

# PREVALENCE OF SYPHILIS, DIAGNOSTIC METHODS AND ASSOCIATED FACTORS IN PATIENTS TREATED IN THE LABORATORY OF HEALTH FOUNDATION OF VITÓRIA DA CONQUISTA (BA)

*PREVALÊNCIA DE SÍFILIS E FATORES ASSOCIADOS EM PACIENTES ATENDIDOS NO LABORATÓRIO DA FUNDAÇÃO DE SAÚDE DE VITÓRIA DA CONQUISTA (BA)*

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## ABSTRACT

**Introduction:** In spite been discovered centuries ago, syphilis remains a sexually transmitted infectious disease of major public health impact given the high prevalence found in Brazil and worldwide. The laboratory detection, with subsequent treatment of this disease, can reduce vertical contamination rates among adults and reduce sequelae from its clinical manifestations. **Objective:** To determine the prevalence of syphilis, as well the gestational and congenital forms of syphilis, and associated factors among patients attending the laboratory of Health Foundation of Vitória da Conquista (FSVC). **Methods:** A retrospective cross-sectional study, using secondary data obtained from the system of notification for syphilis, from FSVC laboratory from July 2012 to July 2013, following the ordinance criteria nº 3242 of 2011. **Results:** 134 patients were identified with positive diagnostic tests for syphilis among the 6,699 patients that were tested, revealing a global prevalence of 2%. The prevalence of congenital syphilis was 2.84 and 2.24% for gestational syphilis. It stands out among the positive ones that 19.4% of the patients were aged less or equal to one year old, 37.3% were pregnant women and the vast majority (94%) of them lived in urban areas. 47% of the patients had venereal disease research laboratory (VDRL) titers up to 1:4. Among those patients with primary positive test, 94% got positive results from the confirmatory test. Between newborns that tested positive for syphilis, 60% had titers up to 1:2. **Conclusion:** The prevalence rates are high considering the parameters established by World Health Organization (WHO) and are capable of representing burden for the population. However, they point out good chances of screening the county from the disease, which is an essential step in addressing this serious infection to the Public Health.

**Keywords:** syphilis, diagnosis, prevalence.

## RESUMO

**Introdução:** A sífilis continua sendo uma doença infecciosa sexualmente transmissível de grande impacto para a Saúde Pública, dadas as elevadas prevalências encontradas no Brasil e no mundo, apesar de ter sido descoberta há séculos. Sua detecção laboratorial, com posterior tratamento, pode reduzir as taxas de contaminação vertical entre adultos, além de reduzir sequelas de suas manifestações clínicas. **Objetivo:** Determinar a prevalência de sífilis, incluindo as formas gestacional e congênita, e fatores associados em pacientes atendidos no laboratório da Fundação de Saúde de Vitória da Conquista (FSVC). **Métodos:** Estudo de corte transversal retrospectivo realizado com dados secundários obtidos do sistema de laudos e norteado pela planilha de notificação para sífilis do laboratório da FSVC no período de julho de 2012 a julho de 2013, obedecendo aos critérios da Portaria nº 3.242, de 2011. **Resultados:** Foram identificados 134 pacientes com provas diagnósticas positivas para sífilis entre 6.699 pacientes testados, revelando uma prevalência global de 2%. A prevalência da sífilis congênita foi de 2,84% e a de sífilis gestacional de 2,24%. Destaca-se entre os positivos que 19,4% dos pacientes tinham idade igual ou inferior a um ano, 37,3% eram gestantes, 94% residiam na zona urbana e 47% tinham títulos de *venereal disease research laboratory* (VDRL) de até 1:4. Desses pacientes com teste primário positivo, 94% tiveram positividade no teste confirmatório. Entre recém-nascidos positivos, 60% tinham títulos de até 1:2. **Conclusão:** As prevalências encontradas estão elevadas levando em consideração os parâmetros estabelecidos pela Organização Mundial da Saúde (OMS) e são capazes de representar ônus para população. No entanto, apontam boa capacidade de triagem do município frente a doença, o que é um passo essencial para a Saúde Pública combater esta grave infecção.

**Palavras-chave:** sífilis, diagnóstico, prevalência.

## INTRODUCTION

Syphilis is a sexually transmitted infectious disease of major impact on public health. According to the World Health Organization (WHO), in 1999, it was estimated 12 million new cases in the world, with the highest incidence seen in developing countries<sup>(1)</sup>. In Brazil, WHO estimates already indicated, in 1999, more than 937,000 cases

of syphilis per year<sup>(1)</sup>. However, since that became a reportable disease (for cases of congenital syphilis in 1986, gestational syphilis from 2005 and acquired syphilis from 2011) until 2012 there were more than 137,000 cases<sup>(2)</sup>. In Bahia, according to the Superintendência de Vigilância e Proteção da Saúde (SUVISA – Office of Surveillance and Health Protection), from 2007 to 2013, there were more than 7,000 cases of syphilis, in which the city of Vitória da Conquista appears with 476 cases<sup>(3)</sup>.

The etiologic agent of syphilis is a bacterium called *Treponema pallidum* which was discovered and identified in 1905 by Schaudinn and Hoffmann and since then has been studied in various parts of the world<sup>(4)</sup>. The transmission mechanism occurs by direct contact with the lesions, by small abrasions caused by intercourse, vertically or through blood transfusions, tattoos or contact with contaminated

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material containing the microorganism – the latter quite unusual today. Once *T. pallidum* infects the individual it may spread through the lymphatic and hematogenous route, and may reach and injure other parts of the body<sup>(5)</sup>.

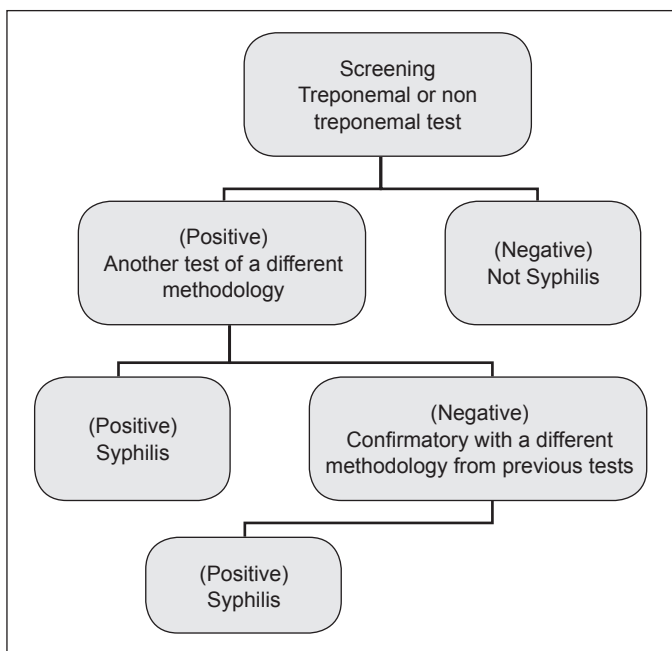
The natural course of infection may be symptomatic divided into three stages: primary, secondary and tertiary syphilis; and two asymptomatic phases: the early and late latent syphilis. Clinical manifestations occur depending on the stage of the disease<sup>(6)</sup>.

Syphilis in pregnant women can lead to the vertical transmission of the disease at any time during pregnancy, especially when the infection is recent, since *T. pallidum* can reach the placental circulation and reach the bloodstream of the fetus, characterizing congenital syphilis. Possible consequences include premature birth, low birth weight, malformations, miscarriage and, later, dementia, bone, liver and muscle problems<sup>(7)</sup>.

There is a worldwide concern about the control of syphilis, especially in adults. In 2008, WHO drew a target aiming at the eradication of congenital syphilis by the year 2015 and proposed the expansion of access to maternal and child health services, increased detection, treatment and control of the disease, as well as the implementation prevention and counseling activities. Another plan was the reduction of prevalence rates of the disease to levels below 1%, which, according to WHO, does not represent a burden for the population<sup>(8)</sup>.

The acquired form of syphilis occurs primarily in adults and may lead to the tertiary stage of the disease. A person may be evolving symptomatic of the primary phase to tertiary or can be asymptomatic carriers of the infection and, after several years developing cardiovascular syphilis, neurosyphilis, among other complications<sup>(9)</sup>.

The diagnosis of syphilis can be performed easily, following recommendations of the Administrative Rule n° 3,242 of the Brazilian Ministry of Health, from December 2011, which established the laboratory flowchart for the diagnosis of syphilis<sup>(10)</sup>. **Figure 1** shows the following flow chart of the diagnosis of syphilis.



**Figure 1** – Flowchart for the laboratorial diagnosis of syphilis. Adapted from regulation n° 3242 of 2011.

Whatever the methodology, the early diagnosis of syphilis can contribute to the reduction of injuries related to the clinical manifestations of the untreated disease, since the treatment is easily accessible and has low cost. Moreover, it can also break the chain of transmission of the disease.

## OBJECTIVE

To determine the prevalence of syphilis, including the gestational and the congenital forms, and associated factors in patients treated in the laboratory of the Fundação de Saúde de Vitória da Conquista (FSVC – Vitória da Conquista’s Health Foundation).

## METHODS

This is a retrospective study of secondary data obtained from the notification system for FSVC Lab syphilis from July 2012 to July 2013.

The FSVC currently manages the largest public health laboratory of the interior of Bahia and figure as the major test maker of the Sistema Único de Saúde (SUS – Unified Health System) in the city and region serving both the needs of patients admitted to the Municipal Hospital of the city of Esaú Matos (maternal and child regional reference) as the patients of the ambulatory net of Vitória da Conquista and region with an average of 55 thousand tests per month. According to the Vitória da Conquista’ scheduling system, the laboratory of FSVC is responsible for supplying about 85% of the exams through the city by SUS.

The laboratory of FSVC performs the diagnosis starting from the non treponemal test - venereal disease research laboratory (VDRL) for screening, following with treponemic immunoassay (IC) in case of reagent in any capacity in the screening test. When there is disagreement between the results of the two methods the samples are forwarded to the Care and Life Support Center (CAAV), in that city, where hemagglutination is the methodology of choice for confirmation of results by the *Treponema pallidum* hemagglutination treponemal test (TPHA). The two confirmatory tests are based on detection of IgM and IgG anti-*Treponema pallidum*. In all the diagnostic tests for syphilis the reagents brand WAMA DIAGNÓSTICA® were used. In the laboratory of FSVC, all positive results for syphilis are recorded in the worksheet and hence notified to the surveillance of the municipality obeying the Administrative Rule n° 104, of January 25, 2011, which includes all forms of syphilis as a compulsory notification.

Data collection was done in the period between 05 and 15 September 2013, from the verification of positive cases for syphilis indicated in the notification sheet. Then proceeded to access the registration form of the patients with the laboratory report system of FSVC (COMPLAB®, version 6.9.4) in order to obtain information such as age, sex, pregnancy state and county of origin.

For the purpose of calculation of prevalence of congenital and gestational syphilis it was necessary to obtain, by Serviço de Arquivo Médico Estatístico (SAME – Statistical Medical File Service) of FSVC, data on the number of live births and the number of pregnant women attended by the Health Foundation Hospital of

Vitória da Conquista — reference in maternal and child care and conducting the highest number of deliveries by SUS in Vitória da Conquista and region.

The data were transported to Microsoft Office Excel 2007 spreadsheet and then analyzed using the statistical package *Epi Info* version 3.5.1, where descriptive analyzes were performed.

The data collection was initiated only after signing a confidentiality agreement by researchers delivered to the Teaching and Research of FSVC and after approval by the Research Ethics Committee of the Multidisciplinary Institute of Health (CEP/IMS-CAT) under the n° 442 012, on August 30, 2013 (CAAE: 20541813.3.0000.5556).

## RESULTS

Among the 6,699 patients who were tested for syphilis in the laboratory of FSVC from July 2012 to July 2013, 134 were classified as positive, taking into account the Administrative Rule n° 3242, from 2011, resulting in a prevalence of syphilis of 2%. Of these, the majority, 25.39% (n = 34), were aged between 20 and 29 years. He drew attention to the presence of 19.4% (n = 26) of individuals aged less than one year, and its absolute majority represented by newborns (n = 25). Regarding the distribution by gender, 65.7% (n = 88) were female, and 50 of them were pregnant at the time of diagnosis, and 15.7% (n = 21), male. Most individuals studied 94% (n = 126) were from the urban area of Vitória da Conquista. **Table 1** describes the group of individuals involved in the study.

In relation to gestational syphilis and congenital syphilis, prevalence rates were, respectively, 2.24 and 2.84%.

**Table 2** shows the distribution of positive cases of syphilis according to the title of VDRL and their occurrence by gender. Most

**Table 1** – Descriptive analysis of individuals with positive diagnosis of syphilis in the period from July 2012 to July 2013 (n = 134)

	n (%)
Age group	
≤1 year	26 (19.4)
15 – 19 years	10 (7.46)
20 – 29 years	34 (25.39)
30 – 39 years	30 (22.38)
40 – 49 years	13 (9.7)
≥ 50 years	21 (15.67)
Gender	
Male	21 (15.7)
Female	88 (65.7)
No specification <sup>1</sup>	25 (18.6) <sup>a</sup>
Place of residence	
Urban area	126 (94)
Rural area	5 (3.7)
Another city	3 (2.2)
Pregnant	
Yes	50 (37.3)
No	84 (62.7)

<sup>a</sup>unspecified sex newborn.

individuals, 47% (n = 63) showed VDRL titers up to 1:2, and only 9.7% (n = 13) of patients had higher titers than 1:64. Among infants, it was observed that 60% (n = 15) had titers up to 1:2.

Among pregnant women involved in the study, there was a more heterogeneous distribution with respect to VDRL titers; however, the majority of 60% (n = 30) showed a title of 1:4.

It was found in this study that all the cases of positive VDRL were subjected to confirmation. **Table 3** distributes all individuals with reactivity in the VDRL that needed to be confirmed and further reveals cases in need of completion of the second confirmatory test – TPHA. It should be noted that most individuals with positive VDRL, 94% (n = 126) showed positive results in

**Table 2** – Sampling distribution of the individuals according titration of venereal disease research laboratory stratified by gender (n = 134)

Title of VDRL	Gender		
	Female n (%)	Male n (%)	Unspecified n (%) <sup>a</sup>
01:01	21 (23.9)	1 (4.75)	7 (28)
01:02	18 (20.4)	8 (38.0)	8 (32)
01:04	15 (17.1)	4 (19)	2 (8)
01:08	7 (8)	2 (9.5)	4 (16)
01:16	9 (10.2)	1 (4.75)	3 (12)
01:32	9 (10.2)	1 (4.75)	1 (4)
01:64	4 (4.5)	1 (4.75)	0 (0)
01:128	4 (4.5)	2 (9.5)	0 (0)
01:1024	1 (1.2)	0 (0)	0 (0)
01:2048	0 (0)	1 (4.75)	0 (0)
Total	88 (100)	21 (100)	25 (100)

<sup>a</sup>unspecified sex newborn; VDRL: venereal disease research laboratory.

**Table 3** – Sampling distribution of individuals with reaction in the venereal disease research laboratory stratified by immunochromatographic and *Treponema pallidum* hemagglutination confirmatory tests (n = 134)

Title of VDRL	IC		TPHA		
	Positive n (%)	Negative n (%)	Dispensable n (%)	Reagent n (%)	No reagent n (%)
01:01	25 (18.6)	4 (3) <sup>a</sup>	27 (20.1)	0 (0)	2 (1.5)
01:02	34 (25.4)	0 (0)	34 (25.4)	0 (0)	0 (0)
01:04	19 (14.1)	2 (1.5)	19 (14.1)	0 (0)	2 (1.5)
01:08	12 (8.9)	1 (0.8) <sup>b</sup>	13 (9.7)	0 (0)	0 (0)
01:16	12 (8.9)	1 (0.8)	12 (8.9)	0 (0)	1 (0.8)
01:32	11 (8.2)	0 (0)	11 (8.2)	0 (0)	0 (0)
01:64	5 (3.7)	0 (0)	5 (3.7)	0 (0)	0 (0)
01:128	6 (4.5)	0 (0)	5 (3.7)	1 (0.8) <sup>c</sup>	0 (0)
01:1024	1 (0.8)	0 (0)	1 (0.8)	0 (0)	0 (0)
01:2048	1 (0.8)	0 (0)	1 (0.8)	0 (0)	0 (0)
Total	126 (94)	8 (6)	128 (95.5)	1 (0.8)	5 (3.7)

<sup>a</sup>two individuals that should be tested and were not; <sup>b</sup>one individual that should be tested and was not; <sup>c</sup>one individual that should not be tested; VDRL: venereal disease research laboratory; IC: immunochromatography; TPHA: *treponema pallidum* hemagglutination.

the first confirmatory test, and only 6% (n = 8) showed a discrepancy between the initial non-treponemal screening test and the first confirmatory treponemal test. All patients who underwent second confirmation had concordant results with the initial treponemal test. That there were five individuals submitted to a second confirmation, four with VDRL presenting title of up to 1:4 and one with 1:16 titration.

## DISCUSSION

In this study, there was a prevalence of 2% for syphilis among patients tested by the laboratory of FSVC. Similar studies with representative samples are still not found in the country, to the point that systematic survey conducted in November 2013 using the bases of PubMed, SciELO and MEDLINE not found any similar study. Probably the fact that the notification of acquired syphilis cases only became mandatory from of Administrative Rule n° 104, from January 2011. However, comparing the prevalence of this study with studies in restricted population groups, it was found that it was smaller. In a study of women from 12 to 63 years in the state of Alagoas, Brazil, there was a prevalence of 2.6%<sup>(11)</sup>, and others held with adults in a university hospital in Rio de Janeiro, Brazil, there was a prevalence of 2.7%<sup>(12)</sup>.

For gestational syphilis the prevalence was 2.24% and is, therefore, higher than the values found in studies such as the Sentinel-blind study in 2006<sup>(13)</sup>, who found 1.1% — a monitoring study of rates prevalence of syphilis in pregnant women in Brazil. It was also higher than the ones found in studies by Guimaraes and Roberts<sup>(14)</sup>, Codes *et al.*<sup>(15)</sup>, Figueiró-Filho *et al.*<sup>(16)</sup> and Macedo Filho<sup>(17)</sup> — which respectively have prevalence rates of 1.7, 2.0, 0.8 and 1.31%. Regarding congenital syphilis, it was found prevalence of 2.84%, which also exceeded values found by Smith *et al.*, in 2013, in Alagoas, and Lorenzi and Madi in 2001, in Niterói (RJ), with prevalence rates, respectively from 0.4 to 1.5%<sup>(18,19)</sup>.

At first sight, it is important to note that the prevalence found in this study are concerning, taking into account the goals set by the WHO to combat and eradicate syphilis in the world and when compared to others prevalences already found in other studies. In further analysis these prevalence values may perhaps be justified in part by the fact that the laboratory of FSVC attends almost all of the municipal SUS demand, including a public hospital in maternal and child reference. The literature points out that low socioeconomic status brings numerous risk factors for infection with *T. pallidum*, resulting in high syphilis prevalence<sup>(20,21)</sup>. Another issue that may explain the higher prevalence is the fact Vitória da Conquista have a diagnostic network that performs screening satisfactorily, following the Ministry of Health recommendations for prenatal, pre-birth to newborns and general population<sup>(22)</sup>. In this sense, the more one realizes screening, the more likely to find positive cases, which surfaced a key action in combating the disease, since it allows the identification and treatment of cases, reducing its dissemination.

The literature has shown that one of the major problems for the purposes of diseases prevalence calculations lies in the

underreporting<sup>(23)</sup>. The present study has as one of its strengths information assurance of all positives for syphilis because, since July 2012, the laboratory of FSVC has been performing the notification of all diagnosed cases of syphilis and its main goal is the generation of indicators able to develop policies that aim at the reduction of syphilis cases in the city.

In this study, it was important the fact that the vast majority of the population was living in the city of the municipality, consistent with study in Sobral (CE), Brazil, from 2006 to 2010<sup>(24)</sup>. Regarding the stratification of patients by age, there was a wide distribution between the groups, revealing an agreement with studies that showed higher prevalence in groups of 20 to 29 years old<sup>(24-26)</sup>. Another important fact is that over 50% of patients with positive results were pregnant women or newborns. In pregnant women the infection with *T. pallidum* is associated with an increased risk for the occurrence of abortions, malformations, premature birth, among other complications that tend to represent more costs for public health<sup>(27)</sup>. Within this logic is important to promote health policies that favor the diagnosis and treatment of syphilis to achieve the goal of eradicating congenital syphilis, as established by the WHO. Understanding that this goal will only be reached from a considerable expansion of population access to screening tests for syphilis, especially in the prenatal stage is imperative.

The laboratory screening for syphilis has low cost<sup>(28)</sup> and does not require sophisticated or widely-equipped laboratories. Depends primarily on the existence of a health network well-structured and imbued in reducing the prevalence of this disease. The laboratory of FSVC screened in a year 6,699 individuals for syphilis, including pregnant women, newborns and individuals in the general population. This number represents the screening of about 3% of the population assisted by the SUS in the city, which shows an enlargement of the service to population, contributing to the reduction of cases of syphilis and perhaps it is why the prevalence rates are higher when compared to the previous studies and the ones that did not meet the requirements of the Administrative Rule n° 3242, of 2011.

Still, it is essential to continue the surveillance of disease and seek to broaden the actions in the diagnosis and treatment in order to see fewer cases, which will help to reduce the prevalence to levels that can not pose a burden for the population (below 1%)<sup>(29)</sup>.

When analyzing the results of confirmatory tests for syphilis in patients with positive VDRL it was observed that in a few cases there had differences between screening and confirmatory test, which could probably be justified in the first instance, by another disease, not syphilis, but which manages production of antiphospholipid antibodies as the VDRL test is not specific and can be present in the reagent of autoimmune diseases, viral, bacterial or parasitic infections<sup>(30)</sup>. In these cases, the TPHA test performed proved consistent with the initial treponemal, which determines the used tests have good sensitivity and specificity and may be part of the laboratory tests<sup>(31)</sup>.

Although the literature says that only observing the VDRL it can be classified as congenital syphilis when the baby bonds are greater or equal to the mother<sup>(32)</sup>, it is important to note



that most newborns treated at FSVC with positive VDRL have lower titles to the mother, which does not exclude the diagnosis of congenital syphilis. In addition, performing treponemic test in these individuals there was a confirmation of positivity, which can be justified by two situations: either in fact be congenital syphilis, or represent the presence of mother's passive antibodies that have experienced treatment for syphilis<sup>(33)</sup>; in these cases, appropriate classification should be performed using antitreponemics IgM tests.

It must be considered in the present study a limitation, which is the fact that it was not made as a survey with proportional population calculating interest groups, such as pregnant women, newborns and the general population, coupled to an interview with several socioeconomic, lifestyle, health condition variables, with which it would be possible to do further analysis. Moreover, the number of patients screened and observed within the one year sample period constitutes a significant population for evaluation of the distribution group (pregnant women, neonates, and the general population) since FSVC not only meets ambulatory but all health facilities assisted by the SUS and its prenatal programs, including high risk, and attend a hospital maternal and child reference where is held the largest number of deliveries by SUS in Vitória da Conquista region.

Another important issue is the fact that this is the first study to show the prevalence and control of syphilis in the county, and the chosen period coincides with the moment of greatest surveillance for reporting of cases of the disease in the city.

Finally, it should be noted that this work could serve as developer of future studies of population surveys that can make causal associations and estimate more accurately the prevalence of syphilis, in order to reinforce the importance of the implementation and maintenance of public policies for the reducing the prevalence to levels that no longer will represent a burden on the population<sup>(29)</sup>.

## CONCLUSION

Prevalence rates are high taking into account the parameters established by WHO and are able to represent burden for the population. However, they point out good capacity of the municipality for screening when facing the disease, which is an essential step for public health to combat this serious infection.

## Conflict of interests

The authors declared no conflict of interests.

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