis incidence due to socioeconomic variables – color of skin, income and schooling, State Hospital Azevedo Lima (HEAL) maternity ward, Niterói, Rio de Janeiro, September to November, 2011**

<table>
<thead>
<tr>
<th>Socioeconomic variables</th>
<th>Incidence rate (by 1,000 live births)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color of skin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>62.5</td>
<td>0.012a</td>
</tr>
<tr>
<td>Mulatto</td>
<td>45.0</td>
<td></td>
</tr>
<tr>
<td>Per capita income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; R$ 200.00</td>
<td>67.0</td>
<td>0.035b</td>
</tr>
<tr>
<td>R$ 200 to 749.00</td>
<td>29.7</td>
<td></td>
</tr>
<tr>
<td>≥ R$ 750.00</td>
<td>18.0</td>
<td></td>
</tr>
<tr>
<td>Schooling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 8 years</td>
<td>90.5</td>
<td>&lt; 0.0001a</td>
</tr>
<tr>
<td>≥ 8 years</td>
<td>10.8</td>
<td></td>
</tr>
</tbody>
</table>

a Chi-square.  
b Chi-square with linear trend.

Syphilis is not a disease of the past, and we should remind health professionals, especially in the mother-child area, of the importance of congenital syphilis among vertical transmitted diseases.

**References**

There is no interest conflict to be declared.

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