

# Human – T Lymphotropic Virus 1 (HTLV-1) Among Blood Donors in Ogbomoso, Oyo State, Nigeria

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## Abstract

This study was designed to determine the seroprevalence of Human T- Lymphotropic Virus 1(HTLV-1) among blood donors in Ogbomoso, Oyo State, Nigeria Three hundred (300) consenting potential blood donors were recruited into the study over a period of three months (May to July, 2013). Each subject was screened for HIV, HBsAg and HCV and a structured questionnaire was administered. A total of 93 (male = 63; female = 30) subjects with mean age of 45±2.3 years previously tested negative for HIV, HBsAg and HCV were screened for HTLV-1 antibodies using Enzyme Linked Immunosorbent Assay (ELISA). Out of 93 subjects tested, 24 (25.8%) were positive for both anti-HTLV-1 IgM and anti- HTLV-1 IgG. Anti- HTLV-1 IgM was highest among the subjects in the age group 18-24, 13(39.4%), male 13(20.6%), single 14 (31.4%) and student 14 (37.8%) while Anti- HTLV-1 IgG was highest among the subjects in the age group 18-24, 15 (45.5%), female 12(19.1%), single 14 (27.5%) and student 14 (37.8%). These results provide more and further evidence that Human T-Lymphotropic Virus 1 is present among blood donors in Ogbomoso and is also one of the transfusion transmissible viral infections.

**Keywords:** Blood donors; HTLV-1; IgM; IgG; Seroprevalence; ELISA; Ogbomoso

## Introduction

Human T-cell Lymphotropic Virus (HTLV) is also called Adult T-cell Lymphoma Virus (ATCL) or Adult T-Cell Leukemia Lymphoma (ATCLL). This virus is from the family of Retroviridae, subfamily of Orthoretrovirinae, genus of Delta retrovirus and species simian T-Lymphotropic Virus. This virus was the first retrovirus to be discovered and identified in 1980 by Poiesz, et al. [1]. There are two types of HTLV, designated HTLV I and II both of which are transmitted via several routes including sexual transmission, vertical transmission, breastfeeding, contaminated blood transfusion, sharing of sharp objects like needle and syringes or transplantation of infected organs and tissues e.g. kidney, Remeser, et al. [2]. In areas where HTLV-1 is endemic, its sero conversions have been observed in 44 - 63% of cases of individuals who received blood contaminated with HTLV-1 infected cells. The prevalence of contamination of the blood with HTLV-1 has also been reported to be 0.3% in United States of America and 0.7% in Brazil by Abbaszadegan, et al. [3]. HTLV-1 transmission by transfusion of cellular blood components has also been reported, requiring testing of blood products in blood banks in high prevalence regions. Cellular blood components transmit HTLV-I with 20 - 63% efficiency. Due to the asymptomatic character of the viral infection, infected persons may donate blood without knowledge of their infection by Remeser, et al. [2]. Since transfusion is one of the major routes of transmission of HTLV-1 and its screening has not been included into the existing blood donor protocol in Nigeria, there is a need to investigate the rate at which HTLV-1 is transmitted via blood transfusion. Little is known about the pattern of prevalence of HTLV-1 in Ogbomoso; this study is therefore designed to determine the seroprevalence of HTLV-1 among blood donors seen at a hospital-based transfusion service in Ogbomoso.

## Materials and Methods

### Study centre

The study centre for this study is the blood bank of Bowen University Teaching Hospital located in Ogbomoso in Oyo State, which is situated in the tropical belt of Southern Western Nigeria.

### Study population

Blood samples for testing were obtained from potential donors at the Blood Bank of the Bowen University Teaching Hospital, Ogbomoso, which registers an average of 20 replacement donors daily as described by Oladipo et al. [4]. All consenting donors were recruited consecutively between May- July, 2013. Approval was obtained from the hospital's research and ethics committee. Participants were asked to and helped to fill the structured questionnaires, including demographic information, history of previous exposure to blood transfusion and donation. The exclusion criteria were: any history of chronic illness (e.g. hypertension, etc.), ages below 18 years or above 59 years (recommended age for blood donation) and seropositivity to HIV, HBV and HCV.

A total of three hundred (300) potential blood donors were invited to participate in the study. They were subjected to HIV, HBV and HCV rapid screening test before recruiting them into the HTLV study. HIV testing was carried out using Determine HIV 1/2™ Test Kit by Abbott Japan Co., Ltd. Minto-Ku, Tokyo, Japan while HBV and HCV Test was likewise done using Test Kit by AbonBiopharm, Hangzhou Co. Ltd, China. Subjects who tested positive to either HIV, HBV or HCV after consenting were excluded from the study.

### Sample collection and analysis

Out of the three hundred donors, 93 subjects were qualified to take part in the study. A blood sample of 5 mls was collected into a sterile,

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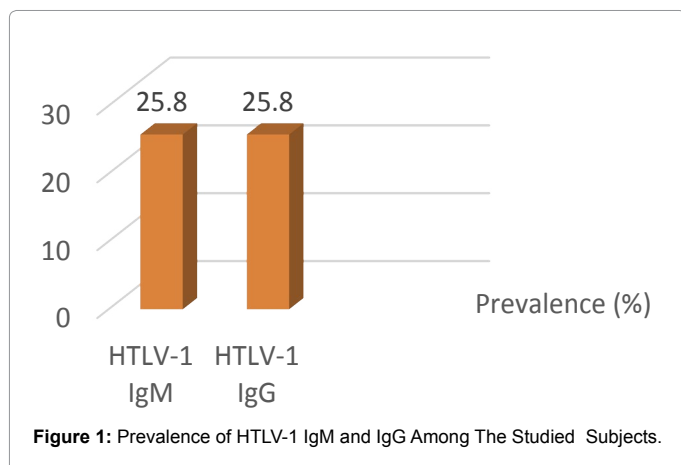


Figure 1: Prevalence of HTLV-1 IgM and IgG Among The Studied Subjects.

Age Range	No of Subjects Tested (%)	No of Subjects with anti-HTLV-1 IgM (%)	No of Subjects with anti-HTLV-1 IgG (%)
18 – 24	33 (35.5)	13 (39.4)	15 (45.5)
25 – 31	26 (28.0)	4 (15.4)	2 (7.7)
32 – 38	18 (19.4)	5 (27.8)	5 (27.8)
39 – 45	11 (11.8)	1 (9.2)	1 (9.2)
46 – 52	4 (4.3)	1 (25.0)	1 (25.0)
53 – 59	1 (1.1)	0 (0.0)	0 (0.0)
<b>Total (%)</b>	<b>93 (100)</b>	<b>24 (25.8)</b>	<b>24 (25.8)</b>

Table 1: Age Distribution of HTLV-1 Antibodies Among the Study Subjects.

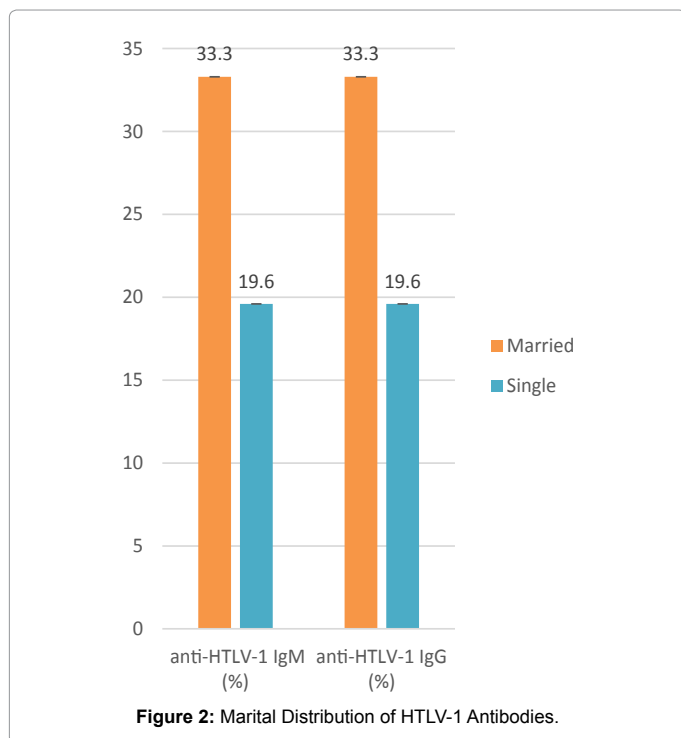


Figure 2: Marital Distribution of HTLV-1 Antibodies.

plain bottle which was centrifuged at 3,000 rpm for 10 minutes. The serum was separated into sterile cryovials and stored at -20°C prior to analysis.

The qualified participants' sera were tested for IgM and IgG HTLV-1 by the Enzyme –Linked Immunosorbent Assay (ELISA) test. The HTLV-1 specific IgM / IgG antibodies were studied by the commercial WKEA Med Supplies Corp, HTLV-1 IgM/ IgG ELISA Kit (China), according to the manufacturer's instructions. All the specimens

were analyzed using the enzyme immunoassay test. The presence or absence of HTLV-1IgM/IgG was determined by comparing the sample absorbance with the absorbance of the cut-off calibrator. The data obtained were subjected to descriptive statistical analysis using SPSS version 17.0 (SPSS Inc Chicago, Ill, USA).

## Results

Figure1 shows prevalence of HTLV-1 antibodies in the study subjects. Out of 93 subjects whose sera were tested using ELISA, 24 (25.8%) were positive for both HTLV-1 IgM andIgG. To facilitate statistical analysis, subjects were grouped in age ranges of equal intervals (Table 1). The highest prevalence of anti-HTLV-1IgG15 (45.5%) was found in subjects whose ages were between 18-24 years and the highest prevalence of anti-HTLV-1 IgM13(39.4%) was also found in subjects whose ages were between 18- 24 years as shown in Table 1. Subjects within the age range of 25-31 years had 4 (15.4%) and 2(7.7%) prevalence of anti-HTLV-1IgM and anti-HTLV-1IgGrespectively. Among other age groups the prevalence of anti-HTLV-1IgM and anti-HTLV-1 IgG was as follows; 32- 38 years 5(27.8%), 39-45 years 1(9.2%), 46-52years 1(25.0%) and 53-59years 0 (0%). The prevalence of HTLV antibodies among single and married subjects is shown in Figure 2. Out of a total of 51(54.8%) singles, 10 (19.6%) tested postive for both HTLV-1 IgM and HTLV-1 IgG. Among the married 42(45.2%) and 14(33.3%) were postive for HTLV-1 IgM and HTLV-1 IgG respectively.The prevalence of HTLV-1 antibodies is higher among married subjects than the single individuals.The sex distribution of the study subjects tested for HTLV-1 antibody is shown in Figure 3. Out of 63 males, 13(20.6%) were positive for anti-HTLV-1 IgM and 12(19.1%) were positive for anti-HTLV-1IgG. Among the 30 females, 11(36.7%) were positive for anti-HTLV-1 IgM and 12(40.0%) were positive for anti-HTLV-1IgG.A total of 93 study subjects with different occupational groups were tested for HTLV-1antibodies. The prevalence of HTLV-1antibodies in civil servant, student, artisan and trading is shown in Table 2. A significant difference was observed in the mean seropositive group in the analysis of variance of the serological pattern of HTLV-1, with a mean of 3 for IgG+ IgM-, 22 for IgG+IgM+, 21 for IgG- IgM- and a mean of 2 for IgG-

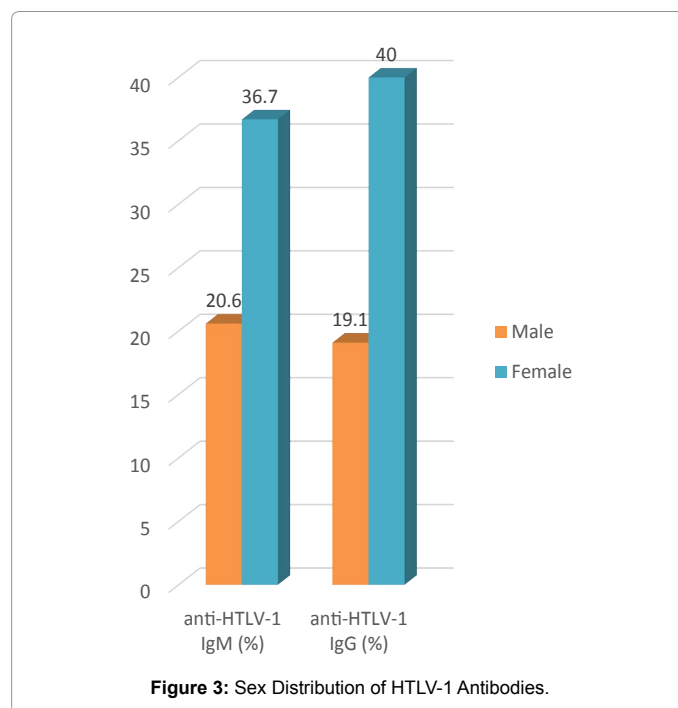


Figure 3: Sex Distribution of HTLV-1 Antibodies.

Occupation	No of Subjects Tested (%)	No of Subjects with anti-HTLV-1 IgM (%)	No of Subjects with anti-HTLV-1 IgG (%)
Civil Servant	22 (23.7)	3 (13.6)	4 (18.2)
Student	37 (39.8)	14 (37.8)	13 (35.1)
Artisan	14 (15.1)	4 (28.6)	3 (21.4)
Trader	20 (21.5)	3 (15.0)	4 (20.0)
<b>Total (%)</b>	<b>93 (100)</b>	<b>24 (25.8)</b>	<b>24 (25.8)</b>

**Table 2:** Occupational Distribution of HTLV-1 Antibodies Among The Study Subjects.

Serological Status	IgG-IgM <sup>a</sup>	IgG <sup>+</sup> IgM <sup>b</sup>	IgG <sup>-</sup> IgM <sup>c</sup>	IgG <sup>+</sup> IgM <sup>d</sup>
Sero-Positive	2 ± 0.04 <sup>a</sup>	3 ± 0.58 <sup>b</sup>	21 ± 0.02 <sup>c</sup>	22 ± 0.58 <sup>d</sup>
Sero-Negative	91 ± 0.70	90 ± 0.58 <sup>c</sup>	72 ± 0.23 <sup>b</sup>	71 ± 0.23 <sup>a</sup>

**Table 3:** Variance Analysis for Serological Pattern of HTLV-1 Antibodies among Subjects Studies

Values= mean scores ± standard error

Mean values followed by the same superscript in the row are not significantly different by Duncan's Multiple Range test.

P ≤ 0.05

IgM<sup>+</sup>; but there was significant difference observed in the mean value of the seronegative group, with a mean 91 for IgG-IgM<sup>+</sup>, 90 for IgG<sup>+</sup>IgM<sup>-</sup>, 71 for IgG<sup>-</sup>IgM<sup>+</sup>, 72 for IgG-IgM<sup>-</sup> in all the groups as shown in Table 3.

## Discussion

The discovery that HTLV could be transmitted by blood transfusion has provoked a greatly heightened emphasis on two fundamental objectives, safety and protection of human life by Tapko et al. [5]. Transfusion transmissible infections (TTIs) are a very serious complication of blood transfusion by Fleming et al. [6]. Fleming [7] observed that these infections continue to pose a great challenge to transfusion medicine, most especially in Africa, due to a high transfusion demand. HTLV-1 is distinct from HIV, but share a similar mode of transmission, primarily; through unscreened and contaminated blood and blood products by contact or transfusion. Other routes include sexual intercourse and vertical transmission from mother to fetus in the immediate pre-natal period by Busch et al. [8]. Three hundred subjects were recruited into the study while only 93 donors who were eligible and consented to participate in the study were analyzed for HTLV-1 IgM and IgG. This was done to determine the rate of infections either recent (IgM) or past (IgG). The mean seroprevalence of HTLV antibodies was 25.8%. The study population had an age range of 18-59 years which is the recommended standard age for prospective blood donors in Nigeria. This explains why no subject was below age 18 and a few above 50 years old. The overall prevalence of anti-HTLV-1 IgM and IgG is 25.8% which is higher than the prevalence reported by Mann, et al. [9] in USA which is 3-5%. The prevalence is also higher than that of Adjei et al. [10] WHO reported 4.2% seroprevalence rate among blood donors in Ghana likewise Idris, et al. [11] who also reported 1.0% among healthy blood donors in Lagos. The seroprevalence from this study is higher than that of Terry et al. [12] who recorded 3.6% of HTLV I/II amongst blood donors in Osogbo. The subjects in the age range 18-24 had the highest HTLV-1 antibodies in the study (IgM is 39.4%; IgG is 45.5%) and this age range represents the most active age group of the study subjects, this could indicate that this is the age range that primary HTLV-1 infection commonly develops. This findings is in support with Terry Alli et al. [12] who observed the same. There was a predominance of male among the study subjects because females are not usually encouraged to donate blood in Nigerian society.

The prevalence of anti- HTLV-1 IgM and IgG 24 (25.8%) in this study in regards sex distribution of the subjects does not have any significance difference between males and females. In this study the

prevalence of anti- HTLV IgM and IgG among the marital subjects was significantly different. Higher seroprevalence of HTLV-1 was observed among the married than the singles due to the fact that the married could be likely engaged more in sexual activities than the singles and which could put them at higher risk of the infection. From this study it was observed that there is recent infection of HTLV-1 from the variance analysis conducted. The observed seroprevalence of HTLV-1 antibodies among the potential blood donors in Ogbomosho, albeit a limited hospital based study, provides some information on the incidence of this infection in the community. It emphasizes the need for continuous epidemiological surveillance to help in the policy decision-making concerning blood safety because in Nigeria, no prospective blood donors are screened routinely for HTLV-1 antibodies. Results of this study shows the prevalence of anti-HTLV IgM/IgG of 24.5% and 24.5% respectively which suggest that the virus ranks as one of the major transfusions transmissible viral infections.

## Conflict of Interest

The authors declare that there is no conflict of interest concerning this research.

## Acknowledgement

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