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Prevalence of Cervicovaginal Infections During Gestation and Accuracy of Clinical Diagnosis

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ABSTRACT

Objectives: The aim of this study was to establish the prevalence of cervicovaginal infections in normal third-trimester pregnant women and evaluate the accuracy of clinical diagnosis.

Method: A total of 328 pregnant women were followed at the Prenatal Outpatient Clinic of the Department of Obstetrics and Gynecology at the School of Medical Sciences, Universidade Estadual de Campinas (UNICAMP), Brazil, from October 1991 to February 1993. The clinical diagnosis was based on the characteristics of the vaginal discharge, and the etiological diagnosis was based on bacterioscopy of the vaginal secretion and direct immunofluorescence for *Chlamydia trachomatis.* The data were analyzed statistically, determining the sensitivity, specificity, and positive and negative predictive value of the clinical diagnosis related to the laboratory diagnosis of the different infections.

Results: The prevalence of infection was 39.6% (*Candida albicans,* 19.2%; bacterial vaginosis, 9.5%; intermediate vaginal flora, 6.7%; *Chlamydia trachomatis,* 2.1%; and vaginal trichomoniasis, 2.1%). The accuracy of clinical diagnosis was low, with sensitivity between 50% and 65% and specificity around 60%, with the exception of trichomoniasis, which showed a sensitivity of 100% and chlamydia, with a sensitivity of 0% and a specificity of 100%.

Conclusion: The accuracy of the clinical diagnosis of infections was low, specifically with respect to the positive predictive value. The results demonstrate the need for specific testing of cervicovaginal infections at prenatal visits. Reliance on simple vaginal examination results in a low yield for detection of vaginal infections. Infect. Dis. Obstet. Gynecol. 6:129–133, 1998.

KEY WORDS
vulvovaginitis; vaginal discharge; bacterioscopy

In general, the presence of lower genital tract infections poses a threat to the health of a woman. When infection is present in the pregnant patient, the consequences can be significant to the well-being of the mother and fetus. Early detection is important because maternal physiological alterations may hamper the infections' diagnosis and management, and the presence of the fetus may limit treatment.[1]

Pregnancy offers an excellent opportunity to establish whether the vaginal ecosystem has been altered or is infected. This, in turn, offers the physician an excellent opportunity for the investigation and treatment of these infections and for education of the patient.

The possible side effects of cervicovaginal infections on the gestation of the fetus have been the focus of several investigations for the past several

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years. Infections of the lower genital tract can have a direct effect on the fetus, while others predispose indirect fetal damage, secondary to premature labor and/or premature rupture of membranes.[2]

In view of the frequent occurrence of lower genital tract infections and their potential seriousness, self-medication continues to be very common. Individuals rely on a medication that was used in the past or that was recommended by a friend or by the salespersons at the pharmacy. Adding to the problem, physicians commonly treat the patient without even performing an examination. Treatment is based on the patient's description of the symptoms, many times over the phone.[3]

Another factor to consider in the management of cervicovaginal infections is that they are frequently asymptomatic. When they are symptomatic, their clinical diagnosis is based only on the clinical characteristics of the vaginal discharge, which has been shown to be insufficient for establishing the correct diagnosis in most cases.[4]

The literature is replete with studies documenting the prevalence of lower genital tract infections during pregnancy. Risk factors such as race, socioeconomic level, STD background, and geographical localization appear to be significant.[5] The present study was undertaken to determine the prevalence of lower genital tract infections among pregnant women attending the obstetrical service at the Hospital de Clínicas of the Universidade Estadual de Campinas, Brazil and to evaluate the accuracy of the diagnosis based on the clinical impression.

MATERIAL AND METHODS

A total of 328 women who were beginning their third trimester of pregnancy and who voluntarily agreed to participate were entered into the study. All the patients attended the Pre-Natal Outpatient Clinic of the Hospital de Clínicas, at the Universidade Estadual de Campinas (UNICAMP), Brazil, in the period between October 28, 1991, and February 16, 1993. Patients attending the High Risk Pre-Natal Care Clinic were excluded. The research protocol was submitted to and approved by the institution's Research and Ethical Committees.

Each woman went through a speculum examination, and the clinical characteristics of the vaginal discharge were used to establish a clinical diagnosis, based only on the patient's complaints and the aspect of the vaginal discharge. Samples of the vaginal discharge were collected and processed as follows: pH measurement, Whiff test, wet mount for light microscopy, and Gram stain. An endocervical specimen was collected and subjected to direct immunofluorescence antigen-antibody testing for the detection of *Chlamydia trachomatis* (Kit Patho DX-DPC, Diagnostic Products Corporation, Los Angeles, CA). The results of these exams were used to determine the definitive diagnosis of the following infections: vaginal candidiasis (VC), bacterial vaginosis (BV), vaginal trichomoniasis (VT), infection by *Chlamydia trachomatis* (CT), as well as intermediate vaginal flora (IVF) without an etiological agent.[6] The diagnosis of BV was based on the presence of white vaginal discharge, positive Whiff test, vaginal pH = 4.5 and clue cells in the Gram stain.[7]

Data were analyzed through descriptive tables of the variables studied, establishing the prevalence of the infections. The accuracy of the clinical diagnosis was evaluated through frequency tables, using the laboratory result as the gold standard. The chi-square test or the exact Fischer test were used for the statistical analysis, as appropriate.

RESULTS

The mean age was 25.7 years (SD = 6.1), and 15.9% were younger than 20 years of age. The mean number of gestations was 2.6 (SD = 1.8), with more than one third (38.7%) of the women being pregnant for the first time. Sixty-three (19.2%) had a history of one or more abortions, and over 10% did not have a permanent live-in partner. One third of the patients were nonwhite, 27.1% were smokers, and almost 70% had a low level of formal education.

Infection was diagnosed by clinical impression in 139 women (42.4%): 17.2% intermediate vaginal flora; 15.9% vaginal candidiasis; 6.2% vaginal trichomoniasis and 3.1% bacterial vaginosis (Table 1). The presence of cervicovaginal infections was established by specific laboratory testing in 121 women (36.9%), but 8 women had more than one infection for a total of 130 (39.6%) positive tests. The infection with the highest prevalence was vaginal candidiasis (19.2%), followed by bacterial vaginosis (9.5%) and intermediate vaginal flora (6.7%). The other infections studied had much lower prevalence: 2.1% for *Chlamydia trachomatis* and for *Trichomonas vaginalis* (see Table 1).

TABLE 1. Prevalence of the different types of genital infection according to clinical and laboratory diagnosis ($N = 328$)

	Clinical impression		Laboratory diagnosis	
Type of Infection	N	%	N	%
Candida albicans	52	15.9	63	19.2
Bacterial vaginosis	10	3.1	31	9.5
Intermediate vaginal flora	56	17.2	22	6.7
Chlamydia trachomatis	—	—	07	2.1
Trichomonas vaginalis	21	6.2	07	2.1
TOTAL	139	42.4	130*	39.6

*8 women had more than one infection (121 women with at least one laboratory infection)

Among the 139 patients with clinical diagnoses of infection, only 74 (53.2%) were confirmed through laboratory exams. On the other hand, 47 (24.9%) of the 189 patients clinically considered to be without any infection had laboratory diagnoses of cervicovaginal infections (Table 2).

The accuracy of the clinical diagnosis based only on patient's symptoms and the aspect of the vaginal discharge at the speculum examination was low regarding all the infections evaluated (Table 3). Every infection was overdiagnosed by clinical impression, with the exception of chlamydia, which was never suspected. Every confirmed infection by *Trichomonas vaginalis* was diagnosed by the clinician, but the specificity was below 60%. The sensitivity for all other infections was between 50% and 65%, which, added to the low prevalence, led to a very low positive predictive value, from 0 in the case of Chlamydia to 29% for Candida. The overdiagnosis and low prevalence expectedly coincide with a high negative predictive value which varied from 88% for Candida to 100% for *Trichomonas vaginalis* (Table 3).

DISCUSSION

The rate of vaginal infections observed in our study may be considered high, as approximately 37% of the pregnant women had at least one type of cervicovaginal infection. This rate is similar to that observed by other authors.[8,9] The young age of most women in the sample, a factor commonly associated with a higher frequency of such infections, would allow one to expect even higher rates than those observed.[9]

Vaginal candidiasis was the most prevalent infection in this study, being present in practically one-fifth of the women. This result agrees with the literature, where it is described as the most frequent genital infection during pregnancy, especially during the third trimester.[9] Some studies, including a few from Brazil, found a much higher prevalence than the one observed in the present study.[10,11] Probably one of the main factors that may explain the difference in prevalence is the methodology used for the diagnosis of vaginal candidiasis. The diagnostic method used in this study was microscopic examination of unstained vaginal discharge (wet preparation), the method most readily accessible in our country. Besides, specialists in vaginal flora are convinced that many women are asymptomatic carriers, while the simple presence of the yeast does not necessarily mean clinical infection.[12]

Our results demonstrated that the frequency of the clinical diagnosis was quite similar to that of the laboratory diagnosis (15.9% vs. 19.2%). However, the expected coincidence between both diagnoses did not occur, as less than 30% of the clinical diagnosis of vaginal candidiasis were confirmed by the laboratory and less than two thirds of the cases confirmed by the laboratory were diagnosed by clinical examination.

Similarly, the very low sensitivity of the clinical criteria for the diagnosis of BV confirms the need for microscopy and Gram stain of vaginal discharge, or at least pH measurement and Whiff test, as a routine in antenatal care, considering the risks associated with BV during pregnancy.

On the other hand, vaginal trichomoniasis was largely overdiagnosed by clinical impression, which was confirmed by the laboratory in only one of every three cases. The low prevalence found in this study is shared by other studies[9] and agrees with the significant decrease in the prevalence of VT observed in the last years.[4] One of the explanations for the low presence of VT is the widespread use of imidazolic derivatives for the treatment of any frothy vaginal discharge. Since the clinical characteristics of the discharge are nonspecific, VT cannot be reliably diagnosed to permit treatment without a demonstration of the presence of the organisms.

The possibility that pregnancy per se increases the risk of infection by *C. trachomatis* has been suggested by various authors, particularly in studies

TABLE 2. Cervicovaginal infections according to laboratory confirmation of the clinical diagnosis

	Laboratory Diagnosis				
	Women with cervicovaginal infection		Women without cervicovaginal infection		
Clinical Diagnosis	N	(%)	N	(%)	Total
Women with cervicovaginal infection	74	(61.2)	65	(31.4)	139
Women without cervicovaginal infection	47	(38.8)	142	(68.6)	189
TOTAL	121	(36.9)	207	(63.1)	328

TABLE 3. Accuracy of the clinical diagnosis of cervicovaginal infections in 328 pregnant women (%)

Infection	Prevalence	Sensitiv.	Specif.	PPV	PNV	$P <$
At least one infection (121)	36.9	61.2	68.6	53.2	75.1	0.0001
Vaginal candidiasis (63)	19.2	63.5	62.5	28.8	87.8	0.001
Vaginal trichomoniasis (7)	2.1	100.0	58.7	5.0	100.0	0.01
Bacterial vaginosis (31)	9.5	64.5	59.8	14.4	94.1	0.03
Intermediate vaginal flora (22)	6.7	50.0	58.0	7.9	94.1	NS
Chlamydia trachomatis (7)	2.1	0	100.0	0	98.2	NS

( ) number of subjects with the infection according to laboratory tests.

carried out with pregnant adolescents who have higher rates of infection than nonpregnant teenagers.[10] Although this study included young women (16% were adolescents), the prevalence of CT was very low (2.1%). In another study carried out by our group in the same hospital, but among nonpregnant women attending the family planning clinic, the prevalence of CT was 6.7%, suggesting that at least in our population, pregnancy is not associated with increased risk of this infection.[13] On the other hand, another explanation for a lower rate of *Chlamydia trachomatis* infection among pregnant women may be that the assay is less sensitive in pregnant women. The low proportion of unmarried women or with a history of STD may also contribute to the low rate observed in the sample.

The rate of CT infection found by us in pregnant women is similar to the rates found by other authors[14,15], although higher prevalence has also been reported.[9] The availability of a simpler, less costly diagnostic method that could eventually be used routinely would be of great help, but at present, the low prevalence of maternal CT infection found in this study does not justify its routine search during prenatal care, considering the cost-benefit of applying the current technology in our country.

Besides the identification of these four groups of infectious agents, a fifth group of pregnant women who presented intermediate vaginal flora suggesting some pathologic process were diagnosed, based on the criteria of Hillier et al.[6] The main finding was a significant decrease of lactobacillus in the microscopic examination of the vaginal discharge, where bacterial vaginosis would be imminent. The prevalence of this intermediate vaginal flora was relatively high among the pregnant women studied (6.7%).

It is recommended that pregnant women with intermediate vaginal flora be carefully followed during prenatal care, due to the higher risk of developing bacterial vaginosis and the higher risk of its potential consequences. Repeated microscopic examinations of the vaginal discharge should be performed whenever the patient relates any symptoms.

The most important conclusion derived from this study is that the clinician cannot trust his or her impression of the symptoms and the aspect of the vaginal discharge to make an etiological diagnosis of cervicovaginal infection. The very low positive predictive value of clinical diagnosis of specific infections, ranging from 0 to 29%, indicated that if instituted, the therapy would be useless in most cases. Our results highlight the need to search actively for cervicovaginal infections during pregnancy, not limited to a single speculum examination. Low-cost and easy-to-carry-out clinical tests (such as vaginal pH measure and Whiff test) and laboratory exams (such as wet mount and Gram stain) should become routine in prenatal care, due to the relatively high prevalence of some infections

and the association of some of them with perinatal complications.

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