EDITORIAL

Sero-prevalence of HIV, HBV, HCV in Blood Specimens Received at a Clinical Laboratory in Atbara, Sudan

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Abstract:

Background: Clinical laboratory personnel, like all healthcare workers, have a high risk of occupational exposure to blood-borne infections from clinical specimens, more so in developing countries, where unsafe practices are common. The most common and important ones are HIV ,HBV, and HCV infections.

Objectives: To determine the sero-prevalence of HIV, HBV and HCV infections in blood samples at a clinical laboratory, and to address the preventive measures.

Methods: Blood samples of 385 subjects attended for investigations of noninfectious illnesses were tested for the seroprevalence of HIV, HBV, and HCV by screening tests and confirmed by ELISA.

Results: Males constituted 63.9%, HIV was confirmed in 0.5%, HBV in 7.8% and HCV in none of the study population.

Conclusion: The risk of blood borne viral disease in blood specimens is remarkable even in non-suspected specimens and protective measures against occupational exposure must be taken in order to prevent infection among laboratory workers.

Key words: HIV, HBV, HCV, occupational hazard, Clinical laboratory, Atbara, North Sudan.

EDITORIAL

الملخص:

انتشار فيروسي التهاب الكبد "ب" و "ج" وفيروس عوز المناعة المكتسب في عينات الدم بالمعمل الطبيفي مدينة عطبرة بالسودان

مقدمة : يتعرض العاملون بالمعامل الطبية ,كما هو الحال مع بقية العاملين بالصحة, إلي مخاطر الإصابة بالأمراض المنقولة عن طريق الدم وبخاصة في الدول النامية حيث تقل إجراءات السلامة. وأهم هذه الأمراض هي فيروسات التهاب الكبد وعوز المناعة.

الأهداف: هدفت هذه الدارسة إلي تحديد نسبة انتشار فيروسي التهاب الكبد "ب" و "ج" وفيروس عوز المناعة المكتسب في عينات الدم بالمعمل الطبي, كما تم إيجاز سبل الوقاية.

المرضى والطرق: تم انتقاء 385 عينة دم لمرضى بأعراض ليست ذات طبيعة عدوائية وأخضعت للفحوصات المسحية والتأكيدية عن الفيروسات.

النتائج: شكل الذكور نسبة 9.63% وكانت نسبة انتشار فيروس عوز المناعة المكتسبة 5.0% وفيروسالتهاب الكبد "ب" 8.7% ولم تحدد أية إصابة بفيروس التهاب الكبد "ج" في عينة الدراسة.

خاتمة: تشكل الأمراض المنقولة عن طريق الدم خطرا علي العاملين بالمعامل الطبية حتى في ظل عدم وجود اشتباه في العينة ويجب اتخاذ التدابير واحتياطات السلامة اللازمة لتفادي الإصابة.

Background:

Healthcare workers have a high risk of occupational exposure, more so in developing countries, with high incidence of blood borne diseases and prevalence of unsafe practices. Among the various blood borne diseases, the most common and important infections are HIV, hepatitis B and hepatitis C.[1] Hepatitis B continues to be a major risk to health care workers, killing approximately 200 per year in USA. In contrast, as of 1990, only 327 total health care personnel had acquired HIV, with no deaths reported. Data are lacking regarding hepatitis C, but it appears to be an increasing concern. Needle pricks are the most common form of occupational transmission, with an infectivity rate of 30% for hepatitis B, 3% for hepatitis C, and 0.3% for HIV.

Universal precautions are the cornerstones of safety. [2]

The economic costs of the failure to control the transmission of infection include increased requirement for medical care, higher levels of dependency and the loss of productive labor force, placing heavy burdens on already overstretched health and social services and on the national economy. [3, 4]

Prevention of occupational exposure is dependent on education. Prevention strategies include immunization, exposure avoidance by the use of universal precautions at all times, and post-exposure advice and prophylaxis.[5]

Recommendations for HBV post-exposure management include initiation of the hepatitis B vaccine series to any susceptible, unvaccinated person who sustains an occupational blood or body fluid exposure. Post-exposure prophylaxis (PEP) with hepatitis B immune globulin (HBIG) and/or hepatitis B vaccine series should be

EDITORIAL

considered for occupational exposures after evaluation of the hepatitis B surface antigen status of the source and the vaccination and vaccine-response status of the exposed person. Guidance is provided to clinicians and exposed health care personnel (HCP) for selecting the appropriate HBV PEP. Immune globulin and antiviral agents (e.g., interferon with or without ribavirin) are not recommended for PEP of hepatitis C. For HCV postexposure management, the HCV status of the source and the exposed person should be determined, and for HCP exposed to an HCV positive source, follow-up HCV testing should be performed to determine if infection develops. Recommendations for HIV PEP include a basic 4-week regimen of two drugs (zidovudine [ZDV] and lamivudine [3TC]; 3TC and stavudine [d4T]; or didanosine [ddI] and d4T) for most HIV exposures and an expanded regimen that includes the addition of a third drug for HIV exposures that pose an increased risk for transmission.(6)

Patients and Methods:

Study subjects:

Patients who presented to the Modern Specialized Laboratory (MSL) with a request for blood investigations for a non-infectious condition during the period from the 1st of June to the 2nd of August and volunteered to participate were included. The MSL is a private pathologist-managed laboratory. Atbara is 310 km north to Khartoum, with a total population of 134,586.

The biodata of all patients were obtained by closed ended pre-tested questionnaire that also included risk factors and knowledge about methods of transmission. All patients were offered pre- and post-test counseling and an informed consent was obtained.

Criteria for exclusion were: age less than 15 years, fever at time of presentation, hemophilia, sickle cell anemia, patients on hemodialysis, patients who refuse to volunteer (no penalty imposed on them) and patients with a request for either an infectious disease or an indirect marker of infection e.g. liver enzymes.

Sample collection

Five milliliters of venous blood were collected from each subject by clean venipuncture, dispensed into a clean dry glass test-tube and allowed to clot naturally at room temperature. The clotted blood samples were then spun in a centrifuge at 2500 rpm for 5 minutes to separate the serum which was used for the analysis of the requested investigation as well as viral screening tests. Sera that reacted positive was refrigerated and used for the confirmatory ELISA test.

Serological analysis

Hepatitis B surface antigen (HBsAg), antibodies to HCV and HIV1and HIV2 were detected using Ultra Rapid Test Device (ACON® Laboratories, Inc. USA). All the reactive samples were confirmed using enzyme-linked immunosorbent assay (ELISA) kits (Human®, Germany). The manufacturers' standard operating

EDITORIAL

procedures were strictly followed for the performance of all tests. **Statistical methods**

The data generated were coded, entered, validated and analyzed using Statistical Package for Social Science (SPSS) version 12.0. The sero-prevalences of HBsAg, HCV and HIV were expressed for the entire study group and by age, sex and risk factors. P-values below 0.05 were considered statistically significant. **Ethical issues** A written informed consent was obtained prior to enrollment. The following information was given during patient education to ensure that patients have the information needed to make an informed choice; a complete description of the aims of the study, infectious agents that were being screened, potential benefits and risks, blood collection procedures and assurance of confidentiality of any information given as well as test results. Any other requested additional information was provided to patients by study personnel. Subjects who were found to have any of the screened pathogens were referred, according to their desire, to a physician clinic where additional investigations and appropriate management and follow-up were given. All participants' information and test results were confidentially kept.

Results:

A total of 385 patients were selected 246 (63.9%) males, (139)36.1% females. Most (64.7%) were in the age range of 26 - 45 years, (15.3%) were illiterates and most (62.3%) were married . Rapid screening tests were reactive in 2.6% for HIV, 7.8% for HBV and 0.3% for HCV. For the confirmatory ELISA test, seropositivity was 0.5% for HIV, 7.8% for HBV and 0.0% for HCV. Eighty-two percent of participants did not know the mode of transmission of viral hepatitis in comparison to 26.5% for HIV. 13.2% gave a history of genital disease. No significant statistical difference was observed with any of the following risk factors: sex, marital status, history of blood transfusion or surgical operation.

Discussion:

Clinical laboratory workers are in direct contact with blood specimens on daily basis. The risk of getting infected by a serious viral disease is under estimated by many of them, especially when there is lack of information regarding the prevalence of blood borne pathogens in the local community they serve. The risk is aggravated by the low awareness about the universal safety precautions and absence of post-exposure prophylaxis strategies.

The aim of this study is to determine the prevalence of the common blood borne viruses: HIV, HBV and HCV in blood specimens in patients not suspected to have a viral disease, i.e. apparently non-infectious samples, which are usually handled with less care.

The male to female ratio was 1.8 to 1.0. Males seem to be more willing to volunteer and spend some time responding to a questionnaire. But sex did not constitute a risk factor for any of the tested infections. While only 26.5% did not know the mode of

EDITORIAL

transmission of HIV, 82% did not know how viral hepatitis is transmitted. This may be due to tremendous efforts exerted to raise the awareness about HIV but not viral hepatitis. At the same time viral hepatitis is more prevalent in our communities with more serious consequences in terms of morbidity and economy.

HIV infection was confirmed in 2 patients (0.5%) by ELISA i.e only 25% of the rapid test positive cases (n=8). The rapid tests are used in our blood banks and routine clinical laboratories, this may shed light on how much blood donors we unnecessarily rejected and donated blood discarded creating panic and suffering. The (0.5%) result of HIV positivity is similar to that reported from west Sudan (0.8%). [7]

Prevalence of HBV in this study (7.8%) was lower than that reported from South (26%) [8] and West (10%) Sudan [7]. But higher than reports from Shendi (North) (5.1%) [9] and Gezira (central Sudan) (5.6%) [10]. The prevalence of HCV (0.0%) was in agreement with that reported from west Sudan [7]. The highest prevalences of HCV were found in African countries and the Middle East [11-13], while the lowest prevalence rate was recorded in England (0.1%). [14]

This study, as for studies in blood donors, does not represent the true prevalence of diseases in the community because the sample is selected.

Conclusion:

The seroprevalence of blood-borne pathogens detected in this study calls for mandatory screening for HBV, HIV and HCV in the whole population. ELISA may be the optimal tool for screening. Protective measures against occupational exposure to the hepatitis viruses and HIV must be taken in order to prevent infection in laboratory and health care workers.

HBV vaccination should be made compulsory for all laboratory workers.

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EDITORIAL

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