Editorial

Mycoplasma genitalium in medical practice: silent as Chlamydia, but with greater potential for aggressiveness

Mycoplasmas belong to the *Mollicutes* classification. The first species was discovered in 1898 by Nocaard & Roux in a case of pneumonia. In this classification four species have a higher impact on a bovine pneumonia case. The *Ureaplasma* genus focusing on the *Urealiticum* and *Parvum* species may be related with problems during pregnancy or even with perinatal impact[1], whereas the *Mycoplasmas* genus represented by the *hominis* and the *genitalium* species are more related to disturbances in the genitals, but can also have an impact on pregnancy[1]. Among these, *Mycoplasma genitalium* (MG) stands out regarding its pathogenicity, especially the growing resistance to antibiotics as shown in recent studies[2,3].

In terms of pathogenicity, *Chlamydia trachomatis* (CT) can be compared with MG. It was first described in 1907, in Berlin, by the zoologist and microbiologist Stanislaus von Prowazek, who defined the existence of inclusion corpuscles of *Chlamydia* in trachoma cases.

After their discovery, both MG and CT were studied as to their pathogenicity mechanisms; however, most studies have been accentuating the *Chlamydia* bacterium. However, several factors have led to an increasing concern regarding MG, requiring more studies.

At first, MG differs from CT in its microbiological structure, since it does not show a cytoplasmic membrane[4], which allows the resistance to all antimicrobial agents that have their action mechanism addressed to that organelle. But the pathogenicity mechanisms are similar to this bacterium: both attach closely to the cells so that these can be included through receivers[4]. In addition to their very small size (the MG is the smallest existing bacterium), it requires intracellular parasites[4].

MG is different than the *Ureaplasma* and the *Mycoplasma hominis* species, which can compose the vaginal microbiome[5]. However, a study showed the presence of MG not associated with the pathogenicity[6].

The prevalence of CT is around 10% in the young population, whereas MG has been reported in about 1 to 2% of the women[7]. Despite this difference, MG has been shown to be increasing; a review of the literature pointed to progressively higher rates by comparing more recent studies[8]. While Manhart et al.[9] reported 7% of MG prevalence in the symptoms of cervicitis in 2003, Gaydos et al.[10], also evaluating cervicitis, found this microorganism in 19.3% of the cases in 2009.

It is important to note that a large group of entities can be associated with both CT and MG, which can include cystitis, cervicitis, changes to the vaginal environment, and even pelvic inflammatory disease, with consequent implication on fertility[11]. These situations are fundamentally important to conduct our diagnostic "clues" towards these agents.

Regarding the diagnosis of both CT and MG, if we wait for signs and symptoms we will miss the diagnoses in about 70 to 80% of the time, since both behave so insidiously; they are known as "silent epidemic" agents. It would be ideal for us to base the laboratory diagnosis on molecular biology testing[12]. These diagnostic methods are sensitive, and in case of CT they should be used for tracking, especially among teenagers, as it is not usually applied in case of MG. MG should be considered in cases of chronic cystitis, cervicitis or pelvic process, even when the first suspicion leads to CT and this agent's treatment.

As far as treatment is concerned, studies show the difference between MG and CT. MG has been categorically more and more resistant to numerous agents that act on CT[3]. In general terms it is possible to state that doxycycline provides 60% of resistance and, therefore, proved to be an ineffective drug to treat MG[12]. Long clinical signs or symptoms that lead us to think of MG as the agent involved involve azithromycin as the first treatment option[10]. However, studies refer to 30% of resistance to this drug[2], and it seems that increasing the time of administration of a single dose of 1 g (used for treating cervicitis by CT) to 5 or even 7 days does not reduce such resistance[13]. Moxifloxacin has been used in case of resistance to azithromycin, although a resistance of more than 5% to moxifloxacin has already been mentioned[14].

In conclusion, we have observed that MG is an emerging pathogen, affecting the reproductive health. It is difficult to be clinically diagnosed and has growing resistance to antibiotics, which makes it more aggressive than CT. Therefore, it should get more attention from the community that works with both male and female genital tract infections.

NEWTON SERGIO DE CARVALHO
Obstetrics and Gynecology Department, Universidade Federal do Paraná (UFPR). E-mail: newtonsdc@gmail.com

GABRIELE PALÚ
Obstetrics and Gynecology Infection Sector at Hospital das Clínicas da UFPR. E-mail: gabrielepalu95@gmail.com

REFERENCES

1. Taylor-Robinson D. Infections due to species of Mycoplasma and Ureaplasma: an update. Clin Infect Dis. 1996;23:671-82.
2. Bissessor M, Tabrizi SN, Twin J, Abdo H, Fairley CK, Chen MY, et al. Macrolide resistance and azithromycin failure in a Mycoplasma genitalium-infected cohort and response of azithromycin failures to alternative antibiotic regimens. Clin Infect Dis. 2015;60:1228-36.
3. Manhart LE, Gillespie CW, Lowens MS, Khosropour CM, Colombara DV, Golden MR, et al. Standard treatment regimens for nongonococcal urethritis have similar but declining cure rates: a randomized controlled trial. Clin Infect Dis. 2013;56:934-42.
4. Razil S, Yogev D, Naot Y. Molecular biology and pathogenicity of mycoplasmas. Microbiol Mol Biol Rev. 1998;62:1094-156.

5. Chaban B, Links MG, Jayaprakash TP, Wagner EC, Bourque DK, Lohn Z, et al. Characterization of the vaginal microbiota of healthy Canadian women through the menstrual cycle. Microbiome. 2014;2:23.

6. Falk L, Fredlund H, Jensen J. Signs and symptoms of urethritis and cervicitis among women with or without Mycoplasma genitalium or Chlamydia trachomatis infection. Sex Transm Infect. 2005;81(1):73-8.

7. Sonnenberg P, Ison CA, Clifton S, Field N, Tanton C, Soldan K, et al. Epidemiology of Mycoplasma genitalium in British men and women aged 16–44 years: evidence from the third National Survey of Sexual Attitudes and Lifestyles (Natsal-3). Int J Epidemiol. 2015;44(6):1982-94.

8. Sethi S, Singh G, Samanta P, Sharma M. Mycoplasma genitalium: an emerging sexually transmitted pathogen. Indian J Med Res. 2012 Dec;136(6):942-55.

9. Manhart LE, Critchlow CW, Holmes KK, Dutro SM, Eschenbach DA, Stevens CE, et al. Mucopurulent cervicitis and Mycoplasma genitalium. J Infect Dis. 2003;187(4):650-7.

10. Gaydos C, Maldeis NE, Hardick A, Hardick J, Quinn TC. Mycoplasma genitalium as a contributor to the multiple etiologies of cervicitis in women attending sexually transmitted disease clinics. Sex Transm Dis. 2009;36:598-606.

11. Lis R, Rowhani-Rahbar A, Manhart LE. Mycoplasma genitalium infection and female reproductive tract disease: a meta-analysis. Clin Infect Dis. 2015 Aug 1;61(3):418-26.

12. Jensen JS, Cusini M, Gomberg M, Moi H. 2016 European guideline on Mycoplasma genitalium infections. J Eur Acad Dermatol Venereol. 2016;30:1650-6.

13. Horner P, Blee K, Adams E. Time to manage Mycoplasma genitalium as an STI: but not with azithromycin 1 g! Curr Opin Infect Dis. 2014;27:68-74.

14. Couldwell DL, Tagg KA, Jeoffreys NJ, Gilbert GL. Failure of moxifloxacin treatment in Mycoplasma genitalium infections due to macrolide and fluoroquinolone resistance. Int J STD AIDS. 2013;24:822-8.

LATE POSTNATAL MOTHER-TO-CHILD TRANSMISSION OF THE HUMAN IMMUNODEFICIENCY VIRUS THROUGH BREASTFEEDING: ANALYSIS OF INFANT CASES OF PREVIOUSLY SERONEGATIVE MOTHERS INFECTED DURING LACTATION

Transmissão vertical tardia do vírus da imunodeficiência humana via aleitamento materno: análise de casos de infecção pediátrica com história materna soronegativa durante a gestação

Ana Carolina Barcellos[1], Nathalia Zorze Rossetto[1], Cristina de Oliveira Rodrigues[2]

ABSTRACT

Introduction: Vertical transmission is considered an indication of human immunodeficiency virus (HIV) infection in children aged below five years. The main postnatal category of exposure is through breastfeeding. When maternal infection occurs in early postnatal period, the risk of infant infection is even higher, due to a high maternal viral rate in this period. **Objective:** To evaluate HIV infection in infants assisted by the Pediatric Infectology Service of Hospital de Clínicas da Universidade Federal do Paraná, emphasizing the cases where vertical transmission occurred postnatally through breastfeeding. **Methods:** Transversal, analytical and descriptive study, with quantitative and qualitative approach, analyzing all HIV-infected patients aged 0 to 16 years, assisted between 2010 and 2015. The analysis of category of exposure was carried out by a general protocol, followed by a specific protocol for cases where transmission was suspected to have occurred due to late postnatal transmission through breastfeeding, aiming at understanding pediatric and maternal characteristics. **Results:** Records from 122 patients were analyzed, with 95.0% of mother-to-child-transmission cases. Between these cases, 11 (9.5%) were considered possible or confirmed late postnatal transmission through breastfeeding, having the presence of breastfeeding as a requirement. By the time of diagnosis, 72.7% presented symptoms of HIV infection. In 45.4% of these cases, mother and children were diagnosed at the same time, and 72.7% of mothers were infected sexually. **Conclusion:** Mother-to-child-transmission was the main responsible for infant infection and there was a significant prevalence of late postnatal transmission through breastfeeding in our sample. Moreover, the severity of infant symptoms, the moment of diagnosis and mother's category of exposure highlight a gap on HIV prevention, and the importance of finding prophylactic measures and scientific improvement in order to reduce HIV transmission through breastfeeding.
Keywords: HIV infections; child; breastfeed; vertical infection transmission.

RESUMO

Introdução: Na faixa etária de 0 a 5 anos, considera-se a transmissão vertical o indicador da infecção pelo vírus da imunodeficiência humana (HIV). A principal via de exposição pós-natal ocorre pelo aleitamento materno. Quando a infecção aguda materna se dá no período puerperal, há maior risco de infecção infantil, devido à elevada carga viral materna. **Objetivo:** Avaliar as formas de infecção pediátrica pelo HIV no serviço de Infectologia Pediátrica do Complexo do Hospital de Clínicas da Universidade Federal do Paraná (UFPR), com ênfase na transmissão vertical tardia via aleitamento materno. **Métodos:** Estudo transversal e analítico, com coleta de dados retrospectiva, avaliando pacientes de 0 a 16 anos infectados pelo vírus HIV, acompanhados de 2010 a 2015. Realizada análise da categoria de exposição por protocolo geral, seguida de protocolo específico para casos sugestivos de transmissão vertical tardia via aleitamento materno, objetivando compreender as características maternas e pediátricas. **Resultados:** Dos 122 pacientes incluídos, 95,0% foram infectados via transmissão vertical. Desses, 11 (9,5%) casos foram de infecção tardia — possível ou confirmada — via aleitamento materno. Ao diagnóstico da criança, 72,7% apresentaram sintomas decorrentes da infecção pelo HIV. Em 45,4% desses casos, mães e filhos foram diagnosticados concomitantemente e 72,7% das mães apresentaram categoria de exposição sexual. **Conclusão:** A transmissão vertical confirmou-se como a principal forma de contaminação pelo vírus HIV, com importante prevalência da infecção tardia pelo aleitamento materno. Essa observação, a gravidade dos sintomas pediátricos, o momento do diagnóstico e categoria de exposição maternos destacam a importância da busca de medidas profiláticas e avanços científicos que objetivem a redução da transmissão do HIV via leite materno.
Palavras-chave: infecções por HIV; criança; aleitamento materno; transmissão vertical.

INTRODUCTION

The human immunodeficiency virus (HIV) is considered the main infectious agent causing death in the world. According to the World Health Organization (WHO), about 39 million people have died since the first cases described in 1981. The HIV epidemic affects not only the health of individuals with the virus, but it also has an impact on families, communities, countries and entire societies, even contributing to socioeconomic changes in several nations[1].

According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), since the beginning of the AIDS epidemic untill June 2015, 798,366 cases of HIV infection were registered in Brazil, and 290,929 deaths were recorded in all age groups[2]. Specifically in the pediatric group, there were 17,539 cases among children aged under 5 years old, and 4,435 cases among children aged between 5 and 9 years. Vertical transmission accounts for approximately 100% of AIDS cases among children aged under 5 years old, making infection rates in this group the indicator of vertical transmission in the country. Based on these data, the

[1]School of Medicine, Universidade Federal do Paraná (UFPR) – Curitiba (PR), Brazil.
[2]Department of Pediatrics, Health Sciences Sector, UFPR – Curitiba (PR), Brazil.

undeniable importance of vertical HIV transmission in children in Brazil is noteworthy[3].

Vertical transmission occurs through the spread of the virus from the mother to the baby, and can occur at different times: intrauterine, peripartum or postnatal via breastfeeding — in this case, it is called late vertical transmission[4]. The general principles governing the various forms of vertical transmission are complex, involving the interaction of different aspects, such as clinical and immunological factors of the mother, the newborn and of breastfeeding. Despite this high complexity, it is known that the main influence on vertical transmission is the maternal viral load[2].

Regarding the postnatal exposure of the newborn to HIV through breastfeeding, there is no doubt about the presence of the virus in breast milk or about its infecting potential, resulting in the contraindication of breastfeeding in HIV-positive mothers. There is a significant increase in the risk of infection through breastfeeding due to factors such as primary maternal infection, high viral load, maternal immunosuppression and inflammatory breast conditions such as mastitis[5]. Even in the case of seronegative mothers during pregnancy, there are situations in which maternal infection occurs in the puerperal period, which constitutes an extreme risk for the child, since there is a high viral load for HIV and a reduction in maternal T-CD4 + lymphocytes count in such situations[4]. It is estimated that the intake of each liter of milk presents a risk of infection corresponding to the risk offered by an unprotected heterosexual relationship, which is the main route of HIV transmission[6].

Given this scenario, a greater emphasis is placed on the importance of breastfeeding for vertical transmission of HIV, especially in cases of puerperal infection of the mother. In order to inform and stimulate interventions that promote prevention against this type of HIV transmission, it is essential to improve knowledge about the epidemiology of these cases.

OBJECTIVE

To identify, among HIV-infected children during follow-up care at the Pediatric Infectious Diseases Service of the Clinical Hospital Complex of *Universidade Federal do Paraná* (CHC-UFPR), the forms of virus acquisition, with emphasis on late vertical transmission through breastfeeding, analyzing the prevalence of children infected via breast milk, and describing the cases in which the maternal infection occurred during the puerperal period.

METHODS

The study was carried out in a cross-sectional, analytical and descriptive manner. Data collection was retrospective, through the analysis of medical records of children and adolescents aged between 0 and 16 years, of both genders, who were diagnosed with HIV and were being followed up by the CHC-UFPR Pediatric Infectious Disease Service between January 2010 and July 2015. Patients with incomplete or missing data were excluded from the study. The study was submitted to *Plataforma Brasil*, under Certificate of Presentation for Ethical Appreciation (CAAE) No. 50905215.0.0000.0096, and approved by the Research Ethics Committee of CHC-UFPR.

All patient charts that met the inclusion criteria were initially assessed using a general profile analysis form. Data were collected

on sociodemographic characteristics and general characteristics of HIV infection, specifying: period of follow-up at the Pediatric Infectious Disease Service; date of diagnosis; and category of virus exposure, which was divided into five subcategories:

1. late vertical transmission through breastfeeding: negative prenatal tests and rapid HIV testing at birth, with subsequent post-treatment and breastfeeding;
2. possible late vertical transmission through breastfeeding: mothers with some negative HIV test during pregnancy and postpartum HIV diagnosis, with breastfeeding;
3. vertical transmission at unknown moment: when the mother presented positive serology for HIV and it was not possible to determine the moment of transmission to the child — due to the proximity of the events;
4. transmission through sexual abuse: when other forms of transmission were discarded and the offender had positive HIV serology;
5. transmission by unknown route: when the mother had HIV negative serology and other transmission routes described in the literature were discarded, or in cases of adoptive or institutionalized children in which maternal data were not known.

Once the overall HIV transmission profile was established in the study population, patients whose data were suggestive of late infection via breastfeeding were submitted to detailed data analysis using a specific collection form. Included in this group were patients classified as possible late transmission and late transmission through breastfeeding in the collection of general data. At this stage, maternal data were collected, including age, parity, exposure category, and date and time of HIV diagnosis and testing. Regarding the gestation of the patient in question, the following variables were considered: prenatal care, HIV testing during prenatal care and type of delivery. As for the infected child, the characteristics analyzed were: birth weight, gestational age, complications in the neonatal period, tests that confirmed the diagnosis, breastfeeding time, age at diagnosis, presence of symptoms at diagnosis, clinical and immunological classification according to the Center for Disease Control and Prevention (CDC)[7], current viral load, current CD4 lymphocytes (Cluster of Differentiation 4), and the treatment and occurrence of previous hospitalizations.

All data were collected, reviewed and tabulated in Excel® before statistical analysis, which was carried out in a descriptive way.

RESULTS

Of the 122 children attended by the CHC-UFPR Pediatric Infectious Disease Service between 2010 and 2015 and included in the study, 63 were males (51.6%), with a median age of 11.05 years, ranging from 0.26 to 16.97 years.

As to the origin, 74 cases were from Curitiba (60.7%), 24 from the Metropolitan Region of Curitiba (19.7%), and 24 from other locations in Paraná (19.7%). Of the 122 patients, 66 (54.1%) lived with their parents, 24 (19.7%) lived with relatives, 17 (13.9%) were institutionalized and 15 (12.3%) were adopted.

The total follow-up time presented an average of 86.2±54.6 months. Regarding the category of exposure, 116 (95.1%) cases were classified as vertical transmission. In 1 (0.8%) case, the exposure category was sexual; and 5 (4.1%) were due to unknown transmission (it was not possible to identify the form of HIV transmission). The cases of

vertical transmission were then evaluated for the moment of infection (**Figure 1**).

Specifically among the 116 cases of vertical transmission: 105 were vertical transmission at an unknown moment (90.5%); 9, possible late vertical transmission via breastfeeding (7.7%); and 2, confirmed late transmission by breastfeeding (1.7%) (**Graphic 1**).

The nine cases classified as possible late vertical transmission via breastfeeding and the two confirmed cases of late transmission through breastfeeding were submitted to detailed analysis. Maternal characteristics are presented in **Table 1**.

The median age of the mothers of children classified as possible transmission via breastfeeding and late transmission via breastfeeding was 34 years old, ranging from 21 to 49 years. From the previous obstetric data, the average number of pregnancies was 3.1±2.18 per mother.
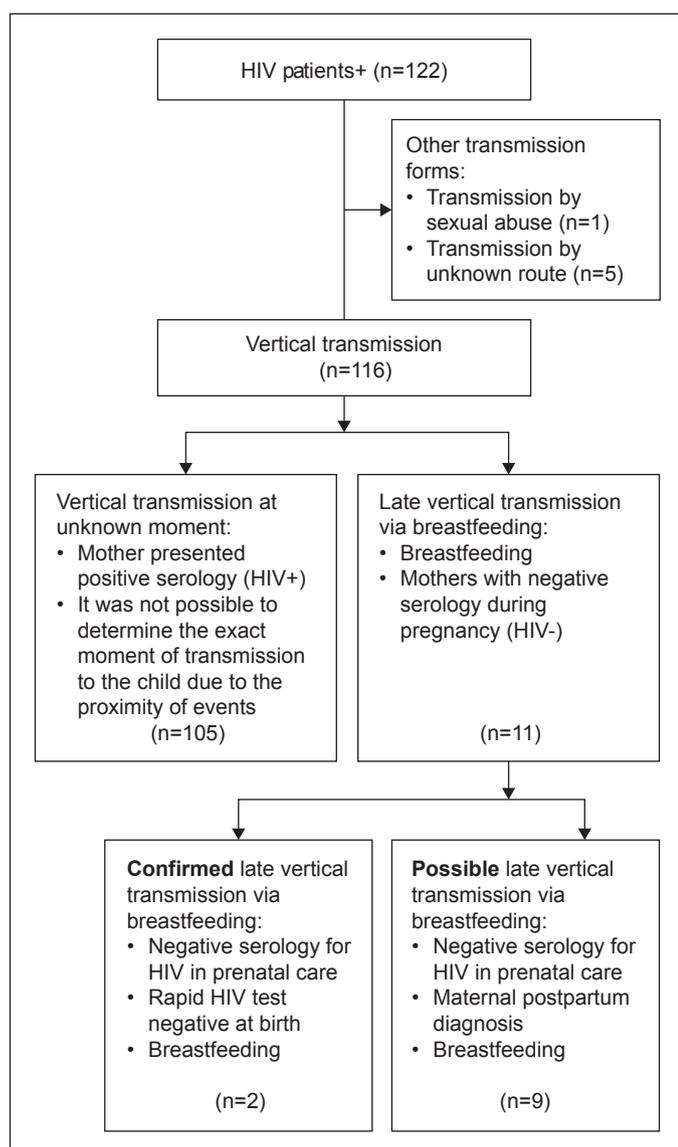
As observed in **Table 1**, 45.4% of mothers were diagnosed as seropositive only at the time of their child's diagnosis. Furthermore, the main category of maternal exposure was sexual: mothers had contact with the virus through an infected partner, relations with multiple partners or both (as in the case of 2 of the 11 mothers).

Regarding gestational data and specific pediatric characteristics, the 11 mothers underwent prenatal care: 8 (72.2%) were performed at primary health care units (BHU) and 2 (18.1%) at CHC-UFPR;
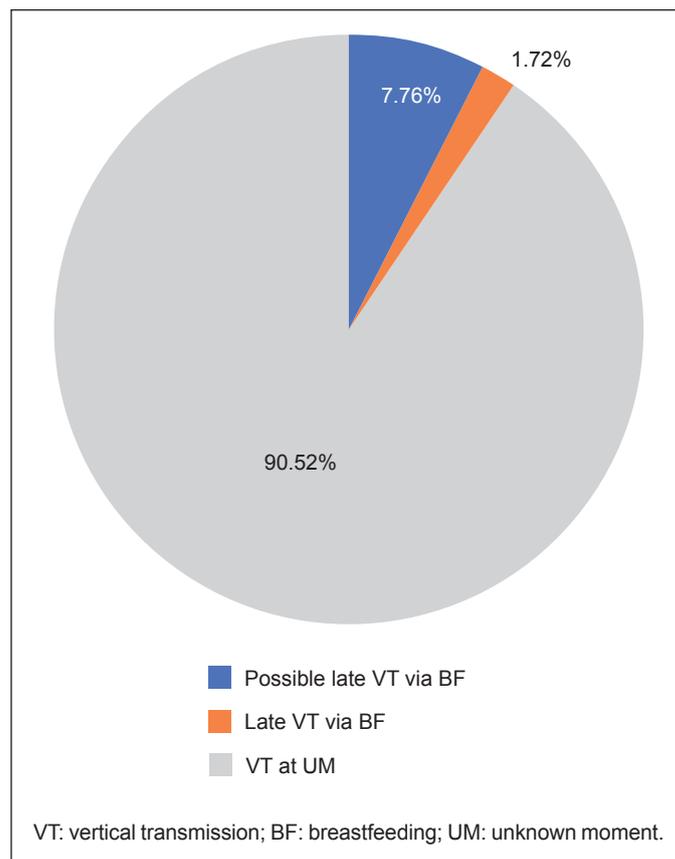
Graph 1 – Distribution of the 116 cases of vertical transmission in follow-up at the HIV/AIDS Outpatient Clinic of the Pediatric Infectious Disease Service of Complexo Hospital de Clínicas, Universidade Federal do Paraná, from 2010 to 2015.

Figure 1 – Distribution of the 122 cases of pediatric patients being followed up at the HIV/AIDS Outpatient Clinic of the Pediatric Infectious Disease Service of Complexo Hospital de Clínicas da Universidade Federal do Paraná from 2010 to 2015, according to the category of exposure and criteria of eligibility of the study.

Table 1 – Maternal characteristics of patients infected by late vertical transmission in follow-up at the HIV/AIDS outpatient clinic of the Pediatric Infectious Disease Service of Complexo Hospital de Clínicas, Universidade Federal do Paraná.

Characteristics	n	%
Moment of diagnosis		
Due to maternal illness	2	18.1
Moment of child's diagnosed	5	45.4
In new pregnancy	2	18.1
Other	1	9.0
Unknown	1	9.0
Category of exposure		
Sexual	8	72.7
Intravenous drug use	2	18.1
Blood transfusion	1	9.0
Unknown	2	18.1

in 1 case (9.0%), the place of prenatal care was unknown. Of the 11 children, 9 (81.9%) were born full term, 1 (9.0%) was preterm, and 1 (9.0%) had no known gestational age. The median weeks of gestation were 38.75 — ranging from 30 to 40 weeks. Regarding delivery, 8 (72.7%) patients were born via vaginal delivery and 3 (27.3%) were cesarean. The median birth weight was 3,157.5 g ranging from 2,900 to 3,925 g. The occurrence of neonatal complications in the patients in question was also analyzed, with only 1 (1.0%) presenting some kind of intercurrence.

The median age of these patients was 7.63, ranging from 3.14 to 14.95 years. Concerning sociodemographic data, 63.3% of the patients were from Curitiba and 36.2% lived in the Metropolitan Region of Curitiba or other cities of Paraná. Among the 11 patients evaluated for late HIV infection via breastfeeding, 9 (81.8%) had their relatives as their guardians, and 2 (18.2%) lived with their parents. All patients were breastfed. The mean duration of the breastfeeding period was 13.36±9.68 months. Of these children, 7 (63.6%) were diagnosed through the HIV ELISA test and 4 (36.4%) through the viral load test. The mean age at diagnosis was 23±17.5 months.

At the time of diagnosis, 8 (72.7%) children had symptoms of HIV infection. All children underwent CDC clinical and immunological classification for HIV patients, carried out at two moments: at the worst clinical and immunological moment during follow-up at the service and at the moment of data collection, as explained in **Table 2**.

It is observed that, at the worst clinical moment, 5 children were classified as B and C (moderate or severe signs and symptoms). In the clinical evaluation in the period of the research, 10 children were classified as N or A, that is, with slight or absent clinical signs or symptoms. Regarding immunological classification, at the worst time (CDC classification), 63.6% of the patients had moderate or severe immunosuppression; at the time of this study's evaluation, 72.7% of the children presented no immunosuppression.

Of the 11 patients, 9 (81.8%) were hospitalized at some time during follow-up at CHC-UFPR: 3 patients due to thrombocytopenic purpura secondary to HIV (2 of them with more than one hospitalization); 5 patients with bronchopneumonia (one of the cases had recurrent episodes); and 1 patient due to pneumocystosis. Conditions such as gingivostomatitis, malnutrition, urinary tract infection, diarrhea, lymphadenopathy and moniliasis were associated with clinical

Table 2 – Distribution of children infected with human immunodeficiency virus via possible or proven late vertical transmission by breastfeeding, according to the Clinical-Immunological classification of Center for Disease Control and Prevention and current evaluation.

Variable	Degree	CDC Classification		Current Evaluation	
		n	%	n	%
Clinical signs and/or symptoms	Absent / low	6	54.55	10	90.91
	Moderate / high	5	45.45	1	9.09
Immunological changes	Absent	4	36.36	8	72.73
	Moderate / high	7	63.64	3	27.27

CDC: Centers for Disease Control and Prevention

conditions that led to hospitalizations; and, in five cases, there was more than one reason for hospitalization.

The viral load in the evaluation during the study period was undetectable for 5 patients (45.45%); for the other 6, it ranged from 81 to 27,676 copies/mL. The mean value of T-CD4 lymphocytes for the 11 patients was 1,761.18±1,456.53 cells/mm³. At the time of this study, 9 (81.8%) patients were undergoing antiretroviral therapy, and 2 (18.2%) did not use the medication.

DISCUSSION

In this study, the prevalence of vertical HIV transmission was confirmed as the main cause of childhood infection. In agreement with the Epidemiological Bulletin of the Brazilian Ministry of Health of 2016, this form of transmission was responsible for more than 90.0% of all cases analyzed in our sample, regardless of the time of infection[8]. Within the vertical transmission category, literature estimates that the infection can occur in utero in 35.0% of cases; peripartum in 65.0% of them; or postpartum via breastfeeding, in 7 to 22% of the cases[4]. With the focus on this last form of transmission, our study detected the existence of cases in which breastfeeding was the probable or confirmed cause for the infection in the puerperal period, totaling 9.5% of the patients with HIV seen in CHC-UFPR.

Determining the exact timing of the transmission and calculating the rate of transmission in each case is challenging. It may be impossible to determine the exact timing of the virus transmission, considering the closeness of the events between the end of gestation, delivery and start of breastfeeding[9]. This fact and the sometimes undesirable quality of medical records were a limitation of our study, since 90.5% of the cases of vertical transmission were classified as vertical transmission at an unknown moment. However, the establishment of a protocol in the methodology of the study to identify cases of transmission via breastfeeding made it possible to identify two confirmed cases and nine possible cases of late vertical transmission via breastfeeding. Included in this protocol are quality prenatal care, presentation of the results of the two anti-HIV serologies recommended by the Ministry of Health, as well as the rapid test for HIV at the time of delivery[10].

Reducing HIV transmission is one of the most important public health dilemmas in the world, involving researchers, health professionals, and policy makers. Especially in developing countries, transmission via breast milk is an important source of virus infection. The average risk of mother-to-fetal transmission has increased in newly-infected lactating women and is estimated to be around 29.0%, illustrating the importance of preventing primary infection during breastfeeding[11]. However, its mechanism is still not fully elucidated, which makes it difficult to implement effective measures to eradicate this form of transmission[12]. Up to the present time, it is known that maternal and child-related factors are involved. Maternal factors include seroconversion during lactation, immunological clinical progression of the disease, viral load in plasma and in breast milk, breast milk immune factors, breast health (e.g., mastitis, abscess or breast fissure), maternal nutritional status and duration of breastfeeding. Child-related factors related to this type of infection include those associated with the immune system and the breastfeeding pattern (mixed or exclusive)[6].

Most studies have considered maternal HIV viral load as the most significant predictor of vertical transmission[13,14]. In a meta-analysis that evaluated the incidence of HIV in pregnant and postpartum women with studies conducted between 1980 and 2013, it was found that in acute infection, where viral load is high, there is a 2.8-fold higher risk of vertical transmission compared to chronically infected mothers[15]. That is, seroconversion in the breastfeeding period is associated with a high risk of postnatal transmission[16]. It has been reported that mothers who undergo seroconversion in the puerperal period are more likely to be single, with multiple partners, with adulterous partners and/or infected with other concomitant sexually transmitted agents[17]. In our study, this trend was confirmed, since 72.7% of the mothers of the infants infected in the breastfeeding period were in the sexual exposure category, which included sexual promiscuity behaviors associated or not with the presence of an HIV-positive partner. In addition, 45.4% of the mothers obtained the diagnosis of infection only at the time of their children's diagnosis, with negative prior tests, which indicates the maternal unawareness of the disease and the probable acute infection in the puerperal period, allowing breastfeeding and consequent infection.

In the newborn, it is believed that the gateway for the virus are the nasopharyngeal and gastrointestinal mucosae. During breastfeeding, virus transmission can occur at any stage, but it appears to be more frequent in the first few weeks and especially in more recent maternal infections[18]. It has been shown that the viral load in the colostrum is higher than in mature milk[19]. However, the number of feedings increases with the child's growth, increasing the risk of transmission by accumulated exposure to the virus[20]. In addition to biological factors, there are socioeconomic and cultural factors related to a higher risk of vertical transmission via breast milk, such as mixed and cross-fed breastfeeding. There are reports, for example, of children with no previous history of exposure to the virus but who were infected with milk from milk banks and from women other than their mothers[21].

In the present study, the characteristics of the current and past morbid history of the children were discussed, including the moment of diagnosis, their evolution and follow-up in the Pediatric Infectology Service. It was observed that 90.9% of the children with possible or confirmed HIV infection through late vertical transmission due to breastfeeding did not present complications in the neonatal period and 81.9% were born full term, which allows to infer that these patients were born, in the majority, in overall good condition. However, at the time of diagnosis, 72.7% of them had symptoms and 81.8% were hospitalized for some important clinical condition — either at some time prior to diagnosis or during the follow-up period at CHC-UFPR. Recurrent bronchopneumonia, thrombocytopenic purpura secondary to HIV, pneumocystosis, gingivostomatitis, malnutrition, urinary tract infection, diarrhea, lymphadenopathy and moniliasis revealed the reasons for various hospitalizations, and in 45.4% of cases there was more than one reason for hospitalization.

Regardless of the timing of HIV infection, once it has occurred, it is known that the progression of the disease is generally faster in infected children compared to adults, with rapid decline of CD4 cells and development of difficult-to-treat recurrent infections[22]. Symptoms of acute infection in children may be nonspecific, as they often coincide with other common childhood infectious conditions, such as upper airway infections, fever, and dermatitis. However, when

concomitant, symptoms such as these may increase the predictive value of HIV infection[23].

In the present study, 45.4% of the children investigated for suspected infection by late vertical transmission presented moderate to severe symptoms at the time of diagnosis, and 63.6% presented moderate to severe immunological changes according to the CDC classification. After treatment with antiretroviral therapy (ART) in 81.8% of the patients in this category, 90.9% of them had mild or absent signs and symptoms, and 72.7% had immunological changes absent in evolution.

Therefore, it can be concluded that the clinical evaluation of HIV infection, even if challenging, is a very important diagnostic tool. When associated with a high degree of suspicion for early diagnosis and treatment, it may contribute to the reduction of infant morbidity and mortality.

The results of this study show the need for concrete definition of preventive measures for vertical transmission via breastfeeding, mainly in the puerperal period. There are already recommendations from the WHO, the United Nations Children's Fund (UNICEF) and the Brazilian Ministry of Health on effective prophylactic measures implemented in Brazil to reduce vertical transmission during pregnancy and peripartum, which include use of ART during gestation and the recommendation of non-breastfeeding in the case of women known to be infected, for example[11,18]. However, as demonstrated in this study, in maternal postpartum infections, these measures are not applied, mainly due to the lack of screening and diagnosis during breastfeeding.

In view of the fact that heterosexual transmission is the main mode of transmission of HIV in underdeveloped regions, and is becoming a major route of infection in developed countries, it is believed that the best measure against infection via breastfeeding would be prevention of HIV infection in young women of childbearing age[24]. To this end, prevention strategies should be linked to primary public health and prevention programs, promoting education on safe sex, condom use, diagnosis and treatment of sexually transmitted infections, taking advantage of the timing of prenatal care for the implementation of such measures. HIV prevention deserves special emphasis among mothers with seronegative testing during pregnancy because of the particularly high risk of mother-to-child transmission of HIV at the time of infection in the puerperium[13]. Prenatal testing and the guarantee of continued contact of the health system with the mothers for up to 24 months postpartum are very important procedures in this process[25]. Also, within this context of sexual transmission, it is important to increase the bond with the children's fathers in the pre-and postnatal periods, highlighting the risks of sexually transmitted infections acquired by them for maternal-fetal health. An example of this was the implementation of the National Policy for Comprehensive Health Care for Man, through the 2008 Male Pre-Natal Program[26].

Prenatal care is also an opportune time for the implementation of safe and healthy breastfeeding practices. In the context of HIV, it is important to educate mothers about the greatest risks of transmitting the virus to children when implementing cross-breastfeeding, even if it is by someone from the same family.

New possibilities for prevention of HIV transmission via breast milk have been emerging, such as the use of ART in mothers during breastfeeding and the use of pre- and post-exposure prophylaxis for

the children. New research on the real potential of these measures is still necessary, so that they can be implemented in the future as public policies[11].

CONCLUSION

It can be concluded that the main form of childhood HIV infection was vertical transmission, with a significant prevalence of cases in which infant infection occurred through breastfeeding after maternal infection in the puerperal period. Due to the significant clinical presentation showed by these children, as well as due to maternal unawareness about their infection status, the need to implement more effective preventive measures is evident.

Conflict of interests

The authors declare no conflict of interests.

REFERENCES

1. UNAIDS. Global Report: UNAIDS report on the global AIDS epidemic 2013. UNAIDS; 2013. 198p.
2. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de DST, Aids e Hepatites Virais. Boletim Epidemiológico HIV/AIDS. Ano IV, n. 1. Brasília: Editora do Ministério da Saúde; 2015.
3. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de DST, Aids e Hepatites Virais. Protocolo clínico e diretrizes terapêuticas para manejo da infecção pelo HIV em crianças e adolescentes. Brasília: Editora do Ministério da Saúde; 2014.
4. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Programa Nacional de DST e Aids. Protocolo para a prevenção de transmissão vertical de HIV e sífilis: manual de bolso. Brasília: Editora do Ministério da Saúde; 2007. 180p. (Série B. Textos Básicos de Saúde).
5. Van de Perre P, Rubbo P, Viljoen J, Nagot N, Tylleskär T, Lepage P, et al. HIV-1 reservoirs in breast milk and challenges to elimination of breast-feeding transmission of HIV-1. Sci Transl Med. 2012;4(143):143sr3.
6. Richardson BA, John-Stewart GC, Hughes JP, Nduati R, Mbori-Ngacha D, Overbaugh J, et al. Breast-milk infectivity in human immunodeficiency virus type 1-infected mothers. J Infect Dis. 2003;187(5):736-40.
7. AIDS Education and Training Center Program. National Coordinating Resource Center. HIV Classification: CDC and WHO Staging Systems. AETC NCRC [Internet]. 2014 [cited on 2016 Oct. 13]. Available from: https://aidsetc.org/guide/hiv-classification-cdc-and-who-staging-systems
8. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de DST, Aids e Hepatites Virais. Boletim Epidemiológico Aids e DST, ano V, n.1. Brasília: Editora do Ministério da Saúde; 2016. 14p.
9. Lehman DA, Farquhar C. Biological mechanisms of vertic.al human immunodeficiency virus (HIV-1) transmission. Rev Med Virol. 2007;17(6):381-403.
10. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Ações Programáticas Estratégicas. Gestação de alto risco: manual técnico. Brasília: Editora do Ministério da Saúde; 2012. 302p. (Série A. Normas e Manuais Técnicos).
11. World Health Organization. WHO Library Cataloguing-in-Publication Data. HIV Transmission through breastfeeding: a review of available evidence: 2007 update [Internet]. 2008 [cited on 2016 Oct. 13]. Available from: http://www.who.int/iris/handle/10665/43879
12. Koulinska IN, Villamor E, Chaplin B, Msamanga G, Fawzi W, Renjifo B, et al. Transmission of cell-free and cell-associated HIV-1 through breast-feeding. J Acquir Immune Defic Syndr. 2006;41:93-9.
13. Garcia PM, Kalish LA, Pitt J, Minkoff H, Quinn TC, Burchett SK, et al. Maternal levels of plasma human immunodeficiency virus type 1 RNA and the risk of perinatal transmission. Women and Infants Transmission Study Group. N Engl J Med. 1999;341:394-402.
14. Nduati R, Richardson BA, John G, Mbori-Ngacha D, Mwatha A, Ndinya-Achola J, et al. Effect of breastfeeding on mortality among HIV-1 infected women: a randomised trial. Lancet. 2001;357(9269):1651-5.
15. Drake AL, Wagner A, Richardson B, John-Stewart G. Incident HIV during Pregnancy and Postpartum and Risk of Mother-to-Child HIV Transmission: a Systematic Review and Meta-Analysis. PLoS Med [Internet]. 2014 [cited 2016 Oct. 13];11(2):e10011608. Available from: https://www.ncbi.nlm.nih.gov/pubmed/24586123
16. Humphrey JH, Marinda E, Mutasa K, Moulton LH, Iliff PJ, Ntozini R, et al. Mother to child transmission of HIV among Zimbabwean women who seroconverted postnatally: prospective cohort study. BMJ. 2010;341:2-15.
17. Duri K, Gumbo FZ, Kristiansen KI, Kurewa NE, Mapingure MP, Rusakaniko S, et al. Antenatal HIV-1 RNA load and timing of mother to child transmission; a nested case-control study in a resource poor setting. Virology J. 2010;7:176.
18. Lamounier JA, Moulin ZS, Xavier CC. Recomendações quanto à amamentação na vigência de infecção materna. J Pediatr (Rio J). 2004;80(5 Suppl):S181-8.
19. Rousseau CM, Nduati RW, Richardson BA, Steele MS, John-Stewart GC, Mbori-Ngacha DA, et al. Longitudinal analysis of human immunodeficiency virus type 1 RNA in breast milk and of its relationship to infant infection and maternal disease. J Infect Dis. 2003;187(5):741-7.
20. Breastfeeding and HIV International Transmission Study Group, Coutsoudis A, Dabis F, Fawzi W, Gaillard P, Haverkamp G, et al. Late postnatal transmission of HIV-1 in breast-fed children: an individual patient data meta-analysis. J Infect Dis. 2004;189(12):2154-66.
21. Nduati RW, John GC, Kreiss J. Postnatal transmission of HIV-1 through pooled breast milk. Lancet. 1994;344(8934):1432.
22. Muenchhoff M, Prendergast AJ, Goulder PJ. Immunity to HIV in early life. Front. Immunol. 2014;5:391.
23. Rouet F, Elenga N, Msellati P, Montcho C, Viho I, Sakarovitch C, et al. Primary HIV-1 infection in African children infected through breastfeeding. AIDS. 2002;16(17):2303-9.
24. De Cock KM, Mbori-Ngacha D, Marum E. Aids in Africa V: Shadow on the continent: Public health and HIV/AIDS in Africa in the 21st century. Lancet. 2002;360(9326):67-72.
25. Temmerman M, Quaghebeur A, Mwanyumba F, Mandaliya K. Mother-to-child HIV transmission in resource poor settings: how to improve coverage? AIDS. 2003;17(8):1239-42.
26. Benazzi AST, Lima ABS, Sousa AP. Pré-natal masculino: um novo olhar sobre a presença do homem. Rev Políticas Públicas [Internet]. 2011 [cited on 2016 Oct. 17];15(2):327-33. Available from: http://www.periodicoseletronicos.ufma.br/index.php/rppublica/article/view/849

Address for correspondence:
CRISTINA DE OLIVEIRA RODRIGUES
Rua dos Funcionários, 1.017, apto. 52
Curitiba (PR), Brasil
CEP: 80035-050
E-mail: criscruz@ufpr.br

AIDS after the age of 50: incidence from 2003 to 2013 in the city of São José do Rio Preto, São Paulo, and the perception on the disease of the elderly of a Basic Health Care Unit

AIDS depois dos 50 anos: incidência de 2003 a 2013 em São José do Rio Preto, SP, e a percepção dos idosos de uma Unidade Básica de Saúde sobre a doença

Natiele Zanardo Carvalho[1], Aryane Martininghe Valim[1], Uriele Silva Rezende[1], Patricia da Silva Fucuta[1], Tatiane Iembo[1]

ABSTRACT

Introduction: The advances in medicine and technology favor aging, thus prolonging sexuality. Concomitantly, AIDS cases present growth on such an unassisted population. **Objective:** To estimate the incidence of AIDS in people aged 50 years of more in the city of São José do Rio Preto, São Paulo, and to verify their knowledge about the disease in a Basic Health Care Unit (Unidade Básica de Saúde). **Methods:** A retrospective study of AIDS incidence based on cases reported in the electronic system of the São Paulo State Health Department between 2003 and 2013. The elderly perception on the disease was evaluated through questionnaires, before and after the educational intervention (leaflets). Data were compared using the McNemar Chi-square test. **Results:** From 2003 to 2013, 224 new cases of AIDS were reported in the studied population, with a predominance of males. Although there was some oscillation in the incidence, a comparison between the beginning and the end of the studied period revealed a 68% decrease in new notified cases. Questionnaires were answered by 34 men and 66 women ranging 50 to 88 years of age. Most of them (59%) reported having a steady partner and denied the use of condom (87%). After the educational activity, only 5% remained in doubt and 68% showed interest in obtaining information about STDs at the Basic Health Care Unit. **Conclusion:** An instability in the incidence of AIDS was observed within the city; however, during the studied period there was a significant reduction in cases. Most of the interviewees did not know about AIDS, and the leaflets proved to be a simple and effective tool.
Keywords: incidence; AIDS; disease prevention; elderly.

RESUMO

Introdução: Os avanços da medicina e da tecnologia favorecem o envelhecimento, prolongando a sexualidade. Concomitantemente, crescem os casos de AIDS nesta população desassistida sobre o assunto. **Objetivo:** Calcular a incidência de AIDS em pessoas com 50 anos ou mais em São José do Rio Preto - SP e verificar o conhecimento dessas pessoas sobre a doença em uma Unidade Básica de Saúde. **Métodos:** Estudo retrospectivo da incidência de AIDS a partir dos casos notificados no sistema eletrônico da Secretaria de Saúde do Estado de São Paulo entre 2003 e 2013. A percepção dos idosos sobre a doença foi avaliada mediante a aplicação de questionários, antes e após intervenção educativa (panfleto). Os dados foram comparados utilizando-se o teste Qui-quadrado de McNemar. **Resultados:** De 2003 a 2013, foram notificados 224 casos novos de AIDS na população estudada, com predomínio do sexo masculino. Embora tenha ocorrido certa oscilação na incidência, ao se comparar o início e o final do período estudado observou-se decréscimo de 68% na notificação destes novos casos. Responderam aos questionários 34 homens e 66 mulheres entre 50 e 88 anos. A maioria (59%) referiu ter parceiro fixo e negou a utilização de preservativos (87%). Após a atividade educativa, apenas 5% continuaram com dúvidas e 68% demonstraram interesse em obter informações sobre DTS na UBS. **Conclusão:** Nota-se instabilidade na incidência de AIDS no município; contudo, no período estudado ocorreu diminuição significativa dos casos. A maioria dos entrevistados não possuía conhecimentos sobre a AIDS, mas os panfletos se mostraram uma ferramenta simples e eficaz.
Palavras-chave: incidência; AIDS; prevenção; idosos.

INTRODUCTION

The Acquired Immunodeficiency Syndrome (AIDS) was first observed in 1981, in the USA, from the identification of cases of imunologica1 dysfunction-related disorders[1]. It is a chronic infectious disease caused by the Human Immunodeficiency Virus (HIV) and is characterized by immunity suppression mediated by CD4+ T lymphocytes, making the individual vulnerable to opportunistic diseases[2].

Since the first AIDS evidence, in 1980, until June 2016, Brazil amounted to 842,710 cases of the disease, 548,850 (65.1%) in men and 293,685 (34.9%) in women[3]. It can be stated that the beginning of the epidemic was marked by the involvement of male homosexuals, but nowadays the syndrome reaches the general population without social, economic, racial, political or cultural distinctions[3,4].

One of the current aspects of the disease epidemiology is the emergence of a new vulnerable population, the elderly, who were minimally affected at the beginning of the epidemic, with only four cases registered in people aged 50 years or more in the first five years[5].

The growing progress of the cases of the disease in this population can be associated with the increasing notification of HIV infection involving people aged more than 50 years and the aging of people living with the virus[6]. With the use of antiretroviral drugs in 1987, life expectancy of HIV-infected individuals was expanded

[1]Medical School of Faculdade Ceres (FACERES) – São José do Rio Preto (SP), Brazil.

and they are growing old with the disease, becoming senior citizens with AIDS[7,8].

OBJECTIVE

To evaluate the incidence of AIDS in people aged more than 50 years notified in the city of São José do Rio Preto, SP, in the period of 2003 to 2013, in order to reveal the current epidemiological situation of the disease in the city. It was also possible to verify the knowledge of the Basic Health Care Unit users on the various aspects of this disease, especially regarding prevention.

METHODS

This is a retrospective study based on the calculation of AIDS incidence in individuals aged 50 years or more, of both sexes, in the city of São José do Rio Preto, SP, from 2003 to 2013.

The population of São José do Rio Preto in 2003 was estimated in 382,273 inhabitants, and 434,039 in 2013. The percentage of men and women remained constant in the two years analyzed: 48% men and 52% women. As for the age group over 50 years, about 75,355 people were estimated in 2003, and 108,370 in 2013. Men and women percentages changed in these two years: 56% of men in 2003, and 44% in 2013.

The World Health Organization (WHO) defines the elderly in Brazil as individuals aged more than 50 years; however, people aged more than 50 participated in this study as it involves the age group considered old for contamination by HIV, besides the significance of the national epidemiological data in this population[9].

Information from the database of notified AIDS stored in the System of the Ministry of Health of the State of São Paulo, and used by the City Hall, were analyzed to calculate the AIDS incidence. The period in question was chosen based on the availability of data recorded in this Secretariat of Health. For the construction of indicators, people aged 50 years or more were registered in the Informatics Department of the Unified Health System (DATASUS), according to the Brazilian Institute of Geography and Statistics (IBGE) for each year studied. The variables sex and age were considered. All results were properly grouped in graphs and charts, followed by the descriptive analysis of each indicator.

After authorization of the Municipal Secretariat of Health, the project was approved by the Research Ethics Committee - protocol number 975,823.

In order to evaluate the knowledge and perception of people aged 50 years or more on AIDS, questionnaires were distributed in the waiting room of the Basic Health Care Unit in the *Parque Industrial de São José do Rio Preto*, SP, in October, 2015.

Individuals with enough intellectual capacity to understand the issues and answer them properly participated in this stage of the study, totaling a sample of 100 people. The exclusion criteria adopted were persons aged less than 50 years and/or with severe hearing problems and cognitive deficit that might prevent the comprehension of the questionnaire, as well as those who refused to answer.

The questionnaire had a simple language adapted to the reality of the users, composed of objective questions addressing the means of transmission, signs and symptoms, treatment/possibility of cure and prevention of AIDS. Literate individuals responded without help, whereas for the illiterate or for the ones with difficulties, the interviewer did the reading, marking the answer indicated by the interviewee.

Based on this initial questionnaire, the data obtained were as follows: demographic (age, sex, marital status, educational level and occupation). To ensure the confidentiality and privacy, participants were identified by numbers.

Then, an educational activity was conducted with the distribution of an information leaflet including illustrative figures with simple language regarding the means of AIDS transmission, signs and symptoms, treatment and prevention. Some time was destined to clarify doubts related to the subject.

Finally, another questionnaire was applied to evaluate if the information provided was effective to improve the knowledge about the disease and to determine the effectiveness of the educational intervention.

The results obtained from the collected information were listed in a descriptive form with the percentages and simple frequencies. The McNemar's chi-square test with a 5% significance level was used to compare before and after intervention results. The analysis was done by IBM SPSS Statistics, version 18, (IBM-SPSS, NY, USA).

RESULTS

During the studied period, from 2003 to 2013, 1,414 new cases of AIDS were notified in the city of São José do Rio Preto, SP. From these cases, 224 occurred in the age group of this study, 50 years of age or more.

In 2003, the incidence corresponded to 35.83/100,000 inhabitants. Interestingly, there was a progressive reduction from this year until 2006, when the rate reached 17.1%. A decline of about 50% was verified in this period.

After four years of incidence reduction (from 2003 to 2006), a discreet rise in 2007 was noted, reaching 21.95% in 2008, with an increase of 4.86/100,000 inhabitants in two years.

A new decline happened in 2009, from 21.95 to 16.25%, i.e., a reduction of 5.7/100,000 inhabitants in just one year, corresponding to a decrease of one quarter from 2008 to 2009. Given this, there is an instability in the incidence, whose values varied considerably from one year to the next.

The number of 25.54/100,000 inhabitants in 2011 was revealed, the highest number registered during the period from 2005 to 2013. After this surge, a decline was observed until 2013, reaching the lowest incidence rate in the studied period, 12/100,000 inhabitants.

However, there was a significant reduction of the cases from 2003 to 2013, similar to a fall of 68% in the 10 years of the study (**Figure 1**).

As far as gender distribution is concerned, an oscillation in both sexes was observed, with a predominance in males, with the peak of incidence in 2009 (70%) (**Table 1**).

To evaluate the knowledge about AIDS through the questionnaires, this study counted on the participation of 100 individuals attending the *Parque Industrial BHCU de São José do Rio Preto*, SP: 34 men and 66 women in the age group from 50 to 88 years, with an average age of 63 years.

Regarding education, most of them declared to not have completed high school (73%). Among them, 29% attended high school and 33% attended elementary school. Only 8% have complete higher education, whereas 4% have no type of study. As for the earnings, 68% were unemployed, and 32% were retired.

As for marital status, 57% are married, 19% are divorced, 13% are widowed and 11% are single. Regarding sexual intercourse, most of them (59%) claimed to have a steady partner, and the remaining 41% reported casual or total absence of intercourse.
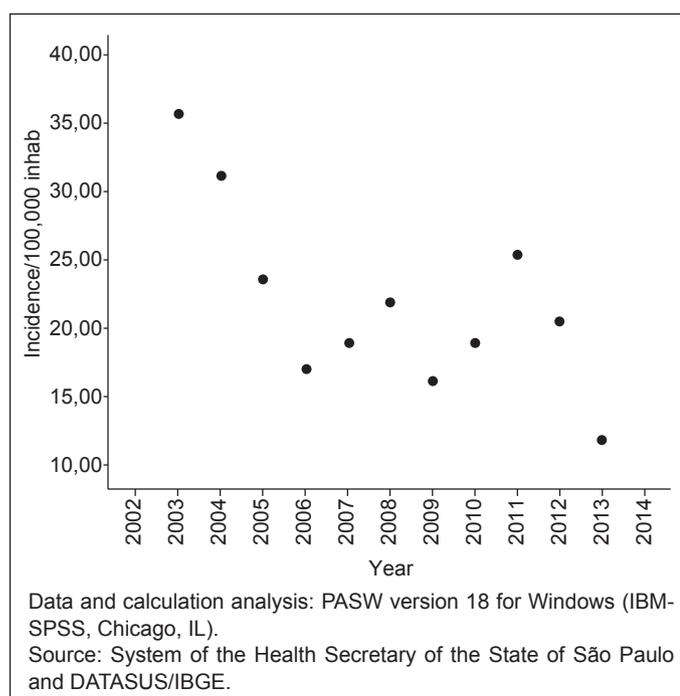

Data and calculation analysis: PASW version 18 for Windows (IBM-SPSS, Chicago, IL).
Source: System of the Health Secretary of the State of São Paulo and DATASUS/IBGE.

Figure 1 – Cases of AIDS in the population aged 50 years or more in São José do Rio Preto-SP according to the yearly diagnosis incidence (2003 to 2013).

Table 1 – Cases of AIDS in the population aged 50 years or more in São José do Rio Preto-SP, according to gender and year of diagnosis, 2003 to 2013.

Year	Male (%)	Female (%)
2003	16/59	11/41
2004	12/50	12/50
2005	11/58	08/42
2006	07/50	07/50
2007	11/58	06/42
2008	12/68	06/32
2009	12/70	05/30
2010	08/50	07/50
2011	17/63	08/37
2012	11/54	09/46
2013	07/61	07/39

Data and calculation analysis: PASW version 18 for Windows (IBM-SPSS, Chicago, IL).
Source: System of the Health Secretary of the State of São Paulo and DATASUS/IBGE.

In the approach on the use of contraceptive methods, only 6% refused to answer. Of the 94 answers, 87% of individuals informed the non-use of condoms, 35% of them justified having a steady partner, 26% declared faith in their partner, and 25% were abstinent.

Of the 55.2% participants who had initially answered to ignore symptoms of AIDS, 84% happened to know them after the distribution of the leaflet. Most of them (98%) learned about the transmission, and 75% about how the disease is transmitted. Only 5% claimed to have doubts even after reading the brochure (**Table 2**).

Assuming that 87% of the interviewees did not feel uncomfortable talking about sex and STDs, they were asked about their interest in receiving information at the BHCU, and 68% have shown such an interest.

Although 45% of participants had already carried out the rapid testing for HIV, 80% claimed to know where to look for help in case AIDS symptoms emerge, and the BHCU was the most indicated place for the diagnosis and treatment of the disease.

DISCUSSION

As this study demonstrates, the incidence of AIDS in the population aged 50 years or more in the city of São José do Rio Preto, SP, was reduced in approximately 50% from 2003 to 2006 (from 35.83 to 17.1%) and remained stable until the last year of the study (2013), when a lower rate was registered (12/100,000 inhabitants). Therefore, it can be concluded that the city showed a linear tendency to a significant reduction.

According to data from the Brazilian Ministry of Health, the detection rate of AIDS, considering the general population, showed stabilization with an average of 20.7 cases per 100,000 inhabitants from 2006 to 2015. This stabilization is owed to the reduction in some States, such as: São Paulo (46.0%), Rio de Janeiro (22.6%), Santa Catarina (16.9%), Distrito Federal (13.1%), Minas Gerais (11.9%), Rio Grande do Sul (11.2%), and Espírito Santo (0.5%), contrary to data observed in the States of Pará and Maranhão, which showed an increase of 91.5% and 82.9%, respectively[3].

Table 2 – Participants' answers to questionnaires in two moments of the interview.

	Interview 1	Interview 2	p-value
SYMPTOMS*	Yes	No	
Yes	38 (93%)	03 (7%)	<0.0001
No	42 (84%)	08 (16%)	
INFECTION†	Yes	No	
Yes	78 (100%)	00 (00%)	<0.0040
No	09 (75%)	03 (25%)	
DOUBTS‡	Yes	No	
Yes	03 (17%)	15 (83%)	<0.0190
No	04 (05%)	71 (95%)	
TRANSMISSION§	Yes	No	
Yes	11 (100%)	00 (00%)	<0.0001
No	82 (98%)	02 (02%)	

*Do you know the symptoms of AIDS?; †Do you know how AIDS is acquired?; ‡Do you still have doubts about sexually transmitted diseases (STD/AIDS)?; §Do unprotected sex and sharing needles transmit AIDS?; Data and calculation analysis: McNemar Chi-square test (5% significance level. IBM SPSS Statistics version 18 software (IBM-SPSS, NY, USA).

Nevertheless, the detection rate of AIDS in people aged 50 years or more, mostly men over the age of 60, has increased in recent years, from 10.9, in 2006, to 13.8, in 2015, in the Brazilian scenario[3]. It is worth mentioning that the present study showed a contrary tendency in this age group, with a decrease of 35.83, in 2003, to 12 in 2013.

Perhaps this phenomenon had occurred due to the reduction of the incidence of AIDS in the elderly population in the city of São José do Rio Preto, SP. On the other hand, as also reported by Ribeiro and Jesus (2006), this can be related to local underreporting. Despite improvements of the disease detection means, access to laboratory tests and health information systems, the reported number of elderly people with AIDS or HIV-positive could be lower than reality[10].

Unfortunately, the lack of interest and training of health professionals regarding senior sexuality is a fact that undermines this approach, contributing to the late diagnosis or even death due to disinformation of the disease and failure in notification[10,11]. This was a well evidenced issue in this study, in which 87% of the interviewees had never received information on STIs at the BHCU, neither felt uncomfortable talking about the subject, and 68% of them showed interest in talking about and receiving information about AIDS in basic health care.

Some studies of the same sort had adverse results in other cities, revealing the high rate and the growing tendency of AIDS among individuals aged 50 years or more, such as in Fortaleza, Ceará[12], and Pelotas, Rio Grande do Sul[13]. Another study conducted in the State of Rio Grande do Sul observed that the most affected group is the one ranging in age from 50 to 59[14]. On the other hand, in the State of Pernambuco, the highest rate was found in the group ranging from 60 to 69 years of age[15], as well as in Distrito Federal[16] and in Ceará[17].

The present study showed a prevalence of men in relation to the women in the number of AIDS cases reported from 2003 to 2013, which is in accordance with the national values of the Ministry of Health, which showed a ratio of 17 cases of the disease in men to 10 cases in women of this age group. Studies carried out in the States of Pernambuco[15] and Ceará[17] also revealed such a relationship; however, there was a feminization of the AIDS epidemic in Distrito Federal, with the ratio of 0.7:1.0 M:F[16].

This expansion of AIDS in the male elderly population may be directly related to the new technologies that improve sexual performance, such as the drugs for erectile disorders, and also to the fact that men seek services of sex professionals more frequently[12,18].

The demystification of sex in old age has been related to several factors that have been improving the quality of life of the population, with greater integration in social life, through the participation in coexistence groups, dancing balls and clubs[11,12,18]. Therefore, a favorable environment for meeting partners was created, which is associated with greater sexual practice, increasing the risk of contamination by HIV[19].

It is worth mentioning that sexuality is not what makes the individual more vulnerable to contracting the virus, but unprotected sex[19]. The low adherence to the use of condoms among elderly men and the low requirement of its use on the part of women are reflections of the non-recognition of older persons as individuals who are vulnerable to STD/AIDS[18,20].

These factors are associated with entrenched beliefs of an asexual elderly population, either by the individuals themselves or by health professionals. The possibility of people aged more than 50 years being infected with HIV seems non-existent to society[18]. Therefore, they tend to postpone the anti-HIV test as they consider themselves as a group with less risk of infection[3].

In a study conducted in the city of Rio de Janeiro, RJ, Fernandes (2011) emphasizes this subject when 31.67% of the participants answered that only young people should receive information on AIDS transmission, and 30% said that the elderly have no risk of acquiring the disease. In addition, 63.33% of the interviewees believe that people aged 60 years or more are even less vulnerable[21].

On account of this restricted and preconceived view, the elderly population remains unassisted by health professionals, who tend to impute some suggestive symptoms of opportunistic infections that occur in AIDS to chronic degenerative diseases that prevail in this age group, which can delay the diagnosis of AIDS in about ten years[18,20,22].

The low education level revealed in this study is an important indicator of the increasing rates of elderly people infected in Brazil. People with lower schooling tend to have more difficulty in assimilating information, making AIDS prevention and treatment adherence insufficient[15,17,23].

It is believed that schooling is also related to the low socioeconomic level, making the individuals with lower schooling more vulnerable to an HIV infection[23]. This fact is associated with the precarious access to information, directly related to the low adherence to the use of preventive methods[15], as well as the one found in this study, in which 87% of the interviewees did not use any type of protection.

Justifications for disregarding protection methods included the following: they had "steady partners" and "trusted them". Once again, it is possible to see the lack of information on different aspects of the disease, mainly regarding the chain of HIV transmission, neglecting prevention.

This study also showed that the population analyzed, besides low schooling, had little information and knowledge about HIV transmission, sexual practices, vulnerability behaviors and AIDS symptoms. Most individuals interviewed (88.4%) did not know about the viral transmission and symptoms of the disease (55.2%). Other studies including elderly people described that this traditionally marginalized population is increasingly being infected with HIV[17,24].

The results observed in the questionnaires reflect the failure of prevention efforts addressed to this group. It should also be noted that the elderly are a population group that remains unassisted by the policies and strategies of health prevention and promotion[18,25]. Sexuality is part of life for any person at any age; however, when related to the elderly, it is surrounded by myths and beliefs[19].

Fernandes (2011) revealed in this paper the same unawareness of the elderly population in Rio de Janeiro regarding AIDS. Most of the interviewees did not know about the possible routes of HIV transmission; 56.67% of seniors reported that AIDS can be transmitted through mosquitoes, 35% through glasses, cutlery, clothes and towels, and 33.33% through sweat[21].

The leaflets proved to be a simple and inexpensive tool, also effective to the knowledge regarding the various aspects of AIDS. Of the 100 individuals interviewed, only 5% still had doubts after reading the brochure. Most of them (98%) learned about the ways HIV could be transmitted and the symptoms of the disease (84%).

Melo *et al*. (2012) conducted a comparative study about the level of knowledge about AIDS among the elderly and young people. The result was the expected: older people have a level of knowledge and information inferior to young people. This factor is associated with the increasing investment in prevention policies addressed to the young population to the detriment of the elderly, in addition to the historic taboo of sexuality denial in old age[24].

In this scenario, it is worth mentioning the education and prevention delay aiming at this group. Although there are public health policies addressed to the elderly, they are not effective and are not practiced in the Health Care Basic Units[18,25]. This is a neglected population group and deprived of prevention.

Few studies investigate the elders' level of knowledge in relation to AIDS, as well as the factors that influence the probable unawareness of this population segment about the disease[24]. Thus, the present work has the potential to warn health professionals about the need for implementing actions and public policies aimed at HIV prevention and transmission control in the elderly population.

CONCLUSION

An instability in the incidence of AIDS in São José do Rio Preto, SP, was noted; however, it can be concluded that the city shows a linear trend of significant reduction of new cases of the disease in the studied period.

The unawareness of the population studied in relation to the main aspects of AIDS was also observed. However, the educational intervention based on the leaflets proved to be a simple, low cost and effective tool to obtain the knowledge about the disease.

Conflict of interests

There is no conflict of interests to declare.

Acknowledgments

REFERENCES

1. Teodorescu LL, Teixeira PR. Histórias da AIDS no Brasil: 1983 a 2003 – as respostas governamentais à epidemia de aids, v. 1. Brasília: Ministério da Saúde/Secretaria de Vigilância em Saúde/Departamento de DST, AIDS e Hepatites Virais, 2015. Available from: <http://unesdoc.unesco.org/images/0023/002355/235557POR.pdf>. Access on: Feb 19, 2017.
2. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de DST, AIDS e Hepatites Virais. Manual técnico para o diagnóstico da infecção pelo HIV [Internet]. Brasília: 2013. Available from: <http://bvsms.saude.gov.br/bvs/publicacoes/manual_tecnico_diagnostico_infeccao_hiv.pdf>. Access on: Mar 04, 2017.
3. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Boletim Epidemiológico: DST/AIDS [Internet]. 2016;5(1). Available from: <http://www.aids.gov.br/pt-br/pub/2016/boletim-epidemiologico-de-aids-2016>. Access on: Feb 12, 2017.
4. Pinto ACS, Pinheiro PNC, Vieira NFC, Alves MDS. Compreensão da pandemia da AIDS nos últimos 25 anos. J Bras Doenças Sex Transm [Internet]. 2007;19(1):45-50. Available from: <http://www.dst.uff.br/revista19-1-2007/7.pdf>. Access on: Feb 09, 2017.
5. Godoy VS, Ferreira MD, Silva EC, Gir E, Canini SRMS. O perfil epidemiológico da Aids em idosos utilizando sistemas de informação em saúde do Datasus: realidades e desafios. J Bras Doenças Sex Transm [Internet]. 2008;20(1):7-11. Available from: <http://www.dst.uff.br/revista20-1-2008/1.pdf>. Access on: Feb 09, 2017.
6. Valente GSC, Pedruzzi BM, Pereira ER, Andrade RMCR. Atividades causadoras de HIV em idosos: revisão integrativa. Rev Enferm UFPE [Internet]. 2013 Aug;7(8):5323-9. Available from: <https://periodicos.ufpe.br/revistas/revistaenfermagem/article/view/11809>. Access on: Jan 05, 2017.
7. Toledo LSG, Maciel ELN, Rodrigues LCM, Tristão-Sá R, Fregona G. Características e tendências da AIDS entre idosos no Estado do Espírito Santo. Rev Soc Bras Med Trop [Internet]. 2010 May-Jun;43(3):264-7. Available from: <http://www.scielo.br/pdf/rsbmt/v43n3/10.pdf>. Access on: Mar 05, 2017.
8. Lazzarotto AR, Deresz LF, Sprinz E. HIV/AIDS e treinamento concorrente: a revisão sistemática. Rev Bras Med Esporte [Internet]. 2010 Mar-Apr;16(2):149-54. Available from: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1517-86922010000200015>. Access on: Mar 05, 2017.
9. Organização Mundial de Saúde. UNAIDS. Relatório sobre a epidemia mundial da SIDA. 2006. Available from: <https://unaids.org.br/relatorios-e-publicacoes/>. Access on: Jan 04, 2017.
10. Ribeiro LCC, Jesus MVN. Avaliando a incidência dos casos notificados de AIDS em idosos no estado de Minas Gerais no período de 1999 a 2004. Cogitare Enferm [Internet]. 2006 May-Aug;11(2):113-6. Available from: <http://revistas.ufpr.br/cogitare/article/view/6852/4866>. Access on: Feb 19, 2017.
11. Laurentino NRS, Barboza D, Chaves G, Besutti J, Bervian SA, Portella MR. Namoro na terceira idade e o processo de ser saudável na velhice: recorte ilustrativo de um grupo de mulheres. Rev Bras Ciênc Envelhecim Humano [Internet]. 2006 Jan-Jun;3(1). Available from: <http://seer.upf.br/index.php/rbceh/article/view/57>. Access on: Mar 05, 2017.
12. Feitoza AR, Souza AR, Araújo MFM. A magnitude da infecção pelo HIV-AIDS em maiores de 50 anos no município de Fortaleza-CE. J Bras Doenças Sex Transm [Internet]. 2004;16(4):32-7. Available from: <http://www.dst.uff.br/revista16-4-2004/6.pdf>. Access on: Feb 10, 2017.
13. Affeldt AB, Silveira MF, Barcelos RS. Perfil de pessoas idosas vivendo com HIV/AIDS em Pelotas, sul do Brasil, 1998 a 2013. Epidemiol Serv Saúde [Internet]. 2015 Jan-Mar;24(1):79-86. Available from: <http://www.scielo.br/pdf/ress/v24n1/2237-9622-ress-24-01-00079.pdf>. Access on: Feb 09, 2017.
14. Vogt S, Luzzi M, Gobetti E, Doring M, Schneider MLM, Dal Bello MS. AIDS na população acima de cinquenta anos no Rio Grande do Sul. Rev Bras Ciênc Envelhecim Humano [Internet]. 2010;7(1):36-46. Available from: <http://seer.upf.br/index.php/rbceh/article/view/999>. Access on: Feb 09, 2017.
15. Pottes FA, Brito AM, Gouveia GC, Araújo EC, Carneiro RM. AIDS e envelhecimento: características dos casos com idade igual ou maior que 50 anos em Pernambuco, de 1990 a 2000. Rev Bras Epidemiol [Internet]. 2007;10(3):338-51. Available from: <http://www.scielo.br/pdf/rbepid/v10n3/04.pdf>. Access on: Feb 12, 2017.
16. Oliveira MLC, Paz LC, Melo GF. Dez anos de epidemia do HIV-AIDS em maiores de 60 anos no Distrito Federal-Brasil. Rev Bras Epidemiol [Internet]. 2013;16(1):30-9. Available from: <http://www.scielo.br/pdf/rbepid/v16n1/1415-790X-rbepid-16-01-0030.pdf>. Access on: Feb 12, 2017.
17. Araújo VLB, Brito DMS, Gimeniz MT, Queiroz TA, Tavares CM. Características da AIDS na terceira idade em um hospital de referência do Ceará, Brasil. Rev Bras Epidemiol [Internet]. 2007;10(4):544-54. Available from: <http://www.scielo.br/pdf/rbepid/v10n4/12.pdf>. Access on: Feb 12, 2017.
18. Santos AFM, Assis M. Vulnerabilidade das idosas ao HIV/AIDS: despertar das políticas públicas e profissionais de saúde no contexto da atenção integral: revisão de literatura. Rev Bras Geriatr Gerontol [Internet]. 2011;14(1):147-57. Available from: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1809-98232011000100015>. Access on: Feb 09, 2017.

19. Andrade HAS, Silva SK, Santos MIPO. Aids em idosos: vivências dos doentes. Esc Anna Nery [Internet]. 2010 Oct-Dec;14(4):712-9. Available from: <http://www.scielo.br/pdf/ean/v14n4/v14n4a09.pdf>. Access on: Feb 12, 2017.

20. Alencar RA, Ciosak SI. O diagnóstico tardio e as vulnerabilidades dos idosos vivendo com HIV/AIDS. Rev Esc Enferm USP [Internet]. 2014;49(2):229-35. Available from: <http://www.scielo.br/pdf/reeusp/v49n2/pt_0080-6234-reeusp-49-02-0229.pdf>. Access on: Feb 05, 2017.

21. Fernandes LLRA. Os saberes de idosos sobre a AIDS: um estudo de enfermagem [dissertation em Enfermagem]. Rio de Janeiro: Escola de Enfermagem Anna Nery, Universidade Federal do Rio de Janeiro; 2011. Available on: <http://objdig.ufrj.br/51/dissert/EEAN_M_LuanaLimaRibaAndrietoFernandes.pdf>. Access on: Feb 09, 2017.

22. Grangeiro A, Castanheira ER, Nemes MIB. A re-emergência da epidemia de AIDS no Brasil: desafios e perspectivas para o seu enfrentamento. Interface Comun Saúde Educ [Internet]. 2015;19(52):5-6. Available from: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1414-32832015000100005>. Access on: Feb 09, 2017.

23. Silva HR, Marreiros MDOC, Figueiredo TS, Figueiredo MLF. Características clínico-epidemiológicas de pacientes idosos com AIDS em hospital de referência, Teresina-PI, 1996 a 2009. Epidemiol Serv Saúde [Internet]. 2011;20(4):499-507. Available from: <http://scielo.iec.pa.gov.br/scielo.php?script=sci_arttext&pid=S1679-49742011000400009>. Access on: Feb 09, 2017.

24. Melo HMA, Leal MCC, Marques APO, Marino JG. O conhecimento sobre AIDS de homens idosos e adultos jovens: um estudo sobre a percepção desta doença. Ciênc Saúde Coletiva [Internet]. 2012;17(1):43-53. Available from: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232012000100007>. Access on: Feb 09, 2017.

25. Sousa AM, Lyra A, Araújo CCF, Pontes JL, Freire RC, Pontes TL. A política de AIDS no Brasil: uma revisão de literatura. J Manag Prim Health Care [Internet]. 2012;3(1):62-6. Available from: <http://www.jmphc.com.br/saude-publica/index.php/jmphc/article/viewFile/119/120>. Access on: Jan 05, 2017.

Address for correspondence:
TATIANE IEMBO
Avenida Anísio Haddad, 6.751 – Jardim Francisco Fernandes
São José do Rio Preto (SP), Brazil
CEP: 15080-310
E-mail: iembo.tatiane@gmail.com

Epidemiological profile of AIDS in adults in the state of Bahia from 1984 to 2013

Perfil epidemiológico da AIDS em adultos no estado da Bahia no período de 1984 a 2013

Jane Cleide de Oliveira Modesto[1], Danielle Cristina Garbuio[2]

ABSTRACT

Introduction: The Acquired Immunodeficiency Syndrome (AIDS) is an infectious disease that causes extensive damage to the population. **Objective:** To evaluate the epidemiological profile of AIDS in adults in the state of Bahia. **Methods:** An exploratory and ecological study of time series was conducted with data provided by the Departamento de Informática do Sistema Único de Saúde (DATASUS) from 1984 to 2013. **Results:** 24,213 cases of AIDS were diagnosed in adults with informed sex. Of this total, 15,261 (63%) were male, but there was a trend of epidemic growth in the female population over time, with a decrease in the sex ratio. The number of registered cases increased from 1990 to 1995 for both sexes. As for the exposure category, a change in the patient profile was revealed during the diagnostic periods. However, there was a predominance of sexual transmission, corresponding to 53.8% (13,017) of the cases diagnosed during the whole period with reported exposure category. Of the total cases, 8,918 (36.8%) corresponded to the heterosexual transmission via. **Conclusion:** The demonstration of the heterosexualization and feminization phenomena of the AIDS epidemic in Bahia shows the need for controlling measures such as educational campaigns including prevention, diagnosis and assistance to stop the epidemic. It is worth mentioning the need to improve epidemiological surveillance actions due to the large number of ignored information and the need for information qualification that allows the generation of more accurate data. However, the data obtained allow us to know the profile of the epidemic and its specificity.
Keywords: acquired immunodeficiency syndrome; health profile; epidemiology.

RESUMO

Introdução: A Síndrome da Imunodeficiência Adquirida (AIDS) é uma doença infecciosa que causa danos de grande extensão na população. **Objetivo:** O presente estudo objetivou avaliar o perfil epidemiológico da AIDS em adultos no estado da Bahia. **Métodos:** Foi realizado um estudo exploratório de delineamento ecológico de série temporal com dados disponibilizados pelo Departamento de Informática do Sistema Único de Saúde (DATASUS) entre 1984 e 2013. **Resultados:** Foram diagnosticados 24.213 casos de AIDS em adultos com sexo informado. Desse total, 15.261 (63%) eram do sexo masculino, entretanto constatou-se tendência de crescimento da epidemia na população feminina ao longo do tempo, com diminuição da razão dos sexos. O número de casos registrados aumentou a partir do período entre 1990 e 95 para ambos os sexos. No que diz respeito à categoria de exposição, foi revelado que, ao longo dos períodos diagnósticos, houve uma mudança no perfil dos doentes, porém ocorreu a predominância da transmissão sexual, correspondendo a 53,8% (13.017) dos casos diagnosticados durante todo o período com categoria de exposição informada. Do total de casos, 8.918 (36,8%) corresponderam à via de transmissão heterossexual. **Conclusão:** A demonstração dos fenômenos de heterossexualização e feminização da epidemia da AIDS na Bahia evidencia a necessidade de medidas de controle como campanhas educativas abrangendo a prevenção, o diagnóstico e a assistência para deter a epidemia. Vale ressaltar a necessidade de aprimoramento das ações de vigilância epidemiológica em virtude do grande número de informações ignoradas e da qualificação da informação que possibilite a geração de dados mais precisos. No entanto, os dados obtidos permitem conhecer o perfil da epidemia e sua especificidade.
Palavras-chave: síndrome de imunodeficiência adquirida; perfil de saúde; epidemiologia.

INTRODUCTION

The Acquired Immunodeficiency Syndrome (AIDS) is an infectious disease that causes great and large damages to population, strong impact on the economy and on family and social structures, and means a serious public health problem in the world[1]. That is the reason why this high magnitude disease has been a society's discussion subject, especially in the international scientific community, which has been exhaustively debating its characteristics and implications since its discovery, three decades ago[2]. Over the years, the epidemic's profile and dissemination underwent profound changes in the country[2-4]. The inequality of the cities' development and urbanization process has given rise to various peculiar AIDS "microregional" epidemics or "sub-epidemics" affecting the various groups, layers and segments of the society[5]. As the cases multiply, distinct groups of people are affected, keeping the epidemic constantly changing[6].

At first, the registered cases were focused on the homosexuals' group, then spread among intravenous drug users and people who had received blood and/or blood products. Nowadays, however, we observe a situation marked by processes of heterosexualization, feminization and pauperization[2].

In the early 1980s, São Paulo and Rio de Janeiro were the first Brazilian cities to have cases of AIDS identified. However, due to rapidly growing, the epidemic reached all regions of the country as time went on, although lacking homogeneity[5].

Therefore, an analysis of the epidemic in every region of the country has a highlighted relevance in view of the different existing dynamics[7]. Among the regions of the country, the Northeast, with 14.6% of the total cases, comes second only to the Southeast (53.8%) and South (20%) regions, in a proportional distribution of cases identified during the period from 1980 to June, 2015[8].

For the reasons mentioned, it is important to characterize the AIDS epidemic in the state of Bahia, since the epidemiological symptoms are not much studied. In addition, the number of cases has considerably increased over the years in the state[9].

[1]Ministry of Health – Salvador (BA), Brazil.
[2]Universidade Anhanguera – Valinhos (SP), Brazil.

OBJECTIVE

To verify the epidemiological AIDS profile in the state of Bahia from 1984 to 2013 seeing that it is relevant to predict possible changes in its epidemiology and, therefore, generate information that might contribute to the planning of actions to control the disease.

METHODS

This is an exploratory time series study of ecological design, with secondary data source obtained by querying the official information system called Sistema de Informação de Agravos de Informação (Information System of Reportable Diseases — SINAN), provided by the Department of Information and Informatics of the Sistema Único de Saúde (Public Health System — SUS), known as DATASUS[10], in the following electronic address: <http://www2.datasus.gov.br/DATASUS/index.php?area=0203>. From the site mentioned, in the "epidemiológicas e morbidade" link, it is possible to access the data on AIDS cases since 1980. It should be noted that this database is public property.

This study aimed at the inhabitants of the state of Bahia aged 13 years or more, as this population is considered an adult population, according to the Definition Criteria of AIDS Cases in Adults and Children of the Ministry of Health[11]. The period of the present study covers since the first AIDS case, in 1984, until December, 2013. Data were consolidated until June 30, 2014, but we decided to analyze data available until 2013, in order to minimize the tendency resulting from the delay of notification.

The variables included in this study were: periods of diagnosis, gender, age group, and exposure category. Sex, age group and exposure category variables are classified in the DATASUS and comply with the following classification: the age group variable chosen for the study was the number 11, and classified according to DATASUS electronic page: 13 to 19 years old, 20 to 24, 25 to 29, 30 to 34, 35 to 39, 40 to 49, 50 to 59, and 60 years old and more. The exposure category variable covered the main routes of transmission of the disease, *i.e.*, sexual (homosexual, bisexual, heterosexual) and blood (injecting drugs users — IDUs, blood transfusion and haemophilia), besides vertical transmission (VT) and accident with biological material.

Finally, the diagnoses were categorized every five years, namely: 1984 to 1989, 1990 to 1995, 1996 to 2001, 2002 to 2007, 2008 to 2013. Data obtained from DATASUS were compiled and analyzed by Microsoft Excel 2010 software.

RESULTS AND DISCUSSION

From 1984 to 2013, 24,213 cases of AIDS were diagnosed in adults in the state of Bahia with sex informed. Of this total, 15,261 (63%) were male. Such data show the reality of the state, seeing that, from 1984 to October, 2015, 26,268 AIDS cases have occurred, 16,488 (63%) of them in males[12].

Table 1 shows the distribution by gender of the number of cases of AIDS in the studied population and the sex ratio during different diagnosis periods. The number of registered cases increased from 1990 to 1995 in both sexes. Such fact agrees with the study by Souza[13], which verified the epidemic's expansion in the state of Bahia opposing to the disease stabilization in the country. According to Souza,

"the growing tendency in Bahia is similar to what happens in the Northeast and North regions"[13] and shows the different profiles of AIDS. It becomes evident that, despite the intense prevention campaign for the disease, we still have a lot to advance to control the transmission in the referred regions, and in the state as well[13].

The number of AIDS cases in males was higher than in the females in all periods studied. From this confirmation, it is important to mention that men still have a higher risk of infection by AIDS than women[12].

A growth epidemic tendency is observed in the female population over time, and there was a considerable increase of the number of cases (more than double) in this population from 1996 to 2013. This period is marked by the development of the feminization of the epidemic. These results agree with the national reality, in which the feminization phenomenon of the epidemic has been observed and highlighted by the continued increase of the number of cases among women since the 1990s decade[1].

The clear decline in sex ratio, from 9.0, in the initial years, and the stabilization in 1.5 in the penultimate and last diagnosis periods, confirms the feminization phenomenon. Such findings about sex ratio agree with the epidemic profile in Bahia, in which stability is noticed, with the average of 1.5 case in men for every case diagnosed in woman[12].

Figures 1 and 2 show the numbers of AIDS cases in male and female adults, respectively, according to the reported exposure category. There was a significant increase in the number of cases classified as "ignored" during the periods, which correspond to 40.1% (9,704) of the total cases in the studied periods. This reality confirms the need to improve the epidemiological surveillance system in order to get close to the database with the actual existing dynamics of the state[13].

Considering the reported exposure category, the prevalence of sexual transmission in both sexes was revealed, corresponding to 53.8% (13,017) of cases diagnosed during the entire period. Of the total cases, 8,918 (36.8%) corresponded to heterosexual transmission. These findings are in accordance with Bahia[12] and Souza[13] and equivalent to the Northeastern reality, in which occurs the predominance of sexual transmission via for both sexes[3,14].

Over the diagnosis period, there was a change in the patients' profile. As evidenced in **Figure 1**, that illustrates the two initial periods (1984 to 1995) of the epidemic in the state of Bahia, the largest number of cases in males was concentrated among homosexuals. In parallel, from 1996 to 2013 a significant increase in the heterosexual group

Table 1 – Number of AIDS cases in adults by diagnosis period according to gender and gender ratio in the state of Bahia, from 1984 to 2013.

Diagnosis periods	Male		Female		Total	Ratio (M:F)
	n	%	n	%		
1984–1989	242,000	90.0	27,000	10.0	269.000	9.0
1990–1995	1,264	79.6	325,000	20.4	1.589	3.9
1996–2001	2,678	67.4	1,297	32.6	3.975	2.1
2002–2007	4,571	59.6	3,093	40.4	7.664	1.5
2008–2013	6,506	60.7	4,210	39.3	10.716	1.5
Total	15,261		8,952		24.213	1.7

Source: Departamento de Informática do Sistema Único de Saúde (DATASUS). Access on: Oct. 10, 2016.

was observed, and this category became predominant. The hetero-sexualization phenomenon in the state is, then, verified.

The change of the epidemiological profile in the state of Bahia related to the exposure category also occurred in the national dynamics, as at the beginning of the epidemic the homosexual group was the most affected. However, from the mid-1990s, the epidemic spread among heterosexuals, as described by Dourado[15].

Figure 2 shows that the disease transmission to the female population in the first period (1984 to 1989) occurred through the IDUs and the heterosexual routes. However, from 1990 on, the heterosexual

IDU: injecting drugs user; VT: vertical transmission.
Source: Departamento de Informática do Sistema Único de Saúde (DATASUS). Access on: Oct. 10, 2016.

Figure 1 – Number of AIDS cases in adult male individuals according to the exposure category in the state of Bahia from 1984 to 2013.

IDU: injecting drugs user; VT: vertical transmission.
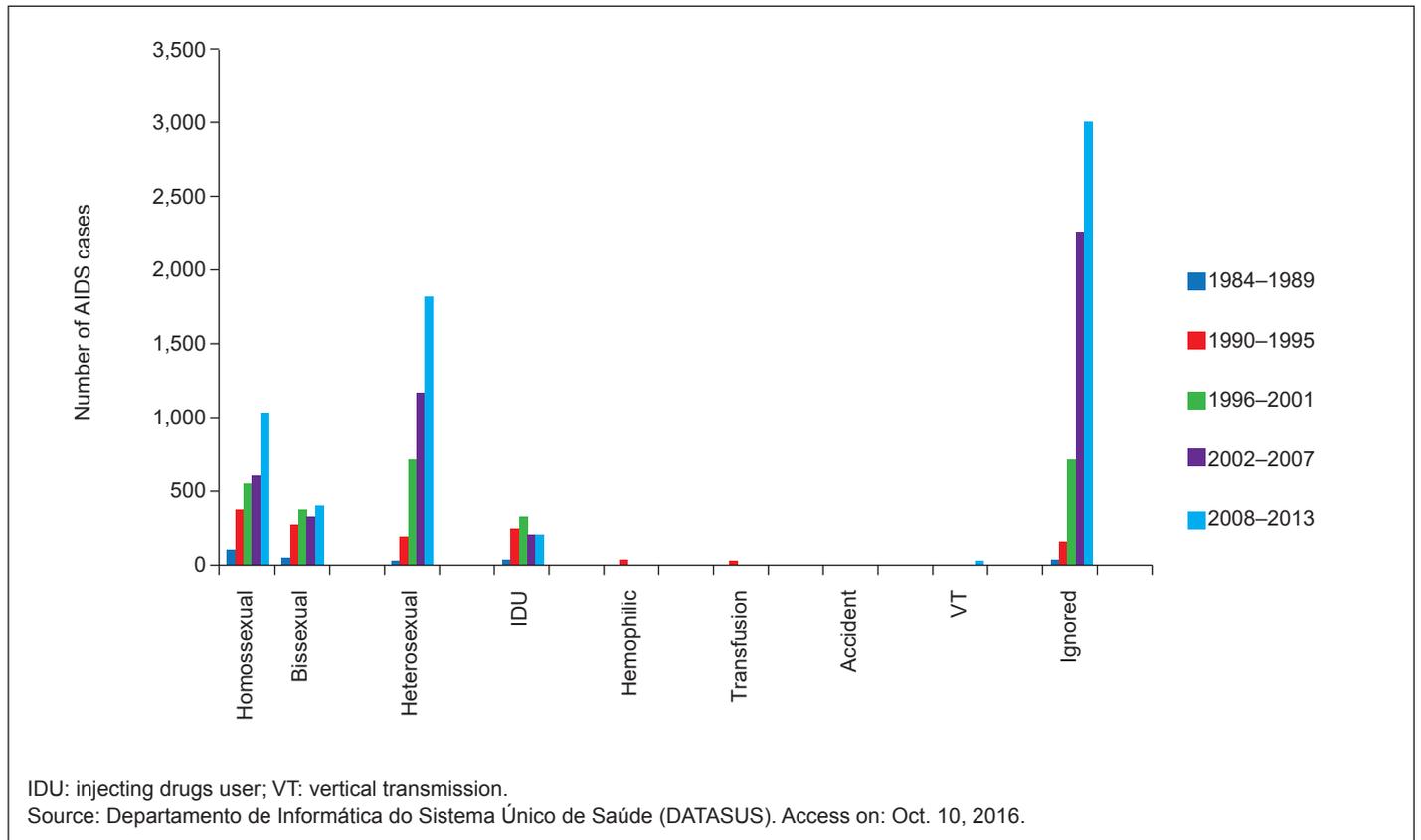Source: Departamento de Informática do Sistema Único de Saúde (DATASUS). Access on: Oct. 10, 2016.
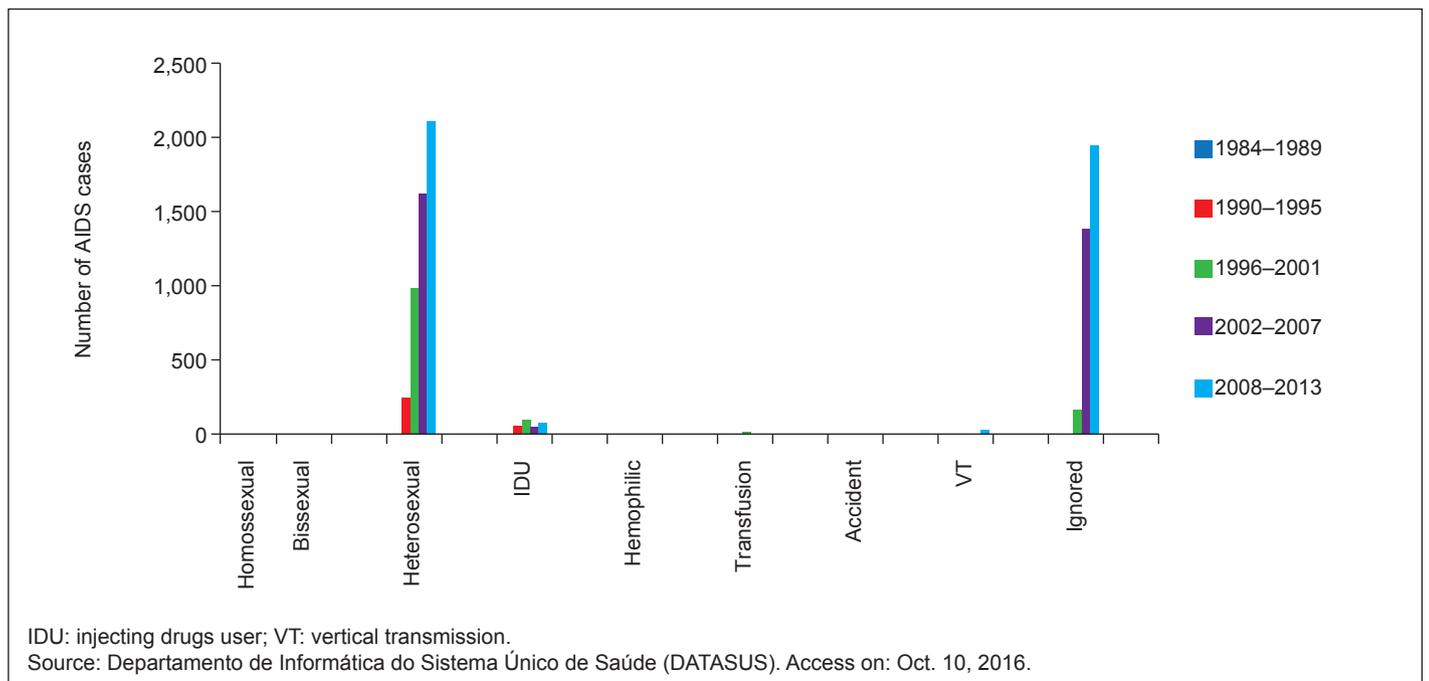
Figure 2 – Number of AIDS cases in adult female individuals according to the exposure category in the state of Bahia from 1984 to 2013.

transmission started to prevail. The heterosexualization is indicated as the reason for the rise in the number of cases among women (feminization)[2], since this is the main route of transmission among the female population in the state of Bahia.

It is very important to emphasize that in general society, due to socio-economic and cultural reasons, the younger women, whose genital tract is more fragile, usually have sex with mature men, who have higher indexes of HIV prevalence, thus increasing the risk of infection during unprotected intercourse[16].

The blood transmission way revealed an important decline, especially the one related to blood transfusion and haemophilia, second only to mother-to-child transmission and accident with biological material, indicating an insignificant number of cases for both sexes. These results agree with Souza's ones[13].

The reduction in the number of cases of transfusion and hemophilia transmission ways in these segments of the population can be explained by the control over the blood and blood products, especially after 1986, when laboratory tests for anti-HIV antibodies became available[2].

Regarding the IDUs exposure category, it was observed that there was a significant reduction of this way of transmission, following the Northeastern dynamic, where a low number of cases with this transmission route is observed[2,3,14]. According to Rodrigues Júnior and Castilho study[17], the highest proportions of IDUs category cases were registered in the Central-West, Southeast and South regions of Brazil.

According to Souza[13], the mother-to-child transmission showed an important decrease in the state of Bahia, which may result from the early knowledge of the serological status and appropriate treatment of pregnant women.

The studies that search the evaluation of the epidemiological profile of AIDS based on the notifications of cases are considered very important by several authors. Castilho et al.[18] confirm that the integrated analysis of reported cases of AIDS in various diagnoses periods and the circumstances of their manifestation serve not only to those populations subject to a greater risk of exposure to HIV, but also to the general population undoubtedly with a greater vulnerability nowadays then at the beginning of the epidemic. In this sense, Szwarcwald et al.[3] highlight that analyses using AIDS cases notifications as a source of information are essential elements to assess the dynamics of the epidemic.

CONCLUSION

It can be affirmed that the AIDS epidemic in the state of Bahia is expanding since the first cases record, in 1984, and one of the main findings of the present study is the growing increase in the number of cases for both sexes. Hence it follows, there is a need for controlling measures such as educational campaigns including prevention, diagnosis and assistance to stop the epidemic. Add to that the insertion of patients in the society due to the stigma of the disease.

The feminization phenomenon was also identified in the epidemic in the state of Bahia, with a significant increase in the number of cases, especially since 1996, with the consequent ratio reduction of the number of cases between the male and the female.

Changes have been observed over the years regarding the profile of the AIDS epidemic due to the heterosexualization phenomenon. Such a finding is related to the feminization of the epidemic, as it denotes the highest transmission of the disease to females.

It is worth mentioning the need for improvement of epidemiological surveillance actions in view of the large number of ignored information, as well as the qualification of information that enable the production of more accurate data. However, despite the limitations, the data obtained allow to know the epidemic profile and its specificity in the state.

Conflict of interests

The authors declare no conflict of interests.

REFERENCES

1. Fonseca MGP, Bastos FI. Twenty-five years of the AIDS epidemic in Brazil: principal epidemiological findings, 1980-2005. Cad Saúde Pública. 2007;23(Suppl. 3):333-44.
2. Brito AM, Castilho EA, Szwarcwald, CL. AIDS e infecção pelo HIV no Brasil: uma epidemia multifacetada. Rev Soc Bras Med Tropical. 2001;34(2):207-17.
3. Szwarcwald CL, Bastos FI, Esteves MAP, Andrade CLT. A disseminação da epidemia da AIDS no Brasil no período de 1987-1996: uma análise espacial. Cad Saúde Pública. 2000;16(Suppl. 1):7-19.
4. Dias PRTP, Nobre FF. Análise dos padrões de difusão espacial dos casos de AIDS por estados brasileiros. Cad Saúde Pública. 2001;17(5):1173-87.
5. Bastos FI, Barcellos C. Geografia social da AIDS no Brasil. Rev Saúde Pública. 1995;29(1):52-62.
6. Sousa ACA, Suassuna DSB, Costa SML. Perfil clínico epidemiológico de idosos com AIDS. J Bras Doenças Sex Transm. 2009;21(1):22-6.
7. Organização das Nações Unidas. UNIAIDS. Programa Conjunto das Nações Unidas sobre HIV-AIDS. A ONU e a resposta à AIDS no Brasil. 2010 Dec. Available from: <http://www.unaids.org.br/biblioteca/Folder%20A%20ONU%20e%20a%20Resposta%20%E0%20aids%20no%20Brasil%202%AA%20Edi%E7%E3o%20FINAL.pdf>. Access on: Aug. 09, 2016.
8. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Programa Nacional de DST e Aids. Boletim Epidemiológico. Brasília: Ministério da Saúde; 2015. Available from: <http://www.aids.gov.br/sites/default/files/anexos/publicacao/2015/58534/boletim_aids_11_2015_web_pdf_19105.pdf>. Access on: Sept. 12, 2016.
9. Dourado I, Noronha CV, Barbosa AM, Lago R. Considerações sobre o quadro da AIDS na Bahia. IESUS. 1997;6(2).
10. Brasil. Ministério da Saúde. Secretaria Executiva. Departamento de Informática do SUS. Informações de Saúde. Available from: <http:/www.datasus.gov.br>. Access on: Oct. 10, 2016.
11. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Programa Nacional de DST e Aids. Critérios de definição de casos de AIDS em adultos e crianças. Brasília: Ministério da Saúde; 2004. Available from: <http>. Access on: Aug. 08, 2016.
12. Governo do Estado da Bahia. Superintendência de Vigilância e Proteção à Saúde. Secretaria da Saúde da Bahia. Boletim Informativo. 2015;(4). Available from: <http://www.vigilanciaemsaude.ba.gov.br/vigilancia_epidemiologica/consulta_boletim_epidemiologico/2650>. Access on: Oct. 10, 2016.
13. Sousa AR de. Distribuição espaço-temporal da AIDS, na Bahia, período de 2002 a 2012 [thesis em Saúde Coletiva]. Salvador: Universidade Federal da Bahia; 2014.
14. Brito AM de. Os múltiplos perfis da epidemia da AIDS e a era dos antirretrovirais no Brasil [thesis em Saúde Pública]. Rio de Janeiro: Escola Nacional de Saúde Pública, Fundação Oswaldo Cruz; 2003.

15. Dourado I, Veras MASM, Barreira D, Brito AM. Tendências da epidemia de Aids no Brasil após a terapia antirretroviral. Rev Saúde Pública. 2006;40(Suppl.):9-17.

16. Bastos FI, Szwarcwald CL. AIDS e pauperização: principais conceitos e evidências empíricas. Cad Saúde Pública. 2000;16(Suppl. 1):S65-76.

17. Rodrigues Júnior AL, Castilho EA de. A epidemia de AIDS no Brasil, 1991-2000: descrição espaço-temporal. Rev Soc Bras Med Trop. 2004 July-Aug;37(4):312-7.

18. Castilho EA, Bastos FI, Scwarcwald CL, Fonseca MGM. A Aids no Brasil: uma epidemia em mutação. Cad Saúde Pública. 2000;16(Suppl. 1):4.

Address for correspondence:
DANIELLE CRISTINA GARBUIO
Rua Eugênia Accácio, 413 – Planalto Paraíso
São Carlos (SP), Brazil
CEP: 13562-300
E-mail: danigarbuio@anhanguera.com

Syphilis, HIV and hepatitis B and C serological screening among parturient admitted in the obstetrics center of a hospital in Southern Brazil, 2014–2016

Triagem sorológica para sífilis, HIV e hepatites B e C entre parturientes atendidas no centro obstétrico de um hospital no Sul do Brasil, 2014–2016

Francielle Valle Batistão[1], Helena Caetano Gonçalves e Silva[1,2], Fabiana Schuelter-Trevisol[1,2,3]

ABSTRACT

Introduction: Maternal-infant morbidity and mortality can be avoided through the provision of adequate prenatal care. **Objective:** To estimate the seroprevalence of syphilis, human immunodeficiency virus (HIV) and hepatitis B and C amongst pregnant women submitted to a rapid testing in the obstetrics center of a hospital in Southern Brazil, 2014–2016. **Methods:** Cross-sectional study. The study englobed parturient patients who did not receive prenatal care, or those ones who had received incomplete prenatal care, with emphasis on the third trimester, and specifically those ones who underwent rapid testing during labor. The study included all rapid testing records from 2014 to 2016, as well as electronic medical records review. **Results:** Of a total of 1,281 pregnant women who underwent serological screening, 1,204 were tested for HIV with two reactive cases (0.2%), 232 for hepatitis B with three reactive cases (1.3%), 243 for hepatitis C with two reactive cases (0,8%) and 234 for syphilis with 18 reactive cases (7.7%). A pregnant woman presented syphilis and hepatitis C coinfection. The average age was 26.3 (SD±6.7) years old, in the 14–47 age range. The type of delivery with the highest prevalence was the cesarean section, with 738 cases (57.6%). **Conclusion:** Based on data from the study, it was possible to conclude that sexually transmitted infections are present in the population, and that successful prenatal care can prevent vertical transmission with adequate monitoring of the newborn.
Keywords: pregnant women; prenatal care; sexually transmitted infections; syphilis; HIV; hepatitis B; hepatitis C.

RESUMO

Introdução: Com o pré-natal, morbidades e mortalidade materno-infantil podem ser evitadas. **Objetivo:** Estimar a soroprevalência de sífilis, vírus da imunodeficiência humana (HIV) e hepatites B e C entre parturientes submetidas a teste rápido no centro obstétrico de um hospital no Sul do Brasil de 2014 a 2016. **Métodos:** Estudo com delineamento transversal. Foram estudadas parturientes que não haviam realizado pré-natal ou realizado o pré-natal incompleto, com ênfase no terceiro trimestre, e que foram submetidas à realização de testes rápidos durante o trabalho de parto. O estudo é do tipo censo, incluindo todos os registros de testes rápidos entre 2014 e 2016, além da revisão do prontuário eletrônico. **Resultados:** Das 1.281 gestantes submetidas à triagem sorológica, 1.204 realizaram teste para HIV com dois casos reagentes (0,2%), 232 para hepatite B com três casos reagentes (1,3%), 243 para hepatite C com dois casos reagentes (0,8%) e 234 para sífilis com 18 casos reagentes (7,7%). Houve uma gestante que apresentou coinfecção entre sífilis e hepatite C. A média de idade foi de 26,3 (DP±6,7) anos, variando de 14 a 47 anos, e o tipo de parto de maior prevalência foi a cesariana, com 738 casos (57,6%). **Conclusão:** Com base nos dados do estudo, foi possível concluir que as infecções sexualmente transmissíveis estão presentes na população e que um pré-natal bem realizado pode evitar a transmissão vertical com o monitoramento adequado do neonato.
Palavras-chave: gestantes; cuidado pré-natal; doenças sexualmente transmissíveis; sífilis; HIV; hepatite B; hepatite C.

INTRODUCTION

The knowledge of the seroprevalence of the main infectious diseases transmitted from mother-to-child during pregnancy, childbirth or breastfeeding has a great importance in the formulation of health policies of obstetrics centers[1,2]. In Brazil, the infectious diseases transmission during pregnancy and childbirth, such as syphilis, infection by the human immunodeficiency virus (HIV) and hepatitis B and C, are relatively frequent[3,4]. Such a situation is quite a challenge faced by public health, concerning strategies planning for these diseases screening in an extensive and practical way to favor the clinical monitoring of pregnant women with the early infections' diagnosis[1,2].

Prenatal care, which is the medical assistance to pregnant women during the entire gestational period, can avoid mother-child morbidities and mortality[5]. According to the Ministry of Health, there is a minimum number of six appointments recommended during pregnancy, with monthly intervals until the 28th week, biweekly from 28 to 36th weeks, and weekly from the 36 to 41st gestational weeks. Serological screening tests for syphilis, hepatitis B and HIV need to be done, besides serology for toxoplasmosis and rubella, when there are suggestive symptoms or endemicity relationship[5].

The World Health Organization (WHO) estimates the occurrence of approximately 357 million new sexually transmitted infections (STIs) per year, emphasizing that the presence of an STI such as syphilis increases the risk of acquiring or transmitting HIV[6]. In relation to laboratory tests, the recommendation of the Ministry of Health is that the following exams are required in the first quarter: syphilis rapid testing and Venereal Disease Research Laboratory (VDRL) testing, as well as anti-HIV diagnosis rapid testing. Tests must be repeated in the third quarter including serology for hepatitis B (HBsAg).

[1]Course of Medicine, Universidade do Sul de Santa Catarina (UNISUL) – Tubarão (SC), Brazil.
[2]Graduate program in Health Sciences of the UNISUL – Tubarão (SC), Brazil.
[3]Clinical Research Center of Hospital Nossa Senhora da Conceição – Tubarão (SC), Brazil.

It should be noted there is no recommendation for serological compulsory hepatitis C screening during pregnancy[7].

According to the prevention protocol for the vertical transmission of HIV, syphilis, and viral hepatitis, as soon as a parturient is admitted to the maternity hospital, the rapid testing on these mentioned diseases should be carried out to verify whether their investigation occurred during the prenatal period, especially in the third quarter, or in case the result is not available. In case of syphilis specifically, the test should be proposed to all pregnant women on the labor occasion[8].

OBJECTIVE

To investigate the results of serological screening with rapid testing for syphilis, HIV and hepatitis B and C in parturient women admitted in the obstetrics center of a hospital located in the state of Santa Catarina, Brazil, from May 2014 to April 2016.

METHODS

A cross-sectional delineation epidemiological study was carried out. Tubarão is a city in the state of Santa Catarina with a population about 102,883 inhabitants in 2015. According to data from the Departamento de Informática do Sistema Único de Saúde (Department of Informatics of the Public Health System — DATASUS), around 2,800 children are born every year in the city (average of the last 10 years).

The hospital under study is the largest hospital in number of beds in the state of Santa Catarina; there are the total of 410 beds. In 2014, there were almost 20,000 hospitalizations, 3,278 at the obstetrics center, totalizing 2,442 births.

Following the Ministry of Health's protocol, since May 2014 the hospital obstetrics center uses rapid testing on viral infectious diseases of greatest impact among parturients who failed tests for syphilis, HIV and hepatitis B during the prenatal period. The tests are applied separately, according to the information obtained by the prenatal portfolio presented by the parturient. The tests are the following:

- Alere Syphilis® (Standard Diagnostic Inc., Republic of Korea), immunochromatographic assay;
- HIV Tri Line® (Bioclin, Minas Gerais, Brazil) — third generation for HIV 1 and 2 type screening;
- Vikia HBsAg® (bioMérieux, Rio de Janeiro, Brazil);
- Anti-HCV — Alere® (Standard Diagnostic Inc., Republic of Korea).

The study approached parturients who have failed prenatal care or held an incomplete prenatal, with emphasis in the third quarter, and that have undergone rapid testing during labor. This is a census type study including all records of the rapid testing of the mentioned hospital between 2014 and 2016. Through these records, it was possible to quantify the seroprevalence of these diseases in this group. Added to that, the electronic health portfolio has been revised, so the other sociodemographic, clinical and laboratory data necessary to the study objectives could be accessed.

The variables of interest included in the study were the diagnosis results of rapid testing on syphilis, hepatitis B and C, and HIV, date, city of residence, prenatal data, age of parturient, mother's education, ethnicity, occupation, marital status, number of children, type of delivery, gestational age and weight of the child.

The collected data were typed in Microsoft Office Excel 2007 (Microsoft Corporation, Washington, D.C., United States), and the statistical analyses were performed in Statistical Package for the Social Sciences (SPSS) software v. 21 (IBM, Armonk, New York, United States). The quantitative variables were described with measures of central tendency and dispersion. Qualitative variables are described in absolute numbers and proportions.

This study was approved by the Research Ethics Committee, under registry of opinion 1,957,591 on March 9, 2017.

RESULTS

During the analyzed period, 1,317 rapid testing were carried out on HIV, and 240 on syphilis and hepatitis B and C in the birth centre at the hospital studied. The difference between the numbers of tests is justified as the implementation of rapid testing for HIV occurred earlier in the service, and only recently for other serologies. Added to that, there is a great concern with HIV prophylactic measures that must be adopted in case of maternal seropositivity to prevent vertical transmission.

From the total of the sample, 3% were excluded, four concerning sexual violence and 36 referring to accidents related to sharp objects, resulting in the final sample of 1,281 pregnant women subject to serological screening included in this study. The result was as follows: 1,240 pregnant women tested for HIV, 232 for hepatitis B, 243 for hepatitis C, and 234 for syphilis.

The average age of pregnant women was 26.3 (SD±6.7) years old, ranging from 14 to 47 years of age. **Table 1** presents the sociodemographic characteristics and origin of the women studied.

Table 2 shows the obstetrics data of the studied sample.

In 2014, 414 (32.3%) rapid testing were performed; in 2015, 670 (52.3%); and in 2016, 197 (15.4%). **Figure 1** describes the results of rapid testing for HIV, hepatitis B and C and syphilis among pregnant women included in the study.

The results of serological screening through rapid testing of 1,281 pregnant women were as follows: HIV=1, 204 testing, two reagent cases (0.2%); hepatitis B=232 testing, three reagent cases (1.3%); hepatitis C=243 testing, two reagent cases (0.8%); syphilis=234 testing, 18 reagent cases (7.7%). A syphilis and hepatitis C co-infection was identified in one woman.

There was no statistically significant difference between seropositive pregnant women for diseases tested by rapid testing concerning maternal age, marital status, ethnicity and education. There was no difference in birth weight and gestational age either. It was observed that the two cases of HIV-positive pregnant women had caesarean section and a higher average on the number of children (p=0.032).

DISCUSSION

The main objective of the present study was to analyze parturients' rapid testing seroprevalence for syphilis, HIV, and hepatitis B and C in the obstetrics center of a hospital in Southern Brazil, from May 2014 to April 2016. In this study, all cases comprised pregnant women who failed prenatal care or it was incomplete, and therefore

there is no serological screening for the investigated diseases, revealing the risk of vertical transmission of the infections and causing individual and general consequences, higher costs and impacts on the health service. According to the hospital's Information Technology Department, during the research period, from May 2014 and April 2016, 5,223 live births were registered. The research detected that 1,221 pregnant women had incomplete prenatal care (23.4%) and 60 failed it (1.1%). Nevertheless, these values are lower than the ones found by Anjos and Boing in national surveys, that indicate 2.7% of absence of prenatal care and 63.1% of incomplete prenatal of Brazilian pregnant women[9].

Among the infections investigated in the present study, syphilis was the most frequent. These data confirm the scenario found in Santa Catarina in 2015, with 3,021 records of acquired syphilis, 1,235 of syphilis in pregnant women and 453 of congenital syphilis[10]. Penicillin is the drug of choice to treat syphilis, and for allergic pregnant women desensitization is recommended[8]. Diagnosis and treatment at the proper time are highly effective

and reduce mother-to-child transmission by up to 97% of cases[11]. A study conducted with 1,380 women met in public maternity hospitals of the city of Vitória (Espírito Santo, Brazil) found that the prevalence of syphilis was of 0.4%[12], below the present study result (7.7%). However, it should be noted that in the present study there

Table 1 – Sociodemographic characteristics and origin of pregnant women subject to rapid testing for HIV, syphilis and Hepatitis B and C from 2014 to 2016 (n=1,281).

Characteristics	n	%
Age		
14–19	221	17.3
20–29	639	49.9
30–39	384	30.0
>39	36	2.7
Not informed	1	0.1
Ethnicity		
White	1,135	88.6
Non-white	127	9.9
Not informed	19	1.5
Marital status		
Married/Common-law marriage	1,093	85.3
Divorced	17	1.3
Single	161	12.6
Widow	6	0.5
Not informed	4	0.3
Occupation		
Self-employed	150	11.7
Wage earner	496	38.7
Housewife	406	31.7
Student	108	8.4
Pensioner	6	0.5
Unemployed	36	2.8
Not informed	79	6.2
Education		
0–8	539	42.1
>8	726	56.7
Not informed	16	1.2
City of residence		
Tubarão	466	36.4
Other cities of Amurel	669	52.3
Other cities of Santa Catarina	135	10.5
Other Brazilian cities	7	0.5
Not informed	4	0.3

Amurel: Associação de Municípios da Região de Laguna.

Table 2 – Obstetrical data of pregnant women subject to rapid testing for HIV, hepatitis B and C, and syphilis from 2014 to 2016 (n=1,281).

Obstetrical data	n	%
Prenatal		
Incomplete	1,221	95.3
Not accomplished	60	4.7
Number of children		
0–1	528	41.2
2–3	579	45.2
>3	105	8.2
Not informed	69	5.4
Gestacional age in quarters		
First	2	0.2
Second	36	2.8
Third	1,203	93.9
Not informed	40	3.1
Type of delivery		
Vaginal	532	41.5
Caesarian	738	57.6
Abortion	2	0.2
Not informed — accomplished	9	0.7
Birth weight in grams		
<2.500	119	9.3
≥2.500	870	67.9
Not informed	292	22.8

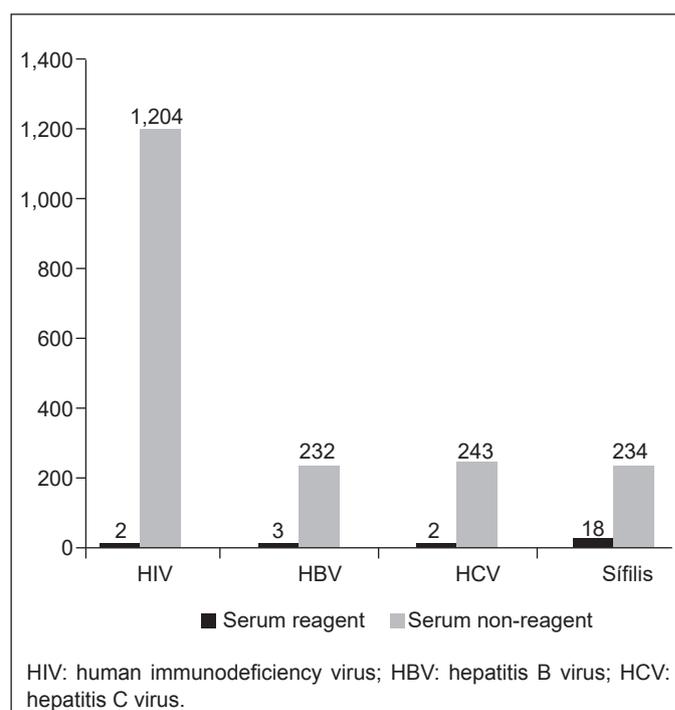HIV: human immunodeficiency virus; HBV: hepatitis B virus; HCV: hepatitis C virus.

Figure 1 – Rapid testing results of parturients admitted in the obstetric center from 2014 to 2016 (n=1,281).

is a reactive serology only in nontreponemal rapid testing, and cannot be considered a diagnosis of gestational syphilis as it could be a serological scar, and it is necessary the confirmation with definitive diagnosis with treponemic testing application. The comparison between studies strengthens the authorities of Santa Catarina's current concern about the growing number of syphilis cases in the state.

Concerning HIV, according to the Department of Epidemiological Surveillance (Diretoria de Vigilância Epidemiológica — DIVE), the average of 468 new cases in pregnant women per year was verified in the state between 2010 and 2016[10]. As the rapid testing has been implemented earlier in the mentioned hospital and due to the severity of the disease, it was observed that the test application is usual to all pregnant women who failed prenatal care or incomplete prenatal, mainly when prenatal portfolio does not indicate the result of anti-HIV serology.

In case of syphilis and hepatitis B and C, besides their recent implementation in the obstetric center routine, hepatitis C is not mandatory in neonatal screening. In addition, the diagnosis of syphilis and hepatitis B can occur in the puerperium.

At time of childbirth, non-reagent women have no indication for chemoprophylaxis. The parturients with reagent result from two rapid testing of different brands will have positive results for HIV, and mother and son should receive chemoprophylaxis during childbirth and puerperium.

According to the updated regulations, injectable zidovudine (AZT) is indicated for the prevention of vertical transmission and should be administered during the early labor until the clamping of the umbilical cord[8].

The newborn should receive the first dose of AZT oral solution preferably in the delivery room, soon after the immediate care, or within the first 4 hours after birth[8]. In this study, only two cases of HIV infection were detected in the rapid testing, which reduces the prevention chances of vertical transmission to the neonate, if there was an early diagnosis. Rapid testing allows the intervention recommended by the protocol for HIV-seropositive pregnant women[13]. In the two cases in question, elective caesarean section was carried out as the diagnosed parturients' viral load was unknown.

In rapid testing for hepatitis B and C, three had reagent result for hepatitis B (1.3%) and two for hepatitis C (0.8%). The vertical transmission of hepatitis B is quite common in pregnant women with HBsAg reagents (surface antigen of the hepatitis B virus). Its prevalence in pregnant women varies according to the endemic infection in the studied geographical region and population[14].

The hepatitis B virus (HBV) transmission routes include sexual contact and possible infection by contact with infected blood or blood products. It is important to note that vertical transmission in global terms represents the main dissemination route of HBV in regions of high prevalence and occurs predominantly during childbirth, through blood, amniotic fluid or maternal secretions contact, being rare the transplacental transmission via breastfeeding, or after birth[15]. Newborns of mothers with reagent rapid testing shall receive, in addition to the vaccine against hepatitis B, human immunoglobulin anti-hepatitis B (IGHHB) in the first 10 hours of life[8].

In hepatitis C, the hepatitis C virus (HCV) vertical transmission rate has been estimated at 5%, with higher rates in women with HCV infection co-infected with HIV. As already mentioned, the

compulsory hepatitis C serologic tracking during pregnancy is not recommended. Nevertheless, the recommendation that women with risk factors should be screened during pregnancy remains, as well for those ones who make use of injecting drugs or have partners who use them. After delivery, there is no immediate conduct for the newborn of mother infected with HCV; there is only monitoring in the first year of life in childcare consultation[16].

One parturient had syphilis and hepatitis C co-infection. It is fact that STIs, especially those ones that cause ulceration as the *Treponema pallidum*, favor the acquisition of other viral infections, such as HIV and hepatitis C. HCV is not considered an STI, but sexual transmission is common among men who have sex with men, with the presence of HIV infection and other STIs, and in sexual intercourse with bleeding, such as anal sexual intercourse[17,18].

Most published studies points out that, in general, prenatal care failure occurs mainly due to socio-economic factors (low income and education family), access to appointments (place of residence far away from the service and cost of transportation), health care quality and social support[19].

Other potentially related factors are: maternal age (late teens and older age), not living with partner, use of alcohol or other drugs during pregnancy, multiparity, non-acceptance of pregnancy, lack of family support, adverse social context, negative experiences during medical appointments and prenatal discredit conceptions[20]. All cases of rapid testing reactors results occurred among pregnant women with incomplete prenatal, and four cases of syphilis and one case of HIV occurred among pregnant women who failed prenatal care.

The present study was limited to describe the obstetric evolution and the characteristics of neonatal births of pregnant women infected with HIV, syphilis and/or hepatitis B and C, since there was no subsequent monitoring of pregnant women and newborns infected. In addition, part of the information had no data recorded, which prevented a more accurate analysis of the reality found. In addition, the lack of association between the reactors results and the sociodemographic and obstetric characteristics are probably because of the small number of reagents results in the studied universe.

CONCLUSION

Among women subject to serological screening rapid testing, the higher prevalence was for syphilis, followed by hepatitis B. The reactivity for hepatitis C was four times higher than for HIV, although screening for hepatitis C is not in the compulsory routine.

Conflict of interests

The authors declare no conflict of interests.

REFERENCES

1. Figueiró-Filho EA, Senefonte FRA, Lopes AHA, de Morais OO, Souza Júnior VG, Maia TL, et al. Frequência das infecções pelo HIV-1, rubéola, sífilis, toxoplasmose, citomegalovírus, herpes simples, hepatite B, hepatite C, doença de Chagas e HTLV I/II em gestantes, do Estado de Mato Grosso do Sul. Rev Soc Bras Med Trop. 2007;40(2):181-7.
2. Boa-Sorte N, Purificação A, Amorim T, Assunção L, Reis A, Galvão-Castro B. Dried blood spot testing for the antenatal screening of HTLV, HIV, syphilis, toxoplasmosis and hepatitis B and C: prevalence, accuracy and operational aspects. Braz J Infect Dis. 2014 Nov-Dec;18(6):618-24.

3.   Cunha AR, Merchan-Hamann E. Sífilis em parturientes no Brasil: prevalência e fatores associados, 2010 a 2011. Rev Panam Salud Publica. 2015 Dec;38(6):479-86.

4.   Reiche EMV, Morimoto HK, Farias GN, Hisatsugu KR, Geller L, Gomes ACLF, et al. Prevalência de tripanossomíase americana, sífilis, toxoplasmose, rubéola, hepatite B, hepatite C e da infecção pelo vírus da imunodeficiência humana, avaliada por intermédio de testes sorológicos, em gestantes atendidas no período de 1996 a 1998 no Hospital Universitário Regional Norte do Paraná (Universidade Estadual de Londrina, Paraná, Brasil). Rev Soc Bras Med Trop. 2000;33(6):519-27.

5.   Brasil. Ministério da Saúde. Caderno de atenção básica: atenção ao pré-natal de baixo risco. Brasília: Ministério da Saúde; 2012. Available from: <http://bvsms.saude.gov.br/bvs/publicacoes/cadernos_atencao_basica_32_prenatal.pdf>. Access on: May 7, 2017.

6.   World Health Organization. Sexual and Reproductive Health. Fact sheet on STIs. Available on: <http://www.who.int/reproductivehealth/topics/rtis/en/>. Access on: May 23, 2017.

7.   Brasil. Ministério da Saúde. Departamento de DST, AIDS e Hepatites Virais. Protocolo Clínico e Diretrizes Terapêuticas para Prevenção da Transmissão Vertical de HIV, Sífilis e Hepatites Virais. Brasília: Ministério da Saúde; 2015. Available from: <https://www.google.com.br/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjQ_5uR4-LXAhVDh5AKHd-88DiwQFggnMAA&url=http%3A%2F%2Fwww.aids.gov.br%2Fsystem%2Ftdf%2Fpub%2F2015%2F57801%2Fpcdt_transmissao_vertical_miolo_pdf_67895.pdf%3Ffile%3D1%26type%3Dnode%26id%3D57801%26force%3D1&usg=AOvVaw1fUHY1_BxlGrD-VqBHwhH5R>. Access on: Nov 2, 2015.

8.   Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de DST, AIDS e Hepatites Virais. Protocolo Clínico e Diretrizes Terapêuticas para Prevenção da Transmissão Vertical de HIV, Sífilis e Hepatites. Brasília: Ministério da Saúde; 2016.

9.   Anjos JC, Boing AF. Regional differences and factors associated with the number of prenatal visits in Brazil: analysis of the Information System on Live Births in 2013. Rev Bras Epidemiol. 2016;19(4):835-50.

10. Governo de Santa Catarina. Diretoria de Vigilância Epidemiológica. Available from: <http://www.dive.sc.gov.br/>. Access on: May 9, 2017.

11. Blencowe H, Cousens S, Kamb M, Berman S, Lawn JE. Lives saved tool supplement detection and treatment of syphilis in pregnancy to reduce syphilis related stillbirths and neonatal mortality. BMC Public Health. 2011;11(Suppl.3):S9.

12. Miranda AE, Rosetti Filho E, Trindade CR, Gouvêa GM, Costa DM, Oliveira TG, et al. Prevalência de sífilis e HIV utilizando testes rápidos em parturientes atendidas nas maternidades públicas de Vitória, Estado do Espírito Santo. Rev Soc Bras Med Trop. 2009;42(4):386-91.

13. Veloso VG, Bastos FI, Portela MC, Grinsztejn B, João EC, Pilotto JH, et al. HIV rapid testing as a key strategy for prevention of mother-to-child transmission in Brazil. Rev Saúde Pública. 2010 Oct;44(5):803-11.

14. Fernandes CN, Alves M de M, de Souza ML, Machado GA, Couto G, Evangelista RA. Prevalência de soropositividade para a hepatite B e C em mulheres grávidas. Rev Esc Enferm USP. 2014;48(1):91-8.

15. Moura AA, Mello MJ, Correia JB. Prevalence of syphilis, human immunodeficiency virus, hepatitis B virus, and human T-lymphotropic virus infections and coinfections during prenatal screening in an urban Northeastern Brazilian population. Int J Infect Dis. 2015;39:10-5.

16. McDermott CD, Moravac CC, Yudin MH. The effectiveness of screening for hepatitis C in pregnancy. J Obstet Gynaecol Can. 2010;32(11):1035-41.

17. Chan DP, Sun HY, Wong HT, Lee SS, Hung CC. Sexually acquired hepatitis C virus infection: a review. Int J Infect Dis. 2016 Aug;49:47-58.

18. Schuelter-Trevisol F, Custódio G, Silva ACB, Oliveira MB, Wolfart A, Trevisol DJ. HIV, hepatitis B and C, and syphilis prevalence and coinfection among sex workers in Southern Brazil. Rev Soc Bras Med Trop. 2013;46(4):493-7.

19. Titaley CR, Hunter CL, Heywood P, Dibley MJ. Why don't some women attend antenatal and postnatal care services?: a qualitative study of community members' perspectives in Garut, Sukabumi and Ciamis districts of West Java Province, Indonesia. BMC Pregnancy Childbirth. 2010;10:61.

20. Darmont MQR, Martins HS, Calvet GA, Deslandes SF, Menezes JA. Adesão ao pré-natal de mulheres HIV+ que não fizeram profilaxia da transmissão vertical: um estudo sócio-comportamental e de acesso ao sistema de saúde. Cad Saúde Pública. 2010;26(9):1788-96.

Address for correspondence:
FABIANA SCHUELTER-TREVISOL
Avenida José Acácio Moreira, 787 – Dehon
Tubarão (SC), Brazil
CEP: 88704-900
E-mail: fastrevisol@gmail.com

CORRELATION BETWEEN BACTERIAL VAGINOSIS AND ADVERSE OBSTETRIC OUTCOMES IN BRAZILIAN WOMEN

Correlação entre vaginose bacteriana e desfechos obstétricos desfavoráveis em mulheres brasileiras

Michelly Nóbrega Monteiro[1], Ricardo Ney Oliveira Cobucci[1], Janice Queiroz[1],

Eudes Euler de Souza Lucena[2], Ana Luísa Fernandes Vital[1], Tatyane Ribeiro de Castro Palitot[1],

José Eleutério Junior[3], Paulo César Giraldo[4], Ana Katherine Gonçalves[1]

ABSTRACT

Introduction: Vaginal infections and modifications in the vaginal flora are very prevalent during pregnancy and have been associated with adverse obstetric outcomes, such as preterm labor, preterm premature rupture of membranes and low birth weight. **Objective:** To evaluate the prevalence and associations of bacterial vaginosis (BV) and pregnancy outcomes among Brazilian pregnant women in the third trimester. **Methods:** A prospective observational study was conducted assessing vaginal microbiota on bacterioscopy (wet mount and Gram stain), using vaginal swabs obtained from pregnant women between 26 and 32 weeks' gestation. The women were monitored until delivery, and their pregnancy outcome and demographic data were collected using an interviewer-administered questionnaire. **Results:** BV was assessed using both Amsel's criteria and Nugent's score in 77 of 190 women, resulting in the prevalence of 42.5%. BV was significantly associated with preterm labor (risk ratio [RR], 2.89; 95% confidence interval [CI], 2.35–3.56) and low birth weight (RR, 2.17; 95%CI, 1.61–2.92). Premature rupture of membranes was not associated with BV. **Conclusion:** BV was found to be very frequent among Brazilian pregnant women in the third trimester and correlated to unfortunate pregnancy outcomes. Regular screening of pregnant women may allow for early treatment and prevention of some obstetric complications.

Keywords: vaginosis, bacterial; pregnancy; pregnancy complications; premature birth; infant, low birth weight.

RESUMO

Introdução: Infecções vaginais e mudanças na flora vaginal são prevalentes durante a gravidez e têm sido associadas com desfechos obstétricos adversos, tais como trabalho de parto prematuro, amniorrexe prematura e baixo peso ao nascer. **Objetivos:** Correlacionar a presença de vaginose bacteriana (VB) com desfecho obstétrico desfavorável em mulheres brasileiras com gravidez no terceiro trimestre. **Métodos:** O estudo prospectivo observacional foi conduzido avaliando microbiota vaginal por bacterioscopia (a fresco e Gram) usando *swab* vaginal obtido de mulheres grávidas entre a 26 e a 32ª semanas de gestação. As mulheres foram monitoradas até o parto, e os dados de seu seguimento e os demográficos foram coletados por meio de um questionário autoaplicável. **Resultados:** Foi diagnosticada VB, com base nos critérios de Amsel e de Nugent, em 77 mulheres entre as 190, demonstrando prevalência de 42.5%. VB foi significativamente associada com maior risco de parto prematuro (*risk ratio* [RR], 2.89; 95% intervalo de confiança [IC], 2.35–3.56) e de baixo peso ao nascer (RR, 2.17; 95%IC, 1.61–2.92). A rotura prematura das membranas não foi associada com VB. **Conclusão:** Foi constatada alta frequência de VB entre as mulheres brasileiras grávidas no terceiro trimestre, e a BV correlacionou-se com piores prognósticos da gravidez. O rastreio rotineiro de mulheres grávidas pode permitir um tratamento precoce e a prevenção de algumas complicações obstétricas.

Palavras-chave: vaginose bacteriana; gravidez; complicações na gravidez; trabalho de parto prematuro; recém-nascido de baixo peso.

INTRODUCTION

Vaginal infections and modifications in the vaginal flora are very prevalent during pregnancy and have been associated with adverse obstetric outcomes, such as preterm labor (PTL), premature rupture of membranes (PROM) and low birth weights (LBW)[1,2]. Therefore, screening for vaginal infections during pregnancy could prevent perinatal complications, including preterm births[3].

A healthy vagina is populated by a myriad of commensal bacteria, which may, in exceptional situations, become pathogenic[3]. *Lactobacillus sp.* is the predominant bacterial species in the vaginal environment, which leads to an acidic pH (3.8 to 4.5), thus inhibiting the growth of potentially harmful agents[3-5]. The amount of *Lactobacillus sp.* morphotype when compared to other microorganisms found on a Gram stain of vaginal fluid determines the type of vaginal microbiota. When Gram staining shows *Lactobacillus sp.* composing 80% or more of the bacterial population, it is interpreted as flora type I. When there are approximately 50% *Lactobacillus sp.* and 50% other bacteria, it is interpreted as flora type II. When there are a clear predominance of other bacteria and a sharp decrease in the number of *Lactobacillus sp.* (<5%), it is interpreted as flora type III[3,6].

Under normal conditions, lactobacilli constitute 95% (flora type I) of the bacteria in the vagina and produce several antimicrobial compounds, including lactic acid and hydrogen peroxide (H_2O_2)[2]. Vaginas colonized with H_2O_2-producing lactobacilli remain persistently colonized with lactobacilli and are less likely to have bacterial vaginosis (BV)[3,4]. However, the absence or low concentration of *Lactobacillus sp.* (flora type III) is significantly associated with BV[2].

BV is a frequent clinical syndrome characterized by alterations in the normal vaginal flora leading to an accentuated decline or lack of the usual H_2O_2-producing lactobacilli and increase of anaerobic bacteria, such as *Gardnerella vaginalis*, *Mobiluncus*, *Mycoplasma hominis*, *Ureaplasma urealyticum*, and *Prevotella*, among other anaerobes[2].

[1]Universidade Federal do Rio Grande do Norte (UFRN) – Natal (RN), Brazil.
[2]Universidade Estadual do Rio Grande do Norte (UERN) – Mossoró (RN), Brazil.
[3]Universidade Federal do Ceará (UFC) – Fortaleza (CE), Brazil.
[4]Universidade Estadual de Campinas (UNICAMP) – Campinas (SP), Brazil.

BV seems to be the most prevalent form of infection among pregnant women with PTL and PROM[3,7]. BV has been associated with an increased risk for PTL, especially in pregnancies under 32 weeks[1,7]. The anaerobic bacteria associated with BV release toxins which stimulate the decidua to produce cytokines such as inter-leucine-6 (IL-6) and tumor necrosis factor (TNF-α). These substances, in turn, provoke the production of prostaglandins involved in cervical collagen remodeling, thus increasing the risk of PTL[4].

Preterm birth is a major problem both in obstetrics and in neonatology, since it is one of the main causes of neonatal morbidity and mortality. The most common morbidities are Severe Acute Respiratory Syndrome (SARS), necrotizing enterocolitis, cerebral hemorrhage, as well as neurosensory disability (blindness, deafness), and delayed physical and mental development[1,6,7]. Preterm birth not only affects the child, but their families, and means more hospitalization and hospital costs[2,8,9].

Morbidity of genital infection in pregnant women is on the rise. Therefore, it is important to ensure etiological diagnosis[9,10]. Screening and proper treatment of genital infections in pregnant women, even when asymptomatic, are of vital importance since inadequate and inaccurate diagnosis generates misguided treatments[9,11].

OBJECTIVE

To evaluate the prevalence and associations of BV and pregnancy outcomes among Brazilian pregnant women in the third trimester.

METHODS

The study was conducted in a university maternity clinic, in the Northeast of Brazil, between May 2015 and January 2016. It was a prospective observational study conducted among healthy pregnant women who were registered at the prenatal clinic for the first time, *i.e.*, registration between 26 and 32 weeks' gestational age with or without symptoms.

To be included in the study, the pregnant woman needed to be apparently healthy and somewhere between the 26th and 32nd week of gestation. This period was chosen, since it is theoretically less prone to complications such as abortion and PTL[6,10,12].

Women were excluded of the study when under 18 years old, if they explicitly refused to participate, had a chronic degenerative disease, used immunosuppressive medication and/or antibiotics, used spermicides during sexual intercourse, had had vaginal intercourse or vaginally douched within the last 24 hours, or suffered from any type of vaginal bleeding.

Eligible women waiting for prenatal care were randomly selected and individually invited to participate. After discussing the objectives, responsibilities, and procedures, the volunteers who wished to participate signed the Informed Consent Form (ICF).

Pregnancy was confirmed by clinical data (minimum menstrual delay of eight days), β-HCG (>1.000 IU/L), or a transvaginal ultrasound showing the presence of a live embryo[6].

Vulvovaginitis diagnosis

Vulvovaginitis (VV) was diagnosed by using microscopy to analyze a suspension of vaginal fluid in 0.9% sodium chloride (NaCl) and smear Gram stained, after collecting material from the sidewall of the vagina. The vaginal content was put on glass slides, one for microscopic (wet mount) evaluation during the consultation and another one for Gram staining, performed in the Microbiology Laboratory, localized at Maternidade Escola Januário Cicco (MEJC), of the Universidade Federal do Rio Grande do Norte (UFRN), without prior knowledge of the case.

The pH was measured using colorimetric Merck® (Rio de Janeiro, Brazil) brand tape, which has a range of variations covering values from zero to 14. The tape was placed on the upper right third of the vaginal wall, avoiding contact with cervical mucus, and a reading was taken after one minute of contact.

The whiff test, consisted of placing vaginal fluid on a glass slide and adding two drops of 10% potassium hydroxide solution to see whether aromatic amines were released or not, was performed.

To prepare the wet mounts to identify the vaginal flora type, a sterile cotton swab was used to take samples from the upper right hand third of the vagina, and then placed in a glass bottle containing 1 mL of saline solution.

BV was diagnosed when at least three of the four Amsel criteria were met (homogeneous vaginal discharge, pH >4.5, clue cells >20%, positive whiff test) and a Nugent score of at least seven was obtained[13,14]. Vaginal trichomoniasis (VT) was diagnosed when the parasitic flagellate was found. The diagnostic of vulvovaginal candidiasis (VVC) was confirmed by the presence of hyphae or gram-positive blastospores.

Follow-up

Women diagnosed with BV, whether symptomatic or not, were treated with metronidazole vaginal cream for 10 days as soon as their results were obtained. All of the women were monitored until delivery. Pregnancy outcomes were recorded in a register for each patient, specifically for this study.

A means of identification was provided in the case notes, and the phone numbers of all the women were taken for ease of communication. All neonates in this study were observed for at least one week after delivery.

The following parameters were recorded for this study: gestational age at delivery (less or more than 37 weeks), rupture of amniotic membranes before arriving to the birthing place (yes or no), neonate birth weight (less or more 2,500 g) and Apgar score. The latter is widely used in maternity wards around the world to clinically evaluate neonatal health immediately after birth (values below 7 considered unfavorable).

Data collection and analysis

Data was collected using interviewer-administered questionnaires. The questionnaire, of which 202 were distributed, included questions on demographic characteristics and adverse pregnancy outcomes studied. PPROM was defined as rupture of membranes occurring at least one hour before the onset of labor pains. PTL was diagnosed as delivery occurring before 37 completed weeks of gestation. LBW was diagnosed as birth weight below 2,500 g at delivery.

The database was built using Stata 11 software (Stata Corp., Texas, Unites States). A univariate analysis of the sample was done, and the sample of women was described considering sociodemographic, clinical and behavioral aspects. Absolute and relative values of quantitative and categorical variables were described. The variables age, menarche, first sexual intercourse and number of children were dichotomized at the median. The correlation between VV, BV and sociodemographic, clinical and behavioral variables was measured using Fisher's exact test and the chi-square test (χ^2). Following this, relative risk (RR) and the respective confidence intervals were estimated for the bivariate analysis (p<0.05).

This study was approved by the Ethics Committee of the UFRN, Brazil, number 30951413.7.0000.5292.

RESULTS

Two hundred and twelve pregnant women were recruited for this study, but only 190 women were studied, since 22 were eliminated for lack of follow-up. Thirty-six of the women studied had BV, giving an overall prevalence of 19%. Of these, 58.3% had preterm delivery, 50% had LBW newborns and 63.8% had PPROM.

The age range of the study participants was 18 to 45 years old (mean age=27±4.5 years), 40.5% of these women had high school, most were mulattoes (46.8%), and 55.8% reported having a stable relationship. VV was diagnosed in 50.8% of women at the time of vaginal material collection, and 12.2% mentioned pathological vaginal discharge in the previous six months. Most patients reported less than three partners in the last year and at least one child (**Table 1**).

Table 2 shows that there was no statistical significance between the presence of BV and sociodemographic, clinical and behavioral variables of the studied patients, such as age, education, and ethnic group. Other variables studied were smoking, allergies, the number of children, menarche, first sexual intercourse, presence of sexually transmitted infections (STIs) in their partners and number of partners (p>0.05).

As shown in **Table 3**, BV was significantly associated with gestational age below 37 weeks (p=0.001; RR 2.897), and LBW (p=0.001; RR 2.175). PPROM and unfavorable Apgar scores were not associated with BV (p>0.05).

DISCUSSION

Vaginal discharge is a common situation in pregnancy, and often physiological. It can be explained, among other factors, by the hormonal changes and hypertrophy of the vaginal epithelium comprised of cells containing glycogen[4,6]. On the other hand, due to immunological factors inherent to pregnancy, pregnant women are more vulnerable to vaginal discharges of infectious character, which can harm both the mother and the fetus[3,6,10]. This pathogenicity has brought up the possibility of a strong correlation with cases of PTL, PPROM and LBW neonates. Recent studies have shown an increased need of preventive and therapeutic strategies to avoid these outcomes[8,9].

According to Farr et al.[15], pregnancy seems to be closely associated with VVC and VV, both related to possible obstetric complications, such as PTL. These results suggest that screening for vaginal colonization of *Candida* species, even in asymptomatic

pregnant women, should occur regularly. When compared to women with normal flora, those with recurrent candidiasis had higher rates of PTL (11.9 *versus* 9.5%) and LBW neonates (10.8 *versus* 8%). Some researchers[12,15] suggest that asymptomatic *Candida* vaginal colonization could also be associated with PTL and LBW neonates. Thus, they justify routine screening and subsequent treatment to improve pregnancy outcomes. However, in our study, the presence of candidiasis in pregnant women did not increase the number of adverse obstetric outcomes.

In pregnant women, BV has been associated with PPROM, PTL and LBW neonates[1,2,10]. Accordingly, in our study the diagnosis of BV was significantly related to PTL and LBW newborns. The presence of VV was observed in 50.8% of our patients, while 40.5% had BV. In the BV group, PTL occurred in 100 women, and 78.3% had LBW neonates. We found a higher prevalence of BV and PTL than Svare et al.[1], that studied 3,262 Danish pregnant women and found BV in 16% of them and the rate of 5.2% of PTL. Afolabi et al.[2], studying Nigerian pregnant women, found a lower prevalence (26%) of BV when compared to our results, and BV was also significantly associated with PTL and LBW. It seems that, in addition to BV, socio-demographic variables, such as poor living conditions

Table 1 – Sociodemographic, behavioral and clinical characteristics of the pregnant women studied (n=190).

Categories	n	%
Age (≤27 years old)	96	50.5
Education		
Illiterate	3	1.6
Primary education incomplete	20	10.5
Primary education complete	76	40.0
High school	77	40.5
College incomplete	7	3.6
College complete	7	3.6
Marital status		
Single	31	15.7
Stable relationship	106	55.8
Separated/divorced	4	2.1
Widowed	1	0.5
Married	48	25.3
Ethnic group		
Caucasian	80	42.2
African-Brazilians	21	11.0
Mulattoes	89	46.8
Menarch age (≤12 years old)	93	50.3
First sex intercourse age (≤16 years old)	103	56.3
Vulvovaginitis (last 6 months)	24	12.2
Vulvovaginitis (current)	100	50.8
STI partners	5	2.6
Vaginal ejaculation *coitus* (per week)		
>4 *coitus*	57	32.2
3–4 *coitus*	120	67.8
Partners previous year		
≤2 partners	98	56.6
≥3 partners	75	43.4
Children (≤1)	137	72.1

STI: sexually transmitted infection.

Table 2 – Sociodemographic, behavioral and clinical characteristics related to bacterial vaginosis (BV) in pregnant women (n=190).

Variable	BV (+)		BV (-)		χ^2	RR	p-value	CI
	n	%	n	%				
Age (years old)								
≤27	39	40.6	57	59.4	0.000	1.005	1.000	0.712–1.418
≥28	38	40.4	56	59.6				
Education								
Up to high school	70	39.8	106	60.2	0.218	0.795	0.640	0.475–1.385
College	7	50.0	7	50.0				
Marital status								
Stable relationship	44	41.5	62	58.5	0.026	1.057	0.872	0.745–1.498
Others	33	39.3	51	60.7				
Ethnic group								
Caucasian	34	42.5	46	57.5	0.104	1.087	0.747	0.770–1.536
African-Brazilians/mulattoes	43	39.1	67	60.9				
Smoking								
Yes	4	44.4	5	55.6	0.000	1.102	1.000	0.520–2.337
No	73	40.3	108	59.7				
Other diseases								
Yes	18	33.3	36	66.7	1.229	0.768	0.268	0.503–1.173
No	59	43.4	77	56.6				
Allergies								
Yes	6	33.3	12	66.7	0.161	0.688	0.808	0.410–1.589
No	71	41.3	101	58.7				
Children								
≤1	52	38.0	85	62.0	0.991	0.805	0.320	0.563–1.149
≥2	25	47.2	28	52.8				
Menarch age (years old)								
≤12	35	37.6	58	62.4	0.260	0.888	0.610	0.623–1.265
≥13	39	42.4	53	57.6				
First sex intercourse age (years old)								
≤16	41	39.8	62	60.2	0.000	0.995	1.000	0.695–1.424
≥17	32	40.0	48	60.0				
STI partners								
Yes	1	20.0	4	80.0	0.236	0.487	0.627	0.084–2.834
No	76	41.1	109	58.9				
Vaginal ejaculation *coitus* (per week)								
>4 *coitus*	28	49.1	29	50.9	2.315	1.371	0.128	0.960–1.958
3–4 *coitus*	43	35.8	77	64.2				
Post anal sex ejaculation								
Yes	1	100.0	0	0.0	0.037	2.487	0.847	2.090–2.959
No	76	40.2	113	59.8				
Partners previous year								
≤2 partners	40	40.8	58	59.2	0.017	1.056	0.897	0.728–1.531
≥3 partners	29	38.7	46	61.3				

BV: Bacterial Vaginosis; χ^2: Chi-square test; RR: Relative Risk; CI: confidence interval; STI: sexually transmitted infection.

Table 3 – Relationship between bacterial vaginosis (BV) and adverse obstetric outcomes (n=190).

	BV (+)		BV (-)		χ^2	RR	p-value	CI
	n	%	n	%				
Apgar (1st minute)								
≤7	10	43.5	13	56.5	0.007	1.084	0.935	0.656–1.789
>7	67	40.1	100	59.9				
Gestacional age								
Preterm (<37 weeks)	21	100	0	0.0	27.570	2.897	0.001	2.352–3.567
Term (>37 weeks)	58	34.5	111	65.5				
Fetal weight (2,500 g)								
Below	18	78.3	8	21.7	13.196	2.175	0.001	1.617–2.927
Above	59	36.0	105	64.0				
Amniotic sac								
Disrupted	23	39.0	36	61.0	0.064	0.924	0.800	0.633–1.349
Intact	58	42.2	73	57.8				
Type of delivery								
Vaginal	36	40.9	54	59.1	0.000	0.988	1.000	0.701–1.393
Cesarean	41	41.4	58	58.6				

χ^2: Chi-square test; RR: relative risk; CI: confidence interval; Apgar score: a method to quickly summarize the health of neonate children.

and difficult access to health services, both inherent to underdeveloped countries, could also favor a greater prevalence of BV, as well as an increased risk of perinatal complications.

Several studies[18-20] have emphasized the importance of diagnosis and proper handling of genital diseases during pregnancy to prevent both maternal and fetal complications. These simple procedures can substantially impact health and reduce the costs of early hospital admission, thus improving management of financial resources. The introduction of routine laboratory screening tests during the prenatal care visits should be considered.

CONCLUSION

The evaluation of vaginal microbiota should be regularly assessed during pregnancy, even in asymptomatic patients, as part of routine examination[21]. In women with persistent discharge, screening for infections of the lower genital tract (vaginal and cervical) should be mandatory[8].

Conflict of interests

The authors declare that there is no conflict of interests regarding the publication of this article.

Acknowledgments

REFERENCES

1. Svare JA, Schmidt H, Hansen BB, Lose G. Bacterial vaginosis in a cohort of Danish pregnant women: prevalence and relationship with preterm delivery, low birthweight and perinatal infections. BJOG. 2006;113(12):1419-25.
2. Afolabi BB, Moses OE, Oduyebo OO. Bacterial Vaginosis and Pregnancy Outcome in Lagos, Nigeria. Open Forum Infect Dis. 2016;3(1):ofw030.
3. Tibaldi C, Cappello N, Latino MA, Polarolo G, Masuelli G, Cavallo F, et al. Maternal risk factors for abnormal vaginal flora during pregnancy. Int J Gynaecol Obstet. 2016 Apr;133(1):89-93.
4. Lamont RF, Sobel JD, Akins RA, Hassan SS, Chaiworapongsa T, Kusanovic JP, et al. The vaginal microbiome: new information about genital tract flora using molecular based techniques. BJOG. 2011 Apr;118(5):533-49.
5. Lindsay KL, Walsh CA, Brennan L, McAuliffe FM. Probiotics in pregnancy and maternal outcomes: a systematic review. J Matern Fetal Neonatal Med. 2013 May;26(8):772-8.
6. Zugaib M. Obstetrícia básica. Barueri: Manole; 2015.
7. Denney JM, Culhane JF. Bacterial vaginosis: a problematic infection from both a perinatal and neonatal perspective. Semin Fetal Neonatal Med. 2009 Aug;14(4):200-3.
8. Sangkomkamhang US, Lumbiganon P, Prasertcharoensook W, Laopaiboon M. Antenatal lower genital tract infection screening and treatment programs for preventing preterm delivery. Cochrane Database Syst Rev. 2015 Feb 1;(2):CD006178.
9. Koullali B, Oudijk MA, Nijman TA, Mol BW, Pajkrt E. Risk assessment and management to prevent preterm birth. Semin Fetal Neonatal Med. 2016 Apr;21(2):80-8.
10. Msuya SE, Uriyo J, Stray-Pedersen B, Sam NE, Mbizvo EM. The effectiveness of a syndromic approach in managing vaginal infections among pregnant women in northern Tanzania. East Afr J Public Health. 2009 Dec;6(3):263-7.
11. Modak T, Arora P, Agnes C, Ray R, Goswami S, Ghosh P, et al. Diagnosis of bacterial vaginosis in cases of abnormal vaginal discharge: comparison of clinical and microbiological criteria. J Infect Dev Ctries. 2011 May 28;5(5):353-60.
12. Nikolov A, Shopova E, Müseva A, Dimitrov A. Vaginal candida infection in the third trimester of pregnancy. Akush Ginekol (Sofiia). 2006;45(6):7-9.
13. Amsel R, Totten PA, Spiegel CA, Chen KC, Eschenbach D, Holmes KK. Nonspecific vaginitis. Diagnostic criteria and microbial and epidemiologic associations. Am J Med. 1983 Jan;74(1):14-22.
14. Nugent RP, Krohn MA, Hillier SL. Reliability of diagnosing bacterial vaginosis is improved by a standardized method of gram stain interpretation. J Clin Microbiol. 1991 Feb;29(2):297-301.
15. Farr A, Kiss H, Holzer I, Husslein P, Hagmann M, Petricevic L. Effect of asymptomatic vaginal colonization with *Candida albicans* on pregnancy outcome. Acta Obstet Gynecol Scand. 2015 Sep;94(9):989-96.
16. Mann JR, McDermott S, Zhou L, Barnes TL, Hardin J. Treatment of trichomoniasis in pregnancy and preterm birth: an observational study. J Womens Health (Larchmt). 2009 Apr;18(4):493-7.
17. van Schalkwyk J, Yudin MH, Infectious Disease Committee. Vulvovaginitis: screening for and management of trichomoniasis, vulvovaginal candidiasis, and bacterial vaginosis. J Obstet Gynaecol Can. 2015 Mar;37(3):266-74.
18. Lamont RF, Nhan-Chang CL, Sobel JD, Workowski K, Conde-Agudelo A, Romero R. Treatment of abnormal vaginal flora in early pregnancy with clindamycin for the prevention of spontaneous preterm birth: a systematic review and metaanalysis. Am J Obstet Gynecol. 2011 Sep;205(3):177-90.
19. Thinkhamrop J, Hofmeyr GJ, Adetoro O, Lumbiganon P, Ota E. Antibiotic prophylaxis during the second and third trimester to reduce adverse pregnancy outcomes and morbidity. Cochrane Database Syst Rev. 2015 Jun 26;1:CD002250.
20. Brocklehurst P, Gordon A, Heatley E, Milan SJ. Antibiotics for treating bacterial vaginosis in pregnancy. Cochrane Database Syst Rev. 2013 Jan 31;(1):CD000262.
21. Lamont RF. Advances in the Prevention of Infection-Related Preterm Birth. Front Immunol. 2015 Nov 16;6:566.
22. Roberts CL, Morris JM, Rickard KR, Giles WB, Simpson JM, Kotsiou G, et al. Protocol for a randomised controlled trial of treatment of asymptomatic candidiasis for the prevention of preterm birth. BMC Pregnancy Childbirth. 2011 Mar 11;11:19.

Address for correspondence:
ANA KATHERINE DA SILVEIRA GONÇALVES
Rua Major Laurentino de Morais, 1218/1301
Natal (RN), Brazil.
CEP: 59020-390
E-mail: anakatherine_ufrnet@yahoo.com.br

Pilot evaluation of a rapid immunochromatographic test for the diagnosis of gestational syphilis

Estudo piloto de avaliação de um teste rápido imunocromatográfico para o diagnóstico de sífilis gestacional

Luiz Eduardo Bernardi[1,2], Mauro Cunha Ramos[3,4], Marcia Susana Nunes da Silva[1], Maria Lucia Rosa Rossetti[1,5]

ABSTRACT

Introduction: Gestational syphilis is a global public health problem and one of the most common causes of adverse effects during pregnancy due to absence or inadequacy of treatment. Establishing a diagnosis of syphilis during prenatal care prevents the transmission of *Treponema pallidum* to the child. **Objective**: The objective of this study was to evaluate the performance of OL Syphilis (OrangeLife, Brazil), a rapid immunochromatographic test for gestational syphilis diagnosis. **Methods**: A total of 185 pregnant women in prenatal care were evaluated by OL Syphilis. The results were compared by traditional methods: Venereal Disease Research Laboratory and Rapid Plasma Reagin (VDRL and RPR) for screening and fluorescent treponemal antibody absorption test (FTA-Abs) for confirmation. **Results**: The prevalence of syphilis in this population was 6.49% (95%CI 3.40 to 11.06%). Rapid Test (RT) sensitivity was 91.67% (95%CI 61.52 to 99.79%) and specificity was 100% (95%CI 97.89 to 100%). Positive predictive value was 100% (95%CI 71.51 to 100%) and Negative predictive value was 99.43% (95%CI 96.84 to 100%). The agreement measured by Kappa coefficient was 0.954 (95%CI 0.863 to 1.000). **Conclusion**: The OL Syphilis test could be used for screening pregnant women, thus providing rapid diagnosis, increasing the probability of diagnosis and timely treatment, and preventing the devastating consequences of congenital syphilis.
Keywords: syphilis; diagnosis; pregnancy; congenital syphilis.

RESUMO

Introdução: A sífilis gestacional é um problema global de saúde pública e é uma das mais comuns causas de efeitos adversos durante a gravidez devido à ausência ou inadequação do tratamento. Estabelecer um diagnóstico de sífilis durante o pré-natal, evita a transmissão de *Treponema pallidum* para a criança. **Objetivo**: o objetivo deste estudo foi avaliar o desempenho de OL Syphilis (OrangeLife, Brasil), um teste imunocromatográfico rápido, para o diagnóstico de sífilis gestacional. **Métodos**: Um total de 185 mulheres grávidas no pré-natal foram avaliadas por sífilis OL. Os resultados foram comparados com os métodos tradicionais: Laboratório de Pesquisa de Doenças Venéreas e Reaginas de Plasma Rápido (VDRL e RPR) como ensaios de seleção e FTA-ABS como teste confirmatório. **Resultados**: A prevalência de sífilis nessa população foi de 6,49% (IC 3,40 a 11,06%). A sensibilidade do teste rápido (TR) foi de 91,67% (IC95% 61,52 a 99,79%) e a especificidade foi de 100% (95%IC 97,89 a 100%). O PPV foi 100% (95%CI 71,51 a 100%) e o VPL foi de 99,43 (95%CI 96,84 a 100%). O acordo medido pelo coeficiente Kappa foi de 0,954 (IC95% 0,863 a 1,000). **Conclusão**: O teste OL Syphilis poderia ser usado no rastreio de mulheres grávidas, fornecendo diagnóstico rápido, aumentando a probabilidade de ter a doença diagnosticada e oportuna, evitando as consequências devastadoras da sífilis congênita.
Palavras-chave: sífilis; diagnóstico; gravidez; sífilis congênita.

INTRODUCTION

Syphilis is a serious resurgent disease[1], in which the absence or inadequacy of treatment is still common. Through data collected in 97 countries, it is estimated that 1.36 million pregnant women have active syphilis. Approximately half of them had one or more adverse obstetric outcomes (215,000 abortions or stillbirths, 90,000 neonatal deaths, 65,000 premature births or low birth weight, and 150,000 newborns infected).

The disease caused the loss of 3.5 million disability-adjusted life years (DALYs) and represents a direct medical cost of US$ 309 million[2]. High-income countries were also shown to have an increasing incidence. In the United States, for example, there was an annual increase after the year 2000, reaching 5 cases per 100,000 inhabitants in 2012[3]. In Canada, in the same year, the incidence of acquired syphilis was the highest in 30 years[4].

Morbidity and mortality rates, however, are not homogeneously distributed, as low and medium-income countries suffer the greatest impacts[5]. In Brazil, a nation-wide representative cross-sectional study, conducted between 2011 and 2012, pointed out syphilis prevalence of 1.02% (95%CI 0.84–1.25) among 23,894 postpartum women[6].

According to the Epidemiological Bulletin of the Ministry of Health, in 2013, the detection rate was 7.4 cases of maternal syphilis per 1,000 live births[7]. In spite of increasing prenatal care coverage, the quality of care did not accompany this increase[8]. As a result, the country is far from eradicating syphilis as a public health problem, since the incidence proposed as a goal by the World Health Organization (WHO) would be of 0.5 cases per 1,000 live births[9].

Treponema pallidum infection is a polymorphic disease that alternates symptomatic and asymptomatic periods in which the only finding is positive serology[10]. Vertical transmission of syphilis can occur at any time during pregnancy, being more frequent in women with recent infection. Miscarriages, stillbirths, low birth weight, and even neonatal deaths are common when transmission to the conceptus occurs[11].

[1]Postgradaute program in Cell and Molecular Biology, Universidade Luterana do Brasil (ULBRA) – Canoas (RS), Brazil.
[2]Municipal Secretariat of São João – São João (PR), Brazil.
[3]Municipal Secretariat of Porto Alegre – Porto Alegre (RS), Brazil.
[4]Specialization in Dermatology, Fundação Federal de Ciências Médicas de Porto Alegre – Porto Alegre (RS), Brazil.
[5]Center for Scientific and Technological Development, Fundação Estadual de Produção e Pesquisa em Saúde (FEPPS) – Porto Alegre (RS), Brazil.

In clinical practice, the diagnosis of syphilis depends on serology by treponemal and/or non-treponemal tests. Among non-treponemal, VDRL (venereal disease research laboratory), RPR test card (rapid plasmatic reagins), and TRUST (toluidine red unheated serum test) are generally used for screening. These tests can be titrated, a procedure that is essential for post-treatment follow-up[12]. Since 2012, the Brazilian Ministry of Health has required that a positive non-treponemal test be confirmed by a treponemal test[7]. The most commonly used treponemal tests are FTA-Abs (fluorescent treponemal antibody absorption test), TPHA (*T. pallidum* haemagglutination test), TPPA(*T. pallidum* passive particle agglutination test), EIA (treponemal enzyme immunoassay), and CIA (chemiluminescence immunoassay)[12]. Laboratories with large volume of samples have started to perform screenings by automated treponemal tests (*e.g.*, CMIA tests)[13], a system named "reverse flowchart"[14]. When using reverse flowchart, non-treponemal quantitative tests remain mandatory for both confirmation and post-treatment follow-up.

More recently, rapid tests (RT) started being used for syphilis screening, particularly gestational syphilis. These are treponemal tests which do not depend on laboratory infrastructure, sophisticated equipment, refrigeration or electricity. They can be used by trained professionals even in resource-scarcity settings[15,16]. They are also considered point-of-care tests whose main advantage is to provide diagnosis at the time of consultation, with results in 15 to 30 minutes. Treatment can supposedly be started immediately, which is crucial for obstetrical prognosis. Rapid tests were evaluated in a laboratory environment, showing satisfactory sensitivity and specificity when compared to conventional treponemal tests[17].

They also presented adequate performance in field situations, including hard to reach locations[18]. The WHO defined ideal characteristics for the choice of a point-of-care test: sensitivity and specificity, quick results, simplicity, low cost, robustness, independence of equipment, and availability to those in need[15]. They are part of the public health recommendations for primary care and mother-and-child hospitals across Brazil, being performed free of charge by the public health system (*Sistema Único de Saúde — SUS*)[19].

OBJECTIVE

The objective of this study was to evaluate OL Syphilis (OrangeLife, Rio de Janeiro, Brazil), a rapid immunochromatographic test for syphilis diagnosis in pregnant women seen at a prenatal service of a university hospital.

METHODS

This was a diagnostic test study that included 189 serum samples from pregnant women attending prenatal care, from October 2014 to January 2015, at a university hospital reference for high-risk pregnancies in the city of Francisco Beltrão, Paraná, Brazil. Three samples were excluded due to presence of hemolysis, lipemic appearance, signs of contamination and/or insufficient volume for testing. Another sample was excluded because its result was considered false positive (reactive VDRL, non-reactive RPR, and negative FTA-Abs). Serum samples collected as part of the prenatal care routine were coded and had all personal identification data related eliminated.

A true "case of syphilis" criteria was reactivity found in one or both non-treponemal tests (VDRL and/or RPR), and confirmed by a treponemal test (FTA-Abs). The VDRL test (Winer, Rosario, AR) was comprised of a solution of cardiolipin, lecithin and cholesterol, and a choline-stabilized buffer. Flocculation was identified by optical microscopy. The RPR test (Laborclin, Pines, Brazil) contained an antigenic suspension that, in the presence of serum containing specific antibodies, would present flocculation visible under a light source. Treponemal fluorescent antibodies were identified by indirect immunofluorescence microscopy. The rapid test used was OL Syphilis, an immunochromatographic with lateral flow test using recombinant *T. pallidum* antigens immobilized in the test line region. It is applicable to whole blood, serum or plasma. All tests were performed according to manufacturers' instructions.

Sensitivity, specificity, positive and negative predictive values were presented as proportions and respective confidence intervals. Concordance was measured using Cohen's Kappa Coefficient. The study was submitted and approved by the human research ethics committee of Universidade Luterana do Brazil under protocol 1047020/2015. An informed consent form was signed (Resolution National Council of Health 466/12 item IV.8), since there was no additional risk to participants: no changes in care routines and observational character of study, in which aliquots were taken from samples previously obtained and tests were performed without any personal identifiers.

RESULTS

Out of 185 samples from pregnant women in prenatal care, 12 were considered positive by non-treponemal tests (11 samples were reagent to VDRL and 7 were positive to RPR). When tested by FTA-Abs, all 12 samples were positive and, therefore, defined as "syphilis cases". All samples that tested negative, defined as "non-syphilis cases", were also negative when tested by RT (**Table 1**). The prevalence of "syphilis cases" in our sample was 6.49% (95%CI 3.40% to 11.06%). RT sensitivity was 91.67% (95%CI 61.52 to 99.79%) and specificity was 100% (95%CI 97.89 to 100%). Positive predictive value (PPV) was 100% (95%CI 71.51 to 100%) and negative predictive

Table 1 – Samples with positive rapid tests.

Sample	RT	VDRL	RPR	FTA-Abs*	Case of Syphilis
1	+	-	-	+	No
67	+	+	-	+	Yes
147	+	-	+	+	Yes
151	+	+	+	+	Yes
159	+	+	+	+	Yes
161	+	+	+	+	Yes
168	+	+	+	+	Yes
173	+	+	-	+	Yes
174	+	+	+	+	Yes
175	+	+	-	+	Yes
176	-	+	-	-	

*Presence of IgG antibodies.
RT: rapid test; VDRL: Venereal Disease Research Laboratory; RPR: Rapid Plasma Reagin; FTA-Abs: fluorescent treponemal antibody absorption test.

value (NPV) was 99.43% (95%CI 96.84 to 100%). The agreement, measured by Kappa coefficient, was 0.954 (95%CI 0.863 to 1.000). A sample that tested positive in RT and non-reactive in VDRL and RPR also resulted positive when FTA-Abs was performed.

DISCUSSION

The findings of this study indicate that OL Syphilis (OrangeLife), a rapid immunochromatographic test, could be used for diagnosing syphilis in pregnant women, so, it may be an additional option in individual care as well as in public health activities. Like all RT, it can be conveniently performed at the time of consultation, providing timely results that allow starting treatment before patients leave the health-care facilities. This is suitable when it comes to healthcare for pregnant women and their partners, to whom implementation of early treatment prevents severe adverse obstetric outcomes[20]. In spite of providing valid results in environments where traditional tests do not work, RT may be misinterpreted, but it can be avoided by training programs with internal and external quality control[18]. The high prevalence of positive results in our sample — over 6% — upholds the serious epidemiological situation in Brazil. It is well above the prevalence found in nation-wide studies[6]. The service being a reference for high-risk pregnancies could have influenced prevalence upwards, but it does not diminish the importance of our findings. We compared OL Syphilis with the Brazilian flowchart used before the implementation of RT in Brazil. The recommendations then were non-treponemal tests for screening, and treponemal tests for confirmation. It is well known that treponemal tests (such as OL Syphilis RT) have greater sensitivity than non-treponemal ones, especially to detect early infections and post-treatment immunological memory[17]. This was found once in our sample.

The sample size can be considered a limitation of this study, however, it allowed us to establish acceptable confidence intervals, as well as positive and negative predictive values. The results were similar to those reported in the literature, where RT was used to diagnose syphilis in pregnant women. The performance of a rapid syphilis diagnostic test known as SD BIOLINE Syphilis 3.0 was evaluated elsewhere (SD Biostandard Diagnostics), and IMMUTREP Treponema pallidum hemagglutination assay (TPHA) was used as control. The standard reference and sensitivity, specificity, and PPV/NPV values of SD BIOLINE Syphilis 3.0 were 92.86% (95%CI: 80.52–98.50%), 98.28% (90.76–99.96%), 97.50% (86.84–99.94%), and 95.00% (86.08–98.96%), respectively, compared to TPHA as the gold standard[21]. Further evaluation was performed using Accu-Tell rapid anti-TP tests; Alere Determine Syphilis TPO; Cypress Diagnostics Syphilis Quick test; and SD Bioline Syphilis 3.0 test. Sensitivity ranged from 78 to 93% and specificity from 95 to 98% in a group of 120 patients. All four tests were proven to have good diagnostic specificity for syphilis (95–98%), and healthcare professionals found them easy to use[22]. As for Chembio MedMira SD Bioline test, the results in a group of 1,514 patients was 94.2-99.67% for sensitivity and 97.2-99.72% for specificity[23].

Using non-treponemal tests for screening and treponemal tests for confirmation is a procedure used in many settings. As a result, multiple visits increase the costs for services, patients, and, most importantly, it implies lost opportunities: many pregnancies have come

to term without adequate treatment while waiting for test results[16]. RT has been recently consolidated as a better option to expand testing for pregnant women, especially in peripheral health settings[9]. The results of RT must also be considered in the light of clinical information — they remain positive in spite of previous treatments; but a positive result does not always indicate active syphilis. A non-treponemal test should always be performed to enable adequate follow-up; nonetheless, it is unacceptable that treatment be postponed until results are available.

CONCLUSION

In conclusion, the OL Syphilis test could be used for screening pregnant women, thus providing rapid diagnosis, increasing the probability of diagnosis and timely treatment, and preventing the devastating consequences of congenital syphilis. It is known that preventing congenital syphilis is one of the most cost-effective measures in public health, as its occurrence in current times is unacceptable and reveals the failure of health systems.

Conflict of interests

The authors declare no conflict of interests.

REFERENCES

1. Cohen SE, Klausner JD, Engelman J, Philip S. Syphilis in the modern era: an update for physicians. Infect Dis Clin North Am. 2013 Dec;27(4):705-22.
2. Newman L, Kamb M, Hawkes S, Gomez G, Say L, Seuc A, et al. Global estimates of syphilis in pregnancy and associated adverse outcomes: analysis of multinational antenatal surveillance data. PLoS Med. 2013 Jan;10(2):e1001396.
3. Centers for Disease Control and Prevention. Department of Health and Human Services. Sexually Transmitted Disease Surveillance 2012. Atlanta: Department of Health and Human Services; 2014. 174p.
4. Morshed MG. Current trend on syphilis diagnosis: issues and challenges. Adv Exp Med Biol. 2014 Jan;808:51-64.
5. World Health Organization. Global Health Observatory Map Gallery [Internet]. 2010. Available from: <http://gamapserver.who.int/mapLibrary/app/searchResults.aspx>. Access on: Oct 16, 2014.
6. Domingues RMSM, Szwarcwald CL, Souza Junior PRB, Leal M do C. Prevalence of syphilis in pregnancy and prenatal syphilis testing in Brazil: Birth in Brazil study. Rev Saúde Pública. 2014;48(5):766-74.
7. Brasil. Ministério da Saúde. Boletim Epidemiológico de Sífilis: 2015. Brasília: Ministério da Saúde; 2015.
8. Saraceni V, Miranda AE. [Coverage by the Family Health Strategy and diagnosis of syphilis in pregnancy and congenital syphilis]. Cad Saúde Pública. 2012 Mar;28(3):490-6.
9. World Health Organization. Investment case for eliminating mother-to-child transmission of syphilis: promoting better maternal and child health and stronger health systems. Geneva, Switzerland: WHO; 2012. 31p.

10. Lafond RE, Lukehart SA. Biological basis for syphilis. Clin Microbiol Rev. 2006 Jan;19(1):29-49.

11. Stoll BJ. Congenital syphilis: evaluation and management of neonates born to mothers with reactive serologic tests for syphilis. Pediatr Infect Dis J. 1994;13(10):845-52.

12. Janier M, Hegyi V, Dupin N, Unemo M, Tiplica GS, Poto M. 2014 European Guideline on the Management of Syphilis [Internet]. 2014. Available from: <http://www.iusti.org/regions/europe/pdf/2014/2014SyphilisguidelineEuropean.pdf>. Access on: Dec. 12, 2017.

13. Sommese L, Paolillo R, Sabia C, Costa D, De Pascale MR, Iannone C, et al. Syphilis detection: evaluation of serological screening and pilot reverse confirmatory assay algorithm in blood donors. Int J STD AIDS. 2016 Jul;27(8):644-9.

14. Morshed MG, Lee M-K, Jorgensen D, Isaac-Renton JL. Molecular methods used in clinical laboratory: prospects and pitfalls. FEMS Immunol Med Microbiol. 2007;49(2):184-91.

15. Nessa K, Alam A, Chawdhury FAH, Huq M, Nahar S, Salauddin G, et al. Field evaluation of simple rapid tests in the diagnosis of syphilis. Int J STD AIDS. 2008;19(5):316-20.

16. Mabey DC, Sollis KA, Kelly HA, Benzaken AS, Bitarakwate E, Changalucha J, et al. Point-of-care tests to strengthen health systems and save newborn lives: the case of syphilis. PLoS Med. 2012 Jan;9(6):e1001233.

17. Jafari Y, Peeling R, Shivkumar S, Claessens C, Joseph L, Pai N. Are Treponema pallidum specific rapid and point-of-care tests for syphilis accurate enough for screening in resource limited settings? Evidence from a meta-analysis. PLoS One. 2013 Jan;8(2):e54695.

18. Benzaken AS, Bazzo ML, Galban E, Pinto ICP, Nogueira CL, Golfetto L, et al. External quality assurance with dried tube specimens (DTS) for point-of-care syphilis and HIV tests: experience in an indigenous populations screening programme in the Brazilian Amazon. Sex Transm Infect. 2014;90:14-8.

19. Brasil. Ministério da Saúde. Orientações para a Implantação dos Testes Rápidos de HIV e Sífilis na Atenção Básica - Rede Cegonha. Brasília: Ministério da Saúde.

20. Kingston M, French P, Higgins S, McQuillan O, Sukthankar A, Stott C, et al. UK national guidelines on the management of syphilis 2015. Int J STD AIDS. 2016 May;27(6):421-46.

21. Mehra B, Bhattar S, Saxena S, Rawat D, Bhalla P. Evaluation of SD BIOLINE Syphilis 3.0 for Rapid Diagnosis of Syphilis: Report from a Regional Sexually Transmitted Infection Reference Laboratory in North India. J Lab Physicians. 2016 Jan-Jun;8(1):36-40.

22. Bocoum FY, Ouédraogo H, Tarnagda G, Kiba A, Tiendrebeogo S, Bationo F, et al. Evaluation of the diagnostic performance and operational characteristics of four rapid immunochromatographic syphilis tests in Burkina Faso. Afr Health Sci. 2015 June;15(2):360-67.

23. Yin YP, Ngige E, Anyaike C, Ijaodola G, Oyelade TA, Vaz RG, et al. Laboratory evaluation of three dual rapid diagnostic tests for HIV and syphilis in China and Nigeria. Int J Gynaecol Obstet. 2015 Jun;130 Suppl 1:S22-6.

Address for correspondence:
MAURO CUNHA RAMOS
Rua 24 de Outubro, 435/202 – Moinhos de Vento
Porto Alegre (RS), Brazil
CEP: 90510-002
E-mail: maurocunharamos@gmail.com