Syphilis screening during prenatal development: missed opportunities in a public maternity hospital in Recife, Brazil

Rastreamento da sífilis no pré-natal: oportunidades perdidas em uma maternidade pública na cidade do Recife, Brasil

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ABSTRACT

Introduction: According to the norms issued by the Ministry of Health for the Prenatal and Birth Humanization Program, pregnant women should undergo two tests for syphilis detection. **Objective:** To evaluate missed opportunities for screening gestational syphilis and to identify factors associated with the missing application of the Venereal Disease Research Laboratory (VDRL) test during prenatal development. **Methods:** This cross-sectional study was undertaken in the maternity ward of a Unified Public Health System (SUS) hospital in the city of Recife in northeastern Brazil. We studied 460 women admitted for termination of pregnancy and/or abortion, between September and October 2013, who had at least one prenatal consultation. We conducted interviews and checked patients' prenatal care records and medical records. Women who did not take at least one VDRL test during prenatal development (reference category) were compared with those who did. Logistic regression was performed on the data collected from the 408 pregnancy records analyzed in order to identify factors associated with a failure to undergo syphilis screening. **Results:** 17.90% of the women in the sample did not take the VDRL test. In multivariate analysis, women who fit the following factors presented a greater chance of not having taken the VDRL test: facing difficulties in taking the test; attendance of the last prenatal consultation before the last trimester of pregnancy; attending less than six consultations; receiving prenatal care in hospital units which did not schedule subsequent exams; being 19 years of age or younger; having had three or more pregnancies. **Conclusion:** Results show that despite the high availability of prenatal care, actions aimed at preventing congenital syphilis still present low effectiveness.

Keywords: congenital syphilis; prenatal care; risk factors.

RESUMO

Introdução: De acordo com as normas do Programa de Humanização no Pré-Natal e Nascimento, do Ministério da Saúde, a gestante deve realizar dois exames laboratoriais para detecção da sífilis. **Objetivo:** Avaliar oportunidades perdidas no rastreamento de sífilis gestacional e identificar fatores associados à não realização do teste Venereal Disease Research Laboratory (VDRL) no pré-natal. **Métodos:** Estudo de corte transversal realizado em maternidade do Sistema Único de Saúde da cidade do Recife, no Nordeste do Brasil. Foram estudadas 460 mulheres admitidas por término da gravidez e/ou abortamento, entre setembro e outubro de 2013, que realizaram ao menos uma consulta de pré-natal. Foram realizadas entrevistas e consulta ao cartão de pré-natal e prontuários. As mulheres que não realizaram pelo menos um VDLR no pré-natal (categoria de referência) foram comparadas com aquelas que realizaram. Nas informações colhidas nos 408 cartões da gestante, foi utilizada a regressão logística para identificar fatores associados com a não realização do rastreio. **Resultados:** Uma parte correspondente a 17,90% das mulheres não realizou o VDRL. Na análise multivariada, apresentaram maior chance de não realizar o VDRL as mulheres que: enfrentaram dificuldades para realizar o exame; realizaram a última consulta antes do último trimestre da gravidez; passaram por menos de seis consultas; realizaram pré-natal em unidade que não realizava agendamento das consultas subsequentes; tinham 19 anos ou menos de idade; tinham três ou mais gravidezes. **Conclusão:** Os resultados mostram que, apesar da elevada cobertura da atenção pré-natal, persiste uma baixa efetividade das ações de prevenção da sífilis congênita.

Palavras-chave: sífilis congênita; cuidado pré-natal; fatores de risco.

INTRODUCTION

Syphilis is an infectious systemic disease of chronic evolution that may be sexually or vertically transmitted through pregnancy. The presence of this infection in pregnant women, and consequently in newborn infants, is a sign of failure in prenatal care, as early diagnosis and treatment of pregnant women, relatively simple measures, are quite effective in preventing its transmission to newborns[1].

In 2008, the World Health Organization (WHO) estimated the number of pregnant women infected worldwide at 2 million, with 80% having received prenatal care[2]. Due to its magnitude, syphilis remains a public health concern to this day[3].

In Recife, the incidence rate of congenital syphilis in 2011 for infants under 12 months of age was 15.4 cases per 1,000 successful deliveries, and the detection rate of syphilis in pregnant women was 8.7%[4].

In 2011, the city of Recife showed a high coverage of prenatal care, including 99.01% of pregnant women. Around 92.05% of consultations were initiated in the first trimester of pregnancy[5].

The WHO advises syphilis screening during prenatal care as a political and universal guideline covered under primary health care.

Paper based on a thesis presented at the Integrated Post-graduate Program in Public Health of the Universidade Federal de Pernambuco (UFPE).

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The goal established for the elimination of congenital syphilis until 2015 recommends that at least 90% of pregnant women be tested[2].

According to the rules of the Ministry of Health's Prenatal and Birth Humanization Program, pregnant women should perform two syphilis detection tests. The conduction of two VDRL tests (one in the first trimester of pregnancy and the other in the last trimester) is recommended[6].

The "Projeto Sentinela Parturiente" study (roughly, "National Pregnancy Watch") revealed that 18.7% of pregnant women under prenatal care in northeastern Brazil did not take any VDRL tests in 2006. The study also indicated that, even among pregnant women who attended six or more prenatal consultations, 8.5% did not undergo any type of syphilis screening[7].

OBJECTIVE

To evaluate missed opportunities for gestational syphilis screening and to identify factors associated with the missing application of the VDRL test during prenatal development in a public maternity hospital in Recife, Pernambuco State.

METHODS

This is a cross-sectional study conducted in Recife, the capital city of the state of Pernambuco, Brazil, which has a population of 1,537,704 inhabitants according to the 2010 census[8].

The study was conducted in the public maternity hospital "Prof. Barros Lima," considered a reference in low risk pregnancies, which has 69 beds, 46 of which are reserved for obstetric procedures[9].

When calculating sample size in order to estimate the associations between explanatory variables and the main outcome, we used the Statcalc module of the Epi Info 3.5.2 software (Centers for Disease Control and Prevention, Georgia, United States), assuming a 95% confidence interval (95% CI), a statistical power of 80%, a proportion of outcome equivalent to 50% among the exposed individuals, and an Odds Ratio (OR) equal to 2. Thus, the estimated sample resulted in 400 women. Considering 10% of losses, a total of 440 women was obtained.

Between September and October 2013, all women admitted for delivery or abortion at the studied hospital who also lived in Recife and had undergone at least one prenatal consultation were included in the sample. 475 women were considered eligible, 96.8% (n=460) of whom were interviewed. There were 14 losses and 1 individual declined to participate.

Data were collected by in person interviews when women were still hospitalized after delivery procedures or, in cases of abortion, after curettage, using a structured, pre-coded questionnaire for recording information and transcribing medical and prenatal records, if present.

In addition to the respondents' socioeconomic and demographic characteristics, the questionnaire covered the proportion of women who began prenatal care in their first trimester of pregnancy; the number of pregnancies; the number of prenatal consultations; and the proportion of women who were not followed-up or who performed at least one VDRL test during prenatal care.

The 408 women (88.7% of the respondents) who presented their prenatal records at the time of the interview were included in bivariate analysis. The women studied were divided into two groups: those associated with the outcome (dependent variable), that is, no indication of VDRL tests in their prenatal records; and those not associated with the outcome (comparison group), that is, with one or more VDRL tests recorded during prenatal care.

Independent quantitative variables were categorized using clinical criteria and/or other bibliographical references or guided by the frequency distribution found for the independent variables. The association between the outcome and the independent variables was measured using the OR, with a 95% CI and a statistical significance level of 5% or less, as indicated by the χ^2 or the Fisher's exact test, when the expected value was equal to or less than five for one or more data cells.

The exposure category chosen for the reference line (used to classify exposed independent variables when calculating the OR) was the one which presented the greater proportion of the outcome. At this stage, variables with a p-value under 0.20 for association with the outcome of the study were selected for multivariate analysis.

During multivariate analysis, the logistic regression model was chosen, since the outcome studied is dichotomous. The following variables were included in the modeling process: years of education; number of total pregnancies; age in years; prenatal consultations in hospitals capable of scheduling subsequent consultations; awareness of the VDRL test; having faced difficulties to perform the VDRL test; attendance of the last prenatal consultation during the last trimester of pregnancy; the number of prenatal consultations provided; and prenatal care start date.

In this step, variables (which had previously presented a cut-off point) were transformed into dichotomous variables.

The goal of this step was to adjust the confounding effect and to investigate the presence of interaction among variables, in order to identify factors presenting a statistically significant association (predictor variables) with the main outcome – i.e. not undergoing VDRL tests – by calculating their respective adjusted OR, with a 95% CI.

In both of the above steps, the Epi Info 3.5.2 and the Statistical Package for Social Sciences (SPSS), version 20 (Chicago, United States) software were used.

This research project was submitted to the Ethics Committee of the Center for Health Sciences of the *Universidade Federal de Pernambuco* (UFPE) and was approved under opinion number 390,216.

RESULTS

Table 1 refers to the socioeconomic and demographic characteristics of the respondents. 60.65% (n=279) of respondents were aged between 20 and 34 years. Among the participants, 53.69% (n=247) attended formal education for 9 to 11 years. Concerning race/skin color, 44.10% (n=203) of respondents declared themselves as brown-skinned (in Brazilian Portuguese, "pardo" is used to refer to Brazilians of mixed ethnic ancestries, commonly a mixture of white Brazilian, Afro-Brazilian and Native Brazilian). With regard to marital status, 75.22% (n=346) of women reported being in a domestic partnership.

Table 2 refers to characteristics related to the respondents' current pregnancy. The category "two or more pregnancies" included 58.90% (n=271) of the participants. 69.20% (n=308)

reported starting prenatal care consultations during the first trimester of pregnancy. 67.22% (n=283) reported undergoing over 6 prenatal consultations.

Among the respondents, 89.20% (n=403) of women reported concluding prenatal care in the last trimester of pregnancy. The majority of respondents, 79.10% (n=364), received prenatal care in clinics of the Family Health Program (in Portuguese "*Programa Saúde da Família*"). 75.90% (n=349) of interviewees received prenatal care in a clinic capable of scheduling subsequent consultations. Around 48.30% (n=222) of women reported that community health workers (CHW) do not perform their monthly home visits.

Table 3 includes variables referring to factors related to VDRL testing based on respondents' interviews and their medical and prenatal records. 66.10% (n=304) of interviewees reported receiving no information regarding sexually transmitted diseases (STD), such as syphilis, during prenatal care; whereas 58.90% (n=271) had no knowledge of VDRL tests. Among the respondents, 60.65% (n=205) of them reported some difficulty in performing the tests requested during prenatal care. Of these, 33.72% (n=114) complained that collection centers were too far from their homes; 27.22% (n=92) reported delays in scheduling exams or in receiving their results; whereas 14.80% (n=50) reported that the queues to schedule exams were too long.

Among the 408 women who provided their prenatal records, 17.90% (n=73) had not performed the VDRL test during the prenatal period. Furthermore, among those who performed VDRL test, 44.78% (n=150) did so during the first trimester of pregnancy. None of the prenatal records analyzed described some rapid testing for syphilis.

Table 4 shows the bivariate analysis of the association between the independent variables studied and the outcome of the study (that is, the absence of VDRL testing during prenatal care). Such variables are those which showed a statistically significant p-value.

Table 1 – Socioeconomic and demographic characteristics of women admitted to a public maternity hospital after birth procedures or curettage in 2013. Recife, Pernambuco.

Variables	% (n)
Age	
13 to 19 years	31.09 (143)
20 to 34 years	60.65 (279)
35 years or +	8.26 (38)
Years of schooling	
Unable to read or write	1.30 (06)
1 to 4 years	4.35 (20)
5 to 8 years	36.52 (168)
9 to 11 years	53.69 (247)
12 years or +	4.13 (19)
Race/skin color	
Brown (parda)	44.10 (203)
White	30.00 (138)
Black	25.90 (119)
Religion	
Without Religion	24.10 (111)
Evangelical	38.30 (176)
Catholic	35.00 (161)
Other	2.60 (12)
Marital status	
Domestic partnership	75.22 (346)
Single no partnership	24.78 (114)
Monthly gross income in minimum wages	
Below 1	33.26 (153)
Between 1 and 4	60.65 (279)
Above 4	1.52 (07)
Didn't know/ did not inform	4.56 (21)

Table 2 – Characteristics related to the current pregnancy and to prenatal care of women admitted to a public maternity in 2013. Recife, Pernambuco.

Variables	% (n)
Number of pregnancies (including the current one)	
1	84.80 (390)
2 or +	15.20 (70)
Start date of prenatal care[a]	
1st quarter	69.20 (308)
2nd quarter	28.30 (126)
3rd quarter	2.50 (11)
Number of consultations[b]	
1 to 5	32.78 (138)
6 or +	67.22 (283)
Time of the last prenatal consultation[c]	
1st quarter	6.20 (28)
2nd quarter	4.60 (21)
3rd quarter	89.20 (403)
Location of last prenatal consultation[*]	
Family Health Program (FHP) clinics	79.10 (364)
Public Hospitals	18.90 (87)
Health Centers	9.80 (45)
Private Clinics	3.26 (15)
Appointment scheduling	
With schedule	75.90 (349)
Scheduled by herself	14.10 (65)
Through Community Health Workers (CHW)	9.30 (43)
Could not answer	0.70 (03)
Visited monthly by community health workers (CHW)	
Yes	44.80 (206)
No	48.30 (222)
There are no Community Health Workers	7.00 (32)

[a]15 women did not answer; [b]39 women did not answer; [c]8 women did not answer; [*]One or more answers were acceptable; FHP: Family Health Program; CHW: community health workers.

Table 5 presents the multivariate analysis, which enabled us to conclude that women who reported experiencing some difficulty in taking the VDRL test during prenatal care had a ten times greater chance of not undergoing the examination if compared to those who reported no such difficulties.

Table 3 – Characteristics related to Venereal Disease Research Laboratory (VDRL) testing, according to respondents' interviews and data collected from their prenatal records for women admitted to a public maternity hospital, in 2013. Recife, Pernambuco.

Variables	% (n)
Information regarding syphilis during prenatal care[a]	
Received no information	66.10 (304)
Received information	32.80 (151)
Knowledge of VDRL testing[b]	
Knows or has heard about it	41.10 (186)
Never heard about it	58.90 (271)
Difficulties in taking the VDRL test[*]	
No difficulties	39.35 (133)
Collection center too far	33.72 (114)
Delay in receiving exam	27.20 (92)
Long waiting queues	14.80 (50)
Lack of materials in the laboratory	1.48 (05)
Poor care by the health service	1.18 (04)
Other reasons	2.60 (09)
VDRL testing (based on prenatal records)[c]	
Took the test	82.10 (335)
Did not take the test	17.90 (73)
Period of pregnancy of the 1st VDRL test[c]	
1st quarter	44.78 (150)
2nd quarter	43.58 (146)
3rd quarter	11.64 (39)

[a]5 women did not know how to answer; [b]3 women did not know how to answer; [c]408 women provided prenatal records; [*]One or more answers were acceptable.

Table 4 – Bivariate analysis between variables and the outcome (VDRL testing during the pre-natal care) for women admitted to a public maternity hospital in 2013. Recife/Pernambuco.

Variable	Outcome		OR	95%CI	p-value
	N/VDRL	Y/VDRL			
Years of education					
≤8 years	40	130	1.90	1.14 – 3.20	0.012
≥9 years	33	205	1.00	-	
Number of pregnancies					
≥3	31	91	1.98	1.17 – 3.30	0.010
≤2	42	244	1.00	-	
Age					
≤19 years	30	99	1.66	0.99 – 2.80	0.055
≥20 years	43	236	1.00	-	
Appointment scheduling of prenatal consultations					
No	32	53	4.15	2.40 – 7.20	0.000
Yes	41	282	1.00	-	
Has heard about the VDRL test					
No	53	183	2.20	1.26 – 3.84	0.005
Yes	20	152	1.00	-	
Difficulties in taking the VDRL test					
Yes	70	220	12.20	3.70 – 39.60	0.000*
No	3	115	1.00	-	
Last prenatal consultation during the 3rd quarter of pregnancy					
No	28	18	10.90	5.60 – 21.40	0.000
Yes	45	317	1.00	-	
Number of consultations (based on prenatal records)					
≤5	55	89	8.40	4.70 – 15.10	0.000
≥6	18	246	1.00	-	
First prenatal care consultation during the 1st quarter of pregnancy					
No	35	88	2.60	1.50 – 4.30	0.000
Yes	38	247	1.00	-	

*using Fisher's exact test; N/VDRL: without VDRL; Y/VDRL: with VDRL, OR: Odds Ratio; 95%CI: 95% confidence interval.

Table 5 – Final multivariate analysis model: factors associated with not undergoing VDRL testing during prenatal care among women admitted to a public maternity hospital, in 2013. Recife, Pernambuco.

Variables	OR_{Crude}	$OR_{Adjusted}$	95%CI	p-value
Difficulties in taking the VDRL test (yes/no)	12.20	10.11	2.96 – 34.60	0.000
Period of the last consultation (1st, 2nd, or 3rd quarter)	10.90	5.46	2.27 – 13.12	0.000
Number of prenatal consultations (≤ 5 / 6 or+)	8.40	3.73	1.89 – 7.36	0.000
Age in years (≤ 19 / 20 or +)	1.66	2.89	1.37 – 6.09	0.005
Number of pregnancies (3 or more /1 or 2)	1.98	2.38	1.12 – 5.07	0.025
Subsequent consultations scheduled after the first consultation (no/yes)	4.15	2.35	1.17 – 4.72	0.016
Heard about VDRL tests (no/yes)	2.20	1.77	0.90 – 3.47	0.099

OR: Odds Ratio; 95%CI: 95% confidence interval.

Having one's last prenatal consultation before the last trimester of pregnancy resulted in having a five times larger chance of not taking the VDRL test during pregnancy. Attending less than six consultations during prenatal care contributed to a four times greater chance of not taking the VDRL test.

Pregnant women under 20 years of age were three times more likely to not undergo VDRL testing during prenatal care than older women. However, women with three or more pregnancies and women who were treated with no prior scheduling at prenatal services were two times more likely to not undergo VDRL testing than those of the opposite group.

DISCUSSION

Syphilis is a disease with serious consequences for women and babies born to HIV+ mothers. The application of nontreponemal serological tests during prenatal care is indicated in several national and international publications[2,6,10-12] as essential for the control and prevention of vertical transmission of syphilis. The high rate of vertical transmission of syphilis and its low detection during pregnancy stem from flaws in prenatal care[12.13]. With early diagnosis and treatment of pregnant women during prenatal care it is possible to prevent congenital syphilis and reduce the risk of miscarriages, serious neonatal infections, and perinatal death[2].

In this study, the proportion of women interviewed who provided prenatal records at the time of interview and who had not taken at least one VDRL test during prenatal care was 17.90%. Although this value is lower than the one found in a 2004 study conducted in public maternity hospitals in Recife[14], is still above the national average[7] of 13.50%. However, it is similar to the estimate found in the northeastern state of Fortaleza (CE) of 20.20%[15].

After logistic regression analysis adjusted for confounding variables, the chance of not undergoing at least one VDRL test during pregnancy remained higher for women in the following categories: aged under 20 years; multiparous, with three or more pregnancies; having undergone the last prenatal consultation before the last trimester of pregnancy; attending less then six prenatal consultations; receiving care at a hospital incapable of scheduling subsequent prenatal consultations.

A study conducted in the United States[16] showed that women aged under 20 years are two times as likely to not undergo screening for syphilis diagnosis during pregnancy when compared with older women.

Other studies[17] that investigated factors associated with the absence of VDRL testing during the prenatal period found similar results, documenting a four times higher chance of taking the VDRL test among women who underwent their last prenatal consultation during the first quarter of pregnancy. A multicenter national study[18] found that women who underwent three or more prenatal consultations were three times more likely to have taken the VDRL test.

Attending six consultations and starting prenatal care early, as recommended by the Program for Humanization of Birth and Childbirth Care and the Rede Cegonha[19,20], are necessary to expand coverage and ensure compliance with the established goals related to the screening of gestational syphilis during prenatal care. A failure to comply with the minimum number of visits and the premature interruption of prenatal care reduce the possibility of VDRL testing and of receiving its results in a timely manner.

Guaranteed scheduling of subsequent consultation proved a factor that favors the diagnosis of syphilis during pregnancy, possibly through strengthening pregnant womens' access to health services[6].

However, the results suggest that one obstacle in universalizing screening for syphilis during prenatal care is in the access to VDRL testing and its results. More than two thirds of the women interviewed reported encountering difficulties in implementing the VDRL in laboratories, indicating the following as main challenges: the distance between the household and the pick-up unit; the delay to receive the results of the examination; and the existence of extensive queues.

The deployment of the rapid test for the detection of infection can correct this difficulty because it will be performed in the clinic itself and the result will be issued in a matter of minutes. In June 2011, by means of Decree No. 1.459/2011, the Ministry of Health[19] introduced this test in primary care. However, at the time of completion of the present study there was still no record of rapid testing for syphilis in the records of pregnant women studied.

This strategy can ensure the treatment of maternal syphilis even in early pregnancy, when it is more effective for the prevention of vertical transmission[21].

The study demonstrated that most of the women had prenatal care in clinics of the FHP, probably due to the decentralization of prenatal care and the strengthening of the basic network by the Ministry of Health[22]. While there should be an increased efficiency in the control of vertical transmission of syphilis in comparison to other models of care[23], it was not evident.

However, approximately one-third of the interviewees reported having less than six visits and starting the prenatal care after the first quarter; moreover, half mentioned the lack of follow-up home visits by CHW. There is evidence that the contact with the CHW may influence the early onset and greater adherence to the activities of the pre-natal care, including undergoing examinations[24].

Although the educational activities are considered an essential part of pre-natal care, particularly in basic units, a little more than 50% of the respondents reported they had heard of the VDRL and 33% have received some information about syphilis in prenatal care. These findings suggest limited adherence to the guidance on the prevention of congenital syphilis in prenatal care. A study conducted in the state of Pernambuco[25] reported inadequate performance in health education as one of the factors that determine the current maintenance of congenital syphilis.

In order to achieve the goal of completing the VDRL test by 90% or more of pregnant women during prenatal care, as recommended by the Ministry of Health[10] and the WHO[2], it is necessary to undertake efforts to improve the early engagement of pregnant women, increase awareness of examination requests for those professionals who provide prenatal care in the first consultation, and ensure access to laboratory examination in a timely manner.

One of the limitations of this study may be the possibility that the estimated proportion of women who had not taken the VDRL test is underestimated since it was based on the medical records of the pregnant women and some professionals may not have registered the examination even if it has been performed.

Another limitation concerns the generalization of results, because the type of motherhood studied does not include pregnant women or women with more severe complications of abortion. Furthermore, the results may not represent the reality of all women who had not attended the prenatal care in the public municipal health department.

CONCLUSION

The loss of opportunity for the diagnosis of syphilis among pregnant women cared for in the public municipal health department also indicates the need for strengthening prenatal care in the primary care network of SUS, in particular with respect to the promotion of action for prevention and control of syphilis and other STDs. This would include educational measures, in addition to providing the means for screening syphilis in pregnancy, preferably in basic health units.

Acknowledgements

We wish to thank the *Autarquia de Ensino Superior de Arcoverde* (EFSA) and the Integraded Post-Graduate Program in Public Health (masters level).

Conflicts of interest

The authors declare no conflicts of interest.

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Received: 07.31.2016
Approved: 10.27.2016