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Prevalence of HIV/AIDS among Ethiopian People in Khartoum State

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Abstract:

Background: *This descriptive cross sectional and analytical study has been done to study prevalence of Human immunodeficiency virus (HIV) infection and the impact of associated factors affecting prevalence in Ethiopian people in west Juref in Khartoum state.*

Methods: *Seventy five blood samples collected from patients coming to Alfaruk medical center, seeking for medical care. Serum was separated from blood and subjected to rapid testing by immunochromatogrphy (ICT) to detect presence of antibody against HIV antigen.*

Result: *Six samples were positive for presence of HIV-Abs (5-positive for HIV-1 and 1 positive for HIV-2) comprising 8% while (69) samples (92%) were negative for HIV.*

ELISA (Fourth generation ELISA) was done on the six positive ICT result as confirmatory test revealed presence of strong positive result indicating presence of HIV-Ab.

Conclusion: *Results of studying parameters of socioeconomic factors affecting. HIV prevalence indicates positive correlation showing high infection rate. In the age group (31-40 years), in males (8%) more than females, all males were Christian, and maybe uncircumcised, in the same time uneducated or just at primary level.*

Key words: HIV, AIDS, ELISA, ICT, Serum, Ag.

INTRODUCTION

Background: Human immunodeficiency virus (HIV) is the cause of the spectrum of disease known as acquired immunodeficiency syndrome (AIDS). AIDS has caused an estimated 36 million deaths worldwide; approximately 35.3 million people are living with HIV globally [1]. AIDS is considered a pandemic a disease outbreak which is present over a large area and is actively spreading [2]. HIV is a retrovirus that primarily infects components of the human immune system such as CD4+ T cells, macrophages and dendritic cells. It directly and indirectly destroys CD4+ T cells [3]. HIV is a member of the genus Lentivirus [4]. Part of the family Retroviridae [5]. Lentiviruses share many morphological and biological characteristics. Many species of mammals are infected by lentiviruses, which are characteristically responsible for long-duration illnesses with a long incubation period [6]. Ethiopian people in Sudan work in barber, restraint, cleaning field and other occupation. Previous of HIV infection is not documented yet. Due to illegal migration of Ethiopian people in to Sudan. Characterization and identification of HIV infection among Ethiopian well help in prevention and minimize the cross infection.

MATERIALS AND METHODS:

This descriptive cross sectional study aimed to study the prevalence of AIDS in Ethiopian people in west Juref in Khartoum state during the period from March to May 2015. As 75 samples were randomly selected for this study and tested by immunochromatographic test (ICT) for HIV and ELISA. Data collected by questionnaire and 3 ml of blood was collected in plain container and centrifuged in 3000 revolution per minute (RPM) for 3 – 5 minutes to separate the blood to serum. Separated serum stored in 4oC until analysis, all samples were analyzed for HIV. Data were analyzed by computerized program SPSS.

Principle of ICT: The HIV 1/2/O (Abon Biopharn-china) is tri line human immunodeficiency virus rapid test device (whole blood / serum / plasma) is a qualitative membrane based immunoassay for the detection to antibodies to HIV-1, HIV-2, and subtype O in whole blood, serum, or plasma. The membrane is pre-coated with recombinant HIV antigen in the test line regions T1 and T2. T1test line is pre – coated with HIV-2 antigen. During testing the whole blood, serum or plasma react with the mixture of HIV-1 envelope and core antigen and HIV - 2 envelope antigens that coated on colored particles in the test strip. The mixture then migrates upward on the membrane chromatographically by capillary action and react with recombinant HIV antigen on the membrane in the test line region. If the specimen contains antibodies to HIV-1 and / or subtype O, or HIV-2 one colored line will appear in the test line region; if the specimen contains antibodies to HIV-1 and / or subtype O, and HIV-2 two colored lines will appear in the test line region .Both indicate a positive result. If the specimen does not contain HIV-1, subtype O, and / or HIV-2 antibodies no colored line will appear in the test line region

indicating a negative result. To serve as a procedural control, a colored line will always appear in the control line region indicating that proper volume of specimen has been added and membrane wicking has occurred.

INTERPRETATION OF RESULT:

Positive: two or three distinct colored lines appear. One line should always appear in the control line region (C), and another one or two apparent control line (S) should appear in the test line region (s) (T1 and / or T2).
***Note**: the intensity of the color in the test line region (T1 and T2) will vary depending on the concentration of HIV antibodies present in the specimen. Therefore, any shade of color in the test line region (T1 and/ or T2) should be considered positive.

Negative: one colored line appears in the control region (C). No apparent colored lines appear in the test line reigns (T1 and T2).

Invalid: control line fails to appear. Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and repeat the test with a new test device. If the problems persist, discontinue using the test kit immediately and contact your local distributor.

Detection of ICT positive serum samples by ELISA using fortress kit for HIV (Ag/Abs) 4th Gen HIV-1 GROUP M (A, B, C, D, E, F, G, H,) GROUP O, GROUP N &HIV-2. Intended use: Fortress kit (fortress diagnostics limited-U.K) is an enzyme-linked immunosorbent assay (ELISA) for qualitative determination of antigens or antibodies to human immunodeficiency virus (HIV) type 1 and / or type 2 in human

serum or plasma. The method is also known as 4th generation ELISA for HIV detection, the kit is intended for diagnosis of clinical condition relate to infection with HIV-1and / or HIV-2.

Principle: This HIV (1+2) Ag/Abs ELISA kit a two-step incubation "sandwich" enzyme immunoassay which uses polystyrene micro well strips per-coated with recombinant HIV antigens (recombinant HIV-1gp41gp120 and recombinant HIV-2 gp36) and anti-HIV (P24) antibodies. As a first step biotinylated anti-HIV (P24) antibodies together with the patient's serum or plasma sample are added into the wells during incubation the specific HIV1/2 antibodies if present in sample will be captured inside the wells. The micro wells are then washed to remove unbound serum proteins. The detection of the captured HIV p24 antigen-biotinylated antibody complex or HIV 1/2 antibodies is achieved during the second incubation step by adding of the enzyme horseradish peroxidase (HRP) which has been conjugated to second HIV 1+2recombinant antigens and to avidin.

P24 detection: When p24 has been captured inside the wells avidin will react with the biotin attach HRP to the Ab-p24-Ab complex.

HIV1/2 antibody detection: When HIV1/2 antibodies have been captured inside the wells the RHP conjugated antigens will bind to the captured antibodies forming Ag-Abs-Ag (HRP) "sandwich" immune complex. The micro wills are washed to remove unbound conjugate and chromogen solutions are added to the wells. In wells containing the Ag-Abs-Ag (HRP) and/or Ab-p24-Ab (HRP) "sandwich" immune complex the colorless chromogens are hydrolyzed by the bound HRP to a blue colored product. The blue color turns yellow after stopping the reaction with sulfuric acid. The amount of color intensity can be

measured and is proportional to the amount of antibodies or p24captured in the wills and to the sample respectively wells containing samples negative for anti-HIV1/2 or p24 remain colorless.

Assay procedure: According to the leaflet of the kit.

Interpretation of result and quality control: Each micro plate should be considered separately when calculating and regardless of the number of plates concurrently processed. The result is calculated by relating each samples optical density (OD) value to the cut-of value (C.O) of the plate. Calculation of the cut-off value C.O =negative control (N.C) + 0.12 N.C = the mean absorbance value for three negative control. S = the individual absorbance (OD) of the each specimen. Negative results obtained when S / C.O <1 Samples giving absorbance less than the cut-off value are negative for this assay which indicate that no HIV 1/2 antibodies or p24 antigen have been detected with this HIV (1+2) Ag&Abs ELISA kit. Positive results obtained when S / C.O. ≥1. Samples giving an absorbance equal to or greater than the cut-off value are considered initially reactive which indicates that HIV 1/2 antibodies and / or p24 antigen have probably been detected using this HIV (1+2) Ag&Abs ELISA kit. Borderline obtained when S /C.O =0.9-1.1 Samples with absorbance to cut-of ratio between 0.9 and 1.1 are considered borderline and retesting of these samples in duplicates is recommended to confirm the results.

Results: The current study aimed to screen seroprevalence of HIV among Ethiopian people in west juref in Khartoum state using rapid test (ICT) and ELISA. Out of 75 tested persons, 6 of them were positive (8%) and 69(92%) were negative using ICT (Table-1). Related to patient's gender all patients who were

seropositive were male (8%) and 69 were negative (92%), 66 were male (92%) and 3 were females (100%) (Table-2). Related to age (Table-3) declared that most infected people (4) of were with (6%) ranging between 31-40 years and 2 of them ranging between 20-30 years with percentage (15%). All positive patients were 6 Christian (8%) whereas negative people comprised 69 some of them were Christian 67 (92%) and 2 were Muslim (100%). (Table-4) Related to marital status (Table-5) showed that out of the 6 positive patient's 5 were not married with (7%) and 1married (25%) whereas negative 69 were single & 3 were married. (Table-6) declared that level of education had effect on prevalence of AIDS and this was clear in this study where (5) out of (6) seropositive were not educated (13%) and (1) was just at primary level of education (3%). (Table-7) showed that effect of patient's employment on prevalence of HIV was declared in seropositive, 5 of them were laborer (9%) and 1 had free job (6%).

Result of ELISA: had shown that 4 sample out of 6 positive were strongly positive to 4th generation ELISA (Table-8).

Table-1: percentage of HIV testing by ICT

Result of HIV ICT					
Positive		Negative		Total	
Count	%	Count	%	Count	%
6	8%	69	92%	75	100%

Table-2: Relation between HIV Prevalence and patient's gender

Gender	Result of HIV ICT						P.value
	Positive		Negative		Total		
	Count	%	Count	%	Count	%	
Male	6	8%	66	92%	72	100	0.6
Female	0	0%	3	100%	3	100	
Total	6	8%	69	92%	75	100	

P.value 0.6 insignificant

Table-3: Relation between HIV Prevalence and patient's age

Age	Result of HIV ICT						P.value
	Positive		Negative		Total		
	Count	%	Count	%	Count	%	
20-30	2	15%	11	85%	13	100	
31-40	4	6%	58	94%	62	100	
41-50	0	0%	0	0%	0	0	0.3
above 50	0	0%	0	0%	0	0	
Total	6	8%	69	92%	75	100	

P value 0.3 insignificant

Table-4: Relation between HIV Prevalence & patient's religion.

Religion	Result of HIV ICT						P.value
	Positive		Negative		Total		
	Count	%	Count	%	Count	%	
Muslim	0	0%	2	100%	2	100	
Christian	6	8%	67	92%	73	100	0.6
Total	6	8%	69	92%	75	100	

P.Value 0.6 insignificant

Table-5: Relation between HIV Prevalence and patient's marital status

Marital Status	Result of HIV ICT						P.value
	Positive		Negative		Total		
	Count	%	Count	%	Count	%	
Single	5	7%	66	93%	71	100	
Married	1	25%	3	75%	4	100	0.2
Total	6	8%	69	92%	75	100	

P value 0.2 insignificant

Table-6: Relation between HIV Prevalence and patient's level of education

Level of Education	Result of HIV ICT						P.value
	Positive		Negative		Total		
	Count	%	Count	%	Count	%	
Illiterate	5	13%	34	87%	39	100	
Primary	1	3%	34	97%	35	100	
Secondary	0	0%	1	100%	1	100	0.3
University	0	0%	0	0%	0	0	
Total	6	8%	69	92%	75	100	

P value 0.3 insignificant

Table-7: Relation between HIV Prevalence and patient's employment

Employment	Result of HIV ICT						P.value
	Positive		Negative		Total		
	Count	%	Count	%	Count	%	
Employee	0	0%	0	0%	0	0	0.7
Laborer	5	9%	53	91%	58	100	
Free job	1	6%	16	94%	17	100	
House wife	0	0%	0	0%	0	0	
Total	6	8%	69	92%	75	100	

P value 0.7 insignificant

Table-8: values of 4th generation ELISA for (6) positive ICT samples.

Sample No.	OD. S / cut-off*	Final results	p.value
10	0.151	Negative	0.3
11	0.137	Negative	
47	25.1	Positive	
52	23	Positive	
73	26.4	Positive	
75	25.7	Positive	

Cut-off value = 0.145

DISCUSSION:

HIV rapid testing remains a key entry point to HIV prevention, treatment, care and support in resource-limited settings [8]. Its main advantages include the relative ease of use, low cost and faster turn-around time over enzyme immunoassays (EIAs) and Western blot (WB) assays. With an HIV rapid testing strategy, increased awareness of HIV status amongst many groups who would otherwise have been unaware of their status has been achieved [7]. Providing quality-assured and accurate rapid HIV serological testing is critical in the early diagnosis and timely counseling of HIV-infected people for referral to care and treatment as well as prevention of mother-to-child transmission and monitoring of HIV prevalence in the population [8]. HIV rapid testing also readily provides access to and enhances HIV counseling and testing in hard-to-reach rural populations [9]. To

date, several African countries have conducted evaluation studies and implemented rapid HIV testing as a tool for fighting the HIV epidemic. These studies have demonstrated that the use of rapid testing can be an important part of the overall HIV testing strategies in resource-limited settings, where cold storage capacity, reliable power, efficient transportation and sufficient numbers of skilled laboratorians may not be readily available [10]. Recently, the use of rapid testing combined with ELISA has increased significantly in Africa and Asia and tends to replace the use of WB assays [11]. Determinants of HIV prevalence: HIV prevalence levels can vary considerably between different countries and between different populations within a country. This diversity is usually attributable to a range of socio-economic, biological, demographic and behavioural factors (Johnson and Budlender, 2002) [12]. Poverty, Prevalence of HIV and other STD in a community, Higher rates of undiagnosed /untreated STDs, Higher rates of incarceration among men, Language barriers and concerns about immigration status present additional prevention challenges. Within the low income urban areas included in the analysis, individuals living below the poverty line were twice as likely to be HIV-infected as those who lived in the same community Within these high poverty areas, HIV prevalence was high and comparable across racial/ethnic groups. In addition to being more common in low income households, HIV infection was also more common among those who were unemployed and had less than a high school education [13].

CONCLUSIONS:

We concluded the following:

1-Prevalence of HIV type 1 and or type 2 in any population can be screened by rapid immunochromatogrophic test (ICT) and

confirmed by ELISA which is characterized with high sensitivity, specificity and simple operation procedure.
2-Factors influencing HIV prevalence in developing countries are socioeconomic status of the individuals including low education, urban residency, work status, poverty, ethnicity, religion, immigration, marital status in addition to biological factors as sex, age and cultural factors as circumcision.

RECOMMENDATIONS:

1. Encourage means of communication HIV/ AIDS, information to the people as mass media channels.
2. A continues screening of HIV in other areas are recommended.
3. Further in depth studies including large sample size.
4. Western blot is essential for accurate identification.
5. Health education recommended in these areas.

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