

Prevalence of Asymptomatic Infection by *Treponema pallidum* in Pregnants of the Baixada Fluminense Region, Province of Rio de Janeiro, Brazil

Ana Carolina Torres¹, Antonio Neres Norberg², Fabiano Guerra Sanches¹,
Jose Tadeu Madeira-Oliveira³, Alex Nagem Machado⁴, Paulo Cesar Ribeiro¹,
Nicolau Maues Serra-Freire⁵

¹Department of Pathology, Iguaçú University – UNIG, Rio de Janeiro, Brazil

²Department of Pathology, Souza Marques Medicine School – FTESM, Rio de Janeiro, Brazil

³Department of Pathology, UNIABEU University Center, Rio de Janeiro, Brazil

⁴Department of Public Health, Medicine School of Manhuaçu - FACIG, Manhuaçu, Brazil

⁵Department of Public Health, Oswaldo Cruz Institute – IOC/FIOCRUZ, Rio de Janeiro, Brazil

Email address:

ana.biovet@bol.com.br (A. C. Torres), antonionorberg@gmail.com (A. N. Norberg), fab.gs@bol.com.br (F. G. Sanches),

jtadeumadeira@yahoo.com.br (J. T. Madeira-Oliveira), alex.nagem@globocom.com (A. N. Machado),

ribeioribeiro@uol.com.br (P. C. Ribeiro), nmsf@ioc.fiocruz.br (N. M. Serra-Freire)

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Abstract: Syphilis is an infectious disease with worldwide distribution caused by *Treponema pallidum*, and has great clinical importance when the pathogenesis is in pregnant women. The congenital disease is the result of the infection by vertical transmission of the *Treponema* to the fetus and can be the cause of high morbidity of the concepts during intrauterine life. It can also cause serious problems during pregnancy such as expontaneous abortus, premature babies with low weight, stillbournes, neonatal mortality, and early or late complications in children who survive to the infection. The aim of this study is to investigate the prevalence of syphilis in pregnant in obstetrics clinics in the Baixada Fluminense region and advise the seropositives for appropriate treatment and evaluate the intervention, contributing to the eradicate to the maternal diseases and preventing the transmission of the *Treponema* to the concepts. During the years 2010 and 2011, venous blood samples were collected from 1183 asymptomatic adult pregnant accompanied by obstetricians to detect anti-*T. pallidum*. The serum obtained from the blood was frozen and stored at -20°C until the analysis by serologic reactions of Venereal Disease Research Laboratory (VDRL) and passive hemagglutination (TPHA). The results showed 28 cases were diagnosed with titers equal or superior to 1:16, suggestive of syphilitic disease, corresponding to the coefficient of prevalence of 2.37%. There were dominance of cases in pregnant in the etary group between 21 and 30 years old. There is asymptomatic infection among the examined pregnant of Baixada Fluminense region, with possible risk of vertical transmission of infection to their concepts.

Keywords: Syphilis, Abortus, Stillborn, Drug Treatment (Source: MeSH: MeSH NLM)

1. Introduction

Syphilis (the Greek *sys* = dirty *philein* = love) was in the past one of the great scourges of humanity and turned epidemic in the middle age. Caused by *Treponema pallidum*

subspecies *pallidum*, it is an infectious, systemic and chronic disease with cutaneous, polymorphic and temporary manifestations. It affects the circulatory and nervous system and other organs; the transmission may be congenital or may occur after birth, usually in adults through sexual

transmission. [1]

Congenital syphilis is the result of infection of the fetus through vertical transmission of *T. pallidum*, may be the cause of high morbidity in intrauterine life and can cause serious problems during pregnancy, such as miscarriage, stillbirth and neonatal mortality, as well as early and late complications in more than 50% of cases of living infants. [1, 2]

The disease is classified into three stages: a) primary syphilis: an individual presents an ulcerated lesion with hardened edges at the site of infection, called chancre; b) secondary syphilis: observed two weeks after the disappearance of the chancre, is characterized by malaise, headache, prostration, jaundice, arthritis, low fever, painless adenopathy in 70% to 85% of the patients. The patient may present exuberant cutaneous lesions or syphilitic reddish-pink rash covering the entire body; c) tertiary syphilis: phase with cardiovascular and neurological impairment, which usually occurs between 20 and 30 years after the initial infection; latency period: can occur between the phases, mainly between secondary and tertiary, and may last for years. Vertical transmission of syphilis in pregnant women occur through placenta at rates of 70% to 100% for the primary phase, 40% for the initial latent phase and 10% for late latent phase, triggering the congenital syphilis. When affecting pregnant non-treated women, the infection can result in spontaneous abortion, prematures, low birth weight, fetal hydrocephalus or perinatal death. [1, 3, 4] The infection of the fetus depends on the latest stage of maternal syphilis, when a greater number of treponemes is in the current circulatory compromising the fetus. Otherwise, the progressive formation of maternal antibodies attenuates the infection of the fetus. Seropositive mothers can give birth to healthy children. The maternal infection in the last trimester of pregnancy, varying according to the load received treponemes and its virulence, may determine the mortality of the fetus. Another mechanism of transmission can occur at birth by direct contact with active lesions of parturients and when infected, can cause from asymptomatic disease to involvement of multiple organs. Infants may have persistent rhinitis, hepatosplenomegaly, renal lesions, lymphadenopathy, bone and skin lesions, among others. Postnatal early manifestations occur in the first two years of life and the late manifestations after this period, usually when the child is approaching to the adolescence. [5]

The World Health Organization (WHO) reported that in developing countries around 10% to 15% of pregnant women are carriers of syphilis. In Brazil, the average estimated is between 3.5% and 4%, with the risk of vertical transmission of *T. pallidum* from 50% to 85% and rates of perinatal mortality by 40%. The vertical transmission rate of untreated syphilitic pregnant women is 70% to 100% for primary syphilis, 40% for early latent syphilis and 10% for late latent syphilis, congenital syphilis triggering may result in spontaneous abortion, premature birth, low birth weight, fetal hydrocephalus and perinatal death. [1, 6]

Of the 12 million people worldwide infected with syphilis each year, 2 million are pregnant women. Probably 50% of

these pregnancies may culminate in fetal or perinatal death, underweight at birth and newborns with congenital syphilis, and these cases are costly to the health system, and could be prevented through prenatal screening checks and treatment of the identified cases. [5, 7]

The discovery of penicillin in the 40s of the last century turn effective the treatment of syphilis, but in the 80s there was its resurgence among the general population, especially cases of congenital syphilis, becoming one of the most challenging problems in public health. Congenital syphilis was a rare event in most rich countries; however, it's rising in several countries of Europe. In sub-Saharan Africa, congenital syphilis continues to represent one of the most important public health problems. [1, 2]

Gestational monitoring associated to laboratory research provides the well-being of the fetuses by protecting them against potential pathogens presents in pregnant women. When the disease is in the acute phase, vertical transmission may occur by promoting infection in the fetus and may evolve to fetal death or cause permanent and irreversible injury. [8, 9]

Considering the importance of the presented disease and its serious injuries to pregnant women and fetuses, the lack of evidence of syphilis in the region, the high incidence of abortions of unknown cause, as well as verified fetal deaths, this study aimed to investigate the incidence of syphilis in women without symptoms of syphilis and with pregnancy monitoring in obstetrics ambulatories in the Baixada Fluminense, province of Rio de Janeiro, Brazil, following to the drug intervention for the confirmed cases.

2. Material and Methods

The serology to investigate and diagnosis syphilis in pregnant was conducted in the Laboratory of Clinical Analysis and in the Laboratory of Parasitic Diseases of the Iguaçú University - UNIG. The study was conducted between 2010 and 2011 and had a transversal design, individualized for pregnant with prenatal care without symptoms of syphilis, with a convenience sample by the given the characteristics settings to integrate sampling unit: being pregnant, having gestational period monitored in clinics of Baixada Fluminense region, Rio de Janeiro, Brazil, have 11 years old or greater. Each individual blood sample was collected, with patients abstaining from food, by venipuncture. To obtain the serum, after punctured blood coagulation, it was centrifuged and the serum obtained was separated into two aliquots, both frozen at -20°C until release the reaction of the Venereal Disease Research Laboratory (VDRL) test and the indirect hemagglutination assay (TPHA). The blood tests were performed by the techniques described by Oliveira-Lima [10]. The data were analysed by descriptive statistics and tested the differences by statistical analysis of variance to compose the age classes, "t" test paired to the evaluation of the class sizes and to the number of positive cases among age classes, and the Kruskal-Wallis test to compare the frequencies of cases among age classes with the

Dunn test for the final decision of inference, having the significance level arbitration in 5% ($p < 0.05$). The study was approved by the Faculty of Health Sciences Ethics Committee of Iguacu University.

3. Results

The VDRL test diagnosed 26 infected among the 1183 asymptomatic pregnant examined, with titers ranging between 1:16 and 1:128. The 26 positive sera for the VDRL were confirmed by the specific test TPHA (*Treponema pallidum* hemagglutination), that confirmed the conclusive diagnosis for the VDRL reactions. Stratification by age of the women integrant of the sample showed the numerical equivalence if considering the age group of human reproduction (Table 1). It was also possible to infer that mostly of the positive cases were among pregnant women aged between 21 and 30 years (62.21%), where the two

classes differs significantly from the other studied (Table 1), in agreement with the literature data.

Considering the coefficient of fecundity for the Baixada Fluminense region, according to the data from the IBGE Census 2010, the composition of age classes group of pregnant women did not differ significantly from the expected, with probability $p = 0.0643$ for type I error for paired "t" test ($p > 0.05$).

The evaluation of the differences between the prevalence coefficients (infected samples) on the seven examined classes of pregnant women showed no significant differences, indicating that the age influences on the possibility of infection ($p < 0.05$) according to the Kruskal-Wallis test, with the decision supported by Dunn's test (Table 1). This perception can be showed both by the prevalence rate, as well as the intensity of the serological reaction indicated by title ratings of the VDRL test (Fig. 1).

Table 1. Age classes of the 1183 pregnant women with monitoring pregnancy in the health system care of the Baixada Fluminense region, Rio de Janeiro, between 2010 and 2011, asymptomatic to syphilis, before serologic tests, with prevalence coefficient (CP) indicators of *Treponema pallidum* infection.

Age group of pregnant (years)	Samples				Smallest and highest titers to the VDRL test	
	Examined		Infected			
	No	%	No	CP (%)		
< 16	24	2.03	0	0 ^d	0	
16 H 20	256	21.64	3	1.17 ^c	1:16;	1:32
21 H 25	412	34.82	11	2.67 ^b	1:16;	1:64
26 H 30	324	27.39	10	3.09 ^b	1:16;	1:64
31 H 35	108	9.13	2	1.85 ^c	1:16;	1:64
36 H 40	46	3.89	2	4.35 ^a	1:32;	1:128
>40	13	1.10	0	0 ^d	0	
Total	1183	100.00	28	2.37	1:16;	1:128

Note: Exponents with different letters in the CP column indicates significant difference at 5% significance; with the same letters indicate no significant difference.

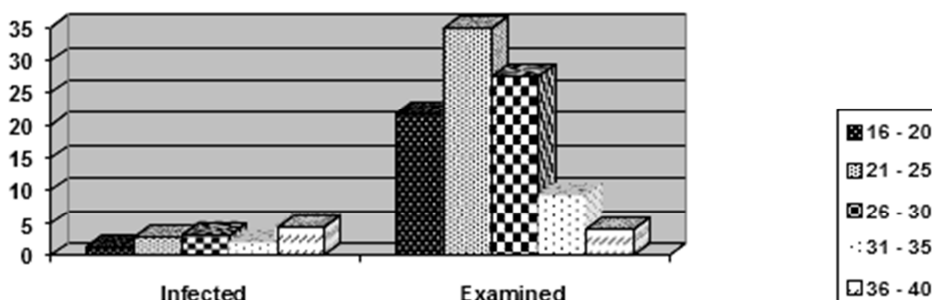


Figure 1. Prevalence of the infection of *Treponema pallidum* in 28 pregnant with monitored pregnancy in health services of Baixada Fluminense region Rio de Janeiro, between 2010 and 2011, asymptomatics to syphilis, detected before VDRL and TPHA serologic tests, according to age classes.

4. Discussion

The research contributed to know the prevalence of infection by *Treponema pallidum* in the studied location. Congenital and perinatal infections represents a significant problem because they are preventable and it points to an absence or neglect of actions on the early diagnosis or lack of treatment of the maternal disease. It's more relevant when the results shows that the major etary group for prevalence is between 16 and 35 years old, which reveals that the infection is concentrated in the reproductive age group of women. The

syphilis incidence in the studied region is also linked to a deficiency of obstetrics and other health professional, also with a lack of preventive and educational programs against sexual transmitted diseases. We emphasize that the knowledge of the prevalence during pregnancy, birth and neonatal period is essential to promote educational and preventive actions to avoid fetal compromise. The later is the diagnosis and treatment of maternal infection more difficulty will be the preventive actions to save to the fetus for vertical transmission. [11]

It is estimated that up to 90% of fetuses affected by the

disease are asymptomatic at birth. [12] The severity of the clinical manifestations of syphilis in newborns depends on maternal treponemia during the pregnancy when the fetus infection occurred. Therefore, at the primary or secondary phase of the disease, perinatal transmission reaches 70% to 100%, reducing to 40% to 80% in the early latent phase and 10% to 30% in late latent or tertiary phases. [13] The untreated children during the neonatal period often come to get sick in the first years of life and may progress to death. [11] More specifically, congenital syphilis has been associated to high rates of prematurity and low birth weight. [12, 14]

Lago [11] concerns about congenital syphilis, emphasizing that even encouraging the monitored pregnancy, the number of cases of congenital syphilis remains at high levels. This fact is possibly related to the delayed uptake of pregnant women for prenatal care since a reduced number of pregnant women demands prenatal monitoring before the twelfth week of pregnancy. This fact, besides contributing to late diagnosis of maternal infection, complicates the treatment to prevent mother-to-child transmission of the treponema. The author also commented that the study of the causes of failure in preventing congenital syphilis reinforces the importance of prenatal care in reducing this disease. Therefore, it is necessary for pregnant women to be accompanied earlier by health services, submitted to all the recommended tests and, if infected, to be adequately oriented, as well as their partners. We support Lago *et al.* [11] because health services in Brazil and other countries aims to eradicate or even reduce the number of cases of congenital syphilis, considering that for the diagnosis and treatment there is no need for complex technologies or high investments.

Our clinical experience regarding the treatment and monitoring of syphilitic pregnant women and their fetuses are in agreement with Saab [15] and Malakar [16]. These researchers affirms that the incidence of syphilis is variable in different risk populations, and late or severe clinical forms depend on various elements that interferes directly in maternal health, such as socioeconomic status, housing and sanitation conditions, hygiene habits and food. The information and health orientation are the most effective ways to modify the perception of those aspects of health in the population and to cause changes in personal attitudes, considered prerequisites for an effective primary care.

The risk of syphilis can be eliminated or reduced if pregnant women follow care attitudes with direct contagion and personal hygiene. At the first doctor's visit and prenatal care, patients should be informed that the preventive measures reduce - but not eliminate - the risk of infection during pregnancy. The secondary prevention, through screening of the trimestral health checks, should be recommended particularly in regions with higher prevalence of the disease. As the prevalence is high, there is a need for immediate treatment to avoiding damage to the fetus, which can result in fetal death, and 80% of infants develops some kind of injury. [15]

It must be considered that the clinical diagnosis of syphilis

is difficult because the primary phase often goes unnoticed and is dormant for many years in the adult, difficulting its epidemiological control. Therefore, we believe that one of the principal measures to control congenital syphilis is performing serology at the first prenatal visit and its repetition in the third trimester of pregnancy.

Silva & Silva-Santos [17] commented that the syphilis serology should be performed in all non-pregnant, and even in pre-nuptial exams. This practice could be an asset to reduce the number of cases in Brazil. The increasing level of cases of congenital syphilis detected after birth is the result of failures in prenatal, as the delay of the results of serological tests.

The prevalence of 2.37% is almost a triple of the 0.99% found by Malakar [16] among pregnant women from Lakhimpur, district of Assam, India. Our data for pregnant women in Baixada Fluminense reflects a serious public health problem. The choice of serology for diagnosis of syphilis in pregnant women in the Baixada Fluminense by VDRL serology and indirect hemagglutination is in agreement with other studies [1, 3] which adopted and considered the best resource for the diagnosis of syphilis as well as the low cost, specific hemagglutination test, is comparable to the absorption of the fluorescent test for anti-treponemal antibodies (FTAbs).

Ríos-González [18] determined the prevalence of syphilis in pregnant attending prenatal control at the gynecology and obstetrics service of the General Elizardo Aquino District Hospital, department of San Pedro, Paraguay. Among 1772 pregnant women, a prevalence of 4.8% was found, higher than the rate found in pregnant women in the Baixada Fluminense region, which was 2.37%.

Manyahi *et al.* [19] examined 39698 pregnant women in the interior of Tanzania in 2011, and found a prevalence of syphilis of 2.5%, with the highest incidence among women of semi-urban and rural areas. The prevalence rate of the Baixada Fluminense, Rio de Janeiro, was 2.37%, almost coinciding with the values found by these authors.

Moura [20] *et al.* tested the serology for syphilis for 54744 pregnant and found a prevalence of 2.8%, slightly higher than the rates verified in our study.

5. Conclusions

The scarcity of citations about syphilis in pregnant women in developed countries due to a low incidence or is a result of better living conditions of the population by investing in prenatal and effective public health programs, advising on the risks of syphilis in the pregnancy care. In some developing countries, high rates of syphilis in the population may occur by the lack of government investment in public health or the monitoring of pregnancy is practically none. So, these low rates are probably due to underreporting, which can distort the difference between prevalence rates found. [6, 7, 8, 17]

The alarming percentage of fetuses with syphilis or even stillbirth by inaction or negligence of government authorities deserves a further consideration. We emphasize that currently

focus is almost exclusively on HIV infection, relegating to the background other diseases with similar perinatal repercussions, such as syphilis. In parallel, we can't ignore the frequent association between HIV infection and other sexually transmitted diseases, especially syphilis. [1, 15] The evidence of the Baixada Fluminense region's subclinical infection with *T. pallidum* shows a fault in the prenatal congenital syphilis prevention, avoidable if the procedures standards established by the Ministry of Health were accomplished, in the aspects of diagnosis and treatment of maternal infection. [1] Nowadays, it is incontestable the need for continued technical training and awareness of the health professionals of services that provide prenatal care.

All seropositive pregnant women attended in clinics and hospitals of the Baixada Fluminense, Rio de Janeiro, were treated according to the recommendations of Veronesi and Focaccia [1]; penicillin G benzathine 2400000 units was applied once a week. Subsequently, serological tests were repeated to monitor the decrease of antibodies titers, expressive sign of syphilitic disease cure.

From the analysis of the results we concluded that: syphilis is present in the Baixada Fluminense pregnant women with prevalence rate of 2.37%, whose were included in the group of high-risk pregnancies, treated effectively with proven cure according to the paired serology. This work aimed to diagnostic and affords treatment of congenital syphilis in the study area providing benefits to the fetuses that probably born free of syphilitic disease.

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