Abstract. The objective of this study was to determine the prevalence of HIV and syphilis and to identify risk factors among pregnant women visiting antenatal clinics in León, Nicaragua. During February to April 2004, blood samples from pregnant women were collected after written consent had been obtained. The samples were tested for antibodies against HIV and Treponema pallidum. A questionnaire was also completed. In total, 1,059 women were included. Antibodies against HIV were not detected in any of the women, whereas antibodies against T. pallidum were detected in 16 (1.5%). Risk factors for syphilis included illiteracy, lower education, and two or more pregnancies. HIV does not seem to be highly prevalent among pregnant women in León (prevalence, 0%; 95% CI, 0.0–0.3). The higher proportion of women infected with syphilis than found in earlier studies suggests that sexually transmitted diseases are circulating in the general population and highlights the increasing importance of HIV prevention.

INTRODUCTION

Since the first AIDS patients were reported in 1981, the disease has become a problem worldwide, and the HIV epidemic is still spreading. In 2003, almost five million people became infected with the virus, the largest increase in infection seen since the start of the epidemic. Global monitoring of the prevalence and incidence of HIV is essential to controlling the AIDS epidemic. In several countries, such as Nicaragua, there is a lack of reliable data on the prevalence of HIV. The first HIV infection was diagnosed in Nicaragua in 1987. Official sources reported that 27 people were HIV positive in 1987 and 376 people in 2004. The World Health Organization (WHO) currently estimates under-reporting to be > 60%. At the end of 2003, an estimated 6,400 people had HIV/AIDS in Nicaragua, a prevalence of 0.2% in adults (15–49 years of age). The incidence and prevalence of HIV/AIDS is lower in Nicaragua than in neighboring countries such as Costa Rica and Honduras, where the prevalence of HIV was estimated to be 0.6% and 1.8% at the end of 2003, respectively.

Nicaragua has seen some changes in the last two decades that might indicate that there will be an increase in the prevalence of HIV in the future: increased prevalence of syphilis, increased mobility, and increased commercial contacts. In Nicaragua, there is no mandatory HIV testing for pregnant women, nor is there counseling to recommend an HIV test. Testing for syphilis, however, is mandatory in the first trimester of pregnancy.

The goal of this prevalence study was to determine the prevalence of HIV and syphilis and to identify risk factors among pregnant women visiting antenatal clinics (ANCs) in a medium-sized city in west Nicaragua. Such information will provide insight into the circulation of sexually transmitted diseases (STDs) in general.

MATERIALS AND METHODS

Design. This was a prevalence study involving pregnant women from whom blood samples were collected for 10 weeks in February, March, and April 2004 in León, Nicaragua. Approval for this study was received from the ethical committee in Nicaragua.

Study population. All pregnant women attending the “Emergencia Ginecología” of the Hospital Escuela Oscar Darilo Rosales Arguello (HEODRA) or one of three ANCs in León were invited to participate in the study, as were all women who had given birth in the previous 24 hours in the HEODRA hospital. The latter group visited the hospital for prenatal care in earlier months. Women who had already participated in this study were excluded.

Non-responders. Reasons for refusal were recorded.

Clinical methods. Women gave their written informed consent after they received information about the study. Demographic and sexual/ reproductive data and information about risk factors for STDs and blood-borne infections were collected by means of an interview questionnaire. Blood samples were collected, and serum samples (in duplicate) were stored at −20°C at the laboratory of the HEODRA hospital before being sent to the Department of Virology of the Eijkman-Winkler Institute of the UMC Utrecht, Utrecht, The Netherlands, for testing for antibodies to HIV and Treponema pallidum.

Laboratory methods. The sera were tested for HIV antibodies, 2–4 months after the samples were taken, using the Enzygnost Anti-HIV1/2 Plus test (Dade Behring, Marburg, Germany), which has a sensitivity of > 99% and a specificity of 99.3–100%. Positive tests were confirmed by immunoblot (Inno-Lia HIV confirmation; Innogenetics, Gent, Belgium). Testing for antibodies against T. pallidum was carried out with an automated inhibition ELISA (Enzygnost; Dade Behring) with a sensitivity of 98.4–100% and a specificity of 99.5% for pregnant women. The presence of syphilis was
confirmed with treponema pallidum haemagglutination assay (TPHA) (Fujirebio, Tokyo, Japan) and venereal diseases research laboratory (VDRL) (Abbott Murex, Dartford, UK), but only when ELISA results were borderline or positive. A positive reaction in ELISA, TPHA, and VDRL was considered indicative of recent and/or active T. pallidum infection. If the ELISA result was borderline and the TPHA and VDRL remained negative, it was concluded that there was no T. pallidum infection. If the ELISA was positive but the TPHA and VDRL were negative, immunoblotting was performed to confirm or rule out T. pallidum infection. A positive ELISA in combination with a positive TPHA or a positive VDRL was considered indicative of (treated) recent T. pallidum infection or T. pallidum infection in the past.

Data analysis. The data were entered and analyzed using SPSS version 10 for windows (SPSS Inc., Chicago, IL). Descriptive statistics were used to determine the occurrence of HIV and syphilis. To identify potential risk factors, univariate relative risks and odds ratios with associated 95% confidence intervals, and significance levels were evaluated using the Pearson’s $\chi^2$ test and the Fisher exact test. Because of the low number of outcomes for T. pallidum infection ($N = 16$), multivariate analyses were not performed.

Follow-up. The participants were invited to return for their test results after 3 months. At this point, they also received counseling on how to prevent HIV and syphilis. The women who were infected with syphilis were contacted; they received free treatment and follow-up.

RESULTS

A total of 1,059 women, 90% of the invited study population, 13–45 years of age (mean age, 22.9 years), were included. The non-responders (10%) did not seem to be different demographically. Reasons for refusal were having been injected too often, being in too much pain, finding it emotionally too demanding after a difficult delivery or the loss of a child, or having taken an HIV test before. In some women, fear and incomprehension seemed to play an important role in the decision. Of the participating women, 702 (66.3%) lived in an urban area and 752 (71.0%) were housewives; 463 (43.8%) were illiterate or had attended primary school only. More than one half of the women (628; 59.3%) said they were in a “union libre,” a steady relationship without being married. The mean number of pregnancies, including the current one, was 2.0. The majority of women (745; 70.7%) reported having had only one sexual partner in the past 5 years.

Fourteen women reported that they had had a genital ulcer, 559 that they had or had had vaginal discharge, 14 that they had or had had genital warts, and 8 that they had had syphilis; 1 woman thought that she was infected with HIV. More than one half of the women (634; 59.9%) had been given an injection in the past 12 months, in most cases, it was a tetanus vaccination in the context of the pregnancy. None of the women reported ever having used intravenous drugs. Four women had or had had commercial sex and 75 women had had a blood transfusion in the past.

HIV prevalence. None of the women tested were HIV positive (prevalence, 0%; 95% CI = 0.0–0.3).

Syphilis prevalence. Sixteen women (1.5%) had evidence of recent or past T. pallidum infection. The univariate associations between T. pallidum infection and demographic characteristics are given in Table 1: illiteracy and primary school education only (relative risk [RR] = 5.7; 95% CI = 1.6–20) and two or more pregnancies (RR = 5.3; 95% CI = 1.9–14.6) were associated with T. pallidum infection; there was a trend for commercial sex (P = 0.059), and there seemed to be a trend for age between 21 and 30 years (P = 0.076).

DISCUSSION

None of the women tested in León were HIV positive, consistent with an earlier comparable study that did not detect HIV infection among 1,185 Nicaraguan women in 1999–2000. However, the prevalence of syphilis (1.5%) in our study was twice as high compared with that study, performed in three medium to large urban districts in the more developed west of Nicaragua. León, the second city of Nicaragua (population in 2004: 180,301), is similar to those urban districts. The prevalence of HIV/AIDS in León is estimated to be slightly lower than that of the capital Managua, Chinandega (a medium-sized city near the border with Honduras), and the remote district Región Autónoma Atlántico Norte. Recent unpublished data states that, at the time of writing, ~6,2 persons/100,000 are newly infected with HIV each year in Nicaragua. (A. Matute, unpublished data) Furthermore, these data also show that 1,672 patients with HIV/AIDS are currently living in Nicaragua. Considering the total

<table>
<thead>
<tr>
<th>Table 1</th>
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<tr>
<td><strong>Univariate relation between potential risk factors and syphilis status of the study population (n = 1,059)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Age 21–30 years</td>
</tr>
<tr>
<td>Rural residence</td>
</tr>
<tr>
<td>Illiterate + primary school level</td>
</tr>
<tr>
<td>Not moved in last 2 years</td>
</tr>
<tr>
<td>“Union libre”</td>
</tr>
<tr>
<td>&gt; 1 partner</td>
</tr>
<tr>
<td>&gt; 2 pregnancies</td>
</tr>
<tr>
<td>Ulcers</td>
</tr>
<tr>
<td>Discharge</td>
</tr>
<tr>
<td>Genital warts</td>
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<tr>
<td>Commercial sex work</td>
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* With two risk factors the data of five women at most are missing.
Moreover, there are \( \sim 14 \) T. pallidum culture. The use of condoms in both stable and unstable sexual relationships is low: in 1996, the higher proportion of women infected with syphilis than found in earlier studies suggests that sexually transmitted diseases are circulating in the general population and highlights the increasing importance of HIV prevention.

In conclusion, it can be stated that HIV does not seem to be highly prevalent among pregnant and postpartum women in León. The higher proportion of women infected with syphilis than found in earlier studies suggests that sexually transmitted diseases are circulating in the general population and highlights the increasing importance of HIV prevention.

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