HIV, Hepatitis B, Hepatitis C, and Syphilis: prevalence and serodiscordance between women and their partners

HIV, hepatite B, hepatite C e sífilis: prevalência e sorodiscordância entre mulheres e seus companheiros

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ABSTRACT

Introduction: The prevention of vertical transmission of sexually transmitted diseases is the object of research by several authors, who reinforce the importance of knowing the serological status of a woman's sexual partner. **Objective:** To evaluate the prevalence and serodiscordance of HIV, hepatitis B, hepatitis C, and syphilis infections among women admitted to a maternity hospital in southern Brazil and their partners. **Methods:** 350 women and their partners were interviewed in a service-based cross-sectional study conducted from August 16 to November 23, 2018. **Results:** 4.0% of the women and 4.3% of the men had one of the infections studied. Among women, 2.0% already knew they were HIV positive, 2.0% had a positive rapid test for syphilis and there was no positive result for hepatitis B or C. A total of 299 (85.4%) partners were located. Of these, 293 (98.0%) agreed to answer the study questionnaire. Of all men interviewed, 281 (95.9%) agreed to undergo an rapid test. Among men, 1.4% already knew they were HIV positive and 0.4% had chronic hepatitis B disease. There was a similar percentage of men with a positive rapid test for syphilis and hepatitis C (1.4%). Regarding couples, 6.8% had some positive test. Most of the positive test subjects were in a serodiscordant relationship (16 serodiscordant couples and 3 positive concordant couples). **Conclusion:** These results reinforce the importance of testing men to prevent the infection of a negative partner and the vertical transmission of sexually transmitted infections. The high acceptance, by men, to undergo an rapid test at the time of the woman's hospitalization demonstrated the viability of this strategy in the maternity ward.

Keywords: Pregnant woman; Sexual partner; Sexually transmitted diseases; Serodiscordance.

RESUMO

Introdução: A prevenção da transmissão vertical de doenças sexualmente transmissíveis é objeto de pesquisa de diversos autores, os quais reforçam a importância do *status* sorológico do parceiro sexual da mulher. **Objetivo:** Avaliar a prevalência e a sorodiscordância de infecções por HIV, hepatite B, hepatite C e sífilis em mulheres internadas em uma maternidade localizada no Sul do Brasil e seus parceiros. **Métodos:** Foram entrevistadas 350 mulheres e seus parceiros em um estudo transversal de base de serviço realizado de 16 de agosto a 23 de novembro de 2018. **Resultados:** Do grupo consultado, 4,0% das mulheres e 4,3% dos homens apresentaram alguma das infecções estudadas. Entre as mulheres, 2% já sabiam ser HIV positivas e 2% apresentaram teste rápido positivo para sífilis. Para hepatite B ou C, não se registrou nenhum resultado positivo. Foram localizados 299 (85,4%) companheiros, destes, 293 (98,0%) aceitaram responder ao questionário do estudo. Do total de homens entrevistados, 281 (95,9%) concordaram em se submeter aos testes rápidos, entre eles, 1,4% já sabiam ser HIV positivos, 0,4% eram portadores crônicos de hepatite B e 1,4% apresentaram testes rápidos positivos para sífilis e hepatite C. Em relação aos casais, 6,8% possuíam algum teste positivo, a maioria (16) era formada de indivíduos sorodiscordantes e 3 de concordantes positivos. **Conclusão:** Esses resultados reforçam a importância da testagem masculina com a intenção de evitar a infecção do cônjuge negativo e a transmissão vertical das infecções sexualmente transmissíveis. A alta aceitação masculina de se submeter ao teste rápido durante a internação da mulher demonstrou a viabilidade dessa estratégia de testagem na maternidade.

Palavras-chave: Mulher grávida; Parceiro sexual; Infecções sexualmente transmissíveis; Sorodiscordância.

INTRODUCTION

Prenatal screening for sexually transmitted infections (STIs) with possible mother-to-child transmission (mainly HIV, hepatitis B, hepatitis C, and syphilis) is recommended to prevent pediatric infection[1].

The occurrence of these STIs is frequent in Brazil, mainly in absolute terms. Among pregnant women, for instance, the most recent information indicates that 49,013 had syphilis, 7,882 were HIV positive and 1,311 had hepatitis B in 2017[2-4]. In addition, there are regional differences in the frequency of STIs. The South region has the highest detection rate of HIV-positive pregnant women (5.8 cases/thousand live births), which is two-fold the national rate (2.8) [3]. The information available for hepatitis C is not specific for pregnant women, with 24,460 cases of the disease recorded in 2017, with an incidence rate of 11.9/100,000 inhabitants (13.6 in men and 10.3 in women)[4].

Except for hepatitis C, the greatest source of STI contagion in pregnant women is sexual intercourse[5,6]. Several authors recommend that partners be tested as an indispensable condition for the prevention of vertical transmission (VT), even if the couple is in a stable relationship[6-10].

The serology for a given disease is not always identical between the members of a couple (seroconcordance). An individual with a negative test may have a partner with a positive result, or vice versa, a situation known as serodiscordance[11]. A study in Mozambique assessed the incidence of HIV in a cohort of 1,221 HIV-negative women during postpartum tests, finding up to 39 % of new infections occurring between 12 and 18 months postpartum. The authors stressed the importance of testing sexual partners, since retesting a woman at the time of delivery was not enough to decrease the number of pediatric infections after birth[7].

Considering that serodiscordance is an increasing source of disease transmission[11] and that prevention programs prioritize vertical transmission prevention while horizontal transmission (from a

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seropositive partner to a seronegative pregnant woman) is undervalued, several authors have studied the role of men in reducing VT, especially HIV[6,12,13]. Men are considered the "forgotten half of this equation"[14].

Although encouraged by associated national protocols, very few partners of Brazilian pregnant women are tested. It occurs rarely in health services, and to our knowledge, scientific evidence on serodiscordance in Brazil is restricted to a study focused on measuring HIV[6] This study conducted in Porto Alegre offered HIV testing to partners of HIV-negative parturient women and found a male prevalence of HIV infection of 0.6% and a serodiscordance of 1.3% among 1,101 couples[6].

OBJECTIVE

The goal of this study was to assess the prevalence and serodiscordance of HIV, hepatitis B, hepatitis C, and syphilis infections in women admitted to a maternity ward and their partners.

METHODS

This was a service-based cross-sectional study. Data were collected from August 16 to November 23, 2018, at a university hospital in the city of Pelotas, State of Rio Grande do Sul, southern Brazil.

Pelotas is a municipality with a 2019 estimated population of 342,405 inhabitants and a human development index considered high (0.739)[15]. The hospital has 22 obstetric beds and an average of 81 births/month, providing care through the Unified Health System only to citizens of Pelotas and 28 cities in the region.

The sample size calculated by the EpiData software was 345 couples, taking into account the surveyed prevalence of the diseases and an error of 1.5 percentage point, plus 20% associated with potential losses and refusals.

The study population consisted of women in a stable heterosexual relationship — duration greater than or equal to three continuous months — admitted to the maternity ward, regardless of the reason for hospitalization, and their respective partners.

A structured questionnaire was built for data collection. In addition to answering the questionnaire, the women authorized the consultation of their prenatal record forms, their hospital records, and contact with their partners. When located, the man was invited to participate in the study, and the study included all those who agreed to participate.

The men answered a questionnaire containing demographic and socioeconomic questions, as well as information about previous testing for the diseases studied. At the end, they were invited to undergo RT for HIV, syphilis, hepatitis B, and hepatitis C. Every contact, interview, and rapid testing was carried out by previously trained interviewers, who came to the hospital according to a pre-defined schedule. The interviews took place at different times during the day and night, but there were not, necessarily, interviewers available 24 hours a day.

Positive outcomes in women were measured by RT for HIV and Rapid Treponemal Test for Syphilis (part of the institution's screening routine). As for hepatitis B and C screening, we considered the HbsAg and Anti-HCV tests performed in the last trimester of pregnancy and those collected by the maternity care team during hospitalization. In the partners, the study team performed an RT for HIV, a Rapid Treponemal Test for Syphilis, an RT for hepatitis B, and an RT for hepatitis C. Serodiscordance for each disease was measured individually for each woman-partner pair and in comparison with the total number of couples.

Couples in which the woman and her partner had both negative results for a given disease were called negative seroconcordant; if both had positive results for the same infection, they were called positive seroconcordant. Serodiscordant couples were those in which one of the two had a positive test, while the other was negative.

The variables used to describe the sample were: self-declared skin color (black, brown, white, yellow, and indigenous), mean age, complete years of study, average per capita income, living in the same household as the partner, and average relationship time.

Data were encoded, entered in duplicate in EpiData version 3.1, and transferred to the Stata software, version 15. Data analysis was performed using descriptive statistics with prevalence calculations and confidence intervals (95%CI).

Women not contacted during hospitalization during the study period were considered losses, as were partners who were at the maternity hospital at some point and were not located. Those women and men who did not accept to participate in the study were considered refusals.

The study was authorized by the Research Ethics Committee of the Universidade Federal de Pelotas Faculty of Medicine under protocol number 2.390.800 (CAAE 79112717.8.0000.5317). All respondents agreed to be part of the study and signed the Informed Consent Form. Every man with a positive result in an RT received post-test counseling and was referred to specialized care for follow-up (in case of HIV and syphilis) or confirmation of the diagnosis (in case of hepatitis B or C). As for the women, all positive results were handled exclusively by the maternity healthcare team, without the interference of the researchers.

RESULTS

During the data collection period, 363 women were eligible for the study. The loss/refusal rate was 3.6% — five were not found (losses) and eight refused to participate. Thus, 350 women were interviewed and made up the study sample. Regarding the study subjects, 54.6% were interviewed after delivery and 62.9% reported being white. The mean age and schooling were 27.8 years (standard deviation (SD: 6.5) and 10.3 (SD: 3.3) complete years of study, respectively. Half of the sample attended prenatal care at a Basic Healthcare Facility in Pelotas (175/350) and one woman did not attend the consultations. The mean number of pregnancies per woman was 2.3 (range: 1 to 9). Almost all subjects (91.1%) stated that they lived in the same household as their partners. The average per capita income of the household was R$ 681.14 reais (**Table 1**).

According to the prenatal record forms, the percentage of women who did not undergo diagnostic testing during prenatal care was 6.9% for HIV, 10.3% for syphilis, 13.5% for hepatitis B, and 42.9% for hepatitis C.

Regarding partners, 64.7% reported being white. The mean age and education levels were 30.9 years (SD: 8.1) and 9.9 (SD: 3.4) complete years of study, respectively. The average relationship time was 72 months (**Table 1**).

Of the total women, 2% already knew they were HIV positive and 2% had a positive RT for syphilis during hospitalization in the maternity ward. Of 343 women who had results available for hepatitis B and 338 for hepatitis C, there were no positive results. Seven women did not have their HBsAg levels collected and 12 did not have their Anti-HCV levels collected in the stipulated period (**Table 2**).

For the 350 women interviewed, 85.4% of the partners were located by the team of interviewers. Of these, 98.0% agreed to answer the study questionnaire. Of the total number of men interviewed, 95.9% agreed to undergo an RT (**Figure 1**).

Out of 281 men with results for HIV, 1.4% already knew they were HIV positive. The 277 men with no previous results and who agreed to undergo the RT had negative results. Regarding syphilis, 1.4% of men had a positive RT result. One man had chronic hepatitis B (0.4%). Among the 281 men with results for hepatitis C, 1.4% had a positive RT result (**Table 2**).

Considering the total number of respondents, 4.0% of the women and 4.3% of the men had some of the infections studied (**Table 2**). Regarding couples with available data, 6.8% had a positive result.

Regarding HIV, 98.2% of the couples were negative seroconcordant and 1.1% were positive seroconcordant. Two couples (0.7%) were serodiscordant for HIV (one HIV-positive woman/HIV-negative man and one HIV-negative woman/HIV-positive man). Out of the 281 couples with results for syphilis, 3.2% were serodiscordant; the rest were negative seroconcordant. Regarding hepatitis B, 0.4% of the couples with available results were serodiscordant; the other couples were negative seroconcordant. As for hepatitis C, 1.5% of the couples were serodiscordant, all related to men with a positive RT result. The remaining 270 couples were negative seroconcordant (**Table 3**).

In the questionnaire, the men were asked about any previous testing for any of the diseases surveyed. In addition, it was also investigated whether the test had been performed during the current pregnancy of the woman and the reason for testing (**Table 4**).

Regarding previous testing, the test mentioned more frequently by the partners was HIV testing, while that of hepatitis C was the least mentioned. Although HIV testing was mentioned by 56.0% of the partners, in 62.0% of the cases the test had not been performed during the current pregnancy of the woman.

Among the four tests, HIV and syphilis were the most frequently performed tests during the woman's pregnancy, although in absolute numbers, there were only 62/293 and 57/293 men, respectively. As for all four tests, most partners reported that they had undergone the test because it was requested as part of the woman's prenatal care routine.

Table 1 – Description of the couples interviewed. Pelotas, RS, Brazil, 2018.

Selected variable	Women (n=350)	Men (n=293)
Self-declared skin color	n (%)	n (%)
Black	52 (14.9)	41 (14.0)
Brown	72 (20.6)	55 (18.8)
White	220 (62.9)	189 (64.7)
Yellow	3 (0.9)	4 (1.4)
Indigenous	1 (0.3)	3 (1.0)
Ignored	2 (0.6)	–
Lives with a partner in the same household	91.1	–
Mean age (years)	27.8	30.9
Complete years of study (mean)	10.3	9.9
Average per capita income (in reais)	681.14	
Average relationship time (in months)	72	

Table 2 – Prevalence of diseases according to sex. Pelotas, RS, Brazil, 2018.

Selected variable	Women (n=350) n (%)	Men (n=281) n (%)
HIV*		
Negative	343 (98.0)	277 (98.6)
Positive	7 (2.0)	4 (1.4)
Syphilis*		
Negative	343 (98.0)	277 (98.6)
Positive	7 (2.0)	4 (1.4)
Hepatitis B#		
Negative	343 (100)	280 (99.6)
Positive	0 (0)	1 (0.4)
Hepatitis C#		
Negative	338 (100)	277 (98.6)
Positive	0 (0)	4 (1.4)
Presence of any infection (HIV, syphilis, hepatitis B, or hepatitis C)	14 (4)	12 (4.3)

*Measured by rapid testing at the maternity ward; #measured in the third trimester of pregnancy or in the maternity ward (women) and by rapid testing in the maternity ward (men).

DISCUSSION

The results showed that approximately one out of every 25 subjects tested positive for any of the infections surveyed (4.0% of the women and 4.3% of the men). Among the women, positive tests for HIV and syphilis were identified in one out of every 50 respondents. Among the partners, there was a similar prevalence of positive tests for HIV, syphilis, and hepatitis C, with 1.4% of the men showing a positive test result for any of these pathologies. Regarding couples with available data, 6.8% had a positive result. Among the 281 couples, the majority of the individuals who tested positive for any of the diseases surveyed were in a serodiscordant relationship, since seroconcordance was evidenced in only three HIV-positive couples (16 serodiscordant couples and 3 positive seroconcordant couples).

Official data and Brazilian studies on HIV prevalence in pregnant women range from 0.4 to 0.9%[9,10,16,17]. Among the male sexual partners of pregnant women, the prevalence reported in two Brazilian studies was 0.6%, very close to the country's official estimate of 0.7%[6,16,18].

Compared to the estimates above, this analysis found a higher prevalence of HIV, both in women (2.0%) and their sexual partners (1.4%). This could be explained, in part, by the fact that the study institution is a reference institution in the care and delivery of HIV-positive pregnant women from the region of Pelotas and neighboring municipalities.

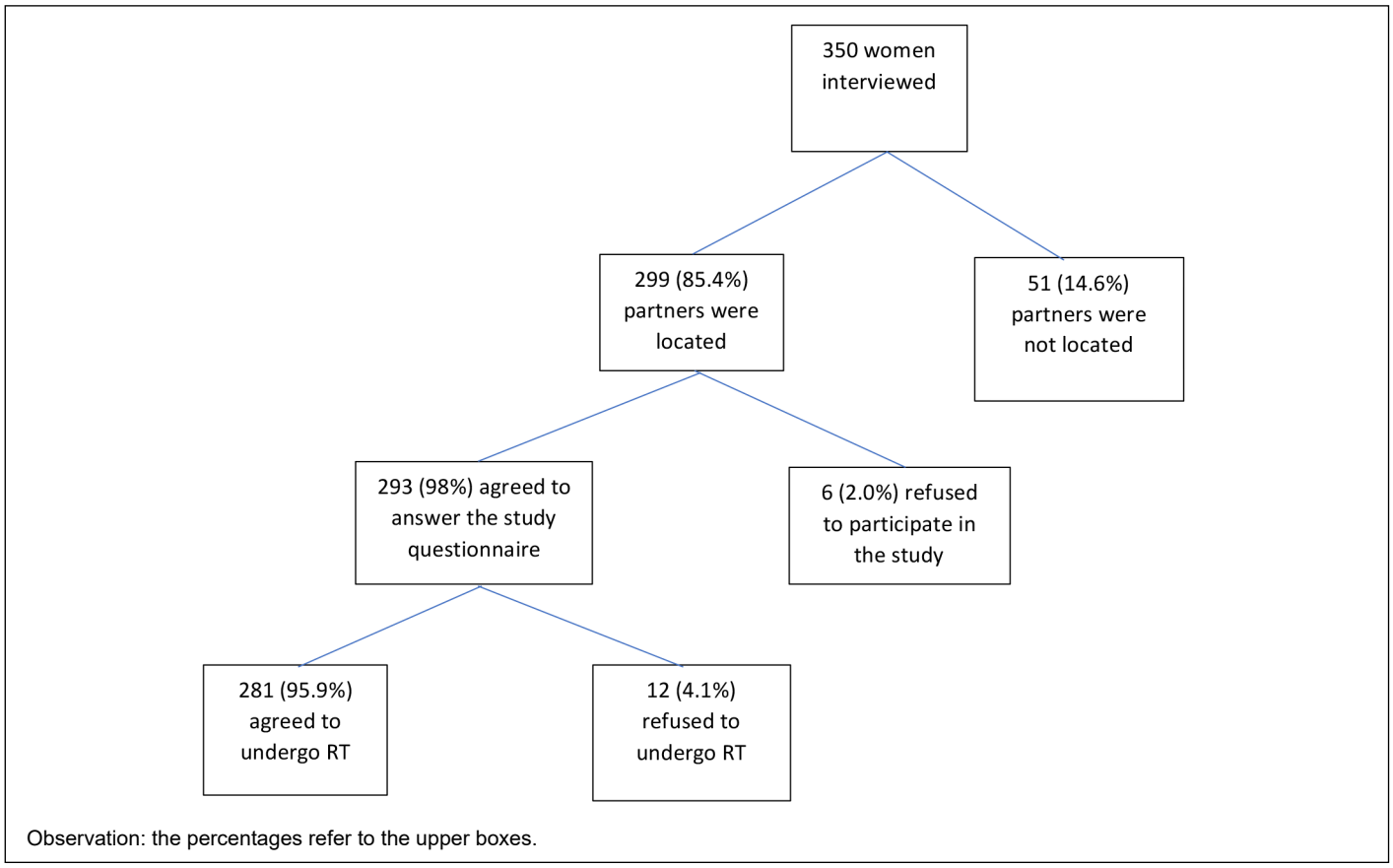

Figure 1 – Flowchart showing the participation of the partners of the women interviewed. Pelotas, RS, Brazil, 2018.

Table 3 – Prevalence ratios among couples by surveyed disease. Pelotas, RS, Brazil, 2018.

Selected variable	Negative seroconcordant number of couples/total of couples (%)	Positive seroconcordant number of couples/total of couples (%)	Serodiscordance between couples number of couples/total of couples (%)
HIV	276/281 (98.2)	3/281 (1.1)	2/281 (0.7)
Syphilis	272/281 (96.8)	–	9/281 (3.2)
Hepatitis B	276/277 (99.6)	–	1/277 (0.4)
Hepatitis C	270/274 (98.5)	–	4/274 (1.5)

Table 4 – Men who had previously undergone testing for HIV, syphilis, hepatitis B, and hepatitis C. Pelotas, RS, Brazil, 2018.

Selected variable	HIV n (%)	Syphilis n (%)	Hepatitis B n (%)	Hepatitis C n (%)
Have you ever been tested for this disease in your life?				
NO	125 (42.7)	170 (58.0)	161 (54.9)	173 (59.0)
YES	164 (56.0)	112 (38.2)	121 (41.3)	107 (36.5)
IGN	4 (1.4)	11 (3.7)	11 (3.7)	13 (4.4)
If so, did you perform this test during your partner's pregnancy?*				
NO	101 (62.0)	53 (48.2)	68 (58.1)	56 (53.8)
YES	62 (38.0)	57 (51.8)	47 (40.2)	45 (43.3)
IGN	–	–	2 (1.7)	3 (2.9)
The reasons most frequently reported for performing the test during pregnancy:*				
At the person's own discretion	9 (14.7)	8 (14.3)	7 (15.2)	6 (13.6)
Requested as part of the woman's prenatal care routine	34 (55.7)	33 (58.9)	27 (58.7)	26 (59.1)
Other reason	18 (29.5)	15 (26.8)	12 (26.1)	12 (27.3)

*Losses ranged from 1 to 4 respondents.

Regarding syphilis in pregnant women, the national data vary according to the region of the country. Most of them have prevalence rates below 2.0%[10,17,19,20], although a study, carried out in the city of Fortaleza in 2010, found 7.7%[21].

In this study, the prevalence of syphilis in pregnant women during hospitalization in the maternity hospital was 2%. By including the cases of syphilis diagnosed during prenatal care, a 3.7% prevalence of the disease was estimated.

With regard to hepatitis B, the results of this study are in line with the official Brazilian figures that report a downward trend in the disease incidence rates[4]. In this sense, the importance of vaccination strategies for disease prevention is emphasized, bearing in mind that an infected partner is usually the main source of infection in women who are not immune to the disease[4].

Literature data regarding the occurrence of hepatitis C in Brazilian pregnant women vary from 0.1 to 1.5%[22,23]. National records for 2017 reported that the detection rate of the disease was higher in the South, compared to other regions of the country[4].

In this study, a woman with a positive test for hepatitis C was not identified, differently from what was evidenced in the partners, among whom 1.4%[4] had a positive RT result for the disease, being required to follow the hepatitis C confirmatory protocol — although the RT used has a sensitivity of 100% and specificity of 99.4%. According to national protocols, pregnant women should undergo prenatal testing only when at risk[5]. However, even though sexual transmission of hepatitis C is considered rare among stable sexual partners[5], some studies suggest the role of this route in maternal contamination, mainly in the coexistence of some STIs[5,24].

Evidence shows that a sexual partner with an STI is the main source of infection for pregnant women[5]. In Brazil, Cardoso et al. and Nóbrega et al. found evidence that Brazilian pregnant women with HIV and/or syphilis were infected through unprotected sex with stable sexual partners[9,10].

Although the term serodiscordance can be applied to any STI that can be measured by serological examination, the literature is scarce regarding serodiscordance studies for a disease other than HIV. HIV serodiscordance ranges from 1% to 18%[6,12,25-29]. If cohorts that included only HIV-positive pregnant women are considered, these estimates are even higher, with 31 to 66.8% of the couples in serodiscordant relationships[11,30-33]. In Brazil, the only study that evaluated this estimate was conducted in Porto Alegre and found a serodiscordance for HIV of 1.3% among 1,101 couples[6].

Considering all 281 couples, among the four diseases investigated herein, the highest prevalence of serodiscordance was for syphilis (3.2%), followed by hepatitis C (1.5%), HIV (0.7%), and hepatitis B (0.4%). By limiting the analysis to the group of couples (n=19) in which at least one member had a positive test, these values correspond to 40% serodiscordance for HIV and 100% for other infections.

The partners were tested after the women had authorized their participation in the study. Compared to a study conducted in Porto Alegre, in which 4.7% of the women did not authorize their partners to be interviewed[6], this study had a higher acceptance rate by the women, since 100% of them agreed to include their partners.

Assessing the acceptance by men to undergo an RT was not the aim of this study, but it can be compared to a study carried out in Porto Alegre, which offered HIV RT to partners of HIV-negative parturients. Concerning the total number of women selected in this study, 66% of the partners underwent an RT for HIV[6]. In the present analysis, 80.3% of the partners answered the questionnaire and accepted to undergo an RT. If only the men who were located by the team (299) were considered, 94% consented to undergo an RT (6 refusals to participate in the study and 12 refusals to undergo an RT). This difference can be explained in part by the characteristics of the team in this study, which stayed for longer periods of time in the maternity facilities, including on weekends and holidays. In addition, the hospital in this study has a lower demand for hospitalizations, which may favor better control over the visits by partners. Finally, the partners of the pregnant women who were admitted to the institution in this study may be more receptive to topics related to STIs and testing strategies. In this regard, if testing was proposed during prenatal care, as suggested by the Brazilian program "Prenatal care for Partners", such a receptivity could have been even greater[34].

Concerning the tests for HIV, syphilis, and viral hepatitis undergone by partners during the current pregnancy of the women, although the percentage of men in the sample who reported a test is low, it is important to note that the majority said the test had been requested by the prenatal physician. This information suggests that the care network for pregnant women in Pelotas and the region is partially incorporating the recommendation of testing partners during prenatal care, needing to be reinforced to prevent horizontal and vertical transmission of STIs[34].

The information that only one woman did not attend prenatal consultations can be considered optimistic. However, although it was not the objective of the present analysis to assess the quality of prenatal care, the percentage of women who did not undergo important tests during prenatal care was significant. Considering the importance of testing as a prevention strategy for VT, the results suggest that there is still a gap in prenatal testing in some services. Further studies to assess this issue are recommended.

The Brazilian guidelines recommend testing for hepatitis C only if at special risk for the disease, such as the use of injectable substances by the woman or partner, blood transfusions, and a history of multiple sexual partners, both the woman and the partner[1]. Despite not being a formal recommendation of the Brazilian protocol, 57.1% of the study's pregnant women tested for hepatitis C during prenatal care. This finding can be considered positive, since some risk conditions are not easily established during prenatal consultations, especially the concept of multiple sexual partners.

The maternity ward has a greater demand for high-risk parturients because of the existence of neonatal ICU beds. Due to the temporary interruption in the operation of another institution in Pelotas, which coincided with the period of data collection for this research, there was an increased demand for obstetric care for habitual risk pregnancies, culminating in an average increase from 81 to 116 monthly births.

Strengths

The high acceptance, by men, to undergo an RT at the time of the woman's hospitalization (95%) demonstrated the feasibility of screening for these diseases in the maternity ward.

Limitations

The difficulty in finding all men can be considered a limitation of the study, since they did not remain at the hospital for the entire duration of their partners' stay. Strategies that would guarantee better recruitment of partners could be created to reach the largest number of partners.

However, it is important to note that it is not always possible to reach all the partners. Of the 51 partners (14.57%) who were not found by the team of interviewers, 16 (31.4%) men never went to the maternity ward during the study period (six were in another municipality, five were not present for different reasons, three were inmates in the prison system, one stayed with the newborn in the ICU of another hospital, and one was prevented from entering the institution because he was carrying a firearm).

CONCLUSION

The results of this study show a significant prevalence of the diseases surveyed. The finding that the majority of couples who had a positive result were serodiscordant is in line with discussions on the importance of testing men during prenatal care to prevent infecting a negative partner and, consequently, the VT of STI.

In addition, the clear acceptance, by men, to test at the time of the woman's hospitalization clearly demonstrates the possibility of adopting testing strategies at this time when the majority of the partners generally attend the hospital.

Approval by the Human Research Ethics Committee

Research protocol approved at the Research Ethics Committee of the Universidade Federal de Pelotas Faculty of Medicine (No. 2.390.800 — CAAE 79112717.8.0000.5317).

Participation of each author

AS: Conceptualization, Investigation, Project administration, Writing – original draft, Writing – review & editing. MFS: Conceptualization, Methodology, Writing – review & editing, Formal analysis, Supervision. BPN: Conceptualization, Methodology, Writing – review & editing, Formal analysis, Supervision.

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Conflicts of interest

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