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Clinical Study

The Prevalence of Urogenital Infections in Pregnant Women Experiencing Preterm and Full-Term Labor

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Urogenital infections are extremely prevalent during pregnancy and are an important cause of premature labor. However, the prevalence of urogenital infections during childbirth is not well known. *Objective*. Identify urogenital infections present at the beginning of labor in both full-term and preterm pregnancies. *Study Design*. Ninety-four women were admitted to the inpatient maternity clinic of the Federal University of Rio Grande do Norte (UFRN). In total, 49 women in preterm labor and 45 women in full-term labor were included in the study, and samples of urinary, vaginal, and perianal material were collected for microbiological analysis. *Results*. The prevalences of general infections in the preterm labor group and the full-term labor group were 49.0% and 53.3% ($P = 0.8300$), respectively. Urogenital infections in the preterm and full-term labor groups included urinary tract infection in 36.7% and 22.2% of women, vaginal candidiasis in 20.4% and 28.9% of women, bacterial vaginosis in 34.7% and 28.9% of women, and group B streptococcus in 6.1% and 15.6% of women, respectively. *Conclusions*. Urogenital infections were prevalent in women in preterm labor and full-term labor; however, significant differences between the groups were not observed.

1. Introduction

Urogenital infections (UGIs) are prevalent during pregnancy and are recognized as an important cause of premature labor. However, little is known about the prevalence of UGIs during labor [1].

Normal cervicovaginal flora plays a crucial role in the defense against the growth and ascension of pathogens. Lactobacilli exercises a local defense mechanism due to its production of lactic acid and hydrogen peroxide. During pregnancy, an imbalance in the vaginal flora favors the colonization of the urogenital system by microorganisms, which can complicate a pregnancy [2].

Bacterial vaginosis (BV), vulvovaginal candidiasis (VC), and trichomoniasis are responsible for 90% of cases of infectious vulvovaginitis, which can lead to gynecological and obstetrical complications such as pelvic inflammatory disease, postabortion endometritis, chorioamnionitis, and premature labor [3, 4].

The most common infection among women in preterm labor (PTL) and preterm delivery (PTD) is BV. During pregnancy, normal vaginal microbiota, which consists primarily of lactobacilli, is substituted by anaerobic bacteria such as *Gardnerella vaginalis* and *Mycoplasma homini,* resulting in a significant reduction in lactobacilli and increased pH (greater than 4.5) [5–7].

Vaginal Candidiasis (VC) is an infection of the vulva and vagina that is caused by various species of Candida, a commensal fungus of the digestive and vaginal mucosae that can become pathogenic under specific conditions such as pregnancy [8, 9].

Pregnant women infected by *Trichomonas vaginalis* have had a high risk of complications. Studies have shown that trichomoniasis is associated with the premature rupture of

membranes, premature delivery, low birth weight, postpartum endometritis, stillbirth, and neonatal death [10].

Urinary tract infections (UTIs) also cause complications during the gestation period. The presence of pathogenic bacteria in the bladder of pregnant women is associated with the mass colonization of the inferior genital tract and the presence of chorioamnionitis, even when the infection is subclinical [11].

In the early 1970s, group B streptococcus (GBS) was recognized as an important cause of neonatal morbidity and mortality in the United States and was determined to be responsible for meningitis and sepsis in newborns, both in its early form in the first seven days of life and in its later form from the seventh to the ninetieth day of life [12]. Due to the high risk of death, preventive measures against GBS are necessary. Moreover, many studies have demonstrated the importance of adequate maternal diagnosis and treatment for the reduction of the vertical transmission of BGS and early-onset neonatal sepsis [13].

In mothers colonized by GBS during pregnancy, vertical transmission occurs during 30 to 70% of births [14]. Beraldo et al. [15] revealed that the prevalence of vaginal and anorectal GBS colonization was 14.9% in pregnant women in the third trimester. Nomura et al. [16] conducted a study in Campinas, SP and demonstrated that the rate of maternal colonization was 27.6%. In the aforementioned study, 30% of these women also suffered from preterm membrane rupture, and 25% went into PTL.

Adequate diagnosis and treatment of urogenital infections during the prenatal period is necessary; however, the prevalence of infections during labor must be studied, and the importance of these infections in determining the outcome of pregnancy and the health of the newborns must be evaluated.

2. Materials and Methodology

The present study involved 94 pregnant women admitted to the inpatient maternity clinic of the Federal University of Rio Grande do Norte (UFRN) in Natal, Brazil, between January and June of 2009. Two groups were created: the preterm labor group (PTL), which consisted of 49 patients with a gestation period less than 36.6 weeks (confirmed by the date of last menstruation and/or ultrasound in the first trimester or by the Capurro index) and the full-term labor group (FTL), which included 45 patients with a gestation period between 37 and 42 weeks.

All of the women were personally interviewed by one of the researchers, and they were included in the study after signing documentation of informed consent. Each patient underwent a gynecological exam, and urinary, vaginal, and perianal samples were taken for microbiological study.

Urinary infection was identified via CLED and MacConkey culture. The isolated bacteria were identified based on biochemical tests carried out on a MicroScan automation apparatus.

BV was identified according to the Amsel criteria, and VC was diagnosed by analyzing vaginal smears. Gram's method was used, and Candida were cultured in Sabouraud agar. Vaginal trichomoniasis was diagnosed via direct microscopic examination, and the presence of GBS was determined by obtaining rectal and vaginal cultures (Todd-Hewitt medium).

Data were collected and condensed into a database and were analyzed using Statistics 6.1 and SPSS 13. A descriptive analysis of the data was completed by constructing bivariate frequency tables, and the following variables were crossed: type of birth, full-term or preterm labor, various sociodemographic factors, the presence of a UGI, and statistics such as the average and standard deviation. To identify differences among the variables, Pearson's Chi-square test with Yates' corrections and the Mann-Whitney U test were used. The prerequisites for each test were considered continuously, and a significance level of 5% was adopted for all tests.

This study was approved by the ethics committee of the Medicine Faculty of the State University of Campinas.

3. Results

The results of the sociodemographic analysis demonstrated that among the 49 PTL women, 79.6% were Caucasian, 95.9% were married (with a fixed partner), 10.2% were smokers, and the average age was 25 years old. Among the 45 FTL women, 75.6% were Caucasian, 97.8% were married, 2.2% were smokers, and the average age was 24 years old. No statistically significant differences in the sociodemographic variables were observed between the groups (Tables 1 and 2).

Of the 49 women in the PTL group, 24 had general infections (49.0%). Among the urogenital infections detected in the PTL group, urinary tract infections (UTIs) were the most prevalent (36.7%), followed by bacterial vaginosis (34.7%). In the FTL group, 53.3% of the 45 women had general infections. The most common infections in the FTL group were bacterial vaginosis and candidiasis (28.9% for both). Statistically significant differences in the studied variables were not detected between the two groups.

4. Discussion

UGIs during pregnancy are an important cause of PTL; thus, preventative measures must be taken during the prenatal period. The prevention of prenatal UGIs is often impossible because UGIs generally present a multifactorial or unknown etiology. Several studies have addressed the association of UGIs with pregnancy [17–19].

Intrauterine infections associated with premature labor occur before the 30th week of gestation. In particular, an association between premature labor and infection at the end of gestation (34–36 weeks of gestation) is fairly uncommon [20].

Microbiota that inhabit the vagina play an important role in the spread of illnesses and the maintenance of a healthy genital tract. The correlation between UGIs and the possibility of infection in the newborn is high; thus, as a first step toward the understanding of infection in newborns, it

Table 1: Sociodemographic analysis and prevalence of urogenital infections in women in preterm and full-term labor.

Sociodemographic Variables	Preterm ($n = 49$)	Full term ($n = 45$)	P value
Age ($\overline{X} \pm$ sd)	25 (7.7)	24 (6.4)	1.0000**
Caucasian n (%)	39 (79.6)	34 (75.6)	0.8247*
Married n (%)	47 (95.9)	44 (97.8)	0.9402*
Smoker n (%)	5 (10.2)	1 (2.2)	0.2464*
N. consultations ($\overline{X} \pm$ sd)	6 (2.4)	7 (3.3)	0.3662**

* Pearson's Chi-square test with Yates' corrections.
** Mann Whitney test.

Table 2: The prevalence of urogenital infection in PTL and FTL women.

Clinical infection	Preterm ($n = 49$)	Full term ($n = 45$)	P value
Vaginal infections	24 (49.0%)	24 (53.3%)	0.8300
Urinary infection	18 (36.7%)	10 (22.2%)	0.1898
Candidiasis	10 (20.4%)	13 (28.9%)	0.4744
Bacterial vaginosis	17 (34.7%)	13 (28.9%)	0.7027
Streptococcus Infection	3 (6.1%)	7 (15.6%)	0.2514

* Chi-square test with Yates' corrections.

is imperative to determine the prevalence of colonization in pregnant women.

In the present study, the highest rate of vaginal infection was observed in the FTL group (53.3%); the rate of infection in the PTL group was 49.0%. Trichomoniasis is also associated with genital infection; however, in the present study, its presence was insignificant, and only one (01) case was identified in each group. In the last few decades, the number of cases of trichomoniasis has decreased due to adequate treatment and improved health conditions of the population [21].

In the current study, high rates of bacterial vaginosis were observed in both groups; 34.7% of women in the PTL group and 28.9% of women in the FTL group had bacterial vaginosis. However, significant differences between the two groups were not observed. Infections that induce premature labor occur very early in pregnancy and are undetected until childbirth [17, 18]. The results of the present study cannot confirm that PTL is associated with the presence of infection.

Significant differences in the prevalence of GBS were not observed between PTL (6.1%) and FTL women (15.6%), which is in agreement with the results obtained by other researchers, who demonstrated that GBS colonization occurred in 5–35% of women during pregnancy. The rate of GBS colonization is dependent on sociocultural and geographical variables, the site and time of sampling, and the bacteriological methodology used to identify GBS [22].

Benchetrit et al. [23] conducted a study in Porto Alegre and were the first to analyze GBS colonization in pregnant women in Brazil. In the aforementioned study, 86 women were evaluated, and the colonization rate was equal to 26%. In the city of Londrina, Parana, 100 women were studied, and a colonization rate of 15% was observed [24].

Simões et al. [25] studied *Candida albicans* and found a prevalence of 19.3% for vaginal candidiasis in normal pregnant women in the third trimester. In the present study, *Candida albicans* was identified in 20.4% of PTL women and 28.99% of FTL women; there was significant difference between the two groups.

The frequency and severity of UTIs during pregnancy have been established for more than a century. Although it is accepted that UTIs cause relatively common problems during pregnancy, several questions concerning this subject remain controversial and have become a motive for clinical investigations [26].

To reduce the rate of urinary infection and related complications during pregnancy, several measures at different points of obstetric assistance must be conducted. Urine cultures must be obtained during prenatal followup to diagnose and treat cases of asymptomatic bacteriuria, the most effective antimicrobial treatment must be used, close medical care should be arranged for high-risk prenatal cases, and the treatment of maternal and perinatal complications in hospitals with adequate conditions must be guaranteed. In the current study, a high percentage of UTIs was observed in both groups; 36.7% and 22.2% of PTL and FTL mothers, respectively, had a UTI. These results are worrisome because of possible complications during pregnancy and labor as well as serious consequences for the newborn.

Our results failed to show an association between sociodemographic variables and the prevalence of UGI. Despite the fact that several risk factors can affect the occurrence of UGIs, such as maternal age, conjugal status, race, and smoking, significant correlations between risk factors and UGI prevalence were not observed in the present study.

Due to the fact that UGIs cause premature labor and are often asymptomatic, early screening and treatment are necessary to reduce mortality and morbidity resulting from premature labor and birth.

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