

## Human T Cell Lymphotropic Virus Types 1 And 2 Among Blood Donors in Aminu Kano Teaching Hospital

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### ABSTRACT

*Human T cell lymphotropic virus belongs to the Retroviridae family, Oncovirinae subfamily, genus Deltaretrovirus, Group VI, positive sense, ssRNA virus and has been linked to the Adult T cell leukaemia/lymphoma, and neurologic disorder called tropical spastic paraparesis. This study was carried out to determine the prevalence of Human T cell lymphotropic virus type 1 and 2 among blood donors at Aminu Kano Teaching Hospital (AKTH). A total of ninety one (91) fit blood donors were recruited at the donor clinic AKTH and were screened for HTLV 1 and 2 by Enzyme Linked Immunosorbent Assay (ELISA). Seroprevalence of HTLV 1 and 2 among the study subjects was 1.1%. This showed that the virus is in circulation in Kano community. There is need for expanded community based study on HTLV among prospective blood donors in Kano State and Nigeria in general to ascertain the actual prevalence of this virus so as to minimize the risk of transferring of the virus from infected individual to non infected person.*

**Key words:** AKTH, Blood donors, Human T cell lymphotropic virus

### INTRODUCTION

Human T cell lymphotropic virus (HTLV) was the first human retrovirus discovered by Gallo in 1979 and published in 1980<sup>1</sup>. HTLVs (80-100nm) belongs to the *Retroviridae* family, *Oncovirinae* subfamily, in the genus Delta retrovirus, positive sense ssRNA, (Group VI) human lymphotropic virus type specie, that use an enzyme called reverse transcriptase to produce DNA from mRNA, the DNA is subsequently integrates into the host's genome for replication<sup>2</sup>. HTLV-1 causes a T-cell proliferation with persistent infection; it can induce malignancy in an infected human, and has been linked to the Adult T cell leukaemia/lymphoma, and neurologic disorder called tropical spastic paraparesis (TSP) or (HAMS) HTLV-1 associated myelopathies<sup>1</sup>. Though it has a worldwide distribution, HTLV-1 is endemic only in South Western Japan, the Caribbean Basin, West and Central Africa, some areas of intertropical Africa (such as South Gabon) and of the middle East (such as the Mashhad region in North-eastern Iran), rare isolated clusters in Australo-Melanesia, and foci in South America<sup>3</sup>. HTLV-2 has been associated with lymphocytosis and increase risk of developing neuropathies cutaneous lymphoma in patients co-infected with HIV<sup>4</sup>. Infection with

HTLV-1 and HTLV-2 are lifelong with asymptomatic carrier state. Over 20 million persons are infected with HTLV-1 and HTLV-2 globally with varying levels of seroprevalence reported in almost every region of the world such as 37% in Japan<sup>4</sup> and 5% in Jamaica<sup>5</sup>. In Africa varying prevalence from 0.6% in Morocco to greater than 5% in several sub-Saharan African countries, for example, in Benin, Cameroon, and Guinea-Bissau was reported<sup>6</sup>. In Europe and North America, low prevalence were reported such as blood donors in France (0.0039%)<sup>7</sup> and United States (0.025%)<sup>5</sup>. In Chile (0.73%)<sup>8</sup> and Argentina (0.07%)<sup>8</sup>, in Brazil (1.35%)<sup>9</sup>, in Colombia (4.3%)<sup>10</sup> and in Australia (14%) prevalence was reported<sup>11</sup>. HTLV-1 Transmission occurs by blood transfusion, sexual contact, and from mother to child by breast feeding through ingestion of infected milk borne lymphocytes and by sharing contaminated needles<sup>12</sup>. The term "blood donors" includes donors of whole blood, red cells, platelets, plasma and other blood components, donated as whole blood and/or through apheresis<sup>13</sup>. The safety and availability of blood and blood products for transfusion requires the recruitment and selection of voluntary non-remunerated blood donors. This allows quality-assured screening of all donated blood and the safe and rational clinical use of the blood. Hence, collection of blood from voluntary non-remunerated blood donors at low-risk of infections that can be transmitted through blood and blood products is the best. This study was aimed to determine the seroprevalence of Human T cell lymphotropic viruses 1 and 2 among blood donors in Aminu Kano Teaching Hospital, Kano.

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## MATERIAL AND METHODS

### Study Area

This research was conducted in Aminu Kano Teaching Hospital (AKTH), Kano a tertiary health care institution and referral Centre for a number of secondary and primary health care facilities within the northwest geopolitical zone. It is located along Zaria road within Kano metropolis, Kano state. The state is located at the north-western region of Nigeria lies between Latitude 11°N and Longitude 8°E with a total land area of 20,760sq kilometer<sup>14</sup>. Kano State borders Katsina to the north-west, Jigawa State to the north-east, Bauchi State to the south-east and Kaduna State to the south-west.

### Research Design

This was a hospital based Cross sectional study which was conducted from June to August, 2017.

### Study Population

Random sampling technique was used to collect ninety one (91) blood samples from the participants (healthy blood donors) in this study, and grouped into age ranges. The blood donors were screened (physically, clinically and by laboratory tests) and found to be fit for donation.

### Ethical Considerations

Ethical approval to conduct this research was sought and obtained from the Research Ethics committees of AKTH, Kano.

### Sample Collection, Processing and Preservation

Five milliliter (5ml) of venous blood sample was collected aseptically from all the participants and dispensed into a plain Vacutainer. The sample was allowed to clot, and then centrifuged at 3000revolution per minute for 5minutes<sup>8</sup>. The serum was transferred into pre-labeled 2ml plain containers and stored at -20°C until required for analysis.

### Sample Analysis

Serum sample was assayed for HTLV 1 and 2 antibodies using qualitative direct ELISA assay kit (AUTOBIO DIAGNOSTIC CO., LTD, Zhengzhou China).

### Assay Procedure

Fifty microliter (50µl) of samples and controls negative and positive were added to their respective wells, 50µl of enzyme conjugate was added to each well with exception of blank well, the plate was covered with lid and incubated at 37°C for 60 minutes.

The plate was washed 5 times with 300µl of diluted wash buffer using plate washer and after the washing is completed the plate was inverted and taped out to remove any residual wash fluid onto absorbent paper.

One hundred Microliter (100µl) of mixed substrate was added to each well including the blank well; the plate was covered with lid and incubated at 37°C for 30 minutes protected from sunlight.

One hundred microliter (100µl) of stop solution was added to each well including the blank well and the absorbance of each well was read at 450nm within 15 minutes in Elisa reader and the result was recorded.

The result was determined using the cut-off value which is calculated using negative mean + 0.18, (CV = 0.256).

### Statistical Analysis

The data was analyzed with SPSS version 20.0 package. The mean, median, standard deviation and other parameters of statistical location were generated. Statistical significance was considered when the p value was less than 0.05 (P value < 0.05).

## RESULTS

The prevalence of HTLV 1 and 2 among blood donors in the study area was 1.1% (1/91) as shown in Table 1.

Age range of the participants was 18 to 50 years, with a mean of 27.87 years, standard deviation of 8.28. Majority of the donors were between the ages of 21 and 30 years. Donors between the ages of 18 to 20 years were 19 (20.9%) while the remaining donors were of 31 to 40 years, and 41 to 50 as shown in Table 2.

Among 91 blood donors only 1 (1.1%) was HTLV 1 and 2 positive and was aged 34 years (age range 31-40 years), which has a frequency of 17(18.7%) of the participants, thus no association based on age variable, as shown in Table 3.

Virtually most of the donors are of higher educational level (tertiary education) 54 (59.3%), with 37 (40.7%) having senior secondary school certificate. Majority of the donors are business men 51 (56%) with 28 (30.8%), students and 12 (13.2%) were civil servants, as shown in Table 4. None of the respondents had any blood transfusion, and most of the donors 63 (69.2%) reported not having multiple sexual partners, with 9 (9.9%) having more than one sexual partners. Participant with first donation were 41 (45.1%) and 40 (43.9%) have history of donation, majority of the donors were for family replacements 82 (90.1%) and 9 (9.9%) were voluntary donors; no commercial donors were captured in the study, as shown in Table 5.

Table 1: Prevalence of HTLV 1 and 2 antibodies among 91 blood donors.

HTLV 1 and 2	Healthy blood donors	Percentage (%)
Negative	90	98.9
Positive	1	1.1
Total	91	100

Table 2: Age distribution of the donors.

Age range (Years)	Gender	Frequency	Percentage (%)
18-20	M	19	20.9
21-30	M	46	50.5
31-40	M	17	18.7
41-50	M	9	9.9
Total	M	91	100

Key: M = male

Table 3: Age prevalence of HTLV 1 and 2 antibodies in blood donors.

HTLV Age group (Years)	Positive (n=1) n (%)	Negative (n=90) n (%)
18-20	0(0.0)	19(20.9)
21-30	0(0.0)	46(50.5)
31-40	1(1.1)	16(17.6)
41-50	0(0.0)	9(9.9)
Total	1(1.1)	90(98.9)

Key: n = number of participants

Table 4: Educational level and occupation of the donors.

Education Level	Frequency	Percentage (%)
Tertiary level	54	59.3
SSCE	37	40.7
Total	91	100
<b>Occupation</b>		
Business	51	56
Students	28	30.8
Civil servant	12	13.2
Total	91	100

Table 5: Behavioral characteristic of the donors and type of donation.

Sexual partners	Frequency	Percentage (%)
None	19	20.9
One	63	69.2
More than one	9	9.9
Total	91	100
<b>Donation</b>		
One (First)	41	45.1
More than one	40	43.9
Total	91	100
<b>Type of donation</b>		
Family replacement	82	90.1
Voluntary donation	9	9.9
Total	91	100

## DISCUSSION

Infection with HTLV-1/2 affects 10-20 million people worldwide, with an overall prevalence of 5-10% though rates as high as 15% have been reported<sup>15</sup>. However, HTLV is said to be confined to specific geographical areas, and Sub-Saharan Africa is in that endemic belt of HTLV, with a stable incidence and high prevalence<sup>1</sup>. The overall prevalence rate of HTLV among apparently healthy and high risk populations documented by Olaleye *et al.*<sup>18</sup> in 1994 was 5.6%. In that study, HTLV prevalence among health care workers was 3.3%. The result obtained in this study among apparently healthy blood donors was 1.1% which shows low prevalence compared with the report by Olaleye *et al.* However, the difference may be due to high risk population involved in their study which



included patients with STDs (16.3%) and commercial sex workers (8.3%).

The result of the current study (1.1%), shows a high prevalence compared to that of Okoye *et al.*<sup>19</sup> at Enugu who reveals a prevalence of 0%, and A slightly higher prevalence than that of Okoye *et al.*<sup>20</sup> in Enugu which reported 0.5%, but is similar to that of Durojaiye *et al.*<sup>13</sup> at Lagos University Teaching Hospital (LUTH), Lagos with a prevalence of 1%. The result shows low prevalence compared to the result of Terry *et al.*<sup>2</sup> at Osogbo which was 3.6%, and that of Akimbami *et al.*<sup>21</sup> at Lagos which was 5.1%. Another recent study by Manga *et al.*<sup>12</sup> at Gombe reveals a seroprevalence of 6.4%, which is higher than the finding in this study. Higher prevalence was obtained by Opaleye *et al.*<sup>23</sup> in Osogbo (24.5%), and Oladipo *et al.*<sup>24</sup> in Ogbomoso (25.8%). This may be due to differences in donor selection criteria utilized in our study area.

The prevalence of HTLV1 and 2 among blood donors in this study is however higher than figures reported in North America and Europe, where very low seroprevalence have been documented 0.01-0.03% in USA and Canada, 0.0039 in France, 0.002% in Norway and 0.0056% in Greece. However, strict donor selection criteria may account for the very low HTLV-1 seroprevalence rates in these countries<sup>23</sup>. Generally, the seroprevalence in this present study is comparatively low compared to other studies in Nigeria. This could be due to the impact of educational status of the participants in this study which may have created awareness on the risk factors of HTLV transmission compared to the study by Iyalla *et al.*<sup>1</sup>. The study population in some other studies comprises both males and females whereas in this study only males blood donors were available at the time of study. This is because blood donors in north western Nigeria, especially Kano are predominantly males. Hence, no sex or gender association was established in this study.

Although, the only blood sample that was HTLV 1 and 2 seropositive was from a 34-year old donor, some other studies demonstrated higher HTLV 1 prevalence with increase in age<sup>18, 24</sup>. This could be due to an increased chances of exposure to the risk factors as an individual grows up. (DELETE the highlighted sentence!) However, other study reported seropositivity with HTLV-1 was seen in donor below 30 years of age<sup>13</sup>.

## CONCLUSION

This study revealed 1.1% seroprevalence of Human T cell lymphotropic virus 1 and 2 among blood donors in AKTH, Kano. The results of this study has therefore prompted the need to conduct a large community based research on HTLV among prospective blood donors in Kano as well as other states in Nigeria to ascertain the correctness of the situation.

## Conflicts of Interest

The authors declare no conflicts of interest.

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