

HIV Prevalence among Secondary School Student Blood Donors in Nairobi County, Kenya

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Abstract: *The Human Immune deficiency Virus and the Acquired Immune Deficiency Syndrome situation in Kenya has affected blood collection in the country leading to a decline from 150,000 units to about 70,000 units annually, yet the demand for blood in Kenya exceeds 300,000 units per year. Schools are a major source of blood in all counties of Kenya and more than 60% of blood in Kenya is collected from secondary school students but the data on HIV prevalence in this category of donors is scarce. The objective of this study was to determine the prevalence of HIV among secondary school student blood donors in Nairobi County and to determine their knowledge on blood donation and blood transfusion practices. Four hundred and thirty four (434) student blood donors were screened for anti-HIV antibodies. Two hundred and forty eight (248) of the students were male and 186 were females. The age of the students ranged between 16–28 years with a mean age of 17.25 ± 1.057 years. Mean age for male students was 18 ± 1.433 years, while the mean age for the female students was 17 ± 1.057 years. Questionnaires to determine the students' knowledge on blood donation and blood transfusion practices were given to the students to fill before blood samples were collected from them by a qualified medical laboratory professional. All blood samples collected were tested for HIV antibodies using Vironostika Uni-FormII Ag/Ab ELISA method (Biomérieux, France) and confirmation done by Enzygnost HIV 1&2 4th generation ELISA test (Simens AG, Germany). Three (3) (0.7%) out of the 434 donors were positive for HIV and 431 (99.3%) were negative. Of these, two (0.46%) were males and one (0.23%) was a female. The data was analyzed using the SPSS version 22. Probability (p) value < 0.05 was considered statistically significant. The results showed a low prevalence of HIV among student blood donors in secondary schools compared to the general population. The study also shows there is low knowledge on blood donation and blood transfusion practices among secondary school student blood donors. Recommendation is made for strengthening the recruitment of secondary school students as voluntary unremunerated blood donors as a more effective strategy to reducing the risk of obtaining HIV infected blood from donors. Extensive and effective use of information education and communication materials to sensitize the secondary school student donor population on blood donations and blood transfusion practices is also recommended.*

Keywords: HIV, Donation, Blood donor, Transfusion, Prevalence

1. Introduction

Blood donation is important in many countries since donated blood alleviates danger in various critical conditions and can be lifesaving for individuals who need it. The safety of donated blood is an important public health concern in most developing countries where the consequences of not providing safe blood for transfusion may adversely affect the critical care for those requiring blood especially in emergencies. Many countries have adopted several measures in line with World Health Organization guidelines to improve the safety of donated blood (Zhao-Hua *et al.*, 2013). Some of the measures adopted include improved organization and management of blood donor recruitment, testing of donor blood, and encouraging appropriate use of blood by individual countries (Tagny *et al.*, 2010). Blood transfusion remains one of the major components of treatment and care for patients with conditions leading to loss of blood (Javadzadeh *et al.*, 2006). Shortage of blood is a constant problem in many developing countries of the world where getting to recruit voluntary non-remunerated donors remains a major challenge causing serious strain to transfusion services throughout the world.

Non-remunerated donors are the major blood source in Kenya and peoples' motivation is critical to keep the blood source sufficient. More effort is required to attract society members for blood donations (Kimani *et al.*, 2011). The rate of blood donation varies from various groups but there is no

study conducted on the secondary school students who donate blood. In Kenya, the safety and adequate supply of donated blood has remained a challenge despite efforts to improve the situation. A good portion of donated blood in Kenya is mainly from family replacement donors (FRDs). This situation is very similar to other countries in Sub-Saharan Africa where about 25% of donors are FRDs (Florent *et al.*, 2012). The family replacement donor is a group considered to be of a higher risk for transfusion-transmissible infections and a lot more effort is necessary to expand the base for voluntary donors (WHO, 2002).

In countries where resources are limited, recruiting young, voluntary and non-remunerated blood donors who are likely to be of lower risk for transfusion-transmitted infections, is the most prudent way to expand the blood donor base as observed by Field and Allain (2007). Transfusion transmitted infections have generally contributed to a severe decrease in the blood donor pool in many developing countries especially in Sub-Saharan Africa. The most notable TTI'S are HIV, HBV, HCV and syphilis (Florent *et al.*, 2012). To minimize the chances of transmitting HIV through donated blood, stringent measures for selection of donors and deferral of donation are necessary, with proper channels that effectively communicate reasons for deferral. Continuous evaluation of new and more sensitive assays to detect HIV and other TTI'S is necessary to ensure early detection of pathogens in donated blood (Nwankwo *et al.*, 2012).

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About 1.7 million Kenyans were living with HIV/ AIDS at the end of 2014 according to UNAIDS estimates. Women aged between 15-24 years are twice more likely to be infected by HIV compared to males in the same age group (UNAIDS, 2014). The WHO's framework for increasing and expanding the pool of low-risk blood donors for the African region, gives several guidelines to be followed. In many countries where the WHO guidelines have been adopted the risk of TTT'S has been drastically reduced by introducing routine testing of donated blood particularly for HIV (Andre *et al.*, 2017).

Distinct promotion strategies should be adopted to increase repeated donations among young, experienced and first time donors. This sharing of experience from regular donor can motivate new donor and helps in reducing misconceptions as well. Special awareness and motivation programs on blood donation and transfusion practices should be launched by dissemination of information particularly on electronic media focusing 18-25 age groups which help in eliminating misconceptions about blood donation among them and in the society (Agbovi *et al.*, 2006)

2. Materials and Methods

All the blood samples collected were tested for anti-HIV antibodies using Vironostika Uni-FormII Ag/Ab ELISA method (Biomereux, France). Any sample that tested positive by this method was subjected to a second confirmatory ELISA method, Enzygnost HIV 1&2 (Siemens Healthcare, Germany). Consent was obtained as required from principals of schools where the research was conducted. Approval for the study was obtained from Kenyatta University's ethical review committee and clearance sort from the National commission for science, Technology and Innovation. Authority to carry out the study was also obtained from the National Blood Transfusion Service in the Ministry of Health.

Data Analysis

Data analysis was conducted using SPSS version 22. The threshold for statistical significance was set at $\alpha = 0.05$ and a two-sided p-value at 95% confidence intervals (CI) reported for corresponding analysis.

3. Results

3.1 Demographic characteristics of students

Four hundred and thirty-four (434) student blood donors comprising 248 (57.14%) males and 186 (42.86%) females enrolled in this study. The age of the students ranged between 16–28 years with a mean age of 17.25 ± 1.057 years. Mean age for male students was 18 ± 1.433 years, while the mean age for the female students was 17 ± 1.057 years

Table 4.1: Demographic characteristics of the study population

Demographic	Number of students (n = 434)	Percent
Gender		
Male	248	57.14
Female	186	42.86
Age (Years)		
16 years	147	33.87
17 years	124	28.57
18 years	101	23.27
19 + years	62	14.3

Table 4.1 gives the general characteristics of the student's donor's gender and their age distribution. It can be said that the bulk of students were less or equal to 17 years, 33.87% were 16 years old and 28.57% were 17 years of age.

HIV prevalence among the students

Three (3) donors tested positive for HIV antibodies representing the prevalence of 0.7%. Of these, two (0.46%) were boys and one (0.23%) was a girl. The majority (33.9%, N = 434) of the donors were 16 years old, followed by those aged 17 years (28.6%, N=434). Students aged 19 years and above were fewest at (14.3%, N = 434).

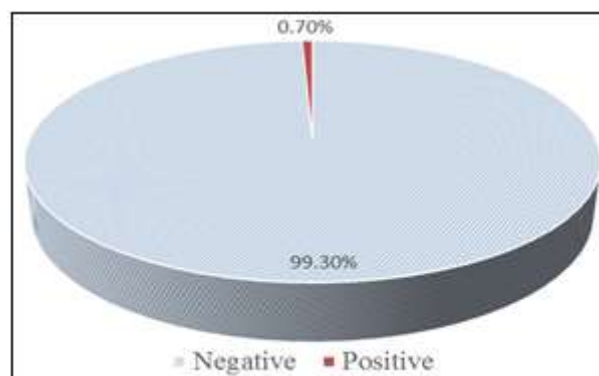


Figure 4.3: HIV prevalence among student donors by gender

Table 4.3: Age distribution of the students by school categories

Ages (Years)	Distribution of students in the different school categories					
	Girls boarding	Boys boarding	Girls day	Boys day	Mixed boarding	Mixed day
16 yrs	43.5	12.2	13.6	12.9	8.2	9.5
17 yrs	13.7	30.6	12.1	26.6	13.7	3.2
18 yrs	11.9	26.7	7.9	35.6	4.0	13.9
19+ yrs	3.2	16.1	1.6	21.0	12.9	45.2

4. Discussions

The objective of this study was to determine the prevalence of HIV among secondary school student blood donors in Nairobi County. The prevalence of HIV among student blood donors in this study was 0.7 %. Recruitment of safe blood donors is still a major challenge for many developing countries like Kenya, yet safe blood donors free from risks of transmitting diseases is the cornerstone of blood safety. In some countries taboos, socio-cultural beliefs and religion are still major obstacles towards altruistic donations and discourage people from engaging in benevolent donations. HIV/AIDS and associated stigma also tend to discourage a

number of people from donating blood fearing to discover their status.

The general HIV prevalence in the population in the specific country, public awareness regarding HIV and blood donation, the selection of donors and steps taken to ensure thorough pre-screening of blood donors are all important factors requiring due attention (Aldebert *et al.*, 2012). In high-income countries, much emphasis has been put on proper donor selection and the HIV prevalence is as low as 0.001 % while in low-income countries the prevalence has remained high (WHO, 2009). Hassan *et al.*, (2008) reported an average incidence of 2.8 % of HIV among apparently healthy blood donors in Kaduna Northern central Nigeria, but Zachariah *et al.*, in 2002 reported HIV incidence of 22 % among blood donors in Kampala Uganda in East Africa, which is significantly higher than the Nigerian studies. The prevalence of HIV infection among blood donors varies from one geographical location to another and can provide a reasonable 'proxy' for HIV infection levels in a larger adult population (WHO, 2002). The majority of blood donors in Sub-Saharan Africa are family members and friends. This group of donors is considered particularly high risk since relatives and friends are likely to donate without considering their health conditions and only donate because they feel obligated to save a family member or friend (Nwankwo *et al.*, 2012). A comparative study on HIV prevalence between voluntary donors in Kenya found a great variation, with the HIV prevalence among voluntary donors at 1.7 % and 10 % among family replacement donors respectively (Kimani *et al.*, 2011).

The frequency of HIV found in this study (0.7 %) is much lower than that found by other studies like the one carried out by Nyamongo *et al.*, (2001) involving all donor groups in five provinces of Kenya, which reported prevalence rate of 9.7 %. Although relatively low HIV prevalence is seen among secondary school student blood donors, the figures contrast sharply to those observed by Glynn *et al.*, (2000) when they analyzed the trends in viral infections among blood donors in the USA and only found a prevalence rate of 0.15 % for HIV. The American Red Cross Blood Services (ARCBS) in a study conducted between 1992 through 2001; found HIV sero-prevalence rates of 0.002 % amongst the general donor population, but only 0.00006 % amongst high school student donors (ARCBS, 2012). The figures in the ARCBS study are almost 10,000 times lower than those found in this study, suggesting that a lot still needs to be done in order to assure the safety of blood donated by secondary school students in Kenya. A study in a rural population India showed a HIV prevalence of 1.56 % among voluntary donors and 2.11% in replacement donors (Sonwane *et al.*, 2003), but another study by Kumar *et al.*, (1996), in Bangalore found a HIV prevalence among voluntary donors to be much lower at only 0.042 % ($p=14266$). In Uganda, the MOH surveillance reports showed a HIV prevalence of 0.7 % among school going blood donors (MOH, 2001). In the more developed countries, chances of transmitting HIV through donated blood is low due to stringent blood screening measures in place. The use of whole-virus lysate ELISAs and p24 antigen based assays has increased the sensitivity of the assays and thus viral products are detectable early during the

window period. The average window period for the most sensitive ELISA for HIV is now to about 20 days (Shimian *et al.*, 2012)

Majority of cases of transfusion-associated HIV transmission may be the result of blood donated during the window period when the viral load of individuals is still low. Using whole-Virus lysate enzyme immuno assays (EIA'S) to screen blood may reduce the window period to about 45 days (95 % , CI 34-55 days). Studies show that the average window period for the most sensitive ELISA for HIV antibodies is now about 20 days giving an average infectious window period of 25 days (95 % , CI= 9-41 days) (Shimian *et al.*, 2012). For effective exclusion of blood donors perceived to bear risk and to protect the blood supply from viral contamination, the criteria used must take into account the specific epidemiological situation of any given country or region.

5. Conclusions

This study shows fairly low prevalence of HIV among secondary school student blood donors in Nairobi County (0.7%) compared to the general population (6.1%). We recommend strengthening the recruitment of secondary school student blood donors to increase the safety of donated blood and reduce risk of HIV transmission through donated blood.

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7. Conflict of Interest

We, the authors, declare that there is no competing interest financially or non-financially.

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