BLOOD TRANSFUSION

Viral Infectivity Markers in Donor Blood: A Retrospective Study of Three Donor Categories

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ABSTRACT

A total of 12,540 homologous donors seen between 1993 and 1999 at the University of Maiduguri Teaching Hospital (U.M.T.H) blood bank were analysed with respect to the frequency of viral infectivity markers (HBsAg and HIV antibodies) as it relates to donor categories. Fifteen percent and 4.07% of voluntary donors were positive for HBsAg and HIV antibodies respectively. Fifteen percent and 4.11% of family replacement donors were positive for HBsAg and HIV antibodies respectively but did not differ significantly from the frequencies in voluntary donors (P>0.05). Commercial donors had the highest frequencies of 21.3% for HBsAg and 7.01% for HIV antibodies, significantly higher than the corresponding figures of 14.63% (P<0.05) for HBsAg and 4.07% (P<0.05) for HIV antibodies in voluntary donors. In addition, 1.99% of the commercial donors tested positive for both viral infectivity markers. It is concluded that family replacement donors are of comparable safety to the voluntary donors while commercial donors have significantly higher frequencies of viral infectivity markers than voluntary donors and carry higher risk of transfusion transmissible infection ***(Nig J Surg Res 2000; 2:75- 80)***

KEY WORDS: Blood donors, HBsAg, HIV Antibodies

Introduction

Most transfusion transmitted infections are caused by viruses notable among which are the hepatitis B and human immune deficiency viruses (HIV).[1] Viral hepatitis continues to be a major risk of transfusion therapy. Hepatitis A is only rarely transmitted by transfusion [2] unlike hepatitis B and C which are commonly transmitted through transfusion therapy. [2-4] Transfusion centres and blood banks routinely screen donors for hepatitis B surface antigen (HBsAg) to detect donors capable of transmitting the virus.[1] Despite adequate screening for HBsAg, post transfusion

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hepatitis continues to be a significant problem mainly due to hepatitis C (HCV) which was then responsible for up to 90% of cases of post-transfusion hepatitis.[5-7] Specific tests for detecting HCV antigen by polymerase chain reaction [8] and HCV antibody by ELISA [9] has greatly improved screening efficiency with resultant decrease in risk of post transfusion hepatitis C virus infection.[9]

During the mid-80s, tests became available for screening of blood donors for the presence of antibodies to HIV 1 and 2[10] but transmission may be possible during window period.[11]

The social life style and risk behavioural pattern of individual homologous blood donors are to a large extent closely related to specific donors categories. In this regard, the voluntary donor population may be considered the ideal reference donor category with relatively low risk for transfusion transmissible infections.[12] Other categories of donor with variable levels of risk for transfusion transmissible infection do exist and make up significant proportion of the donor panels of many blood Banks.

In accordance with the recommendation of the world Health Organisation (W.H.O) and the International Society of Blood Transfusion (I.S.B.T), the voluntary donor may be defined as an individual who gives blood, or blood component freely and voluntarily without receiving payment in the form of money or substitute for money, and the motivation must be purely to help the unknown recipient and not for any personal benefit (altruism). [13s] An individual who gives blood in replacement for that which has been given to his relation is referred to as family replacement donor. [12] But when a person donates blood for the purpose of transfusing a defined patient, such a person is referred to as a directed donor.[14] Directed donations are often a response to the hazards of transfusion transmissible infections, in particular the risk of Human Immune Deficiency Virus (HIV) infection.[4] Such donors are usually selected from among family members or friends who the recipient believes are in good health and are not engaged in high risk behaviours.[4] Directed donation should be discouraged because it contravenes the ethics of blood transfusion in which the donations should be anonymous and for altruistic reasons.[13,14]

Commercial blood donors are those who give blood in return for payment in one form or the other and may sell their blood to more than one blood bank.[12] The practice of commercial donations runs counter to the ethical principles of blood transfusion services as recommended by the WHO. Every efforts should be made to discourage it.[13]

At the University of Maiduguri Teaching Hospital (UMTH), North Eastern Nigeria, all blood donors are routinely screened for HBsAg and HIV antibodies. In this report we present the pattern of these viral infectivity markers with respect to difference in homologous donors categories.

Materials and Methods

Homologous blood donors at the UMTH undergo mandatory screening tests for HBs Ag by latex agglutination and HIV antibodies by ELISA and confirmatory testing by the western blot techniques. In our blood bank, the homologous donor panel consists of three types of donor categories: voluntary, family replacement and commercial. By going through the donor registers in our blood bank the number and proportion of donors in each of the three categories as well as the number and proportion of positive screening tests

within each of the categories were determined retrospectively for a seven year period, 1993 – 1999.

The data was analysed using the chi-square test and a probability level of $P<0.05$ was taken as significant.

Results

In this study the proportions of different donor categories as shown in Table 1 revealed that the voluntary donors made up only 10.19% of the homologous donor population while the family replacement donors constituted 24.86% of the donor population. However, the commercial donors constituted the bulk of the homologous donor population making up to 64.95%.

Considering the homologous donor population as a whole (Table 2), the overall frequencies for HBsAg, HIV antibodies and both viral infectivity markers where 19.15%, 5.99% and 1.29% respectively. However, analysing the data with respect to individual donor categories, the voluntary donors considered the ideal reference donors, had frequency levels of 14.63% and 4.07% for HBsAg and HIV antibodies respectively. These where lower than the corresponding frequencies found among the overall donor population. The family replacement donor had comparable frequencies figures of 15.4% and 4.11% for HBsAg and HIV antibodies which did not differ significantly from the corresponding figures of 14.63% ($P>0.05$) for HBsAg and 4.07% ($P> 0.05$) for HIV antibodies in voluntary donors (Table 2). Commercial donors had the highest frequencies of 21.3% for HBsAg and 7.01% for HIV antibodies. These figures were higher than the corresponding figures of 19.15% for HBsAg and 5.99% for HIV antibodies in the overall donor population and were statistically higher than the corresponding figures of 14.63% ($P<0.05$) for HBsAg and 4.07% ($P<0.05$) for HIV antibodies seen among voluntary donors (Table 2). In addition, 1.99% of the commercial donors were tested positive for both viral infectivity markers (Table 2).

Discussion

The pattern of viral infectivity markers seen among different donor categories in this study reaffirms the ethical status of the voluntary donors as the ideal reference donor. This is because they had the lowest frequencies for viral infectivity markers and remain the safest donors. The voluntary donors are usually derived from individuals who are less likely to be involved in high-risk behaviours. They are not only safer but also more likely to respond to appeal for blood in emergencies than other types of donor.[12] Unfortunately, in our environment; there is a paucity of voluntary donors constituting only 10.19% of all donors. The paucity of voluntary donors is a common feature of the donor panel of most tropical African countries including Nigeria.[15] There is therefore an urgent need to embark on an expanded community donor education programme in order to motivate suitable individuals to volunteer to donate.

The frequencies of viral infectivity markers among the family replacement donor in this study were similar to that seen among the voluntary donors implying that the family replacement donors were at the same safety level as the voluntary donors. This is not surprising because the family replacement donors are mostly derived from responsible family members and friends and are generally of comparable social and moral standard to

the voluntary donors. Although the family replacement donor formed only 24.86% of our donors, they constituted an important segment of the donor panel. They are relatively safe, and with adequate counselling may be encouraged to donate regularly [12] to boost the blood bank reserve.

The commercial donors in this study had the highest frequencies of viral infectivity makers, which were significantly higher than the observed frequencies among voluntary donors, and 1.99% of them were positive for both viral infectivity markers. This is not surprising because the commercial donors were usually in relatively poor state of health. Many of them may be associated with high risk behaviours such as prostitution and drug abuse and are therefore at greater risk for transfusion transmissible infection.[12, 16] The very high frequency of viral infectivity markers in the commercial donors would imply that this category of donors may have high cases of window period donations that may increase the risk of transfusing serologically undetectable infective blood. [11,17-20]

Therefore commercial donation should be actively discouraged in order to increase the safety of blood and blood products in our environment. The paucity of voluntary donors promotes the practice of commercial donation by indirectly compelling patients to patronise commercial donors at times of urgent need. It is not surprising that up to 64.95% of our donors in this study were commercial. It is therefore not possible to abolish commercial donation without first strengthening the voluntary donor base. This can be achieved at national level through a well-coordinated national blood transfusion service to be set up and adequately funded by the Government. Meanwhile, individual hospitals should constitute transfusion committees to be charged with the responsibility of setting up counselling guidelines to advise patients and their relatives against patronage of commercial donors. Surgeons should encourage eligible patients to practice autologous donation as a means of getting cheap and safe blood instead of opting for commercial blood, which is costly and carries high risk of infection.

Table 1: Proportions of homologous donor Categories as seen at the UMTH blood bank, 1993-1999

Donor categories	Total No. of units donated(%)
Voluntary	1278 (10.19)
Family replacement	3117 (24.86)
Commercial	8145 (64.95)
Total	12,540 (100)

Table 2: Frequency of viral infectivity markers among homologous donor categories as seen at the UMTH blood bank, 1993 –1999

Donor categories	Total no of units donated	No of units positive for HBsAg(%)	No of units positive for HIV antibody (%)	No of units positive for both HBsAg and HIV antibody (%)
Voluntary	1278	187(14.63)	52(4.07)	0
Family replacement	3117	480(15.4)	128(4.11)	0
Commercial	8145	1735(21.3)	571(7.01)	162 (1.99)
Total	12540	2402(19.15)	751(5.99)	162(1.29)

Conclusion

Family replacement donors are of comparable safety to voluntary donors. Commercial donors have higher frequencies of viral infectivity markers than voluntary donors and therefore carry a higher risk of transfusion transmissible infections.

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