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Short Communication

Seroprevalence of Syphilis in Apparently Healthy Students from a Tertiary Institution in Benin City, Nigeria

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SUMMARY: The seroprevalence of syphilis in students from a tertiary institution in Benin City, Nigeria was investigated. Venous blood samples (5 mL) were collected from 214 apparently healthy students aged 19–38 years (118 males and 96 females) between February and October 2009 and the serostatus of syphilis determined qualitatively using the rapid plasma reagin test. Seropositive sera were confirmed using the *Treponema pallidum* hemagglutination test. The total seropositivity for syphilis was 15.4%, with a prevalence in males and females of 18.6 and 11.4%, respectively. This difference was statistically significant ($P < 0.05$). The highest prevalence was found for the 24–28-year-old age group, while the lowest prevalence was found for the 19–23-year-old age group, where no female tested positive. The results of this study show that the prevalence of syphilis infection among students in Benin City was high and is a public health concern. All persons, including voluntary blood donors, patients with sexually transmitted diseases, or those attending for routine medical checkups, should therefore be thoroughly screened for syphilis infection.

Nigeria is one of the countries in sub-Saharan Africa which has experienced an upsurge in HIV/AIDS infections and the corresponding major public health problems. The reported relationship between HIV and syphilis infection (1–3) has led to an increased rate of morbidity and mortality (4). Syphilis is a sexually transmitted disease (STD) caused by the spirochete *Treponema pallidum* whose major route of transmission is sexual intercourse, including genital, oral, and/or anal contact with or without penetration (3,5–7). However, the disease can also be transmitted in vitro by blood transfusion (13) and intravenous drug use (4).

The incidence of syphilis and other STDs, such as HIV, has been reported to have increased significantly during the last decade (8). Syphilis is found worldwide and about 12 million cases were reported in 1999 (9). Studies in Africa have revealed different rates of infection in different countries, ranging from 17.4% in Cameroon to 8.4% in South Africa, 6.7% in Central Africa, and 2.5% in Burkina Faso (9). Different prevalence rates, ranging from 2 to 14.3%, have been reported for Nigeria (10–12).

Although many previous studies of syphilis have been performed in Nigeria, most of them involved either pregnant women or blood donors. However, there is a paucity of information concerning the student population, which tends not to include large numbers of either volunteer blood donors or pregnant females. Many apparently healthy students in Benin City, Nigeria are interested in and willing to donate blood despite the increasing risk of sexually transmitted infections, perhaps due to the amount of money they receive. We therefore decided to study the seroprevalence of syphilis infection among students at the University of Benin in Benin City.

Blood samples from 214 students from the University of Benin, all of whom gave informed consent and volunteered to participate in the study, were collected at random between February and October 2009. The study group was aged between 19 and 38 years (mean, 22.6 ± 3.1) and consisted of 118 males and 96 females. The students were asked to complete questionnaires to provide information regarding their age, sex, marital status, religion, and occupation. These questionnaires were given code numbers and the names of the students were not included. The term ''apparently healthy students'' used herein is taken to mean those without any previously diagnosed STD. Students with a previous history of STD, or a current infection (within the study period) were excluded.

Venous blood samples (approximately 5 mL) were collected by venipuncture under aseptic conditions using a sterile disposable syringe. They were then placed in sterile containers without any anticoagulant, then capped and left to clot at room temperature. Each sample was centrifuged at 150 rpm for 5 min and the serum separated into another container containing ethylenediaminetetraacetic acid (EDTA) using a sterile pipette. Samples were labeled and kept in a refrigerator until required for analysis (not more than 2 months). The rapid plasma reagin (RPR) test was performed qualitatively (RPR card test/carbon antigen-RPR; Wampore Laboratories, Princeton, N.J., USA). All samples and reagents were allowed to reach room temperature before use. Tests were performed and evaluated according to the manufacturer's instructions. The

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Table 1. Seroprevelence of syphilis infection in this study

Sex	No. tested	No. (%) positive
Male	118	22 (18.6)
Female	96	11 (11.4)
Total	214	33 (15.4)

Table 2. Seroprevalence of syphilitic antibodies among different age groups

Age group	No. samples	Male	Female	%total positive
		No. (positive)	No. (positive)	
19–23	18	11 (1)	7 (0)	5.5
24–28	81	46 (12)	35 (6)	22.2
29–33	61	39 (6)	22 (4)	16.3
34–38	54	22 (3)	32 (1)	7.4
Total	214	118 (22)	96 (11)	15.4

RPR-positive sera were confirmed using the *T. pallidum* hemagglutination test (13). Ethical approval was obtained from the Edo State Ministry of Health Ethical Committee. Statistical analyses were carried out by standard methods (14).

The majority of participants were undergraduate students at various levels of study in the university, and there were 118 (55.1%) males and 96 (44.9%) females. This difference was not statistically significant ($P > 0.05$). They were aged between 19 and 38 years (mean, 22.6 ± 3.1). Of the 214 samples collected, 33 (15.4%) were seropositive (22 [18.6%] males and 11 [11.4%] females) (Table 1).

Table 2 shows the seroprevalence of syphilitic antibodies in the different age groups. The highest seroprevalence (22.2%) was observed in the group aged 24–28 years, followed by the groups aged 29–33 years (16.3%) and 34–38 years (7.4%). The lowest prevalence (5.5%) was observed in the group aged 19–23 years. The difference in seroprevalence between the groups aged 24–28 and 29–33 years was statistically significant ($P < 0.05$), as was the difference between the groups aged 34–38 and 24–28 years ($P < 0.05$).

Syphilis is still a major cause of STDs in both developed and developing countries, especially India (7,15), Turkey (16), Ethiopia (1), and Nigeria (4,10). This study found a seroprevalence of syphilis in the student population of 15.4%, which is exceptionally high considering the number of samples in this study. This result is in contrast to the 1.2% reported in 595 blood donors in the same country (4), the 1.2% reported in Kenya (17), the 1.1% in Osogbo, south-western Nigeria (18), and the 5% reported in a previous study in Nigeria (12), but similar to the 15.2% reported in another Nigeria-based study (10). Although the number of previous studies involving syphilis in apparently healthy students is not sufficient to discuss this result further, it nevertheless suggests that syphilis is still prevalent in our community.

Syphilis has been shown to be more frequent in populations with lower socio-economic status, in males, and in subjects aged between 15 and 30 years (mean, 26.1 ± 2.7), with a male-to-female ratio of 1.3:1. This latter finding is in contrast to the 1:1 male-to-female ratio observed in a previous study (16). The increased number of seropositive males recorded in this study may be attributed to the increased socio-cultural sexual activities common to males. Furthermore, it is known that most females seldom allow physicians to use needles/syringes on them due to the pain and fear of STDs. We were unable to evaluate whether the seropositivity detected herein indicated current infection or past infection as only qualitative testing was carried out. However, the clinical implication of the presence of antibodies to syphilis in an apparently healthy population is an increased risk of transmission of this infection to recipients of blood/blood products and through sexual contact. Proper screening of blood samples donated by this population group must therefore be carried out to reduce the transmission of syphilis in our environment.

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Conflict of interest None to declare.

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