Jpn. J. Infect. Dis., 56, 165-167, 2003

Short Communication

Prevalence of Antibodies to Syphilis among Blood Donors in Accra, Ghana

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(Received May 1, 2003. Accepted August 29, 2003)

SUMMARY: Several infectious diseases have been found to be associated with transfusion of blood and blood components. Reports from studies conducted in many African countries indicate a high incidence of blood-borne pathogens such as syphilis infections among healthy blood donors. The prevalence of syphilis antibodies in blood donors in Ghana is not known. This study was therefore conducted in order to determine the prevalence of antibodies to syphilis among blood donors seen between the months of January and March 2003 at the National Blood Transfusion Service, Accra area (Blood Bank) at the Korle-Bu Teaching Hospital, Accra, Ghana. The presence of antibodies specific for syphilis was tested using Veneral Disease Research Laboratory and particle agglutination test kit. A sero-prevalence rate of 7.5% was found. Our sample of blood donors was largely comprised of male subjects (500 out of 536 donors, and only 1 out of the 36 screened female donors was positive), making sex comparisons statistically undesirable. In both sexes, the age distribution of subjects positive for syphilis antibodies was from 19 - 54 (median age, 32) years. In conclusion, our results indicate that syphilis is prevalent among healthy blood donors in Ghana, and that there is a need to introduce the screening of donated blood for syphilis in Ghana.

Syphilis is a major public health problem worldwide (1-5). There is growing evidence that the disease is widespread in Africa (6-9). One of the significant routes for transmission of the infection is through blood transfusion (3,4). The prevalence of antibodies to syphilis in healthy African blood donors is relatively high (6-9). In Ethiopia, the sero-prevalence of antibody to syphilis among blood donors was 12.8% (7). A similar prevalence rate (12.7%) of syphilis antibodies has recently been reported in blood donors from Dar es Salaam, Tanzania (9).

Ghana, a tropical country in West Africa, with a population of 19.7 million and a gross domestic product (GDP) of 7.4 billion US dollars (Ghana National Statistics Report 2000) is currently experiencing a serious human immunodeficiency virus (HIV) epidemic (Disease Control Unit, HIV Sentinel Surveillance Report 2000, National AIDS/STD Control Programme). For financial reasons, population surveys cannot be conducted, and therefore sentinel studies are the only means for providing information regarding the transmissions of infections such as syphilis, as well as monitoring the changes over time.

The Korle-Bu Teaching Hospital (KBTH), Accra, Ghana, is a national referral 1,500-bed hospital. According to the National Blood Transfusion Service (NBTS), Accra, Ghana, in 2001, nearly 16,000 units of blood were transfused at the KBTH. Currently, donor blood is screened for only HIV-1 and -2, and hepatitis B virus (HBV) by NBTS. In Ghana, blood donors are volunteers or family members and friends of patients needing blood transfusions. Little or no information is available regarding the sero-prevalence of syphilis and other potential transfusion-related pathogens in Ghanaians (10,11). The present study was therefore undertaken in order to determine the prevalence of antibodies to syphilis infection among blood donors seen at the NBTS at the Korle-Bu Blood Bank, Accra, Ghana. Such information may be invaluable to health planners and policy makers in Ghana.

This study was carried out between the months of January and March 2003 among blood donors at the NBTS at the Korle-Bu Blood Bank. This center serves the KBTH, other hospitals/clinic in the Accra metropolitan area, both Governmental and non-Governmental, and some parts of the Central and Eastern Regions of Ghana. Blood donors undergo a clinical screening, which involves a questionnaire and a routine medical examination, and only those found to be healthy are used as donors. Donated blood is routinely screened for HIV-1 and -2 antibodies and HBV surface antigen. In this study, an additional blood sample was also taken from blood donors for detection of antibodies to syphilis. Sera were screened for the presence of antibodies to syphilis in parallel with the Veneral Disease Research Laboratory (VDRL) test (Murex Diagnostics Ltd., Dartford, UK) and *Treponema pallidum* particle agglutination (TPPA) test kit (Serodia, Fujirebio Inc., Tokyo) in accordance with the manufacturer's instructions. VDRL and rapid plasma reagin (RPR) assays detect antibodies against the non-treponemal, cholesterol-lecithin cardiolipin antigens, and hence are said to be non-specific. Their specificity ranges from 84 - 99%, and positive serology usually occurs within 1 week of disease manifestation in 60 - 75% of cases of primary syphilis, and virtually all cases of secondary syphilis (12). The TPPA assay detects antibodies directly against *T. pallidum*, is reactive earlier, and has a sensitivity of 81 - 98% and a specificity of about 90% (12). In accordance with international recommendations, any

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blood sample which is reactive as determined by either the VDRL or TPPA test is considered to be potentially infected (13). The study was approved by the Ethical and Protocol Review Committee of the University of Ghana Medical School, Accra, Ghana.

The results showed that, of the 536 samples tested, 496 were negative and 40 were positive for syphilis antibodies, giving an overall syphilis prevalence rate of 7.5%. Three of the 536 samples screened were reactive as determined by the VDRL test (0.6%; 3/536), whilst 38 were reactive as determined by the TPPA test (7.1%; 38/536). Our sample of blood donors was comprised largely of male subjects (500 out of 536 donors, and only one out of the 36 screened female donors was positive for syphilis antibodies), making sex comparisons statistically undesirable. In both sexes, the age distribution of subjects positive for antibodies to syphilis was from 19 - 54 (median age, 32) years.

In this study we provide data on the sero-prevalence of antibodies to syphilis among healthy blood donors in Ghana. The prevalence rate of antibody to syphilis among blood donors at the NBTS at Korle-Bu was 7.5%. The significance of this level of sero-positivity remains to be determined. The reason(s) for the relatively lower rate of sero-prevalence, compared with 12.7% (9) and 12.8% (7) among Tanzanian and Ethiopian blood donors, respectively, cannot be discerned in this study. However, oral and unpublished reports suggest that sexual promiscuity and a growing incidence of intravenous drug abuse occur among the Ghanaian population. These are risk factors for the transmission of syphilis and HIV (3,14,15); hence, it is conceivable that some individuals may have a higher than normal risk of contracting syphilis. The sero-prevalence rate of antibodies to syphilis in healthy blood donors ranges from 1% to as high as 20% in several at-risk-groups (1-4).

In developed countries, transfusion-transmitted infections are now extremely rare because of improved donor selection processes, and universal serologic screening of donors for blood-borne pathogens coupled with the shift from transfusion of fresh blood components to transfusion of refrigerated products (16,17). Less developed countries such as Ghana are not able to fully implement the above procedures to ensure the safety of transfused donor blood. Furthermore, low income countries tend to have relatively high demands for blood transfusion on account of high incidences of anemia, malnutrition, and surgical/obstetric emergencies that are associated with blood loss (18). The consequent high volume of transfusion has the potential for the transmission of unscreened pathogens such as syphilis, and other blood-borne viruses.

The 7.5% sero-prevalence rate of antibodies to syphilis found in this study calls for a major review of the practice of screening donor blood in Ghana. Based on the results of the present study, the present policy in which prospective donors are screened clinically and for only HIV and HBV infections therefore require urgent revision. This is especially important because of recent reports of close association between intravenous drugs abuse, and HIV and syphilis infections (7,19,20), although our study was not designed to explore such relationships.

The results reported herein are unexpected and thus trigger more questions than answers, such as: 1) What is the level of infection among asymptomatic blood donors in Ghana? 2) Do the presence of circulating antibodies to syphilis in donor blood provide sufficient grounds for a risk of transmission of disease to recipients, particularly immunocompromised and/or immunosuppressed patients? 3) If there is such a risk, how will it develop in the course of time and what is the course of action to be taken by the health authorities? Further studies are therefore necessary to define the risk of transmission of syphilis to recipients (particularly immunocompromised patients) of blood donated by such asymptomatic blood donors since the presence of syphilis antibodies is an indication of active infection (3,4).

In conclusion, this study, although limited by the small sample number of subjects, nevertheless highlights the need for screening blood donors for circulating antibodies to syphilis infection.

ACKNOWLEDGMENTS

The authors would like to thank Mr. John Tsakpo and the staff of the National Blood Transfusion Services for their excellent technical assistance and for helpful contributions.

This work was supported by a grant from the Korle-Bu Teaching Hospital, Korle-Bu, Accra, Ghana

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