

# Journal of **AIDS and HIV Research**

**Volume 5 Number 11 November 2013**  
**ISSN 2141-2359**



*Academic  
Journals*

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Pitout JDD, Church DL, Gregson DB, Chow BL, McCracken M, Mulvey M, Laupland KB (2007). Molecular epidemiology of CTXM-producing *Escherichia coli* in the Calgary Health Region: emergence of CTX-M-15-producing isolates. *Antimicrob. Agents Chemother.* 51: 1281-1286.

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Full Length Research Paper

## Effects of 12 weeks cycle exercise programme on CD4 count and viral load in HIV sero-positive patients in Kano, Nigeria

I. S. Yar'zever<sup>1\*</sup>, U. Abubakar<sup>2</sup>, A. L. Toriola<sup>3</sup> and Nicholas U. Igbokwe<sup>4</sup>

<sup>1</sup>Department of Internal Medicine, Murtala Mohammed Specialist Hospital, Kano, Nigeria.

<sup>2</sup>Professor Wali Center for HIV/AIDs Aminu Kano Teaching Hospital, Kano, Nigeria.

<sup>3</sup>Department of Sport, Rehabilitation and Dental Sciences, Tshwane University of Technology, South Africa.

<sup>4</sup>Department of Physical and Health Education, Obafemi Awolowo University, Ile-Ife, Nigeria.

Accepted 18 September, 2013

**This study investigated the effects of 12 weeks bicycle ergometer exercise programme on CD4 cell count and viral loads in 40 male HIV sero positive patients in Kano, Nigeria, aged 39.2 years who were randomly assigned to experimental (n = 20) and control (n = 20) groups. The patients' pre and post-test anthropometric measurements as well as CD4 cell counts and viral loads were obtained using standard biochemical techniques. Following 5 min warm up, the experimental group participated in 30 min incremental cycle (mechanical brake type) exercise, thrice a week for 12 weeks at 50 to 60% of their maximum heart rate (HR max). Significant increase in pre and post-test values of CD4 cell counts (28%) and reduction of viral loads (34%) were found in the exercise group in contrast to the control group (p < 0.05). It was concluded that regular participation in sub- maximal structured exercise programme could lead to beneficial changes in human immunodeficiency virus (HIV) positive patients.**

**Key words:** Human immunodeficiency virus (HIV), sub-maximal exercise, CD4 cell count, viral loads.

### INTRODUCTION

Discovered in 1983, human immunodeficiency virus (HIV) is a retrovirus identified as the etiologic agent for acquired immunodeficiency syndrome (AIDS). AIDS is characterized by changes in the population of T-cells lymphocytes that play a key role in the immune defense system (Centre for Disease Control (CDC), 2008). In the infected individual, the virus causes a depletion of subpopulation of T-cells, called T-helper cells or CD4 cells. Within three to six weeks of exposure to HIV, infected individuals generally develop a brief, acute syndrome characterized by flu-like symptoms associated with high levels of viremia in the peripheral blood. In most infected individuals this is followed by an HIV-specific immune response and a decline of plasma viremia, usually within four to six weeks of the onset of the symp-

toms (Marston et al., 2007).

The asymptomatic period is characterised by persistent, low level plasma viremia and a gradual depletion of CD4+lymphocytes leading to severe immunodeficiency, multiple opportunistic infections, malignancies and death (Asamoah-Odei et al., 2004). CD4 cells or T-helper cells are white blood cells which organise the immune system's response to some microorganisms, including bacteria, fungal infections and viruses (O' Brien S. Nixion A Tynan and Glazier R, 2004). The CD4 count is the measurement of the number of CD4 cells, in a cubic millimeter of blood. This is sometimes written as CD4 cells/mm<sup>3</sup>.

The CD4 count of a person who is not infected with HIV may lie anywhere between 500 and 1200 (Bartholomew,

\*Corresponding author. E-mail: dr.ibyar@yahoo.com.

2001). HIV can infect CD4 cells and use them to produce more HIV copies. Even when a person with HIV feels well and has no symptoms, millions of CD4 cells are infected by HIV and are destroyed each day, and millions more CD4 cells are produced to replace them. If CD4 count falls below 250 to 200, it is recommended that the individual starts treatment with anti-HIV drugs because this is the level at which the risk of AIDS-related illnesses is greatly increased (Agbogboroma, 2008). The CD4 count can give an overall trend of the immune system's health in terms of whether it is declining or improving. It can fluctuate in response to infections, stress, smoking, exercise, the menstrual cycle, contraceptives, and the time of day and even the seasons of the year (Glencross et al., 2002).

Viral load is the term used to describe the quantity of HIV in the blood. The more the HIV in the blood, the faster the CD4 cells are likely to disappear, and the greater the risk of developing symptoms or further illness within the next few years (Valdiserri, R.O, Holtgrave, D.R, West, G.R, 1999). Viral load measurements can rise and fall from one blood sample to the next but this may have no long-term impact on the health of the person being tested (Kannangai et al., 2001).

Every day, over 6,800 persons become infected with HIV and over 5,700 persons die from AIDS, mostly because of inadequate access to HIV prevention and treatment services (Nigerian Federal Ministry of Health NFMH, 2005). The HIV pandemic remains the most serious of all infectious diseases and it poses the most serious challenge to public health (World Health Organization (WHO), The Joint United Nations Programme on HIV/AIDS (UNAIDS), The United Nations Children's Fund (UNICEF), 2007; Utulu, S.N., Lawoyin, T.O, 2007). Aerobic exercise has been found to be beneficial in many disease conditions and its application can never be over-emphasized (CDC, 2007). Studies have shown that regular physical activity can beneficially increase CD4 count and lowered viral loads levels, few investigations, if any, have been carried out on HIV patients in this part of Nigeria.

With increased prevalent rates of HIV/AIDS patients in Kano metropolis and the difficulty of some patients getting anti-retroviral drugs motivated the need to investigate the effects of 12 weeks cycling exercise programme on HIV positive patients in Kano, northern Nigeria. It is therefore hypothesized that the exercise programme would yield beneficial changes in HIV patients CD4 count and viral load, thus serving as a non-pharmacological means of improving the overall quality of life of the patients.

## METHODOLOGY

### Research design

This study was conducted at the outpatient unit of Fatima specialist hospital Kano, Nigeria, using a pre-test-post-test randomized-

controlled trial group design in which the dependent variables (CD4 count and viral load) were measured before and after cycle exercise programme. The initial phase of the study involved a comparison of subjects receiving antiviral treatment care (control group), with subjects receiving antiviral treatment care plus cycle exercise (exercise group) for 6 weeks. Following this initial phase of the study, subjects randomly assigned to the control group performed cycle exercise for 6 weeks, while the experimental group continued to perform cycle exercise for an additional 6 weeks (12 weeks total). The design was utilized for ethical reasons, given that all cycle sessions performed by the exercise group during the initial 6 weeks of the trial were performed in the presence of those subjects randomly assigned to the control group.

Using a randomised, controlled study design, 40 HIV positive males ( $n = 40$ ) with an average age of 35 years were stratified into groups A or B (A: CD4 less than  $200/\mu\text{l}$ , B: CD4 of 300 to  $500/\mu\text{l}$ ). They were randomly assigned to either exercise ( $n = 20$ ) or control group ( $n = 20$ ). The treatment group participated in a supervised 12 weeks aerobic cycle exercise programme level out thrice a week. The control group did not receive any exercise intervention initially but during the 2nd phase, the control group also participated in cycle exercise for 6 weeks. To assess CD4 cell counts and viral loads, bicycle ergometer exercise testing was used according to CDC (2007) classification and the progress of illness was carefully monitored.

### Selection criteria

Participants included HIV seropositive patients who had a CD4 count of 200 cells/ $\mu\text{l}$  or less and those with CD4 count between 300 to 500 cells/ $\mu\text{l}$ , most of who were on antiretroviral drug treatment. All participants were assembled at Fatima Hospital Kabuga Kano where the experiment was conducted. Each patient completed the physical activity readiness questionnaire (PAR-Q) (American College of Sports Medicine ACSM, 2007) and gave consent after the purpose, procedure, possible risks and benefits of the study were carefully explained to them (UNAIDS/WHO, 2007; ACSM, 2007). They were constantly briefed about their health condition throughout the experimental period as requested by Kano State branch of people living with HIV/AIDS (PLWHA).

### Experimentals

#### Physical measurements

The patients' anthropometric measurements were taken using the protocol of the International Society for the Advancement of Kinanthropometry (ISAK) (Martell-Jones et al., 2006). These included height and weight from which body mass index (BMI) calculated as a ratio of body mass to stature and expressed as  $\text{wt kg}/\text{m}^2$ , was derived. UNAIDS/WHO (2007) guidelines were followed during the laboratory procedure to estimate the CD4 count and viral load in sero positive patients. CD4 lymphocyte was constructed for each subject by modeling log CD4 count against time in days. These included: specimen selection, collection, storage, and testing, HIV testing technologies and strategies, selecting and evaluating testing technologies, quality assurance measures, ethical issues, factors affecting CD4 lymphocytes and viral loads, for example, infections, stress, and time of the day, smoking and others were carefully considered.

#### Measurement of viral load

Viral load was measured through RNA polymerase chain reaction (PCR) (standard method) using AMPLICOR HIV-1 MONITOR Test,

version 1.5 (Roche Diagnostics, USA). The protocol can detect viral load from 400 to 750,000 copies. Viral load blood samples (10 ml) were taken from the patients' antecubital vein at 9 am using swab spirit to clean the area and applying the tenniquoit above the area. The vacutainer was used before exercise as described by Mustafa (2008). Blood was then put into ethylenediaminetetraacetic acid (EDTA) bottle label with identification code and centrifuged for 25 min at 1600 rpm. It was then aliquot into 3 tubes.

### **Sample preparation**

Extraction buffer was mixed with quantitative standard and 600 µl of extraction buffer was added into separate tubes labeled as high positive, low positive and negative controls. Each patient's sample was then put into 9 different tubes making a total of 12 tubes for each set of test. For the control tubes, 200 µl of normal human plasma and 50 µl of the control was added to each respective tubes and vortexes. For sample tubes, 200 µl of patient plasma were added in each tube and vortexes, and then incubated at room temperature for 10 min. After incubation, 800 µl of 100% isopropanol was added to each tube and vortexed immediately. Then, all samples and controls were centrifuged for 15 min at 12,500 rpm. The supernatant was aspirated and 1 ml of 70% ethanol was added and centrifuged for 5 min at 12,500 rpm. The supernatant was then centrifuged to spine down excess ethanol. 400 µl of diluents were subsequently added and vortexes noted for 3 s. This gave ribonucleic acid (RNA) for amplification.

### **Amplification**

700 µl of master mix reagent was mixed with 100 µl of manganese and invented to mix. Then 50 µl of the working master mix was dispensed into reaction tubes. 50 µl of extraction sample was added into the reaction tubes and then placed into the thermocycler (Apply Biosystems B No 9700, USA) and incubated for 1 h 30min. Subsequently, it was taken out from the thermocycler and 100 µl of denaturation solution was added.

### **Detection**

100 µl of hybridisation solution was added into the micro well plate after which, 25 µl of denatured amp icons was also added into the micro well plate. Serial dilution of 1 in 5 was made and incubated for 1 h at 37°C. After 1 h, it was washed by the micro well plate washer for 5 min, 100 µl conjugate was added and incubated further for 15 min and micro well plate was washed 5 times. 100 µl of substrate A and B was added and incubated at room temperature in the dark for 10 min. Thereafter, 100 µl of stop solution was added and the absorbance was read using micro well plate reader. This gave the optical density (OD). Finally, a soft wave (KC4 Roche, USA) was used to interpret the optical density (OS) base on the number of viral load copies.

### **Measurement of absolute CD4 count**

The CD4 count blood samples were taken from the patients' antecubital vein at 9 am just before the exercise using vacutainer/needle, tenniquoit and a swab spirit. The swab spirit was used to clean the area where blood was to be taken from the antecubital vein with the tenniquoit tied just above the antecubital area and 10 ml of blood was taken as described by (Albert,

Abrahamsson, Nagy, 1990). 20 µl of whole blood sample was mixed with 20 µl of CD4 easy count antibody in a level rohren tubes, then incubated in the dark at room temperature for 15 min. 800 µl of CD4 easy count no lyse buffer was diluted then read using cyflow SL green. After reading, it was gauged and the count noted per ml. To find the CD4 count in µl, the report was created using a report template (software, cyflow SL Green, Partec, Germany) to arrive at CD4/µl.

### **Exercise training**

A bicycle ergometer (mechanical brake type, Model no. HG 5013, Hang Zhou Tianhai Holding Group Co. Ltd., China), which includes indicators of fractional resistance was used for the exercise programme according to ACSM (2007) guidelines. Rpm was measured using a micro switch device and counter. It was regularly calibrated to ensure accuracy. Each exercise session was preceded by a 5 min warm up session followed by gradual exercise loads administered incrementally based on 50 to 60% heart rate response, typically at 25 watts with power increments of 10 watts per stage of 10 min for 30 min. Participants in the experimental group exercised three times a week for 12 weeks. The control group was advised to continue with their normal day to day activities without partaking in any structured physical exercise. They however, received periodic health talks on HIV/AIDS, dieting and ways to avoid HIV complications and opportunistic infections. Approximately 75% of participants in the experimental group complied (> 60% attendance) with the exercise programme, and analyses of exercise relapse data indicated that obesity and smoking status, but not exercise-associated illness, differentiated compliant from noncompliant exercisers. During the study, two patients in the control group with CD4 count less than 200 cell/micro liter later died and another became seriously ill and could not continue with the study. Their data were subsequently excluded from the analysis.

### **Pilot test**

The PAR-Q was first tested for content validity. Subsequently, it was pilot tested within two weeks interval with 15 HIV positive patients in Infectious Diseases Hospital, Kano in June, 2008. Pearson's r of 0.65 to 0.8 was obtained.

### **Statistical analysis**

Statistical analyses included means, standard deviation and t-test to describe the patients' CD4 count and viral load values. The analyses also examined if any significant differences existed between the experimental and control group before and after the exercise programme.

## **RESULTS**

As provided in Table 1 are the means and standard deviation of subjects' age and physical characteristics. Their mean height was 157.4 ± 3.39 cm, while the average body weight was 39.77 ± 8.79 and 59.77 ± 8.79 kg for the pre-and post-test measures, respectively. Pre and post test body mass index (BMI) values were 19.4

**Table 1.** Subject's physical characteristics (N=40)

Variables	Mean	SD	SE
Age (years)	39.2	12.75	3.29
Height (cm)	1.57.4	3.39	0.932
<b>Weight (kg):</b>			
Pre-test	54.72	9.52	2.27
Post test	59.767	8.79	1.27
<b>BM1:</b>			
Pre-test	19.4	5.76	1.49
Post-test	19.9	4.76	1.39

N = Total number of subjects; SD = standard deviation; SE = standard error.

**Table 2.** Pre-and post-test descriptive statistics of CD4 count and viral load (experimental group; N= 20).

Variables	Mean	SD	%Δ
<b>CD4 counts (cells/mm<sup>3</sup>)</b>			
Pre-test	269.67	77.7	28
Post-test	297.73	87.9	
<b>Viral load (copies/ml):</b>			
Pre-test	474000.2	198027.7	-26
Post test	409666.5	203134.7	

N= Total number of subjects; %Δ = percentage change; SD = standard deviation.

**Table 3.** Descriptive statistics of CD4 counts and viral loads (Control group; N=20)

Variables	Mean	SD	%Δ
<b>CD4 counts (cells/mm<sup>3</sup>)</b>			
Pre-test	207.667	83.96	-7
Post-test	265.267	87.88	
<b>Viral load (copies/ml)</b>			
Pre-test	460333.3	202100.25	9.6
Post test	470000.0	21580414	

N = Total number of subjects; %Δ = percentage change; SD = standard deviation.

and 18.9 kg/m<sup>2</sup>, respectively. There were no significant differences in the patients' body weight and BMI for pre and post test, respectively.

At the end of the 12 weeks exercise programme, the subjects had the following mean values: CD4 count (297.73 ± 87.9 cell/mm<sup>3</sup>), viral loads (409666.5 ± 205134.7

copies/ml) (Table 2). In calculating the percentage change between the pre and post-test measurements in CD4 count, the following formula was used: post-test – pre-test × 100 and pre-test – post-test × 100 for viral load. This yielded an increment in CD4 (28%), and decrease in viral load (-34%) (Table 2). A high standard deviation (SD) was found for CD4 and viral load which suggests that the group had considerable variability in these measurements. The results showed that after the exercise programme the control group had the following profile: CD4 count (265.3 ± 87.8 cells/m<sup>3</sup>); and viral loads (470000.0 ± 2158 copies/ml) (Table 3). The corresponding pre-post percentage changes CD4 count (-7%) and increase viral load (9.6%). These indicate a decrease in CD4 count by -7% and an increase in viral loads by 9.6% in the control group.

Table 4 summarizes the differences in both pre-test and post-test in CD4 count and viral load values. The correlation between exercise and CD4 count and viral loads were 0.996 for CD4, 0.895 for viral loads in the experimental group, while the calculated t values were 8.536 (CD4) and 11.481 (viral load) for experimental group. The control group had t values of 0.985 (CD4) and 0.824 (viral load), respectively. There was a substantial increase in CD4 count and a decrease in viral loads in the experimental group while in the control group there was a decrease in CD4 count and an increase in viral load, respectively. The study demonstrated a significant deference in CD4 count between the pre experimental and post experimental groups after the exercise programme (t = 8.3, p < 0.05) (Table 5). This suggests that 12 weeks cycle ergo-meter exercise programme can substantially increase CD4 counts in HIV/AIDS positive patient.

Variation in the patients' pre and post-test CD4 count is illustrated in Figure 1. The highest CD4 count of 500 cells/mm<sup>3</sup> (pre-test) was found in respect of subject 17, while subject 5 had the lowest value (180 cells/mm<sup>3</sup>). Regarding post-experimental CD4 count, subject 17 had the highest value (580 cells/mm<sup>3</sup>) whereas lowest value (170 cells/mm<sup>3</sup>) was noted in respect of subjects 5 and 14. The percentage difference between the two groups was 28%. The result of this study revealed a significant difference between the experimental and control group with regards to viral load after the bicycle exercise programme (t = 11.5; p < 0.05) (Table 6). This shows that the exercise programme had a beneficial effect on viral load in the HIV patients. Variations in patient's viral load are further illustrated in Figure 2.

The highest viral load of 750, 000 copies (pre-test) is shown in subjects 5, 12, 13, 14, 16 and 20 and the lowest viral load copies of 100, 000 copies was found in patient 7. For the post-experimental viral load, subjects 5, 12, 13 and 20 had the highest value of 700,000 copies while the lowest value of 80,000 copies was recorded for subject

**Table 4.** Differences within groups in CD4 count and viral loads for post exercise interventions in experimental and control groups (N = 40).

Variables	Baseline	post-test	df	t	Correlation	%Δ
<b>Experimental group (N=20)</b>						
CD4 count (Cells/m <sup>3</sup> )	269.67±77.7	297.77±87.97	19	8.536	0.996	28
Viral load (copies/ml)	4740000.0±98	439666.5± 205	19	11.481	0.895	-26
<b>Control Group (N=20)</b>						
CD4 count (cells/m <sup>3</sup> )	272.67±84	265.27±87.89	19	0.985	-	-7
Viral load (copies/ml)	460333.3±202	470000±216	19	0.824	-	9.6

N= Total number of subjects, df-degree of freedom, t= test of significance, %Δ= percentage change.

**Table 5.** Student t-test for post-treatment CD4 count (N = 40).

Group	Mean	SD	df	t-value	%Δ
Pre Experimental	265.27	85.2	40	8.3	21
Post Experimental	297.7	87.9			

Critical value = 2.04. SD = Standard deviation; d f= degree of freedom; %Δ = percentage change; p ≤ 0.05.

17. The percentage difference between the two groups was 26%. It was discovered that patients with a low CD4 count of 200 and below did not respond substantially to the exercise programme unlike those with CD4 of 300 to 500 cells/mm<sup>3</sup>.

The result of study shows greater increase in CD4 count and decrease in viral loads substantially in patients within group B: (CD4 count 300 to 500 cell/mm<sup>3</sup>) than group A: CD 200 and below. Also, a general beneficial increase of 28% in CD4 count and 34% decrease in viral load in the experimental group than the control group was found. There was a decrease CD4 of -7% and increase of 9.6% viral loads in the control group. There were substantial correlations between low intensity exercise, CD4 count and viral loads of 0.91 and 0.82, respectively. Although, biological condition of the HIV and AIDS patients in the experimental group improved generally, no physical improvement on the patients' body weight and BMI was found. The fitness level of patients in the experimental group also improved in contrast to the control group. The increase in CD4 count during the exercise might be due to enhancement of exercise on the T heaper cells as well as on the immune system (George et al., 2000).

## DISCUSSION

The present study examined the effects of 12 weeks bicycle ergometer exercise programme on CD4 cell count and viral loads in male HIV positive patients. The findings of the study demonstrate significant differences between the experimental and control groups in CD4 cell count and viral loads as shown in Table 4. The beneficial

increase in CD4 count following a structured exercise programme as found in this study is consistent with previous reports (Mustafa, 2008; Macarthur et al., 1993; Schlenzy et al., 1992; Shinkai et al., 1992). For instance, Mustafa (2008) reported a slower progression of HIV to AIDS at 1, 2, 3 and 4 year hazard ratio (HR) of 0, 0.96, 1.18, and 1.36, respectively. Exercising 3 to 4 times/week had a more protective effect than daily exercise. Exercise was found to increase CD4 count during a year by a factor of 1.07. In another study, Macarthur (1993) reported a moderate increase in CD4 count in 25 individuals with severely immuno compromised form of HIV infection. It was found that in 24 weeks of habitual exercise, there was evidence of a training effect on CD4 count and viral loads. CD4 reportedly increased by 12%.

In another study aimed at evaluating the long term benefit of exercise on the biological condition of HIV/AIDS patients as well as on the course of illness, Schlenzig et al. (1992) reported that within 12 weeks of aerobic exercise by seropositive patients, the overall biological condition of the HIV and AIDS patients as well as course of illness improved. A delay of AIDS related complications was noted which was due to an improvement in CD4 count and viral loads by 15 and 25%, respectively in the experimental group. Regular exercise though seemed to be correlated with increase in T4 cell count and decrease in viral loads. However, the present findings contrast with those of previous published reports (Terry et al., 1999; Stringer et al., 1998; Vergel et al., 1998) which demonstrated no change in CD4 count and viral loads after moderate to high intensity aerobic exercise programme on patients with CD4 count below 200 cells/mm<sup>3</sup>. Rather, exercise created complications in HIV/AIDS patients leading to deterioration of their biological conditions and course of the illness.

The present study showed a beneficial effect on CD4 count and viral load with exercise, with more improvements found in early HIV infected patients CD4 count 300 to 500 cell/mm<sup>3</sup>. Those with long time HIV/AIDS infection (that is, CD4 count 200 cells mm<sup>3</sup> or below) should participate in clinical supervised exercise programme. The attrition experienced in the control group during the study might be due to patients having already

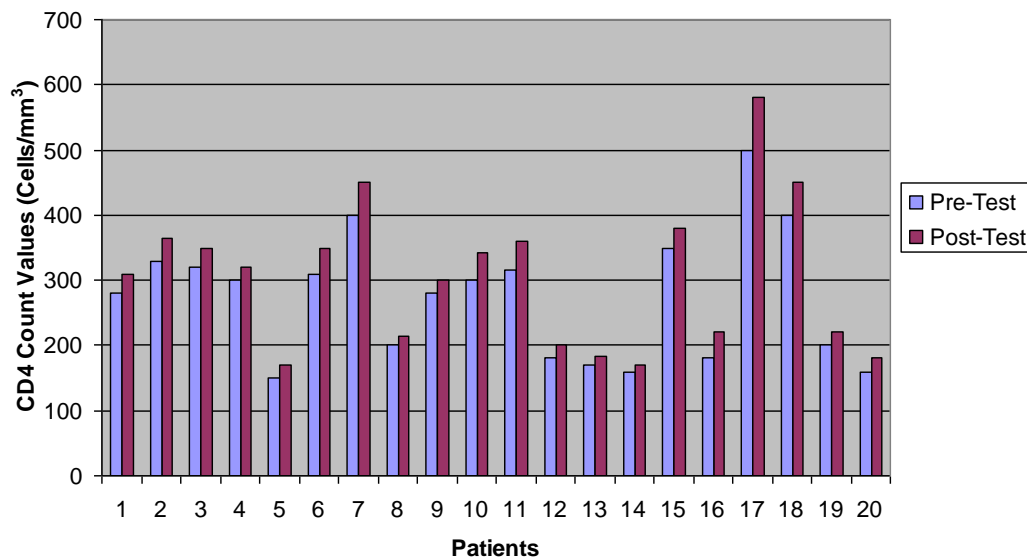


Figure 1. Pre and post CD4 count values (experimental groups).

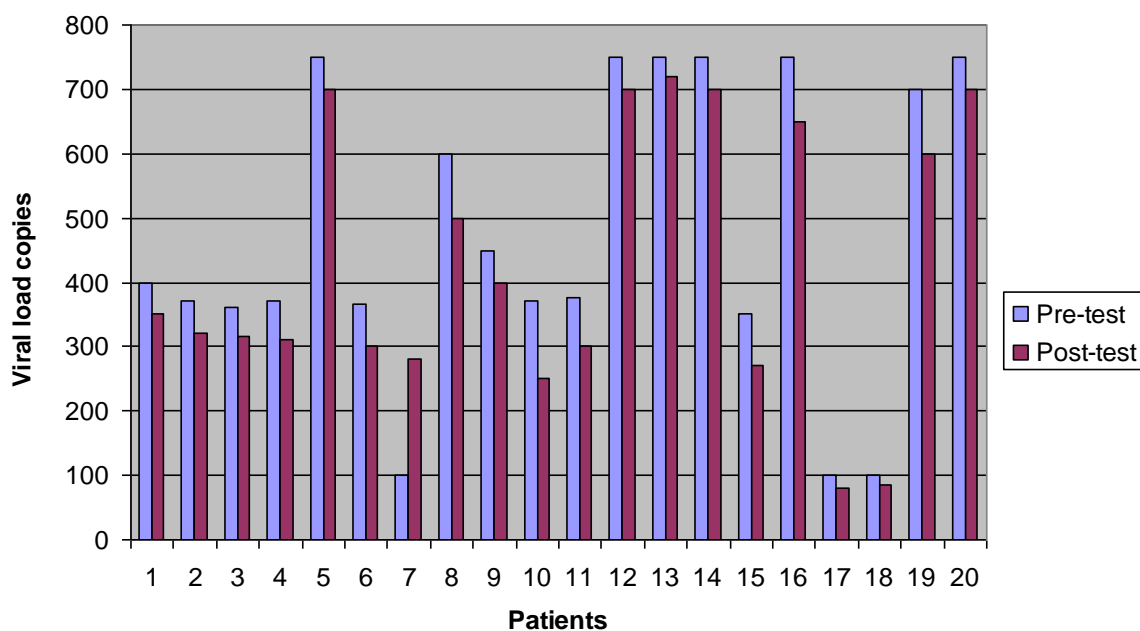


Figure 2. Pre and post viral load (experimental groups).

Table 6. Student t-test for post-treatment viral load (N = 40).

Group	Mean	SD	df	t- value	%Δ
Experimental	439666.5	2051	40	11.5	26
Control	470000	2158			

Critical value = 2.04. SD = Standard deviation; df= degree of freedom; %Δ= percentage change; p≤ 0.05.

weak system due to long term HIV infection and opportunistic infections.

### Limitations and implications for further research

This study did not take into consideration the fact that some of the patients were already on antiretroviral medication and there were no restrictions on alcohol, smoking and patients' lifestyles. Further studies should take these short comings into account. Furthermore, it will be important in future studies to include health and fitness activities as an essential component of programme objectives for HIV management and to quantify the amount of exercise which will lead to beneficial increase

in CD4 count and decrease viral loads leading to overall health improvement and physical condition of HIV positive patients.

## Conclusion

In view of the marked changes found in the participants' CD4 count and viral loads, it is concluded that regular participation in structured exercise programme could lead to beneficial changes in CD4 count and decrease viral loads in seropositive individuals.

## ACKNOWLEDGEMENT

The authors would like to acknowledge the charitable trust monies from professor Gateel foundation which funded the data collection and analyses of the research.

## REFERENCES

- Albert J, Abrahamson B, Nagy K (1990). Rapid development of Isolate-specific neutralizing antibodies after primary HIV-1 infection and consequent emergence of virus variants which resist neutralization by antilogous sera. *AIDS* 4: 107-112
- Agbogboroma C (2008). HIV/AIDS and material mortality: The role of traditional/ religious leaders on reduction of material mortality. UNFPA conference, Sokoto, Nigeria.
- American College of Sports Medicine (ACSM) (2007). Guidelines for Exercise Testing and Prescription (8<sup>th</sup> ed.). Baltimore: Williams & Wilkins.
- Asamoah-Odee E, Gavcia-calleja JM, Boerma T (2004). HIV Prevalence and Trends in Sub-Sahara: No decline and large sub-regional differences. *Lancet*, 364:35-40.
- Bartholomew C (2001). Prices of CD4 assays and viral load tests must be reduced for developing countries. *BMJ*, 323: 809-810.
- CDC (2008). HIV/AIDS Surveillance Report Rev. ed. Atlanta; US Department of Health and Human Services: (2008)1-54.
- George AB, Thomas DF, Timothy DW, Kenneth MB (2000). Exercise Physiology. Human Bioenergetics and its Applications (3<sup>rd</sup> ed.). New York: MC Graw-Hill.
- Glencross DK, Stevens GB, Scottle AR, Mendelow BV, Stevens WF (2002). The challenge of laboratory monitoring of HIV. *S. Afr. Med. J.* 92:248.
- Kanangai R, Ramalingams HF, Jesudason MV, Vijayakumar T, Abraham OC, Zachariah A, Sridharan G (2001). Correlation of CD4 P T-cells counts estimated by an immunocapture technique (capellia) with viral seropositive individuals. *Clin. Diagn. Lab. Immunol.* 8:1286-1288.
- Macarthur TS, Rodger DR, Levine SD, Birk TJ (1992). Cardiopulmonary, immunology and psychological responses to exercise training in individual seropositive for HIV. International Conference on AIDS Geneva. *Med. Sci. Sports and Exercise* 25(6):684-688.
- Marston M, Todd J, Glynn JR, Nelson KE, Rangsin R, Lutalo T, Urassa M, Biraro S, Van der Paal L, Sonnenberg P, Zaba B (2007). Estimating 'net' HIV-related Mortality and The Importance of Background Mortality Rates. *AIDS*, 21 (6) 565-571.
- Mustapha T (2008). Association between exercise and HIV disease progression in a cohort of homosexual men. *Annals of Epidemiology* 9(2):127-131.
- Nigerian Federal Ministry of Health: NFMH (2005a). National HIV/syphilis sero-prevalence, sentinel survey among pregnant women attending ante-natal clinics. Technical Report, Nigeria.
- Nigerian Federal Ministry of Health: NFMH (2005b). Department of Public Health, National AIDS/ST Programme. Technical Report, Nigeria.
- O'Brien S, Nixion A, Tynan, Glazier R (2004). Effectiveness of aerobic exercise in adults living with HIV/AIDS. *Med. Sci. Sports Exercise* 36:1639-1666.
- Schlenzig C, Jaeger H, Wehrenberg M, Poppinger J, Rieder H (1992). International conference on AIDS. *Int. conf. AIDS* 8:153.
- Shinkai S, Shores KS, Shek PN, Shepard RJ (1992). Acute exercise and immune function relationship between lymphocyte activity and changes in subject counts. *Int. J. Sports Med.* 13(6): 452-61.
- Stringer WW, Berezovskaya M, O'Brien WA, Beck CK, Casaburi R (1998). The effect of exercise training on aerobic fitness, immune indices and quality of life in HIV+ Patients. *Med. Sci. Sports Exerc.* 30(1):11-16.
- Terry L, Spring E, Albewo D (1999). Moderate and high intensity exercise training in HIV-1 seropositive individual: A randomized trial. *Int. J. Sports Med.* 20(2):142-146.
- UNAIDS (2007). Comparing Adult Antenatal-Clinic Based HIV Prevalence with Prevalence from national Population Based Surveys in Sub-Saharan Africa. UNAIDS Presentation. Accessed 17 June 2008 at <http://data.unaids.org/pub/presentation>.
- UNAIDS/WHO AIDS Epidemic Update: UNAIDS/06.29E.1 SBN 929, 1735426 (2006).
- Utulu SN, Lawoyin TO (2007). Epidemiological features of hiv infection among pregnant women in Makurdi Benue State, Nigeria. *J. Biosocial Sci.* 39(3):397-408.
- Valdiserri RO, Holtgrave DR, West GR (1999). Promoting early diagnosis and entry into care. *AIDS B.* pp. 2317-2330.
- Verger NR, Salvatop BC, Mooney MO (1998). Anabolic steroids resistance exercise and protein supplementation effect on lean body mass in HIV patients. *Med. Sci. sports J.* 13:120 -185.
- WHO, UNAIDS, UNICEF (2007). Towards Universal Access; Scaling up Priority HIV/AIDS Interventions in the Health Sector. Progress Report (April). Geneva: WHO.

*Full Length Research Paper*

# Reception and treatment of HIV/AIDS children in school

**Tuntufye Selemani Mwamwenda**

Nelson Mandela Metropolitan University, 50 Holzner Road, Pinetown 3610, South Africa.

Accepted 6 September, 2013

**Reception and treatment of human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) children in school investigated the extent to which children living with HIV/AIDS are accepted and treated in school. Such investigation was based on various research findings of these children indicating resistance to their attending the same schools with HIV/AIDS free children, constituting the majority of enrolments. A quantitative method in the form of descriptive statistics consisting of frequency, percentage, chi-square and probability was employed in the analyses of data. The sample was based on a diverse population drawn from universities in America, Kenya, South Africa and Tanzania. The results showed a good knowledge of HIV/AIDS on the part of the respondents, as it ranged from 64 to 72%. In terms of the chi-square, the results were statistically significant for all the participating institutions of higher learning. The respondents expressed the view that HIV/AIDS children should attend school together with HIV/AIDS free children. It was concluded that, though the results were gratifying in favour of school children living with HIV/AIDS, there was a considerable number of respondents who were opposed to this view; thus calling for their further exposure to public education on HIV/AIDS.**

**Key words:** Admission, erosion of self-esteem, human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) policy, hostile environment, parents' concern, policy implementation, school attendance.

## INTRODUCTION

Reports that human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) children had been admitted to one of the Vietnamese schools, resulted in parents of non-HIV/AIDS children swiftly removing their children from the school (Overland, 2009). Consequently, those HIV/AIDS children had to be withdrawn in favour of the majority HIV/AIDS negative students. Such resistance against HIV/AIDS children occurred, despite the laws prohibiting discrimination against such children. On the Voice of Vietnam (2013), it was reported that one third of HIV/AIDS school-age children in the Ho Chi Minh (MCH) City are granted admission, while the majority are denied such admission on the status of their being HIV/AIDS

positive. This is a city which has as many as 4,000 children living with HIV/AIDS. Parents of non-HIV/AIDS school children are reportedly opposed to their children mingling with HIV/AIDS children at school, lest they pass on the disease. In some cases where such children are already admitted, they are eventually sent away from school, because of the resistance by parents.

According to Radio Free Asia (2009), there are 60,000 HIV/AIDS positive people in the City of Ho Chi Minh, Vietnam. In one of the schools, more than a dozen children were sent home on the first day of school because they were HIV/AIDS positive. Such a decision was as a result of parents demonstrating and protesting



against the admission of HIV/AIDS infected children. One parent was quoted to have said, "It is better for our children's schooling to stop than let them sit next to AIDS infected children" (Radio Free Asia, 2009). Government officials intervened, and the children were readmitted, only to be turned away the first day they returned for school. The problem is wide to the point that, it is extended to children who are not HIV/AIDS positive, but one of their parents has such status. Such reception and treatment of children living with HIV/AIDS is in contravention with government policy which forbids discrimination against HIV/AIDS school children, but this makes no difference as far as parents' resistance is concerned. In some cases, they go as far as saying that they would rather be bombed as it was during the Vietnam War than have their children attend school with HIV/AIDS children (Radio Free Asia, 2009).

In Thailand, Ishikawa et al. (2011) carried out an investigation of 513 respondents consisting of 274 boys and 237 girls on primary school children's attitudes toward peers who were affected by HIV and AIDS. There were 74% respondents who were opposed to attending the same school with HIV/AIDS children. Such response held true for boys more than was the case with girls, who felt that it was okay to study with HIV/AIDS children. It was further observed that children were not comfortable playing with HIV/AIDS children. Even those who said they would play with infected peers, added that, they would keep at a distance from them. Moreover, from their perspective, they drew no difference between children who were HIV/AIDS positive, and those with infected family member, on the assumption that, children who had parents who were living with HIV/AIDS must also be HIV/AIDS positive.

In India, a school was particularly established to cater for HIV/AIDS children (MediaCorp Press, 2005) who had been denied admission in other schools. The school was staffed by HIV/AIDS counsellor, teacher and nurse (MediaCorp Press, 2006). It is pointed out that in other schools, children living with HIV/AIDS are either denied admission or other children bully them and have no respect for them, which erodes their self-esteem. In Kerala State, India, in one of the schools, parents of 400 children threatened to pull out their children because the school had admitted two HIV/AIDS children (MediaCorp Press, 2006). So the children had to leave the school. Several years later, another school admitted five HIV/AIDS children (Oneindia News, 2007). Similar threat was made. This time round, it was not the parents that won. The Kerala State officials made it very clear that parents had the option of pulling out their children, but the HIV/AIDS children would remain at the school. They further warned the parents that, should they succeed in removing the HIV/AIDS children from the school by use of force, then the government would withdraw the funds

given to the school for its operation. That was the end of the story and it worked.

Human Rights Watch (2005) charges governments in Sub-Saharan Africa, with negligence of HIV/AIDS related problems, as there are 43 million of them who are not in school. Most of them are unlikely to enrol, attend or continue in school till completion. Worse still, such children end up being sexually exploited, unemployed, engage in child labour and being predisposed to contract the very disease which has placed them in their current predicament (Human Rights Watch, 2005).

The investigation was based on three African countries, namely Kenya, South Africa and Uganda. HIV/AIDS school children are frequently absent from school, for reasons such as: ill-health, poor access to essential medicines, hostile environment at school as they are bullied by other children, as well as AIDS-related discrimination and stigma. In denial of existing positive policy, governments in question did very little to address problems encountered by children living with HIV/AIDS (Human Rights Watch, 2005). Many of the HIV/AIDS children were sent away from school for failure to pay fees or producing documents proving that they should be exempted from paying fees.

Thornton (2008) reports that in the United Kingdom, HIV/AIDS primary and secondary school children are often turned away from school, which is contrary to anti-discrimination laws in the country. A number of schools insist that parents should divulge their children's HIV/AIDS status, although this is supposed to be confidential. Children seeking admission are denied if it is found out that they are HIV/AIDS positive. There are 1,500 HIV/AIDS school children in UK. Every year, 100 children test HIV/AIDS positive (Thornton, 2008). No case of HIV/AIDS transmission has ever been reported at any school (Thornton, 2008). This, nevertheless, appears to have no impact on the way HIV/AIDS children are treated and their applications for admission.

In the United States of America, the majority of HIV/AIDS children attend public schools with HIV/AIDS free children, based on the experience that there has been no reported instance, where children have been HIV/AIDS infected in schools (US Department of Education, 1991). It can be argued that, the school plays an important role of providing protection and support for HIV/AIDS and non-HIV/AIDS children, particularly in the form of health services and meals (Childinfo, 2011). Moreover, schooling helps HIV/AIDS children to cope with the health situation in which they find themselves. In the school context, HIV/AIDS children experience some stability and normalcy in their lives (Childinfo, 2011).

In summary, the evidence presented in this literature review, most of which emanates from Asian countries, shows that HIV/AIDS children are neither welcome to attend school with non-HIV/AIDS children, nor are they

treated with dignity. Though most resistance emanates from parents, fellow students do contribute to the resistance through bullying and lack of respect for HIV/AIDS children. There is, nevertheless, concerted effort to see that HIV/AIDS children are afforded their rightful place in the school system and society as a whole.

## METHODOLOGY

### Sample

The sample of the present study comprised 424 male and female university adolescents drawn from America, Kenya, South Africa and Tanzania, both males and females. The total number of participants added up to 424, with a distribution of 102 Kenya university students, 164 South Africa university students, 100 Tanzania university students, and 58 American college students.

### Measuring instrument

The questionnaire comprised one question soliciting a response on the basis of three options, namely: "Yes, No, Don't Know". All that was expected was to tick the option that was descriptive of what they knew about HIV/AIDS. The question read as follows: "Should children with AIDS go to the same school with those who do not have AIDS?"

### Procedure

Since the researcher could not be in all places at the same time, arrangement was made for university lecturers to be responsible for administering the questionnaire to their respective students. They were also advised that they had the choice of responding to the questionnaire, if they so wished. In addition to the question, participants were to fill in their gender and date of birth. For the purpose of confidentiality, participants were not permitted to write their names or institution of affiliation. On completion of the questionnaire, the lecturers collected the papers which were sent to the researcher in New York for scoring and analyses.

## RESULTS

Descriptive statistics in the form of frequency, percentage, chi-square and probability were used as a method of data analyses, as displayed in Table 1. The response to the question for America was 64%, Kenya was 72%, South Africa 64% and Tanzania was 67%, who did not think HIV/AIDS should be followed by "positive children". In terms of chi-square, the results were as follows:  $\chi^2$  (2df, N56) = 25.6,  $p < 0.001$  for America;  $\chi^2$  (2df, N100) = 73,  $p < 0.001$  Kenya;  $\chi^2$  (2df, N162) = 86,  $p < 0.001$  South Africa, and  $\chi^2$  (2df, N98) = 70,  $p < 0.001$  Tanzania. All the values of the chi-square were statistically significant in favour of those who said HIV/AIDS children should attend school together with those who are HIV/AIDS free. In summary, the participants' knowledge

**Table 1.** Frequency percentage chi-square and probability should children with aids go to the same school with those who do not have aids?

No.	Country	Frequency	%	$\chi^2$	P
1	America	37	64	26.5	0.00
2	Kenya	73	72	73	0.001
3	South Africa	105	64	86	0.001
4	Tanzania	67	67	70	0.001

for the four institutions of higher learning ranged from 64 to 72%, which was interpreted as being good. The analyses of data based on chi-square for all the four samples was statistically significant at  $p = 0.001$ . Both in percentage and chi-square values, respondents had no problem with HIV/AIDS children attending school with those who were HIV/AIDS free. This was an interesting finding, given that the review of literature showed a contrary stance.

## DISCUSSION

Reception and treatment of HIV/AIDS children in school investigated the extent to which children living with HIV/AIDS are afforded appropriate reception and treatment in school. This was motivated by the fact that, the research approach tended to clearly indicate that, not all was well with such children in their school career. A number of countries namely America, Kenya, South Africa and Tanzania higher education students served as participants. As already presented, both frequency, percentage and chi-square analyses for the four groups of university students clearly showed that they supported the concept that HIV/AIDS children should not be deterred from attending the same schools as children who do not live with HIV/AIDS. These findings are of interest in view of what others have reported, regarding the extent to which such practice has been vehemently opposed for fear that HIV/AIDS children would transmit HIV to their children. In India, Thailand, Vietnam, Sub-Saharan Africa and the United Kingdom, such findings have been reported (Human Rights Watch, 2005; Thornton, 2008; Radio Free Asia, 2009; Childinfo, 2011). The present findings are in contrast to such findings, as respondents were opposed to children living with HIV/AIDS attending exclusive schools.

Though in America, there are isolated instances of discrimination against HIV/AIDS children attending the same public schools, the official and common policy is that no child shall be barred from attending public school on account of HIV/AIDS (US Department of Education, 1991). It is interesting to note that schools opposed to inclusive education, their countries have similar policies

in place as the United States of America. Therefore, the problem is with the implementation of such policy. This is a challenge. A policy ceases to be one, if it is not implementable. India is one of the countries that have chosen to stand by the policy (Oneindia News, 2007). The findings of this investigation are in support with policies that aspire to see that schools must be inclusive in providing education to both HIV/AIDS infected and those who are free of HIV/AIDS.

Both in Childinfo (2011) and Ishikawa et al. (2011), it has been cogently argued why HIV/AIDS children, like other children, should be afforded due accommodation in the school system. The school plays an important role of providing protection and support for HIV/AIDS and non-HIV/AIDS children, particularly in the form of health services and meals. Schooling helps HIV/AIDS to cope with the health situation in which they find themselves. In the school context, HIV/AIDS children experience some stability and normalcy in their life (Childinfo, 2001). Similarly, Ishikawa et al. (2011) advanced the argument that schools provide protection and support for HIV/AIDS affected and infected children. For example, provision of education literacy, numeracy, vocation skills and other life skills, facilitate children to cope with their present and future life. Moreover, keeping the children in school contributes to psychosocial support and enhances the reduction of HIV/AIDS infection, exploitation and child abuse (Ishikawa et al., 2011).

## CONCLUSION

This brief study investigated the experience HIV/AIDS positive children go through during their education career. While research findings reported by others have shown that HIV/AIDS children are neither welcome nor afforded due human dignity, the findings of the present investigation showed that, participants were receptive of policies that favour inclusive education for both infected, affected and non-infected children attending school together. While the findings of the present investigation were positive and in favour of children living with HIV/AIDS attending school jointly with uninfected children, the challenge calls for further exposure to HIV/AIDS public education for those concerned. Policies

intended for the integration of children in school are rather dormant, hence a call for their re-activation so that HIV/AIDS children are not unduly barred access to public education. The number of respondents who felt otherwise warrants concern.

## REFERENCES

- Childinfo (2011). Protect and support children affected by HIV and AIDS. Online at: [www.childinfo.org/hiv\\_ids\\_children\\_affected.html](http://www.childinfo.org/hiv_ids_children_affected.html) [Accessed 10 June 2013].
- Human Rights Watch (2005). Letting them fail: Governments neglect and the right to education for children affected by AIDS. *Human Rights Watch* 17(13):(A).
- Ishikawa N, Carr-Hill R, Chaimuangdee K (2011). The attitudes of primary school children in Northern Thailand towards peers who are affected by HIV and AIDS. *AIDS Care* 23(2):237-244.
- MediaCorp Press (2006). Exclusive school for HIV/AIDS children in India. Online at: [aidscareswatch.blogspot.com/2006/11/exclusive-school—forhivaids-children.html](http://aidscareswatch.blogspot.com/2006/11/exclusive-school—forhivaids-children.html) [Accessed 10 June 2013].
- Oneindia News (2007). Policy framework to protect HIV/AIDS children from discrimination. Oneindia News.
- Overland MA (2009). HIV positive kids shunned from Vietnam school. Online at: [www.time.com/world/article/08599,191\\_8249.00.html](http://www.time.com/world/article/08599,191_8249.00.html) [Accessed 10 June 2013].
- Radio Free Asia (2009). Schools reject AIDS children. Online at: [www.rfa.org/English/news/Vietnam/Hiv\\_08282009102134.html](http://www.rfa.org/English/news/Vietnam/Hiv_08282009102134.html) [Accessed 10 June 2013].
- Thornton J (2008). HIV children turned away from schools. Online at: [www.guardian.co.uk/education/2008/jul/13/schools.uk](http://www.guardian.co.uk/education/2008/jul/13/schools.uk). [Accessed 10 June 2013].
- US Department of Education (1991). Placement of school children with AIDS. Online at: [www2.ed.gov/about/offices/list/oct/docshq5329.html](http://www2.ed.gov/about/offices/list/oct/docshq5329.html) [Accessed 10 June 2013].
- Voice of Vietnam (2013). HIV positive children going to school in tears. Voice of Vietnam.

*Full Length Research Paper*

# The beliefs of African university men and women on HIV/AIDS being God's indignation

Tuntufye Selemani Mwamwenda

Nelson Mandela Metropolitan University, 50 Holzner Road, Pinetown 3610, South Africa.

Accepted 27 September 2013

The purpose of this study was to investigate the tenet that HIV/AIDS is God's indignation for those who engage in sexual intercourse outside the institution of marriage. Moreover, this study aimed at identifying gender differences that HIV/AIDS is God's indignation against sexual immorality. Descriptive statistics comprising frequency, percentage, chi-square and probability was used for data analysis. The sample comprised a diverse sample of 366 men and women university students drawn from Kenya, South Africa and Tanzania. Statistically, majority of the participants did not subscribe to the tenet that HIV/AIDS is God's indignation directed at those who engage in sexual behaviour outside of holy matrimony. In the Kenyan sample, more women than men respondents rejected the notion that HIV/AIDS was God's indignation against sin. As for both the South African and Tanzanian samples, there were more men than women rejecting that God uses HIV/AIDS to inflict punishment on sinners. It was concluded that such tenet must be rejected and combated through public education.

**Key words:** HIV/AIDS, transmission, God's indignation, gender difference, impact of belief, university students, misconception.

## INTRODUCTION

In many countries of the world, people of all walks in life have had divergent views about HIV/AIDS; common among them is the belief that those living with HIV/AIDS are being subjected to God's condemnation for engaging in sin or immorality (Mwamwenda, 2013; Feresu and Smith, 2013; Fraim, 2012). In sub-Saharan Africa, religion has played both supportive or detrimental roles for those who are infected by HIV/AIDS. It has been argued, for the purposes of maintaining and asserting moral ground and moral authority, there is a link between sexual transgression and AIDS as sin and immorality (Mbonu et al., 2009; Kopelman, 2012; Du Toit, 2012; Dete, 2012).

In this context, Kopelman (2002) expresses the view that HIV/AIDS affects sub-Saharan Africa more than any other part of the world, and yet they are least equipped to combat it. Therefore, this calls for intervention from

nations endowed with wealth and necessary recourses. However, the HIV/AIDS infected persons may be distanced from those ready to be of assistance, because of beliefs such as it being a punishment from God for engaging in sexual activity outside marriage. "Religious versions hold that God punishes them in order to castigate, encourage virtue, warn, and rehabilitate (Kopelman, 2012). Along a similar train of thought, Hartwig et al. (2006) point out that in sub-Saharan Africa, there exists hindrance to HIV/AIDS prevention and intervention which has been associated with faith-organizations that play a double role in the fostering and mitigating stigma.

Such religious and secular beliefs are not only untenable, but also are devoid of cogency, place blame on HIV/AIDS infected persons rather unjustly and further jeopardize the compassionate care patients deserve

(Clifford, 2004; Du Toit, 2012; Mbonu et al., 2009). It is argued that, such views are dangerous and irrational, on account that, they influence policies and cost lives (Kopelman, 2002).

Van Dyk and Van Dyk (2007) conducted a study on 1,352 persons regarding their view that HIV/AIDS was God's punishment. In response, majority of the respondents did not agree with the statement, but 16.7% supported that, it was God's punishment for sinners. Manzell et al. (2011) cited one of the participants in their research arguing that, HIV/AIDS is but a scourge visited by God, because society has turned its back against religion and morality.

According to Dete (2012), many people in sub-Saharan Africa are eager to know more about HIV/AIDS and how they can get cured from such a terrible disease, the response they receive from some of their churches is that of hopelessness, as they are convinced beyond doubt that, HIV/AIDS is but God's punishment for people who engage in sin. People with HIV/AIDS are stigmatised through negative attitudes toward them. This is reflected by those who are not accepted in churches because they are living with HIV/AIDS; those who used to be members have been stripped of their membership; and those who held important office or played an important role in church activities have been denied of such roles (Dete, 2012; Mbonu et al., 2009; Clifford, 2004; Du Toit, 2012; Hartwig et al., 2006; Kopelman, 2002).

In a sample of 100 Sudanese and Bantu Somali immigrants' women living in Omaha, Nebraska, USA, Feresu and Smith (2013) assessed their knowledge, attitudes and beliefs about HIV/AIDS. The results showed that participants believed that HIV/AIDS was a punishment from God, and 38% held the belief that those living with HIV/AIDS were being punished for engaging in wrong behaviour; and 34% were of the opinion that victims of HIV/AIDS were served right to suffer. A more encouraging result to note was that, 82% disagreed with the statement that God makes the decision as to who should get HIV/AIDS (Feresu and Smith, 2013).

In a study of 1925 university students in Turkey, Fraim (2012) investigated knowledge levels and misconceptions about HIV/AIDS. The results indicated that both male and female students had an extremely high level of HIV/AIDS knowledge. Despite such a high level of HIV/AIDS knowledge, there were some misconceptions noted. For example, 16% stated that HIV/AIDS is God's punishment. The analysis of this collective response based on gender indicated a statistically significant gender difference with males outnumbering females (Fraim, 2012).

In Canada, Loutfy et al. (2012) sought to gain an understanding of gender and ethnicity differences of 1026 HIV/AIDS positive individual in Ontario, Canada on their stigma in response to them being HIV/AIDS. Women had statistically higher scores than was the case with men in terms of level of stigma, with higher scores implying that they experienced stigma more than their counterparts. Feresu and Smith (2013) elaborate that women are

associated with deviant sexual behaviour such as sex work and promiscuity that may lead to contracting HIV/AIDS which is repeatedly associated with God's wrath in terms of consequences.

According to Bell (2002), 50% of people living with HIV/AIDS in the world are women, which are considered disproportionate to them as individuals and in their social roles as both mothers and care givers. According to the World AIDS Day (2012), about 75% of HIV/AIDS transmission is as a result of intimate sexual relationship between men and women. Adolescent girls infected by HIV/AIDS are about six times the number of boys. Both girls and women are disproportionately vulnerable to HIV/AIDS due to their physiological susceptibility by about 2 to 4 times greater than men (World AIDS Day (2012)).

The sexuality nature of women has been subjected to stigma and controls, compounded by social, cultural, economic and legal forms of discrimination (World AIDS Day, 2012; Gahagan, 2012; Terry et al., 2005; Bell, 2002). In addition, society continues to make judgment that HIV/AIDS is God's punishment for engaging in sex (Loutfy et al., 2012; Bell, 2002).

In view of the current body of research and societal attitudes towards HIV/AIDS, the present investigation sought to find out the extent to which a diverse sample of university female and male respondents drawn from Kenya, South Africa and Tanzania would either confirm or reject the existing belief that HIV/AIDS is God's indignation directed against those who engage in sexual activity outside the sanction of holy matrimony. The motivation of this investigation is derived from Loutfy et al. (2012) who assert that: "A clear understanding of the association between HIV-related stigma, gender and ethnicity can inform the development, implementation and evaluation of tailored stigma reduction intentions".

## METHODOLOGY

The sample of the present investigation comprised university men and women drawn from Kenya, South Africa and Tanzania. The total number of participants added up to 366 with a distribution of 102 Kenyan university students, 164 South African university students, and 100 Tanzanian university students.

### Measuring Instrument

The questionnaire comprised one question soliciting a response on the basis of three options, namely, "Yes", "No", "Do not know". The respondents were required to mark the option that best expressed what they knew about HIV/AIDS. The question read as follows: "AIDS is a punishment for those who break God's law which says it is wrong to have sexual intercourse outside marriage"

### Procedure

Since the researcher could not be in all places at the same time, arrangement was made for university academics in Kenya, South Africa and Tanzania to be responsible for administering the questionnaire to their respective students. Students were also

**Table 1.** Frequency Percentage Chi-Square and Probability.

S/N	Country	Female	Male	Frequency	%	$\chi^2$	P
1	Kenya	38	64	25.27	66.42	3.2	0.10
2	South Africa	93	71	50.42	50.59	4.2	0.05
3	Tanzania	42	58	23.43	55.74	6	0.05

N=366, HIV/AIDS is a punishment for those who break God's law which says, it is wrong to have sex outside marriage.

advised that they had the choice of responding to the questionnaire, if they so wished. In addition to the statement, participants were to fill in their gender and date of birth. For the purpose of confidentiality, participants were not permitted to write their names or institution of affiliation. On completion of the questionnaire, the academics collected the papers which were sent to the researcher in New York for scoring and analysis.

## RESULTS

Descriptive statistics in the form of frequency, percentage, chi-square and probability level were used as a method of data analysis as displayed in Table 1.

The response to the statement for Kenya university women was 66 and 42% for men; South Africa women was 54 and 59%; and Tanzania women was 55% with men scoring 74%, respectively. The chi-square results were as follows:  $\chi^2$  (1df, N100)=3.2,  $p < 0.10$  Kenya university;  $\chi^2$  (1df, N162)=4.2,  $p < 0.05$  South Africa;  $\chi^2$  (1df, N98)=6,  $p < 0.05$  Tanzania. All the values of the chi-square were statistically significant in favour of those who rejected the statement that HIV/AIDS is God's indignation against sexual immorality. In terms of gender differences, Kenya women were more inclined to express that, HIV/AIDS was God's punishment against sexual immorality. South Africa men were of the view that, HIV/AIDS is God's condemnation for engaging in sexual immorality. In Tanzania, the opposite to Kenya held true, in so far as more men held the belief that HIV/AIDS is God's indignation against sexual immorality.

In summary, the analysis of data showed that university women and men differed regarding their views regarding HIV/AIDS being God's wrath against engaging in sexual activity contrary to cultural expectations. In terms of gender difference, the ratio was 1:2 as in Kenya more women were in agreement with the statement, whereas the respondents in both South Africa and Tanzania were of the view that HIV/AIDS is God's punishment for those who do not adhere to his law regarding sexual morality.

## DISCUSSION

The objective of this investigation was to find out the extent to which university men and women would believe that HIV/AIDS is God's indignation against individuals for engaging in sexual behaviour outside wedlock. The

results showed that majority of participants in all three of the diverse groups did not agree with the premise that God was using HIV/AIDS as a plague to discipline sinners. The results indicated that gender differences were rather divergent. In Kenya, there were more university women who concluded that God did not use HIV/AIDS as a punishment. However, for both South Africa and Tanzania there were more men who were of the view that HIV/AIDS was not used as punishment.

The findings of this study are in agreement with what other researchers have reported, as well as those who have reported different findings (Mwamwenda, 2013; Fraim, 2012). Van Dyk and Van Dyk (2007) reported that in their study of 1,352 university students, 16% agreed with the statement that God punishes people with HIV/AIDS for engaging in sexually immoral behaviour. In the present findings, those who were of similar view exceeded 16%. The same held true with what has been reported by Manzell et al. (2011). A similar percentage was reported by Fraim in Turkey, in a sample of 1,925 university students, and the majority of those expressing such view happened to be men. The same was observed in the present investigation with both South African and Tanzanian men. On the other hand, it is different from the Kenyan sample where more university women subscribed to the tenet than was the case with men.

Given the extent to which HIV/AIDS has a tremendous impact on women and girls due to cultural, economic, and physiological factors (Bell, 2002; Gahagan, 2012; Worlds AIDS Day, 2012; Feresu and Smith, 2012; Loutfy et al., 2012), one would have expected more university women than men supporting the view that HIV/AIDS is God's indignation against those involved in sexual immorality. However, in the present investigation, it was not the case. To the contrary, more men in the South African and Tanzanian samples expressed such view. It was in the case of the Kenyan sample only, where women more than men who thought the statement was unacceptable.

## Conclusion

In this investigation, it has been shown that there are gender differences in the extent to which university men and women feel about HIV/AIDS being God's punishment for engaging in sexually immoral behaviour. For the Kenya sample, more women than men rejected the

notion that HIV/AIDS is God's indignation against sinners. In both the South African and Tanzanian samples, the contrary held true. What is of interest in the present study is not so much the level of knowledgeability about HIV/AIDS, as it is the misconceptions. The numbers of those who accepted the notion of HIV/AIDS is substantial. This therefore should be a matter of concern in the field of HIV/AIDS public education.

## REFERENCES

- Bell, E. (2002). Spotting inequality. *Bridge Bulletin, Issue 11* September.
- Clifford P (2004). Theology and the HIV/AIDS epidemic. [www.christianaid.org-uk/imaages/hiv\\_theologyfinal.pdf](http://www.christianaid.org-uk/imaages/hiv_theologyfinal.pdf). [Accessed 13 May 2013]
- Dete, M (2012). HIV not God's way of punishing sinners. Available at: [www.zimpapers.co.zw/index.php?option=com\\_content & view=article&id=5517:hiv-is-not-gods-way-of-punishing-sinners&catid=48-blogs&-temid=155](http://www.zimpapers.co.zw/index.php?option=com_content&view=article&id=5517:hiv-is-not-gods-way-of-punishing-sinners&catid=48-blogs&-temid=155). [Accessed 13 May 2013].
- Du Toit J (2012). HIV, AIDS and religions: An ambiguous relationship. Available at: [www.consultancyAfrica.com/index.php?option=com-content&view=article&id=357&temid=217](http://www.consultancyAfrica.com/index.php?option=com-content&view=article&id=357&temid=217). [Accessed 13 May 2013].
- Feresu S, Smith L (2013). Knowledge, attitudes and beliefs about HIV/AIDS of Sudanese and Bantu Somali immigrant women living in Omaha, Nebraska. *Open J. Preventive Med.* 3(1):64-98.
- Fraim NL (2012). Knowledge levels and misconceptions about HIV/AIDS: What do university students in Turkey really know? *Int. J. Humanities and Social Sci.* Vol. 2 No. 12.
- Gahagan J (2012). Gender matters in HIV prevention. Available at: [www.catie.ca/en/pif/sping-2012/gendermatters-hiv-prevention](http://www.catie.ca/en/pif/sping-2012/gendermatters-hiv-prevention). [Accessed 13 May 2013].
- Hartwig KA, Kissioki S, Hartwig CD (2006). Church leaders confront HIV/AIDS stigma. *J. Commun. Appl. Soc. Psychol.* 16:492-497.
- Kopelman LM (2002). If HIV/AIDS is punishment, who is bad? *J. Med. Philosophy.* 27(2):231-243.
- Loutfy MR, Logie CH, Zhang Y, Blits SL, Margolese SL, Tharao WE, Rourke SB, Ruede S, Raboud JM (2012). *PLoS One* Vol. 7, No.12.
- Manzell JE, Correale J, Adams-Skinner J, Stein ZA (2011). Conflicts between conservative Christian institutions and secular groups in Sub-Saharan Africa: Ideological discourses on sexualities, reproduction and HIV/AIDS. *Glob. Public Health* 6(2):192-209.
- Mbonu NC, Van den Borke B, De Vries NK (2009). Stigma of people with HIV/AIDS in Sub-Saharan Africa: A literature review. *J. Trop. Med.* pp. 1-14.
- Mwamwenda TS (2013). African university students' knowledge of HIV/AIDS and knowledge transfer. *J. AIDS HIV Res.* 5(9):341-346.
- Terry PE, Mhloy M, Masavaure T, Adlis S (2005). Gender equality and HIV/AIDS prevention: Comparing gender differences in sexual practice and belief among Zimbabwe University students. *International Quarterly of Community Health Education*, 24(1)29-43.
- Van Dyk PJ, Van Dyk AC (2007). Does the church deliver? Perceptions among South Africans about the role of the church in the HIV/AIDS field. *Ecclesia JRG* 28(2)682-697.
- World AIDS Day (2012). Addressing gender perspective in HIV protection. Available at: [www.ccm.egy.blogspot.com](http://www.ccm.egy.blogspot.com). [Accessed 30 August 2013].

*Full Length Research Paper*

# Human immunodeficiency virus/Acquired immune deficiency syndrome (HIV/AIDS), Related knowledge, risk perception and practice of confidential counseling and testing for HIV among patients in a tertiary health institution in North Western Nigeria

Awosan K. J.\*, Ibrahim M. T. O. and Ali A. I.

Department of Community Medicine, College of Health Sciences, Usmanu Danfodiyo University, Sokoto, Nigeria.

Accepted 5 October, 2013

Acquired immune deficiency syndrome (AIDS) caused by the human immunodeficiency virus (HIV) is the leading cause of death in sub-Saharan Africa. A major focal point of the epidemiology and spread of HIV infection and AIDS is HIV/AIDS related knowledge, especially as these affect AIDS risk behaviors in vulnerable populations of Africa. While HIV testing serves as the gateway to treatment, care, and prevention of HIV/AIDS; uptake of HIV testing is very low in sub-Saharan Africa. This study was conducted to assess the HIV/AIDS related knowledge, risk perception and practice of HIV confidential counseling and testing among patients in Sokoto. A descriptive cross-sectional study among 184 randomly selected patients attending the medical outpatient clinic of Specialist Hospital Sokoto, Nigeria was conducted in September 2010. Informed consent was taken and information was collected by a pre-designed questionnaire, data analysis was done using computer software, SPSS version 17. Almost all the patients (97.8%) have heard about HIV/AIDS. Although only 18.3% knew the causative agent, majority had adequate knowledge of transmission (71.1%) and prevention (62.2%) of the disease, with a few among them having some misconceptions. Most (89.4%) perceived the disease to be a serious threat to them, but some still engaged in sharing needle with another person (12.2%), and casual sex (8.3%). Barely half (57.2%) knew where to do HIV test, and only 23.9% have been tested for HIV. Inadequate awareness and poor practice of HIV testing was demonstrated in this study despite adequate knowledge and perception of risk of HIV/AIDS. This suggests the need for all the stakeholders to intensify health education aimed at removing misconceptions about the disease and improving uptake of HIV testing.

**Key words:** Acquired immune deficiency syndrome/human immunodeficiency virus (HIV/AIDS), knowledge, risk perception, confidential counseling and testing.

## INTRODUCTION

Acquired immune deficiency syndrome (AIDS) caused by the human immunodeficiency virus (HIV) is the leading cause of death in sub-Saharan Africa. In 2007, the African

region contained an estimated 68% of all people living with AIDS and recorded 76% of all AIDS deaths, with 1.7 million new infections, bringing the number of people

\*Corresponding author. E-mail: awosankj1@yahoo.com.



living with HIV to 22.5 million, and with 11.4 million AIDS orphans living in the region (Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO), 2007). Nigeria has the third largest population of people living with HIV, after India and South Africa (Joint United Nations Programme on HIV/AIDS (UNAIDS), 2006). Similar to the situation in most countries in the region, AIDS continued to be the leading cause of mortality among adults in Nigeria with a cause specific mortality rate of 132 deaths per 100,000 population (World Health Organization (WHO), 2013).

The 2008 HIV sentinel survey shows that Sokoto state, the study area had a relatively low prevalence of 6.0% when compared with the other states in Nigeria, but it was still above the national average of 4.6%. Contrary to the situation in the other states in Nigeria where the prevalence of HIV was higher in urban than rural areas, Sokoto and the neighboring Kebbi state recorded a higher prevalence of HIV in rural areas compared to urban areas. In Sokoto state the rural prevalence of HIV was 10.1% while the urban prevalence was 3.9% (National Population Commission (NPC) and ICF Macro, 2009).

A major focal point of the epidemiology and spread of HIV infection and AIDS is HIV/AIDS related knowledge, especially as these affect AIDS risk behaviors in vulnerable populations of Africa. Many people are unaware that they are infected with HIV. Less than 1% of the sexually active urban populations in Africa have been tested, and the proportion is even lower in rural populations. The large population of people who are unaware of their status is of concern, especially considering situations where such people had to donate blood in settings without reliable HIV screening kits. Also not knowing that they are infected with HIV especially if they are free of symptoms is likely to cause a lower perception of vulnerability among them and this could result in more risk-taking behaviors (Kumaranayake et al., 2001).

Universal precautions are frequently not followed in sub-Saharan Africa, because of both a shortage of supplies and inadequate training. HIV transmission through the transfusion of blood and blood products is highly efficient (about 90% efficient) and this is significant in Africa and other developing countries where HIV screening facilities for blood transfusion are not adequate. Patients therefore constitute a special group at risk of the disease through iatrogenic transmission of the virus (Ofosu-Barko, 1998).

An integrated care for HIV/AIDS and chronic medical conditions like diabetes and hypertension has been found to result in efficiency gains for the services and satisfactory outcome for patients by promoting adherence to care and lifestyle changes for these disease conditions (Janssens et al., 2013). Also, the prevalence of HIV co-infection with other infectious diseases such as tuberculosis is high in Nigeria, with a tuberculosis/HIV co-infection rate of 25% in 2010 (United States Agency for International Development (USAID)/Nigeria, 2012); the medical outpatient clinic in essence provides an avenue

for access to patients at high risk of HIV/AIDS. A study in Ibadan reported that, despite the high awareness of HIV/AIDS, 19.5 and 34.3% of diabetic and schizophrenic patients respectively, engaged in casual sex without using condom (Ogunsemi et al., 2006).

While HIV testing serves as the gateway to treatment, care, and prevention of HIV/AIDS, uptake of HIV testing is very low in sub-Saharan Africa where only about 12% of men and 10% of women in the general population have been tested for HIV and also received the results (World Health Organization (WHO), 2007). Reports from studies show a wide gap between willingness to undergo HIV testing and uptake of the test. In a study among patients with tuberculosis, while 73% were willing to undergo the test, only 35% have been tested (Degu et al., 2007). In another study among pregnant women, while almost all of them were willing to undergo the test, only few of them said they would undergo the test if the result would be shared with their relatives (Ekanem et al., 2004). Inaccurate risk perception, fear of possible outcome, stigmatization, divorce, isolation, and other problems have been identified as barriers to uptake of voluntary counseling and testing (VCT) for HIV (Deborah et al., 2002). Just as knowledge of HIV/AIDS influences uptake of HIV testing, HIV counseling and testing intervention has been found to significantly increase AIDS related knowledge and reduce risk behavior among patients attending tuberculosis clinics in Abidjan, Cote d'Ivoire (Wiktor et al., 2004). This study was conducted to assess the HIV/AIDS related knowledge, risk perception and practice of HIV confidential counseling and testing among patients in Sokoto.

## MATERIALS AND METHODS

This cross-sectional descriptive study was carried out among patients attending the medical outpatient clinic of Specialist Hospital located in Sokoto town of Sokoto state, North Western Nigeria, in September 2010. Sokoto has a predominantly Hausa-Fulani population, while the non-natives belong to Igbo, Yoruba and Igala ethnic groups among others. The natives are predominantly Moslems, among the non-natives some are Moslems while some are Christians. The hospital provides health services to the population in Sokoto and those referred from the other local government areas in the state. The department of medicine of the hospital runs the medical outpatient clinic thrice a week, and sees an average of 170 patients daily. The sample size was estimated at 184 using the statistical formula for calculating the sample size for descriptive studies (Ibrahim, 2009), 13% acceptance rate of HIV testing from a previous study (Enosolease et al., 2004), precision level of 5% and an anticipated response rate of 95%. After explaining the objectives of the study to them, one in every four patients seen in the clinic was recruited over a four day period to obtain the required sample size of 184.

A set of pretested, semi-structured, interviewer administered questionnaire was used to obtain information on respondent's socio-demographic characteristics, knowledge of causative agent, transmission and prevention of HIV/AIDS, risk perception and exposure, awareness of where HIV testing is done, willingness to do the test, barriers to doing it, and previous HIV testing. The questionnaire was adapted from the survey tool used for the 2007

**Table 1.** Socio-demographic profile of respondents.

Socio-demographic profile	Frequency (%)
<b>Age groups (in years)</b>	
15-29	43 (23.3)
30-39	57 (31.0)
40-49	43 (23.4)
50-59	34 (18.5)
60 and above	7 (3.8)
<b>Sex</b>	
Male	110 (59.8)
Female	74 (40.2)
<b>Marital status</b>	
Single	22 (12.0)
Married	142 (77.2)
Separated	5 (2.7)
Divorced	7 (3.8)
Widowed	8 (4.3)
<b>Education</b>	
None	2 (1.1)
Quranic only	114 (62.0)
Primary	8 (4.3)
Secondary	32 (17.4)
Tertiary	28 (15.2)
<b>Religion</b>	
Islam	161 (87.5)
Christianity	23 (12.5)
<b>Occupation</b>	
Housewife	61 (33.2)
Artisan	15 (8.2)
Farmer	29 (15.8)
Civil servant	17 (9.2)
Business woman	47 (25.5)
Professional	15 (8.2)

National HIV/AIDS and Reproductive Health Survey (Federal Ministry of Health (FMoH), 2008). The questionnaire was pretested among 10 patients attending the general outpatient unit of the hospital; appropriate modification was made based on the observations made during the pretest. Four student nurses assisted in questionnaire administration after pre-training on conduct of survey research, the objectives, selection of study subjects and questionnaire administration. Ethical permission to carry out the study was obtained from the Management of the hospital, and informed written consent was also obtained from the study subjects before questionnaire administration.

Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 17 computer statistical software package. Knowledge of HIV transmission was scored on a 9 item scale, while a 6 item scale was used for scoring knowledge of HIV prevention. Correct response was scored one and incorrect response or none-

response was scored zero. Respondents scoring less than 65% were considered to have inadequate knowledge while those with scores of 65% and above were graded as having adequate knowledge. Descriptive statistics and Chi-square test were done to explore associations between demographic characteristics, knowledge, risk perception and practice of HIV testing. Logistic regression analysis was used to determine the variables that predict adequate knowledge of HIV transmission and prevention. All levels of significance were set at  $p < 0.05$ .

## RESULTS

The age of the respondents ranged from 19 to 73 years with a mean of  $41.6 \pm 12.5$  years. Majority of the respondents were male (59.8%), married (77.2%), Moslem by religion (87.5%) and had only quranic education (62.0%) as shown in Table 1.

### Knowledge of HIV/AIDS

One hundred and eighty (97.8%) of the 184 respondents have ever heard of HIV/AIDS. Radio/television was the most common source of information (49.4%), followed by health workers (22.2%), friends/relatives (14.4%), while only a few (13.9%) obtained information through newspaper/magazines.

While 129 (71.7%) of the 180 respondents that have ever heard of HIV/AIDS were aware that the disease could be asymptomatic, knowledge of its causative agent was poor. Only 33 (18.3%) knew the disease to be caused by a virus. Majority, 80 (44.4%) attributed it to prostitution, 43 (23.9%) attributed it to homosexuality, 15 (8.3%) had no idea of the cause, while 5 (2.8%), 3 (1.7%) and 1 (0.6%) attributed the disease to promiscuity, God's punishment and juju/witchcraft, respectively.

Most of the respondents (71.1%) had adequate knowledge of transmission of HIV, 96.1% knew that the virus could be transmitted through sexual intercourse with an infected person, 83.9% knew that transmission could follow transfusion with an infected blood. About 74.4% of the respondents knew that HIV could be transmitted from an infected mother to her unborn child, 87.8% were aware of transmission through sharing sharp objects like razor and needles, while 65.0% knew that it could be transmitted from an infected mother to her baby through breast feeding. About 23.9% of the respondents had misconceptions on the transmission of the disease through mosquito bites, while some also misconceived the virus to be transmissible by shaking hand with an infected person (11.1%), and sharing clothes (10.0%) or toilet (10.0%) with an infected person (Table 2).

Adequate knowledge of HIV transmission was found to be statistically significantly associated with secondary/tertiary education ( $\chi^2 = 19.788$ ,  $p < 0.001$ ). In logistic regression models, secondary/tertiary education was the only predictor of adequate knowledge of HIV transmission (odds ratio (OR) = 4.917, 95% confidence interval (CI) = 0.193 – 0.453) as shown in Table 3.

**Table 2.** Knowledge of routes of HIV transmission.

Can HIV be transmitted through the following ways?	Response		
	Yes [No. (%)]	No [No. (%)]	I don't know [No. (%)]
Sexual intercourse with an infected person	173 (96.1)	0 (0)	7 (3.9)
Transfusion with an infected blood	151 (83.9)	4 (2.2)	25 (13.9)
From an infected mother to her unborn child	134 (74.4)	10 (5.5)	36 (20.0)
Sharing sharp objects like razor and needles	158 (87.8)	6 (3.3)	16 (8.9)
Breast feeding by an infected mother	117 (65.0)	24 (13.3)	39 (21.7)
Shaking hand with an infected person	20 (11.1)	130 (72.2)	30 (16.7)
Sharing clothes with an infected person	18 (10.0)	123 (68.3)	39 (21.7)
Sharing toilet with an infected person	18 (10.0)	118 (65.6)	44 (24.4)
By mosquito bites/bed bugs	43 (23.9)	102 (56.7)	35 (19.4)

**Table 3.** Predictor of adequate knowledge of HIV transmission.

Variable	Odds ratio	Sig.	95% CI	
			Lower	Upper
Male versus female sex	1.812	0.072	-0.010	0.240
Age 40 years and above versus age below 40 years	0.272	0.786	-0.111	0.146
Single versus married, separated, divorced and widowed	0.402	0.688	-0.242	0.160
Secondary and tertiary education versus primary education and below	4.917	< 0.001	0.193	0.453

Majority of the respondents (62.2%) had adequate knowledge of HIV prevention, 91.7% knew abstaining from sex, 74.4% knew limiting sexual intercourse to only one HIV negative partner, and 62.2% knew use of condom daily as ways of preventing HIV infection. Other preventive measures known to them included avoiding sharing of sharp objects such as razor and needle (83.9%), treating HIV positive mother during pregnancy (61.1%), and feeding an HIV positive mother's baby with substitute milk (59.4%) as shown in Table 4.

Adequate knowledge of HIV prevention was also found to be statistically significantly associated with secondary/tertiary education ( $\chi^2 = 22.781$ ,  $p < 0.001$ ). Similarly, in logistic regression models, secondary/tertiary education was the only predictor of adequate knowledge of HIV prevention (OR = 5.392, 95% CI = 0.227 – 0.488) as shown in Table 5.

### HIV/AIDS risk perception

One hundred and sixty one (89.4%) of the 180 respondents that were aware of HIV/AIDS considered the disease to be a serious threat to them, only 3 (1.7%) did not see it as a threat, while 16 (8.9%) were unsure if it constitutes a threat to them or not. Only a few of the respondents engaged in risky behaviors related to HIV/AIDS, 22 (12.2%) had shared needle with another person, while 15 (8.3%) had engaged in casual sex within the past 12 months. While condom use was low (9.8%) during sex with marital partners, 13 (86.7%) of the 15

respondents that had engaged in casual sex reported use of condom.

### Practice of VCT for HIV

Barely half, 103 (57.2%) of the 180 respondents who have ever heard of HIV/AIDS knew where to get VCT for HIV done, and only 43 (23.9%) had done the test. Reasons given for not undergoing the test included fear of rejection by family and friends (26.3%), lack of privacy where test is done (20.4%), fear of divorce by partner (19.0%), fear of discrimination at work (18.2%), and fear of death (16.1%). Eighty five (62.0%) of the 137 respondents that have not done the test were willing to do it.

### DISCUSSION

This study shows that almost all the respondents (97.8%) were aware of HIV/AIDS; this is in concordance with the high level of awareness (99.0%) reported in the study by Igwegbe et al. (2005). A larger proportion of the respondents obtained information on HIV/AIDS through radio and television (49.4%) than from health workers in this study; this is similar to the findings in the study by Ayankogbe et al. (2003), that reported higher contribution from the mass media than the health workers in the dissemination of information on HIV/AIDS. This could mean that health workers did not consider disseminating information on HIV/AIDS an important component of the

**Table 4.** Knowledge of HIV prevention.

Can HIV be prevented through the following ways?	Response		
	Yes [No. (%)]	No [No. (%)]	I don't know [No. (%)]
By abstaining from sex	165 (91.7)	5 (2.8)	10 (5.6)
By limiting sexual intercourse to only one HIV negative partner	134 (74.4)	12 (6.7)	34 (18.9)
Use of condom every day	112 (62.2)	21 (11.7)	47 (26.1)
Avoid sharing of sharp objects such as razor and needle	151 (83.9)	3 (1.7)	26 (14.4)
By treating HIV positive mother during pregnancy	110 (61.1)	13 (7.2)	57 (31.7)
By feeding an HIV positive mother's baby with substitute milk	107 (59.4)	17 (9.4)	58 (31.1)

**Table 5.** Predictor of adequate knowledge of HIV prevention.

Variable	Odds ratio	Sig.	95% CI	
			Lower	Upper
Male versus female sex	1.688	0.093	-0.018	0.232
Age 40 years and above versus age below 40 years	0.547	0.656	-0.093	0.164
Single versus married, separated, divorced and widowed	1.300	0.156	-0.068	0.331
Secondary and tertiary education versus primary education and below	5.392	< 0.001	0.227	0.488

primary preventives services to be offered to their patients, especially those presenting with other medical conditions. Even though most of the respondents had adequate knowledge of HIV transmission (71.1%) and prevention (62.2%), a good proportion still had misconceptions on the transmission of the virus through mosquito bites (23.9%), shaking hand with an infected person (11.1%), and sharing clothes (10.0%) or toilet (10.0%) with an infected person. A study by Iliyasu et al. (2006), also reported similar levels of misconceptions, and this could influence their attitude to people with the disease. The relatively low prevalence of casual sex (8.3%) among the respondents in this study could be due to their high perception of risk (89.4%) in contrast to the findings in a study by Adegun et al. (2013) that reported a much lower risk perception (53.0%) and higher prevalence of casual sex (80.6%).

The marginal level of awareness of HIV testing (57.2%) and the poor practice of HIV testing (23.9%) recorded in this study is similar to the findings in a study by Ikechebelu et al. (2006), that reported only a slightly higher level of awareness (63.2%) and practice of HIV testing (26.4%). Other studies reported discrepancies between awareness of HIV testing, willingness to be tested and those that actually had the test done. While Charles et al. (2009) in Tanzania, reported high awareness of VCT (100.0%) but poor practice (34.6%) of HIV testing, Daniyam et al. (2010), reported high awareness of VCT (83.1%) and a relatively good practice (50.7%) of HIV testing. The low risk perception of HIV/AIDS (37.2%) among the respondents in the Tanzania study could have contributed to the poor practice of HIV testing recorded in the study, and it highlights the fact that other factors apart from awareness or willingness to be tested play

significant roles in uptake of HIV testing. The barriers to uptake of HIV testing recorded in this study, such as fear of rejection by family and friends (26.3%), lack of privacy where test is done (20.4%), fear of divorce by partner (19.0%), fear of discrimination at work (18.2%) and fear of death (16.1%), were also recorded in studies by Adewole et al. (2004) and Mbamara et al. (2013).

## Conclusion

Though majority of the patients had adequate knowledge of HIV/AIDS and perceived the disease to be a serious threat to them, misconceptions and involvement in high risk behavior persist among them. Also there was inadequate awareness and poor practice of confidential counseling and testing for HIV. This suggests the need for all the stakeholders to intensify health education aimed at removing misconceptions about the disease and improving uptake of HIV testing.

## ACKNOWLEDGEMENTS

The authors appreciate the Management of Specialist Hospital, Sokoto for the ethical approval; likewise the Head of Department of Medicine and staff of the Medical Outpatient Clinic for their cooperation. They also thank all the patients that participated in the study.

## REFERENCES

Adegun PT, Adegoke SA, Solomon OS, Ade-Ojo IP (2013). Perception of personal risk for acquiring immunodeficiency virus infection/

- acquired immune deficiency syndrome among people attending outpatient clinics in a tertiary hospital of Nigeria. *Indian J. Pub. Hlth.* 57(2):96-9.
- Adewole DA, Lawoyin TO (2004). Characteristics of volunteers and non-volunteers for voluntary counseling and HIV testing among unmarried male undergraduates. *Afr. J. Med. Sci.* 33(2):165-70.
- Ayankogbe OO, Omotola BD, Inem VA, Ahmed OA, Manafa OU (2003). Knowledge, attitudes, beliefs and behavioural practices for creating awareness about HIV/AIDS in Lagos State, Nigeria. *Niger Med. Pract.* 44:7-10.
- Charles MP, Kweka LJ, Mahande AM, Barongo LR, Shekalagbe S, Nkya HM, Lowassa A Mahande MJ (2009). Evaluation of uptake and attitude to voluntary counseling and testing among health care professional students in Kilimanjaro region, Tanzania. *BMC Pub. Hlth.* 9(9):128.
- Daniyam CA, Agaba PA, Agaba E (2010). Acceptability of voluntary counseling and testing among medical students in Jos, Nigeria. *J. Infect. Dev. Ctries* 4(6):357-61.
- Deborah B, Rachel B (2002). Voluntary counseling and testing and young people: a summary overview. *Family Health International, Arlington, USA.*
- Degu J, Aschalew E, Bernt L (2007). Acceptability of HIV counselling and testing among tuberculosis patients in South Ethiopia. *BMC International Health and Human Right.*
- Ekanem EE, Gbadegesin A (2004). Voluntary counseling and test (VCT) for human immunodeficiency virus: a study on acceptability by Nigerian women attending antenatal clinics. *Afr. J. Rep. Hlth.* 8(2):91-100.
- Enosolease ME, Ofoor E (2004). Acceptance rate of HIV testing among women seeking induced abortion in Benin City, Nigeria. *Afr. J. Rep. Hlth.* 8(2):86-90.
- FMoH (2008). National HIV/AIDS and Reproductive Health Survey, 2007 (NARHS Plus). Federal Ministry of Health, Abuja, Nigeria.
- Ibrahim MTO (2009). Research methodology and dissertation writing for health and allied health professionals. Abuja: Cress Global Link Limited.
- Igwegbe AO, Ilika AI (2005). Knowledge and perception of HIV/AIDS and mother to child transmission among antenatal mothers at Nnamdi Azikwe University Teaching Hospital, Nnewi. *Nig. J. Clin. Prac.* 8(2):97-101.
- Ikechebelu IJ, Udigwe GO, Ikechebelu N, Imoh LG (2006). The knowledge, attitude and practice of voluntary counseling and testing (VCT) for HIV/AIDS among undergraduates in a polytechnic in south east Nigeria. *Niger J. Med.* 15(3):245-9.
- Iliyasu Z, Abubakar IS, Kabir M, Aliyu MH (2006). Knowledge of HIV/AIDS and attitude toward voluntary counseling and testing among adults. *J. Natl. Med. Assoc.* 98(12):1917-22.
- Janssens B, Van Damme W, Raleigh B, Gupta J, Khem S, Soy Ty K, Yun M, Ford N, Zachariah R (2013). Offering integrated care for HIV/AIDS diabetes and hypertension within chronic disease clinics in Cambodia. *Bull. of the WHO* 2013.
- Kumaranayake L, Watts C (2001). Resource allocation and priority setting of HIV/AIDS interventions: addressing the generalized epidemic in sub-Saharan Africa. *J. Int. Dev.* 13 (4):451-466.
- Mbamara SU, Obiechina NJ (2013). Awareness and attitudes toward voluntary counselling and testing for HIV/AIDS among law undergraduates in tertiary institutions in south east Nigeria. *J. Reprod. Med.* 58(1-2):55-60.
- NPC and ICF Macro (2009). Nigeria Demographic and Health Survey 2008. Abuja, Nigeria: National Population Commission and ICF Macro.
- Ofoos – Barko K (1998). The current status of the HIV/AIDS epidemic. What are the driving forces? "In" HIV/AIDS in Nigeria lessons learnt and the way forward. *First Nat. Conf. HIV/AIDS, Abuja 15<sup>th</sup> – 17<sup>th</sup> December, 1998:* 45 – 51.
- Ogunsemi OO, Lawal RA, Okulate GT, Alebiosu CO, Olatawura MO (2006). A comparative study of HIV/AIDS: knowledge attitude and risk behaviors of schizophrenic and diabetic patients in regard to HIV/AIDS in Nigeria. *Med. Gen. Med.* 8(4):42.
- UNAIDS (2006). Report on the AIDS Epidemic 2006. Joint United Nations Programme on HIV/AIDS. Geneva, Switzerland.
- UNAIDS and WHO (2007). AIDS epidemic update 2007. Joint United Nations Programme on HIV/AIDS and World Health Organization. Geneva, Switzerland.
- USAID/NIGERIA (2012). Nigeria tuberculosis fact sheet 2012. Available at: <http://photos.state.gov/libraries/nigeria/>.
- WHO (2007). Towards Universal Access: Scaling up Priority HIV/ AIDS Interventions in the Health Sector. Progress Report. World Health Organization Geneva, Switzerland.
- WHO (2013). World Health Statistics 2013. World Health Organization, Geneva, Switzerland. Available at: [http://www.who.int/gho/publications/world\\_health](http://www.who.int/gho/publications/world_health).
- Wiktor SZ, Abouya L, Angoran H, McFarland J, Sassan-Morokro M, Tossou O, Coulibaly D, Coulibaly IM, Greenberg AE (2004). Effect of an HIV counseling and testing program on AIDS-related knowledge and practice in tuberculosis clinics in Abidjan, Cote d' Ivore. *Int. J. Tuberc. Lung Dis.* 8(4):445-50.

Full Length Research Paper

## Awareness and knowledge levels about HIV/AIDS among high school students in Mugla, Turkey

Bora Ekinci<sup>1\*</sup> and Atilla Goktas<sup>2</sup>

<sup>1</sup>Mugla School of Health Sciences, Mugla Sitki Kocman University, Mugla, 48000, Turkey. <sup>2</sup>Department of Statistics, Faculty of Science, Mugla Sitki Kocman University, Mugla, 48000, Turkey.

Accepted 15 October 2013

This study was designed to investigate current awareness and knowledge levels of high school students about human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) in a very popular tourism city Mugla, Turkey. The participants were consisted of 1184 students from 11 secondary schools in Mugla and asked to fill out a questionnaire form, which was consisted of 50 questions. The form contained two scales, one of socio-demographical property of the individuals and the other scale was about knowledge levels of students. The findings present a clear data of the well known dilemma of knowing the right thing and doing wrong about risks of those that should beware of AIDS. The average knowledge levels of students were found to be moderate with a score of  $71.15 \pm 4.87$ . All socio-demographic properties were found to be effective on knowledge levels of students. The results indicated that all students were aware of AIDS and know prevention methods, but they did not know the main target for what or whom they protect themselves.

**Key words:** High school students, knowledge levels, human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), Mugla.

### INTRODUCTION

Acquired immunodeficiency syndrome (AIDS) was first recognized in 1978, in USA, in healthy homosexual individuals and later it was accompanied by severe, fatal disease. Cause of the disease for these cases was firstly thought as immunosuppressive neoplasm or endocrinological disease and found out to have appeared among young adults. Because first cases were homosexuals, disease was named as "gay compromise syndrome" and "gay related immunodeficiency" (Grani et al., 2005). In 1981 MS Gottlieb (Swenson et al., 1997) diagnosed a fatal infection accompanied by *Pneumocystis carinii* and reported it as "New acquired cellular immunodeficiency". Therefore both name and prognosis of this illness were

well defined and titled as AIDS.

Agent of AIDS was first detected in 1983 and was named as "human immunodeficiency virus (HIV)", in 1986 HIV-2 was also identified (Prescott et al., 2007). Although HIV was determined as cause of AIDS in 1983, analyses of frozen serum samples suggested a similar virus that had infected a sexually active boy in 1968 in St. Louis (Koneman et al., 1997). Subsequently after discovery of HIV, AIDS has quickly become one of the most deadly and feared disease in the world. Beginning of surveillance studies from 1981 to end of 1983, it was detected not only in homosexuals but also at intravenous (IV) drug users (Börsum and Gjeramo, 2004; Eggermont, 2005).

\*Corresponding author. E-mail: [immunbora@yahoo.com](mailto:immunbora@yahoo.com). Tel: + 90 252 2112232. Fax: +90 252 2111880.

In USA, total cumulative number of AIDS cases was about fifty thousand between 1981 and 1987, but it raised to a quarter million people from 1993 to 1995. During this period around the world, about 10 million cases was detected (Lagerberg, 2004). According to World Health Organization 2008 report, it was about 33.4 million (31.1 to 35.8 million). Since HIV-1 is the major cause of AIDS in the world today, HIV-2 is mostly seen in West Africa region. These patients were either carrier or active AIDS patients. The majority of these cases live in developing countries of Asia, South Africa and Sub-Saharan Africa (Prescott et al., 2007). Beside HIV spreading over world wide, it is also being an emerging problem for Turkey. According to Turkish Ministry of Health data, by June of 2012, 5740 cases were reported, 58.8% of them were between the age ranges of 15 to 39.

As the cause of infection, incidence and prevalence rate of HIV infection continues to rise up in Europe and world wide. Since first discovery of AIDS, many therapeutic approaches were performed for eradication. But today, instead of eradication, suppression of virus should be considered. Nevertheless, today drugs are not used to prevent or eradicate AIDS, but for eliminating opportunistic infections of which HIV infection was triggered. Once a person is infected, eradication of virus from the body is impossible. Additionally, because drug expenses are very high and in developing countries lack of health care organizations, the preventive practices are not feasible. As in other viral infections, success depends on both viral factors and awareness degree of people for prevention of HIV. The awareness degree and related factors of people vary on age, education, gender, socio-economic status, well organized health-care and support activities (Adkins, 2002). It is important that concerted attempts should be performed for sexually active young individuals, through educational and occupational programs to inform them of sexually transmitted diseases (Uwakwe, 2000; Hou, 2009).

Through these estimation attempts, obtained results will be worth full to assess awareness of individuals about HIV. Lessons learned will further our understanding of HIV-related behavioural patterns among young adults and provide insights for developing effective and culturally relevant behavioural intervention strategies. Therefore education is the most important step to prevent spreading of HIV worldwide. For this purpose, this study was designed to examine and to evaluate current awareness and knowledge levels of high school students about HIV/AIDS in Mugla, Turkey.

## MATERIALS AND METHODS

The target group for this study consisted of all 11th grade (last grade) secondary school students within age range 16 and 18 years in Mugla, Turkey. The city is located at the Aegean region on

the extreme south west of Turkey with the population of 63,000. Mugla is an important tourism centre with approximately three million visitors from various countries. 1,184 students from 11 secondary schools were asked to participate in our questionnaire. All students were approached by letter and asked for participation by city educational director of Mugla. The research protocol and procedures were reviewed and approved for the ethical considerations by the Educational Director of Mugla and School of Health Sciences Committee. The questionnaire was modification of Dehart and Birkimer's Sexual risk scale (DeHart and Birkimer, 2009). The form was pilot tested with 50 pupils to identify reliability and where revision might be essential. Major revisions were made to facilitate understanding and applicability of questionnaire.

The final questionnaire form consisted of 50 statements and contained two scales: (i) 15 personal questions related to socio-economical situation "such as, salary income, information about their family, source of information etc., (ii) 35 questions about knowledge levels related to HIV and AIDS. At this second section, students replied the questions by one of three answers; true, false or do not know. Scoring was performed as, one point for correct answers and zero point for false or not known questions. The maximum score was 35 points and later converted to hundred scales and evaluated. Therefore, knowledge level scores of 0 to 50 points (0 to 18 true answers) were concerned as less, 51 to 75 (19 to 27 true answers) as moderate and above ( $\geq 28$  true answers) as well.

The demographic variables and individual items were analyzed using descriptive statistics. The results were analyzed statistically with the statistical package for social sciences (SPSS) program. The socio-demographic data were collected as independent variables, where knowledge level scores were as dependent variables.

## RESULTS

1184 secondary school students participated in our questionnaire with age range 16 to 18 years, and their socio-demographic findings were summarized in Tables 1 to 4. Over half of the students were female (53.5%) and 46.5% of the students were male. The average knowledge levels of students were found to be moderate with a score of  $71.15 \pm 4.87$ . According to our results, knowledge levels of female ( $73.1 \pm 5.75$ ) were higher than male ( $69.3 \pm 5.91$ ), thus gender is an effecting factor of knowledge (Table 1). In another word, a significant correlation was detected between gender and knowledge levels ( $p < 0.05$ ).

A total of 66.6% of the students' parents had 750 TL ( $\approx$  500 US dollars) and above income per month. As depicted in Table 2, obtained data indicated that there was a significant correlation between salary income and knowledge levels ( $p < 0.05$ ). Income rates might directly or indirectly affect the knowledge levels of students and can be suggested that the more the gained money the more students got knowledge. Additionally, schooling levels of parents evaluated and statistically analyzed whether there is correlation between knowledge levels and schooling levels of parents. As summarized in Table 3, most of the parents were primary schools, with the rates of 60.5 and 49.3% for fathers and mothers,

**Table 1.** Gender versus knowledge scores.

Parameter		Score (%)			Total (%)	X	
		Less	Moderate	High			
Gender	Male	Count	116	208	309	633	69.3±5.91
		Gender	18.4	32.8	48.9	100.0	
		Score	61.1	58.8	48.2	53.5	
		Total	9.8	17.5	26.1	53.5	
	Female	Count	74	145	332	551	73.1±5.75
		Gender	13.4	26.3	60.3	100.0	
		Score	38.9	41.2	51.8	46.5	
		Total	6.3	12.3	28.1	46.5	
Total	Count	190	353	641	1184	71.15±4.87	
	Gender	16.1	29.8	54.2	100.0		
	Score	100.0	100.0	100.0	100.0		
	Total	16.1	29.8	54.2	100.0		

X: Average knowledge score (100).

**Table 2.** Salary income of the family versus knowledge levels.

Parameter		Score (%)			Total (%)	X	
		Less	Moderate	High			
Income (TL)	0-750	Count	101	140	154	395	65.0±5.92
		Income	25.6	35.4	39.0	100.0	
		Score	53.2	39.8	24.0	33.4	
		Total	8.5	11.8	13.0	33.4	
	751-1500	Count	64	157	284	505	72.4±5.40
		Income	12.7	31.1	56.2	100.0	
		Score	33.7	44.6	44.3	42.7	
		Total	5.4	13.3	24.0	42.7	
	1501 and above	Count	25	55	204	284	77.7±5.67
		Income	8.8	19.4	71.8	100.0	
		Score	13.2	15.6	31.7	23.9	
		Total	2.1	4.6	17.2	23.9	
Total	Count	190	352	641	1184	71.15±4.87	
	Income	16.1	29.8	54.2	100.0		
	Score	100.0	100.0	100.0	100.0		
	Total	16.1	29.8	54.2	100.0		

X: Average knowledge score (100), TL: Turkish Liras.

respectively. Knowledge levels of students who had primary school level educated father and mother were  $67.9 \pm 5.8$  and  $66.8 \pm 5.81$ , respectively. 14.7% of mothers and 23.1% of fathers of the participants

graduated from university and knowledge levels of the students were observed as  $79.2 \pm 5.54$  and  $78.1 \pm 5.39$ , respectively (Table 3). There is a statistically significant correlation between knowledge levels of students and



**Table 3.** Educational status of mothers and fathers versus knowledge scores of students.

Education status	Score								X
	Less		Moderate		High		Total		
	N	%	N	%	N	%	N	%	
<b>Mother</b>									
Not literate	10	0.8	13	1.1	14	1.2	37	3.1	66.7±5.36
Primary school	142	12.0	247	20.9	327	27.7	716	60.5	67.9±5.8
Secondary school	24	2.0	73	6.2	160	13.5	257	21.7	75.1±5.38
University	14	1.2	20	1.6	140	11.8	174	14.7	79.2±5.54
Total	190	16.1	353	29.8	641	54.2	1184	100.0	71.15±4.87
<b>Father</b>									
Not literate	4	0.3	5	0.4	2	0.2	11	1.0	60.3±4.68
Primary school	127	10.7	213	18.0	244	20.6	584	49.3	66.8±5.81
Secondary school	40	3.4	82	6.9	193	16.3	315	26.6	73.4±5.53
University	19	1.6	53	4.5	202	17.1	274	23.1	78.1±5.39
Total	190	16.1	353	29.8	641	54.2	1184	100.0	71.15±4.87

X: Avarage knowledge score (100); N: Count

**Table 4.** Source of information and knowledge scores.

Source	Count % (in group)	%	X
Family	14 (1)	1.2	65.3±7.63
School	442 (41)	37.3	70.9±7.63
Media	99 (9)	8.4	63.4±6.55
Books and magazines	23 (2)	1.9	70.7±6.24
Others	30 (3)	2.5	66.8±5.71
More than one source	472 (44)	39.9	72.2±6.36
Total	1080 (100)	91.2	72.6±5.53
Not informed	104 (100)	8,8	55.7±6.55
Total	1184	100.0	71.15±4.87

X: Avarage knowledge score (100)

education levels of parents ( $p < 0.05$ ). As suggested in Table 3 in case of schooling levels of parents which become high, knowledge levels of students increased.

As summarized in Table 4, the most common reported source of information for both male and female students was school educational programs (41%) and 43.7% of the students gained information from more than one source. Family and books were reported as the least accessed source of information. 91.2% of the students reported that they were informed about HIV/AIDS previously by various educational materials. When we assessed the knowledge levels of not informed students, the knowledge level was the least as  $55.7 \pm 6.55$ . There was a strong correlation between knowledge levels and informational status ( $p < 0.05$ ). With respect to source of

information, the students who got informed by school educational programs or more than one source had higher awareness and knowledge with a score of  $70.9 \pm 7.63$  and  $72.2 \pm 6.36$ , respectively (Table 4). Given answers to question about being in sexual activity, 40.5% of the students answered yes, but 29.3% of them did not reply the question. In respect to the given answers, the findings present a clear data of the well known dilemma of knowing the right thing about how to prevent spreading AIDS and doing wrong about risks to those they should beware of. The brief summary of giving wrong answers by the students were listed below and given answers, counts of wrong answers and wrong answer percentages in brackets were given, respectively.

1. AIDS is a virus caused, curable illness (Yes, 47.0%);

2. HIV can be transmitted by swimming in a pool with infected person (Yes, 31.8%);
3. HIV can be transmitted by sharing comb/brush (Yes, 33.3%);
4. Cannot be transmitted by sharing injectors (Yes, 60.7%);
5. Can be transmitted by insect or mosquito bites (Yes, 43.7%);
6. Drugs using for therapy of AIDS does not eliminate HIV but can inhibit growing (No, 39.0%);
7. Inadequate cleaning of barbers' or dentists' equipments do not effect transmission of virus (Yes, 33.4%);
8. Piercing, tattoo are risky behaviors for spreading AIDS (No, 30.2%);
9. Perspiration has the least risk for spreading of HIV (No, 45.8%);
10. Carriers can be seen as healthy, shows no symptoms of illness and these patients do not transmit disease (Yes, 55.7%);
11. IV drug users are at great risk of HIV (No, 35.8%);
12. Hemophilia patients, health care staff, because they are in relation with blood products probably at risk of being infected (No, 32.0%);
13. Enzyme-linked immunosorbent assay (ELISA) is the name of diagnostic test (No, 42.3%);
14. A vaccine was developed for HIV (Yes, 51.9%);
15. Patients must be isolated from the public (Yes, 40.6%);
16. Do not let patients to marry (asked for personal comment; Yes, 73.8%).

## DISCUSSION

An early onset of sexual activity in young adolescents has been associated with various health issues. Adolescents who initiated early sexual activity are less likely to take appropriate precautions, and are at possible risk of contracting a sexually transmitted disease and various kinds of problems (Adkins, 2002). According to Turkish Ministry of Health data, the first case was diagnosed in 1985 in Turkey. 52.7% of the reported AIDS cases have resulted from heterosexual relationships (Statistics of Turkish Ministry of Health, 2011).

Reports from various studies have suggested that two thirds of the AIDS cases among adolescents have resulted from sexual behaviour. These rates showed significant differences between countries. These discrepancies may vary among population depending on social behaviour, cultural background, religion, education, economical status, age and gender differences and awareness of population. Additionally also educational programs given by medical personnel, mass media, and family members can also affect ratios of AIDS cases and

transmission routes (Grani et al., 2005; Nath, 2009). Because AIDS is still not a curable illness, the main goal denses towards informing individuals about the modes of transmission, emphasize the importance of prevention rather than curing illness (Muinonen et al., 2002).

According to previous studies performed in USA, statistics of AIDS related knowledge levels and behaviour showed significant differences in general population. People with < 12 years of education and individuals over the age of 50 are likely not to respond correctly to general AIDS knowledge questions (Swenson et al., 1997). These analyses allowed researchers make two basic decisions about fighting against AIDS. First, it is important to focus research and interventions on young people. Second, those young adults who differ in education and in cultural background should be separately studied (Yadav et al., 2011).

Studies of young adolescents suggest that they have quite high level of knowledge about HIV/AIDS; these include transmission, prevention and general. And sources of information were mostly as mass media, family members and friends or medical personnel (Swenson et al., 1997; Yadav et al., 2011). Previous studies reported similar average results about information sources varying among countries according to living conditions. Adolescents had many different sources of information available. School and media aimed at prevention programs (95%), parents (39%), books (39%), television (19.3%) and physicians (3%) are the most common sources (Eggermont, 2005; Nath, 2009).

According to our study groups' economical status, salary incomes directly or indirectly affect the awareness of students. It can be suggested that the more the gained money, the more students get knowledge. The participants who had less money had less knowledge level like  $65.0 \pm 5.92$  and in opposition to this, whose family had more income rate, and had the most knowledge level as  $77.7 \pm 5.67$ . There is a statistically significant relation between salary income and knowledge levels of participants.

In our study, only 1.4% of participants indicated family as an information source but schools were the main source with a ratio of 41%. Beside these observations, more than one information sources (43.7%) played an active role in education for HIV/AIDS. 8.2% of the students whose knowledge level was  $55.2 \pm 6.55$  said that they never had any information from anywhere. However the avarage knowledge level of students who got informed from more than one source was  $72.6 \pm 5.53$  ( $p < 0.05$ ). Schooling could therefore be associated with either an increase or a decrease in the risk of HIV infection depending on the different influences on behaviour. But in recent years, improvement in sexual health education concerning HIV given in schools should also guide to safer sexual behaviour and awareness of

HIV/AIDS among young people (Muinonen et al., 2002; Hou, 2009). These efforts might be effective for prevention of HIV spreading as many articles emphasized. In opposition to these, many studies performed in Africa suggested that in general, population have either shown no association between education and HIV-1 infection status or increase in HIV risk with increasing education and few studies showed higher risk of HIV infection among those with more education than among those with less education (Glynn et al., 2004). We have also explored associations between family education level and students' knowledge level ( $p < 0.05$ ). Knowledge levels of students whose mothers and fathers are not literate were  $66.7 \pm 5.36$  and  $60.3 \pm 4.68$ , and whose relatives have university degree were  $79.2 \pm 5.54$  and  $78.1 \pm 5.39$ , respectively. These observations suggested that improving general education levels as well as targeting health messages were more effective for those with poor education and empowered them to act on them.

Besides education level, socio-demographic status and living conditions can play an important role in changing sexual behaviours, being aware of sexually transmitted diseases and prevention of AIDS spreading (Glynn et al., 2004; James et al., 2004). The interaction between gender and knowledge levels reflects statistically significant relation. Knowledge levels of females and males were  $73.1 \pm 5.75$  and  $69.3 \pm 5.91$ , respectively ( $p < 0.05$ ). According to previous studies, gender criteria did not show efficient influence on knowledge and those results vary (Edgardh, 2002; Muinonen et al., 2002; James et al., 2004). 40.5% of the students were stated as sexually active.

In recent studies, it was reported that sexual activity has increased and attitudes have changed through having first sexual intercourse at a younger age and increase in the reported numbers of sexual partners. Students who had sexual intercourse at a younger age and had many sexual partners continue to have high number of sexual partners, regardless of their level of knowledge and awareness of AIDS (Lagerberg, 2004; Mahat and Scoloveno, 2006). Our results about sexual activity ratios were compatible with those reported in studies; likely, most of sexually active young adolescents were male. Although average knowledge level of the students is  $71.15 \pm 4.87$ , some answers to the questionnaire reflected that, students were not informed adequately. 47% of the students thought AIDS as a curable disease; also 60.7% of them believed that HIV cannot be acquired by contaminated needles or injections. 55.7% of students revealed that HIV carriers do not seem to be ill, thus it is not a transmittable disease. Students had also misconceptions about how HIV is transmitted, such as 43.7% of students who thought that HIV can be transmitted by mosquito or likely insect bites. Interestingly, 51.9% of the participants

thought that there is a vaccine against HIV. Reported in a previous study of Mahat and Scoloveno (2006), 93.3% Nepalese adolescents were aware that HIV is not transmitted by mosquito bites, and also 75% of Ethiopian adolescents and 40.3% of Turkish adolescents either. Yadav et al. (2011) also revealed that youths were less aware of transmission routes of infection. Mahat and Scoloveno (2006) also reported that Nepalese adolescents in their study had moderate level of AIDS knowledge, but there was need for improvement because of uneven knowledge in the subcategories of mode of transmission, prevention and perceived risk.

In previous studies by Serlo and Asvarinne (1999) and Uwakwe (2000), the ratio of true answers was higher than our observations. Participants revealed that blood donation, insect bites and toilet seats might be risky for HIV infection with a ratio of 47.3, 22.4 and 16.3%, respectively. It would be a safe assumption to assert that the relationship between knowledge and attitudes among health care workers would appear to have followed a similar pattern to that observed within the general public. Despite relatively high levels of knowledge about AIDS and its mode of transmission, levels of fear about the disease and prejudicial attitudes towards AIDS and patients decreases but remains. Educational programs may prevent fear or prejudicial attitudes. For instance, by systematic HIV-AIDS educational programs, health care workers led to positive changes in the participants' knowledge attitudes and compliance with HIV/AIDS (Snowden, 1997). To make clear of students individual beliefs about HIV patients and permission about marriage, 73.8% of students thought that AIDS patients are never permitted for marriage and 40.6% of students indicated that these patients should have been isolated from population.

## CONCLUSION

In this study, majority of the students was aware of the mode of HIV/AIDS transmission and knew its prevention methods. However they did not know the main target for what or who against they protect themselves.

## REFERENCES

- Adkins L (2002). Risk, sexuality and economy. *Br. J. Sociol.* 53(1):19-40.
- Börsum KM, Gjerme PE (2004). Relationship between knowledge and attitudes regarding HIV/AIDS among dental school employees and students. *Eur. J. Dent. Educ.* 8:105-110.
- DeHart DD, Birkimer JC (2009). Sexual Risks Scale - Perceived Susceptibility (SRSP) Web site: <http://chipts.ucla.edu/resources/?category=6>. Accessed June 24, 2009.
- Edgardh, K (2002). Sexual behaviour and early coitarche in a national sample of 17-year old Swedish boys. *Acta Paediatr.* 91:985-991.

- Eggermont S (2005). Young adolescents' perceptions of peer sexual behaviours: the role of television viewing. *Child Care Health Dev.* 31(4):459-468.
- Glynn JR, Caraél M, Buvé A, Anagonou S, Zekeng L, Kahindo M, Musonda R (2004). Does increased general schooling protect against HIV infection? A study in four African cities. *Trop. Med. Int. Health.* 9(1): 4-14.
- Grani F, Gnisci F, Nobile CGA, Angelillo IF (2005). Adolescents and sexually transmitted infections: Knowledge and behaviour in Italy. *J. Paediatr. Child Health.* 41: 260-265.
- Hou, Su-I (2009). 'HIV-related behaviors among black students attending Historically Black Colleges and Universities (HBCUs) versus white students attending a traditionally white institution (TWI)'. *AIDS Care.* 21(8):1050-1057.
- James S, Reddy SP, Taylor M, Jinabhai CC (2004). Young people, HIV/AIDS/STIs and sexuality in South Africa: the gap between awareness and behaviour. *Acta Paediatr.* 93: 264-269.
- Koneman EW, Allen SD, Janda WM, Schreckenberger PC, Winn Jr WC (1997). *Colour Atlas and Textbook of Diagnostic Microbiology* 5th ed.; Lippincott, Philadelphia, U.S.A.
- Lagerberg D (2004). Sexual knowledge and behaviour in South African students: a case for prevention with focus on behaviour. *Acta Paediatr.* 93: 159-161.
- Mahat G, Scoloveno MA (2006). HIV/AIDS knowledge, attitudes and beliefs among Nepalese adolescents. *J. Adv. Nurs.* 53(5): 583-590.
- Muinonen U, Suominen T, Välimäki M, Lohrmann C, Peate I (2002). Early adolescents' HIV related knowledge, attitudes and behaviour in Finland. *Int. J. Nurs. Pract.* 8: 81-88.
- Nath, A (2009). HIV/AIDS and Indian youth – a review of the literature (1980 - 2008). *SAHARA J: Journal of Social Aspects of HIV/AIDS.* 6(1): 2-8.
- Prescott LM, Harley JP, Klein DA (2007). *Microbiology* 7th ed.; The McGraw Hill Companies: Ohio, USA. pp. 878- 885.
- Serlo LK, Asvarinne H (1999). Attitudes of University students towards HIV/AIDS. *J. Adv. Nurs.* 29(2): 463-470.
- Snowden L (1997). An investigation into whether nursing students alter their attitudes and knowledge levels regarding HIV infection AIDS following a 3-year programme leading to registration as a qualified nurse. *J. Adv. Nurs.* 25: 1167-1174.
- Swenson LW, Carmel S, Varnhagen CK (1997). A review of the knowledge, attitudes and behaviours of university students concerning HIV/AIDS. *Health Promot. Int.* 12(1): 61-68.
- Uwakwe CBU (2000). Systematized HIV/AIDS education for student nurses at the University of Ibadan, Nigeria: impact on knowledge, attitudes and compliance with universal precautions. *J. Adv. Nurs.* 32(2): 416-424.
- Yadav SB, Makwana NR, Vadera BN, Dhaduk KM, Gandha KM (2011). Awareness of HIV/AIDS among rural youth in India: A community based cross-sectional study. *J. Infect. Dev. Ctries.* 5(10): 711-716.

## UPCOMING CONFERENCES

**6th International Meeting on HIV Persistence, Reservoirs and Eradication Strategies,  
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**17th International Conference on AIDS and Sexually Transmitted Infections in Africa,  
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