

Knowledge, Attitude, and Practice of HIV/AIDS among medical students in Alzaiem Alazhari University, Khartoum, Sudan from Feb-March 2020

Rehab Faisal Badawi Wedatalla ^a, Refga Siddig Abdelrhman ^a, Razan Sharaf Eldein Elamein Hassan ^a, Hiba A.A. Babikir ^b, Hassan I. Osman ^{c,d}

a = Department of Community Medicine, Faculty of Medicine, Alzaiem Alazhari University, Khartoum North, Khartoum, Sudan

b = Department of Clinical Pharmacology, Faculty of Pharmacy, Alzaiem Alazhari University, Khartoum North, Khartoum, Sudan

c = Department of Psychiatry, Medicine Program, Napata College, Khartoum North, Khartoum, Sudan

d = Napata Research and Innovation Center (NRIC), Napata College, Khartoum North, Khartoum, Sudan

Abstract

Background: Knowledge, attitudes and practices (KAPs) studies regarding HIV/AIDS are one of the corner stones in the ongoing fight against the disease. Youths are most vulnerable to infection because they engage in risky practices due to a lack of adequate information. Thus, evaluating their KAPs will help in designing appropriate prevention strategies. This study was aimed at assessing the KAPs of Alzaiem Alazhari University students, Sudan, on HIV/AIDS. **Methods:** This was a cross-sectional study carried out on 150 students aged 18–30years, selected by systematic random sampling. Data was collected by a standardized structure questionnaire, from Feb to March 2020, to evaluate their KAPs regarding HIV/AIDS. Data was analyzed using SPSS version 20.0. **Results:** All respondents were aware of HIV/AIDS. Sources of information varied, the most common being sex education in university. The majority of participants demonstrated an adequate understanding of HIV transmission and prevention. However, misconceptions about routes of transmission were observed in 23.3 % of respondents. Students with medium and high levels of knowledge were more likely to display positive attitudes. Although statistically not significant, we found that as knowledge increased the ability of respondents to report safer sex decreased ($P = 0.922$). **Conclusion:** Students had a satisfactory level of knowledge on HIV/AIDS prevention. Those with adequate knowledge were more likely to display positive attitudes towards HIV. Having adequate knowledge did not imply engaging in safe practices. This study none-the-less highlighted some misconceptions about HIV transmission, intolerant and discriminatory attitudes towards HIV, and risky sexual practices among study participants which can be corrected by reinforcing sex education curriculum as sex education in school was their main source of information on HIV/AIDS.

Keywords: HIV; AIDS; Sudan; KAP

Background:

Since 1981 when the first cases of AIDS were reported in the United States, HIV/AIDS infection has spread rapidly to many countries over the years and became a global health challenge. The disease continues to affect millions of people irrespective of age or sex. Estimates show that globally at the end of 2013, 35 million (33.2–37.2 million) people were living with the infection and 1.5 million deaths were recorded due the disease (1).

Although global statistics reveal a general decline in AIDS related deaths and new HIV infections thanks to the concerted efforts of various stakeholders, the toll of HIV/AIDS continues to be harsh in developing countries particularly those in sub-Saharan Africa. As of 2012, 71 % of people living with HIV worldwide were in sub-Saharan Africa which also accounted for 70 % of new infections and approximately 74 % of all deaths related to AIDS (2). Worldwide, over 40 % of new infections are among young people 15–25 (3). The youth are much more prone to HIV infection as well as other sexually transmitted infections as a result of a lack of correct health education.

information, engagement in risky behaviors, economic exploitation, regional and national conflicts and a lack of access to adequate reproductive health services (4). Every day, 5000 young people in the world become

infected with HIV, which translates into almost 2 million new infections per year (5).

Knowledge, attitudes and practices (KAPs) studies regarding HIV/AIDS are one of the corner stones in the fight against the disease. Adequate knowledge about HIV/AIDS is a powerful means of promoting positive attitudes and engaging in safe practices. Many prevention programs have focused on increasing knowledge on transmission so as to overcome misconceptions that could prevent behavioral change towards safe practices (6) and also reduce the stigma against people living with HIV/AIDS. Stigmatizing attitudes have been shown to be strongly associated with misconceptions on HIV transmission and negative attitudes towards people living with HIV (7).

An assessment of KAPs among any population is highly necessary in planning the management and prevention of HIV, and as baseline to evaluate the success of prevention strategies. Studies involving the youth (8, 9) carried out in Cameroon have documented a high level of awareness of HIV/AIDS but knowledge on various specific aspects relating to HIV/AIDS remain poor, with high levels of risky behaviors such as having multiple sex partners and inconsistent use of condom (10,11). Despite their engagement in risky behaviors the majority of youths do not perceive themselves to be at risk of contracting the infection (12,13).

Problem Statement:

Various studies reported by the WHO reveal that most preventive studies on KAP of HIV/AIDS in Africa focus mainly on use of condoms as a preventive measure (14,15). While condom use may have risen in sub-Saharan Africa with varying percentage across the region (17% to 40%), there are many factors that keep people from using them (16-19). But there still exists evidence that African adolescents may require an introduction to age-appropriate sex education. Adolescent sex may be a reality but is there some chance that we can intervene the concept of delay in age when they commence sexual activities or perhaps their approach to initiation and exposure to sex by early knowledge through age-appropriate sex education (20, 21). This is more or less the desired focus for this study.

Africa may be aware that prevention is key to control of HIV/AIDS. However, Africans have focused on prevention mostly in the urban communities than in the rural communities. In the United States, it was reported by the CDC in 2008 that attention has returned to HIV/AIDS prevention strategies and necessitates addressing the mental health needs of the forth coming uninfected generations (22).

One in 6 persons in the world is an adolescent and there are 1.2 billion people aged 10 to 19 years.

Adolescents are also exposed to significant deaths, illness and diseases. Unprotected sex may jeopardize not only their current health but also their health for years to come. Critical steps in prevention of health problems in adulthood and future of countries, will involve promotion of healthy practices during adolescence (23).

Objectives:

General Objective: To assess Knowledge Attitude and Practice of HIV/AIDS among medical students in Alzaeim Alazhari University.

Specific objectives:

- 1-To assess Knowledge on HIV/AIDS transmission, prevention and control among medical students in Alzaeim Alazhari University.
2. To assess the attitude and practice of adolescents towards HIV/AIDS in medical students in Alzaeim Alazhari University.

General overview of HIV and AIDS

Since 1981 when the first case of HIV/AIDS was diagnosed, 75 million people worldwide have become infected with HIV and 39 million people have died of AIDS related illness from this pandemic. Although there has been a global decline in new infection with HIV since 2001 by 38% as of 2013, the number of people living with HIV is estimated as 35 million people. An observed rise from 29million in 2001 to 35 million by 2013. HIV/AIDS report in sub-Saharan Africa reveals that there are estimated 24.7 million people

living with HIV aids of which 1.5 million accounts for new HIV infection in sub-Saharan Africa. Between 2005 and 2013 there has been a decrease in the new HIV infection in sub-Saharan Africa by 33%. Africa is home to 15.2% of the world population. However, sub-Saharan Africa accounts for almost 70% of the global total of new HIV infections and 70% of all AIDS death in 2013, and 1.1 million People died of AIDS related causes in 2013 (24).

HIV/AIDs may still remain an epidemic in sub-Saharan Africa. Treatment coverage remains at an all-time low of 37% of all people living with HIV in this region. HIV prevalence in western Africa is highest in Nigeria with the second largest number of people living with HIV in Africa second in number to South Africa with an infection rate of 3.2% (25, 26).

Burden of HIV/AIDS in Adolescents

Adolescence includes young people aged 10-19 years. One in six persons in the world is an adolescent and there are 1.2 billion people aged 10 to 19 years. Adolescence is the period when many people begin to explore their sexuality most young people at this age become sexually active. Adolescents are also exposed to significant deaths, illness and diseases. Unprotected sex may jeopardize not only their current health but also their health for years to come. Global reports on adolescents reveal that 2 million adolescents are living with HIV (27,28).

HIV/AIDS is the second highest cause of adolescent deaths globally with an estimated 1.3 million adolescent dead in 2012. All age groups, except adolescents, experience a decline in AIDS related deaths between 2005 and 2012. Over these eight years, AIDS related death among all ages fell by 30%, but among ages 10-19 years it increased by 50%. This may because less emphasis is placed on reaching boys and girls with HIV preventive care and treatment programs. Emerging evidence suggests that young people living with HIV, especially adolescents, are less likely than others to receive health care that can keep them healthy and alive (29-33).

Decline recorded in HIV prevalence in young people in 21 of 24 countries with natural HIV prevalence of 1% or higher, has been attributed to effects of behavioral changes, such as waiting longer to become sexually active, having fewer multiple partners and an increase use of condoms amongst people with multiple sexual partners (34).

Critical steps in prevention of health problems in adulthood and future of countries will involve promotion of healthy practices during adolescence. As a result, access to sexual and reproductive health information becomes increasingly important during this period. Adolescence is an important time for laying the foundations of good health. Many health-related behaviors and conditions that underlie diseases commence or are reinforced during this period. An example is HIV/AIDS. If left unattended health problems and behaviors that arise during adolescence can affect quality of adulthood (35).

Recent surveys in low- and middle-income countries reveal that only 24% of young women and 36% of young men respond correctly when asked five questions on HIV/AIDS transmission (36). Knowledge is the best tool for prevention of disease as it has the power to influence change in attitude and practice. Also, young adolescent girls are not only biologically more susceptible to HIV infection, they are more likely to have older sexual partners who use injecting drugs, thus increasing the potential exposure to HIV/AIDS (37).

In a study conducted on adolescents in Tanzania it was observed that 11% and 13% of males and females, respectively, had sex before 15 years of age. Of the study subjects aged 15 to 24 years, 81% and 36% of males and females, respectively, had sex in the previous twelve months prior to the data collection; of whom 47% of males and 42% of females used condoms the last time they had sex. In the same study, only 44% of the Tanzanian young females correctly knew how to prevent HIV infection as does 49% of the males. A similar study in Zambia reported that 16% of males and 14% of females had sex before 15 years of age, respectively; of whom only 37% currently knew how to prevent HIV infection (38).

The above studies and burden of HIV/AIDS amongst youth suggest that continual HIV prevention outreach and education efforts including programs on abstinence and on delaying the initiation of sex are required as

new generations replace the generations that benefited from earlier prevention strategies (39).

To prevent the spread of new infection, adolescents and young people need accurate and relevant information (age appropriate), this may also be accompanied by access to voluntary counselling and testing, HIV education in schools and the prevention of other STIs. Besides, the CDC estimates show that about 47% of high school students have had intercourse and 7.4% of them had their first intercourse by age 13 years worldwide (40).

Therefore, adolescents are vulnerable to early age initiation of sexual activities, STIs, substance /drug abuse, alcohol and the like which facilitate the risk of acquiring HIV/AIDS. Researches also reveals that a large proportion of young people do have low attitude (less concern) about becoming infected with HIV. While condom availability may have increased in sub-Saharan Africa, many factors keep adolescents from using them (41).

One of the MDGs is to halt the spread of HIV/AIDS, and has as its indicators prevalence amongst 15–24-year-olds and the proportion of this age group with comprehensive correct knowledge of HIV/AIDS. Young people need to know how to protect themselves and have the means to do so. This includes being able to obtain condoms to prevent sexual transmission of the virus and clean needles and syringes for those who inject drugs, better access to HIV testing and counselling is also required (40).

Addressing HIV/AIDS in Adolescents

Evidence shows that school-based sex education can be effective in changing the knowledge attitude and practices that lead to risky behavior (41). The lack of data at the country level continues to stifle an effective natural response on how to promote HIV prevention most countries have no or insufficient data on HIV prevalence and or sexual behavior trends among young people including several countries with exceptionally high prevalence in sub-Saharan Africa (42).

Majority of preventive research done in Africa and adolescents have focused on the knowledge attitude and practice of condom usage for the prevention of HIV but none has really focused on abstinence (43).

Hypothesis one: If knowledge of HIV/AIDS will help change their attitude towards sex for a possible delay in the time to commence.

Age-appropriate sexual education can increase knowledge and contribute to more responsible sexual behavior. Out of 83 evaluations reviewed in 2006, around 50% of such programs showed a decrease in sexual risk taking among participants (44).

In many countries sexual activity is initiated in early adolescence before age 15 years. Evidence shows that sexual activity among young people is a reality and that there is a need to take action to empower them to make responsible and informed decisions in regards to sexual health and HIV (45).

Programs to prevent HIV infections amongst young people will be more effective if they include combination of prevention approaches that are youth friendly and promote comprehensive services that include sexuality education, knowledge of HIV, access to sexual and reproductive health services, and discussion on harmful sexual norms and practices. Therefore, actively engaging young people in the design, implementation, monitoring and evaluation of HIV policies, services and programs will enhance leadership skills to equip them to demand youth friendly services and programs (46,47).

Adolescents are not educated well enough in sex related matters. Wagbatsoma and Okoli observed that cultural traditions beliefs, fear, and other inhibitors are known to prevent adolescents from acquiring knowledge from their parents and teachers while poverty parents' unemployment and the desire to explore themselves exposes them to the risk of infection. Poverty is known to significantly increase the likelihood of a number of unsafe sexual behaviors. In South Africa, poverty and orphanhood was reported to influence coerced sex and multiple sexual partners especially among female adolescents (48-50).

Knowledge of HIV/AIDS

In a 2002 survey conducted in Sierra Leone, the following information was gathered in regard to adolescents

and HIV/AIDS, an alarming 30% of adolescents are yet to learn about HIV/AIDS. There were also differences observed between rural and urban areas of about 26%. The knowledge of the term HIV/AIDS is well over 50%. There is very little understanding of HIV/AIDS comes to be and only about 8% knew the difference between the virus and the disease. There were also gender differences in knowledge with the boys being better informed than the girls concerning HIV/AIDS. Sources of information on HIV/AIDS were peers, sexual partners, parents, teachers, and mass media including radio, TV, and newspapers. The most reported of where they get their information from mass media 45%. Radio in particular, 9.5% from peers and only 2.5% receive information from their parents (51).

In Uganda, it was observed that the knowledge of HIV/AIDS has increased with 86% of male and 78% of female adolescents knowing two or more effective ways to avoid HIV/AIDS (52).

Knowledge about HIV/AIDS prevention

Concerning the knowledge of prevention in the same survey conducted in Sierra Leone, only 7.2 % stated all three methods (ABC) abstinence, be faithful and condom use as means of protective methods known to them. As of 2002, sticking with one partner was still relatively common (54.5%), however, if sticking with one partner is practiced still remains unassessed. 55% of adolescents do not abstain from sex to protect themselves from HIV infection and adolescents in rural area are 34% less likely to abstain from sex. Urban adolescents are 55% less likely to abstain from sex in order to prevent HIV. In the same study, 10% of adolescents preferred condom use as a means of protection (53).

Testing is important in the fight against HIV/AIDS. Adolescents are willing to get tested. They believe they should get tested. However, there were limited testing sites. From a study, 62.5% of adolescents were willing to be tested for HIV/AIDS. 19.7% knew where to get tested, 1.6 % never had a test for HIV, and 71.9% believe people should know their HIV/AIDS status. Uganda was at the forefront of VCT between 1990 and 2002. This study revealed that Most Ugandan adolescents say they are willing to get tested. 72% of males and 67% of female adolescents who had never been tested say they are willing to get tested and only 3% of males and 6% of females aged 15-19 years say they had ever been tested (54).

A study conducted in Botswana reported that 63.1% of respondents displayed adequate knowledge of HIV/AIDS. This was an improvement from that observed by Majelantle et al which was 43%. There are still misconceptions about modes of transmission and perceived use of condom and testing services remains low in Botswana. However, in Botswana correct knowledge of prevention remains low (55,56).

Knowledge about how is HIV/AIDS is transmitted

About 50% of adolescents are aware that HIV/AIDS may be transmitted via blood transfusion this is closely followed by the use of infected needles as another mode of transmission, while about 25% of adolescents in the urban communities were not aware of this mode of transmission, in the rural communities this number is said to double. The difference in knowledge of this mode of transmission between male and females was about 8%. About mother /fetus transmission as a mode of transmission, 56.8 % were unaware and between the rural and urban communities a difference of 17% was reported. In Botswana in 2008 about 83.3% of students knew that pregnant women infected with the HIV can transmit the virus to her unborn child (56,57).

Knowledge about difference in HIV and AIDS, Progress from HIV to AIDS

There is discrepancy between Knowledge of HIV/AIDS and sexual behaviors (58). In 2008 Majelantle observed that about 76.5% of young people knew the difference between HIV/AIDS (59).

Stigmatization discrimination and misconception regarding HIV/AIDS

In the 2002 study of Sierra Leone, adolescents had mixed attitudes towards people living with HIV/AIDS. About 60.2% of adolescents believe that people living with AIDS should be discriminated, about 67% believe an infected teacher/worker should not be allowed to work, 81% believe one should not buy food from trader with HIV/AIDS, 78% believe one should not share meal with an HIV/AIDS infected person, 67.7% believe a

student with HIV but no AIDS should not be allowed into class, 26.7% can keep secret the HIV/AIDS status of a family member. Adolescents believe that healthy looking persons do not carry the disease; a difference between urban and rural of 27.3%. About 50% of either sex believes a healthy-looking person does not carry the disease the greater percentage in this belief being reported in females (60).

Uganda has been at the forefront of sub-Saharan countries in the fight against HIV/AIDS. Neema observed that 83% of young people still believed in stigmatizing PLWA. 37% of male and 49% of females maintained that HIV status should be kept private. One in five were willing to care for HIV/AIDS relative at home. 55% male and 54% female adolescents did not believe HIV positive teachers should be allowed to keep teaching (61).

In a School survey conducted in Botswana in 2005, young people have negative attitudes towards PLWA. Half of young people in Botswana believe that someone with AIDS should be isolated even if they do not show signs and symptoms. Majelantle et al concludes that misconceptions about HIV transmission tends to promote negative attitudes towards PLWA. In this study, 20.8% of students reported that they view people infected with HIV/AIDS in a bad way. 72.6% thought that a healthy-looking person can be infected with HIV. And 23.9% of males had negative attitude towards people with HIV compared to 17.8% of female counterparts (62).

Sexual behavior and practices amongst adolescents

Although aware of the dangers of HIV/AIDS, adolescents continue to engage in sexual behaviors that place them at high risk of contracting the disease (24). The attitude towards use of condoms by adolescents in Sierra Leone in 2002 revealed that 38 % considered condom use as a protective means in the urban community 58.4% and in the rural 22.8%. 64.7% of adolescents in the urban region have the attitude that HIV may be contacted by anyone as compared to 34.1% the counterparts in the rural community (63). In 2009, we still have less than 20% reported condom use in last sexual encounter by adolescents in Africa with the average mean age of sexual intercourse being 13.7 years (64).

A study in Uganda reported that adolescents revealed that HIV infection is high in the females within the age group of 15 years to 19 years at a male female ratio of 3:6, the same is observed in Nigeria there is a ratio of 1:2 (65).

HIV sexual risk behaviors/practices in adolescents

HIV/AIDS sexual behaviors among adolescents in Sudan have been identified and are early age at sex initiation, unsafe sex, and multiple sexual partners. Prevalence of sexual activities among undergraduates at institutions in Enugu state revealed that 76.8% are actively involved in sexual activities. An alarming 85.4% of females and 62.3% of males have greater than one sexual partner, and more females 65.7% than males 42.2% had their first sexual encounter as an adolescent. Lack of condom use, anal and oral sex are observed to be common among: lower social class adolescents, females, and off campus students (66).

This places an emphasis on the need of educational risk reduction strategies to change attitudes and behavioral practices of youths (67). In Sub-Saharan Africa, we might say that condom use by adolescents increased over the years from less than 20% to about 40%. This increase may be associated with the fact that there has been an increase of condom use being the focus of studies of adolescent sexual practices. Lack of use of community reproductive health services is prevalent, this may be because they are not easily assessable by adolescents which may affect their access to information and services available to them (68).

Treatment, control and prevention strategies for HIV/AIDS amongst adolescents

An interesting notion is that suggested by Thomas et al about a third prevention program concerning the effect of behavioral strategies could be increased by aiming for many goals such as, for example, delay in onset of first intercourse, reduction in number of sexual partners, and an increase in condom use. And suggests a multilevel approach of which targeting institutions and communities which this research aims to achieve. King Holmes describes this as Highly Active Retroviral Prevention (HARP) (69).

HIV/AIDS education and training among adolescents

There is the need to strengthen socio behavioral interventions. Studies have observed that the knowledge of study population correlates with their sexual practices and that prevention was the best option for the disease. These studies also agree that better informed youths will enhance the principle of prevention (70).

HIV/AIDS voluntary counselling and testing among adolescents

Studies in Developing and developed countries reveal that adolescent-friendly services such as voluntary HIV counselling and testing (VHCT) may be the best method of educating adolescent about HIV and AIDS related risks. However, the argument that lack of information, poor quality of services/allocation of centers, and the fear of stigma or the fear of VCT process remains some of the reasons identified for not attending VCT services by youths (71).

Neema observed that 72% male and 67% females who had never been tested say they are willing to get tested 3 % of males and 6% of females aged 15 to19 years said they have never been tested (72).

The Knowledge of facilities that provide HIV testing services in the community is described as high in Botswana and may vary by region, age, and educational level. With the chances that the more educated the more likely to have a correct knowledge about HIV/AIDS. From their study, they reported that 79.5% of students knew a place to go for HIV test in their community, 28.8% of students have never been tested for HIV. 34.4% had an HIV test within one year, 79.8% of the students knew the results of their most recent HIV test and 30.6% of the students reported that the result of their most recent HIV test was positive (37). The case may not be the same in rural communities of Nigeria as most adolescent children, especially the females will join their parents to the farms. Also, most of the adolescents may not be well informed as to where to get tested and even if they knew, they may be constrained by the distance and the cost of transportation.

Behavioral change among adolescents

There are reports that demonstrate that increased knowledge about AIDS is not a predictor for behavioral change. However, knowledge about the disease is a prerequisite for change. Several studies have shown that health-related knowledge has power to change people's attitudes and health care behaviors in different contexts (37).

The role of peers increases in importance when the role of parents diminishes (36). Fakko and Stephenson both agree in their studies that intervention policies on HIV/AIDS should focus on those students whose mothers are of low socio-economic status and family cohesion and bonding should be encouraged because young people lack the information and skills that would enable them to avoid high risk behaviors (73).

HVCT is considered an integral component of HIV prevention and strategies may be because perceived risk of infection may drive HIV testing among youths and a few studies have examined this HVCT behavior among youths (35,36).

Biraro et al observed the following sexual behavioral trends in rural setting of Uganda: First, the median age of first sexual intercourse had increased in Uganda adolescents. Between 1993-2006 median ages at first sex amongst females increased from 16.7 years to 18.2 years and from 18.5 years to 19.9 years among boys. Secondly, a decline in number of sexual partners in 2006 of about 1.4%. However, the use of condom still varies among adolescent (73).

A-B-C preventive strategy among adolescents

A lot of studies conducted in sub-Saharan Africa over the years have focus mainly on condom usage as a preventive method (28-37). This study in Nigeria hopes to focus on how knowledge can cause a change at early initiation of sexual activities emphasizing abstinence until they are at least wiser to make an informed consent to sexual activities. As observed in Uganda (31). Gaps have also been observed in young people's knowledge of HIV and treatment availability (26).

Summary

Lessons to learn from Uganda: Sexual activities in adolescents is a reality (14,19,24). The issue remains that adolescents may still be engaged in risky sexual practices despite knowledge of HIV/AIDS. Interventions aimed at behavioral change and service delivery strategies for adolescents' sexual health education and counselling units needs to be provided. Youth friendly services are important and needed if young people are to receive adequate sexual and reproductive care. (74)

Research Methodology

This is a cross-sectional study was conducted on Alzaiem Alazhari University's campus in Khartoum, Sudan. A list of all the faculty of medicine batches in the Alzaiem Alazhari University was obtained and the site locations had a total of 5 batches, then two batches were randomly selected, (batches 22 and 23). Sudanese students who study in the study area during the period of study were eligible to participate in this study. The study population consisted of students from the two batches. Only medical students of batches 22 and 23 who agreed to participate were included in this study. that was conducted during the period from Feb-March 2020. The sample size was collected using the following formula:

$$N = \frac{n}{1+n(d)^2} = \frac{386}{1+386(0.04)^2} = 150$$

N= population size

D=degree of precision

Data was collected by standardized structure questionnaire that had been administered. Data of knowledge, attitude and practices in the target population was collected and analyzed using the Statistical Package for Social Science (SPSS, Version 20). A p-value of less than 0.05 was used to determine the level of significance. Results were expressed as tables and figures. The research participants had not been subjected to harm in any means, and full consent was obtained from any participant's after demonstrating the aim of research.

Results

Socio-demographic characteristics:

The sample was composed of 150 participants. Of this, 95 (63.3%) were from batch 22 and 55 (36.7%) batch 23. There were 60 (40%) male, 90 (60%) were female. The majority were from Khartoum state. The mean age of the study sample was 23.5 years (SD= 1.1) with a median of 23.0 years, (range = 18–24). The distribution of the study participants is shown in Table 1.

Table 1: The distribution of the study participants.

Characteristics		Number	%
Batch	22	95	63.3
	23	55	36.7
Gender	M	60	40
	F	90	60
Residence	Khartoum	106	70.7
	Other Sudanese State	44	29.3
Age	18-24 years	145	96.7
	25-30 years	5	3.3

Knowledge

To evaluate participants' knowledge on routes of transmission of HIV/AIDS respondents were asked to list four routes of transmission. Correct responses included unprotected sexual intercourse, transfusion of infected blood and blood products, transmission from infected mother to child and sharing of infected blades, needles

and unsterilized medical equipment. Those who listed all four correct were graded as “Excellent” knowledge, 3 correct as “Good”, 2 correct as “Fair” and only one or none correct as “Poor”. Only (45.2 %) of our respondents had excellent knowledge of routes of transmission of HIV. The majority (52.4 %) had good knowledge. However, those with poor knowledge comprised only 2.4 % of the study population. To further confirm the participants’ level of understanding of HIV transmission, they were asked more questions on routes of transmission (Table 2). Those with wrong responses had misconceptions. Up to 23.3 % thought that HIV could be transmitted by mosquito bites while 15.5 % thought having sex with only one uninfected faithful partner could result in transmission. With regards to knowledge of prevention and control, (82.2 %) indicated that transmission could be reduced by having sex with one faithful uninfected partner, (85.3 %) indicated that the use of condoms could reduce the risk of HIV/AIDS transmission, (90.5 %) indicated abstinence as a prevention strategy (Table 2). However, 18.1 % believed that there exists a cure for HIV/AIDS and 3.4 % indicated sexual intercourse with a virgin as being curative.

Table 2: Knowledge on HIV/AIDS transmission, prevention and control

Question		% with a correct answer	% with wrong answers
Knowledge on route of transmission			
1	HIV can be acquired via mosquito bites	76.7	23.3
2	Can a person get HIV by sharing a meal with someone who is infected?	92.2	7.8
Knowledge on prevention and control			
3	Can the risk of HIV transmission be reduced by having sex with only one faithful uninfected partner?	84.5	15.5
4	Can a healthy-looking person have HIV infection?	98.8	1.2
5	Does condom use reduce risk of HIV transmission?	85.3	14.7
6	Can the risk of HIV transmission be reduced by abstaining from sexual intercourse?	90.5	9.5
7	Can an HIV-infected male be cured of HIV if he has sex with a young girl who is a virgin?	96.6	3.4
8	Is there a cure for HIV/AIDS?	81.9	18.1

Attitudes toward people living with HIV

52.6 % of respondents indicated a willingness to take care of a sick HIV-positive relative or continue friendship with an HIV-positive friend while 56.9 % would buy food and other goods from an HIV-positive person (Table 3). The majority of the participants accepted that an HIV-positive student should be allowed to continue her/his studies (71.6 %) and that an HIV-positive teacher should be allowed to continue her/his teaching profession (75 %). Only 52.5 % of students had positive attitudes towards PLHIV. Those who had negative attitudes comprised 47.5 %. (Table 3).

Table 3 Attitudes towards people living with HIV/AIDS among this group

Question	Yes (%)	No (%)
If one of your relatives, who is HIV positive, becomes ill, would you be willing to care for her/him in your house or community?	52.6	47.4
If your friend is HIV positive, would you continue your friendship with him/her?	52.6	47.4
If a shopkeeper or food seller is HIV positive, would you buy items from him/her?	56.9	43.1

If a student is HIV positive, she/he should be allowed to continue his/her study in school?	71.6	28.4
If a teacher is HIV positive, she/he should be allowed to continue his/her teaching in school?	75	24.1

Practices related to HIV/AIDS

As illustrated in Table 4, 30.7% of respondents had a history of screening for HIV, while only 11.3% came into contact with patient's contaminated blood products. The majority of the participants (57.3%) would ask for screening of blood before transfusion and 77.3% would ask for a new syringe before use. The majority of the participants (84%), had never participated in health education program related to HIV.

Table 4: Practices related to HIV/AIDS

Question	Yes (%)	No (%)
Have you done screening for HIV?	30.7	69.3
Have you contact patient's contaminated blood products?	11.3	88.7
Do you ask for a new syringe before use?	77.3	22.7
Do you ask for screening of blood before transfusion?	57.3	42.7
Have you ever participated in health education program related to HIV?	16	84

Associations of knowledge with attitudes and practices bivariate correlations showed a positive, significant relationship between knowledge and attitude ($P = 0.000$). This shows that respondents with medium and high levels of knowledge were likely to have proportionately positive attitudes than those with low level of knowledge. A negative correlation was found to exist between knowledge and practices but this was not significant (0.922).

Discussion

Knowledge, attitudes and practices (KAP) studies are very useful tools prior to any intervention to assess the extent to which individuals or communities are ready to adopt risk-free behaviors (26). In our study, 97.6 % of participants had a high level of knowledge of HIV/AIDS whereas those with poor knowledge comprised 2.4 %. Comparing with study done in Thanavanh et al. (75) in which 46.3 % had high levels of knowledge, and 22.4 %, poor knowledge, our participants were better informed about HIV/AIDS.

We investigated knowledge of transmission and prevention of HIV infection on participants. Participants demonstrated awareness on routes of transmission of HIV/AIDS. Acceptable levels of knowledge (excellent and good) were demonstrated by the majority of participants respectively. However, misconceptions about transmission such as the belief that infection could be transmitted by mosquito bites (23 %), sex with an uninfected partner (15.5 %), non-usage of condom (14.7 %), abstinence (9.5 %) and sharing a meal with an infected person (7.8 %) were observed among a small proportion of participants. These misconceptions could result in risky behaviors—unprotected sex, multiple sexual partners, etc., which may expose them to infection. These findings show the need for reinforcement of educational interventions particularly in the secondary school curriculum. Similar misconceptions have been reported (76-78).

With respect to HIV, students exhibited mixed attitudes displaying positive attitudes on some of the issues and negative attitudes on others. Overall, only 52.5 % of participants had a positive attitude towards PLHIV. This shows that discriminatory attitudes were present in a considerable proportion (47.5 %) of the participants. However, a greater majority accepted that HIV positive students could be allowed to continue

their education (71.6 %) and that an infected teacher should continue teaching (78.0 %). Discriminatory attitudes towards HIV might be an obstacle for the efficient propagation of awareness programs, and voluntary counseling and testing for HIV. A significant positive correlation ($P = 0.000$) was observed between knowledge and attitude showing that good knowledge could contribute to positive attitude as it could mean a better understanding of transmission. Thus, sustained education of young people on HIV/AIDS is crucial to the elimination of discriminatory attitudes towards HIV.

A negative correlation was observed between knowledge and practices on HIV/AIDS but this was not statistically significant ($P = 0.9$). Ankamah et al. (40) reported similar findings, though their study was on adult men. There were no significant differences in KAP between male and female participants. Significant differences in KAP were also not observed between participants in various age groups. HIV/AIDS-related activities should be focused on adolescents because this is the age when sexual activity begins. At this age, most adolescents are in school thus are accessible through in-school education. In our findings, this was confirmed as the most effective way of reaching students because it was picked as the main source of information on HIV/AIDS by 66.4 % of the participants. Accurate HIV knowledge will support adolescents in making informed choices about practices that may protect them from HIV infection.

Conclusion

The level of knowledge regarding HIV/AIDS transmission, prevention and control was considered satisfactory. However, some misconceptions about HIV transmission, risky behaviors and discriminatory attitudes were observed among participants that call for concern and must be addressed promptly. Sexual education in schools, should be reinforced to correct the misconceptions observed in this study and encourage safe practices and positive attitudes towards HIV.

Recommendations

We recommend other studies should be held in a more inclusive population to know magnitude of HIV in our country.

We recommend health education for help to improve our understanding of HIV transmission especially among young people.

We recommend a center for students. A safe haven where they can go and get non-judgmental counselling for HIV/AIDS, STIs and reproductive health issues not only in Alzaeim Alazhari University, but anywhere adolescents are the majority in the population. This place may also serve as indicator and monitoring center for all related adolescent health issues.

References

1. World Health Organization. Global Health Observatory Data. HIV/AIDS. www.who.int/gho/hiv/en. Accessed 28 Nov 2015.
2. UNICEF. HIV/AIDS Global and Regional Trends. <http://data.unicef.org/hivaids/global-trends>. Accessed 9 Apr 2015.
3. Joint United Nations Program on HIV/AIDS. At the Crossroads: Accelerating Youth Access to HIV/AIDS Interventions. www.un.org/esa/socdev/unyin/documents/aidsunfpa.pdf Accessed 28 Apr 2014.
4. Chen FP. HIV/AIDS prevent among young people in East and South-East Asia in the context of reproductive and sexual health. *Asia Pac Popul J.* 2008;23:7–28.
5. UNAIDS. Beginning of the end of the AIDS epidemic. The Gap Report. www.unaids.org/sites/default/files/media_asset/UNAIDS_Gap_report_en.pdf. Accessed 28 May 2015.
6. Plautz A, Meekers D. Evaluation of the reach and impact of the 100 % Jeune youth social marketing program in Cameroon: findings from three cross-sectional surveys. *Reprod Health.* 2007;4:1.
7. Lydie N, Robinson NJ, Ferry B, Akam E, De Loenzien M, Zekeng L, Abega S. Adolescent sexuality and the HIV epidemic in Yaounde, Cameroon. *J Biosoc Sci.* 2004;36(5):597–616.

8. Herek GM, Capitanio JP, Widaman KF. HIV – related stigma and knowledge in the United States: prevalence and trends, 1991–1999. *Am J Public Health*. 2002;92(3):371–7.
9. Dimbuene ZT, Defo BK. Fostering accurate HIV/AIDS knowledge among unmarried youths in Cameroon: Do family environment and peers matter? *BMC Public Health*. 2011;11:343.
10. Tarkang EE. HIV knowledge and its association with sexual behaviours among out – of – school adolescents in Kumba, South West Region of Cameroon. *Int STD Res and Rev*. 2014a; 2(2): 123-134
11. Rwenge M. Sexual risk behaviours among young people in Bamenda, Cameroon. *Int Fam Plann Persp*. 2000;26(3):118–23.
12. Meekers D, Klein M, Foyet L. Patterns of HIV risk behaviour and condom use among youth in Yaounde and Douala, Cameroon. *AIDS Behav*. 2003;7(4):413–20.
13. Meekers D, Klein M. Determinants of condom use among young people in urban Cameroon. *Stud Fam Plann*. 2003;33(4):335–46.
14. WHO/UNAIDS. Global Statistical Fact Sheet. 2014 available on line www.who.int/mediacentre/fact-sheet/
15. Wabgastoma VA Okojie OH. Knowledge of HIV/AIDS and sexual practices among adolescents in Benin City, Nigeria. *African J. Reprod Health*. 2006; 10(3):73- 83
16. Idele P, Gillespie A, Porth T, Suzuki C, et al. Epidemiology of HIV and AIDS among Adolescents, current status, inequalities and data gaps. *J Acquir Immune Defic Syndr* 2014; 66; S144-S153
17. Tiezzi L, Lipshutz J, Wroblewski N., Vaughan R., & McCarthy J. Pregnancy prevention among young, minority urban adolescents: Results of the in your face pregnancy prevention program. *Family planning perspectives*, 1997; 29; 173-176
18. UNICEF UNAIDS. Opportunity in crisis: preventing HIV from early adolescence to young adulthood. 2011. Available online via unicef.org/hiv-aids/adolescents-young-people
19. CDC HIV/AIDS Fact Sheet 2008. Available online via www.cdc.gov/hiv/resources/factsheet/pdf/youth.pdf
20. Armitage C J, Conner M. Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*. 2001; 40, 471 - 499.
21. Lagerwerf L, Boer Health communication in southern Africa: Engaging with social and cultural. South Africa. Rosenberg publishers. 2007
22. WHO media centre, Joint news release (WHO and UNICEF): Adolescents falling through gaps in HIV services recommendation to increase testing, counselling and treatment of HIV in this neglected group. 2014
23. Tarkang EE. Factors associated with perception of risk of contracting HIV among secondary school female learner in Mbonge subdivision of rural Cameroon. *Pan Afr Med J*. 2014b; 17: 259
24. Wabgastoma VA Okojie OH. Knowledge of HIV/AIDS and sexual practices among adolescents in Benin City, Nigeria. *African J. Reprod Health*. 2006; 10(3):73- 83
25. Mberu, B.U. Risk perception for HIV/AIDS infection among premarital sexually initiated youth in Nigeria. *African Population studies* 2010;24:3 188-210
26. Idele P, Gillespie A, Porth T, Suzuki C, et al. Epidemiology of HIV and AIDS among Adolescents, current status, inequalities and data gaps. *J Acquir Immune Defic Syndr* 2014; 66; S144-S153
27. United Nations population Fund. State of world population and possibilities in the world of 7 billion UNFPA 2011
28. UNAIDS World AIDS Day report. SG report on Adolescents and Youths. 2011
29. Tiezzi L, Lipshutz J, Wroblewski N., Vaughan R., & McCarthy J. Pregnancy prevention among young, minority urban adolescents: Results of the in your face pregnancy prevention program. *Family planning perspectives*, 1997; 29; 173-176
30. UNICEF UNAIDS. Opportunity in crisis: preventing HIV from early adolescence to young adulthood. 2011. Available online via unicef.org/hiv-aids/adolescents-young-people
31. CDC HIV/AIDS Fact Sheet 2008. Available online via

www.cdc.gov/hiv/resources/factsheet/pdf/youth.pdf

32. DHS. Nigerian Demographic and health survey 2013 preliminary report. Nigeria: 2013
33. CIA Fact book, 2012. www.cdc.gov/globalhealth/countries/nigeria/pdf/nigeria.pdf
34. Armitage C J, Conner M. Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*. 2001; 40, 471 - 499.
35. Lagerwerf L, Boer Health communication in southern Africa: Engaging with social and cultural. South Africa. Rosenberg publishers. 2007
36. WHO Health for the World's adolescents: a second chance in the second decade. Place
37. WHO media centre, Joint news release (WHO and UNICEF): Adolescents falling through gaps in HIV services recommendation to increase testing, counselling and treatment of HIV in this neglected group. 2014
38. Coates T, Richter L, Caceres C. Behavioural strategies to reduce HIV transmission: How to make them work better. 2008. *Lancet* 372: 669–684
39. Mannell J, Cornish F, Russell J. Evaluating social outcomes of HIV/AIDS interventions: a critical assessment of contemporary indicator frameworks
40. Jemmott JB, Jemmott LS, Fong TG. Reductions in HIV risk associated sexual behaviour among black male adolescents: effects of an AIDS prevention intervention. *American Journal of public health*. 1992; 82:3
41. Bandura A. Perceived self-efficacy in the exercise of control over AIDS infection. In *primary prevention of AIDS: Psychological Approaches*. California USA. Sage publications Inc. 1989
42. Neema S, Musisi N, Kibombo R. Adolescents sexual and reproductive Health in Uganda: A synthesis of research evidence, occasional report, New York: The Allan Guttmacher Institute 2004, No 14
43. Maswanya E.S, Moji K, Horiguchi I, Nagata K, Aoyagi K, Honda S, Takemoto T. Knowledge, risk perception of AIDS and reported sexual behaviour among students in secondary schools and colleges in Tanzania. *Health education Research theory and practice*. 1999; 14:2 189- 196
44. Stephenson R. Community influences on young people's sexual behaviour in 3 African countries. *AMJ public Health*. 2009; 99(1)102-109. doi 10.2105/AJPH.2007.126904.
45. Gupta N, Mahy M. Sexual initiation among adolescent girls and boys: trends and differentials in sub-Saharan Africa. *Arch Sex Behav* 2003; 32:41–53
46. Prata N, Vahidnia F, Fraser A. Gender and relationship differences in condom use among 15–24-year-olds in Angola. *Int Fam Plann Perspect* 2005; 31:192–199
47. Taffa N, Klepp KI, Sundby J, Bjune G. Psychosocial determinants of sexual activity and condom use intention among youth in Addis Ababa, Ethiopia. *Int J STD AIDS* 2002; 1:714–719
48. Valedéz JJ et al. Putting the C back into the ABCs: a multiple year, multi-yregion investigation of condom use by Ugandan youths 2002- 2010. *PLOS one* 2014; 9 (4): e93083. Doi 10.1371/journal.pone.0093083
49. Exavery A, Lutambi A M, Mubyazi GM, Kweka K, Mbaruku G, Masanja H, Multiple sexual partners and condom use among 10-19 yearold in four districts in Tanzania: What do we learn? *BMC public Health*. 2011; 11: 490. doi 10.1186/1471-2458-11-490.
50. Meekers D, Klein M. Determinants of condom use among young people in urban Cameroon. *Stud Fam Plann* 2002; 33:335–346 Amina Mohammed. Knowledge attitudes and practices regarding HIV/AIDS of hotel staff from a selected hotel group in Cape Town. Cape Peninsula University of Technology 2006
51. Betts S, Peterson D, Huebner AJ. Zimbabwean adolescents' condom use: what makes a difference? Implications for intervention. *J Adolesc Health* 2003; 33:165–171
52. Central statistics office, UNICEF Sierra Leone. Survey Report on Adolescent knowledge, attitude and practice concerning HIV/AIDS in Sierra Leone. 2002.
53. Biraro S et al. Is sexual risk taking behaviour changing in rural southwest Uganda? Trends in rural population cohort 1993-2006. *Sex Transm Infect* 2009; 85 (Suppl 1):i3–i11. doi:10.1136/sti.2008.033928
54. Fako TT, Kangara LW, Forcheh N. Predictors of Knowledge about HIV/AIDS among young people: Lessons from Botswana. 201 *Journal of AIDS and HIV Research* 2 (6) PP. 116-130. Available online <http://www.academicjournals.org/jahr>

55. Majelantle RG, Keetile M, Bainame K, Nkawana P Knowledge, opinions and attitude towards HIV and AIDS among youth in Botswana. *J Glob Econ*. 2014; 2: 108. Doi:10.4172/economics.1000108
56. The Demographic Health Survey Program. Cameroon DHS, 2011-HIV Fact Sheet. www.dhsprogram.com/publications/publication-HF42-HIVFact-Sheets.cfm. Accessed 22 Apr 2015.
57. WHO. Cameroon: Summary of Country Profile for HIV/AIDS treatment scale-up. www.who.int/hiv/HIVCP_CMR.pdf. Accessed 15 Apr 2015.
58. Plautz A, Meekers D. Evaluation of the reach and impact of the 100% Jeune youth social marketing program in Cameroon: findings from three cross-sectional surveys. *Reprod Health*. 2007;4:1.
59. Lydie N, Robinson NJ, Ferry B, Akam E, De Loenzien M, Zekeng L, Abega S. Adolescent sexuality and the HIV epidemic in Yaounde, Cameroon. *J Biosoc Sci*. 2004;36(5):597–616.
59. Herek GM, Capitano JP, Widaman KF. HIV – related stigma and knowledge in the United States: prevalence and trends, 1991–1999. *Am J Public Health*. 2002;92(3):371–7.
60. Dimbuene ZT, Defo BK. Fostering accurate HIV/AIDS knowledge among unmarried youths in Cameroon: Do family environment and peers matter? *BMC Public Health*. 2011;11:343.
61. Tarkang EE. HIV knowledge and its association with sexual behaviours among out – of – school adolescents in Kumba, South West Region of Cameroon. *Int STD Res and Rev*. 2014a; 2(2): 123-134
62. Rwenge M. Sexual risk behaviour among young people in Bamenda, Cameroon. *Int Fam Plann Persp*. 2000;26(3):118–23.
63. Meekers D, Klein M, Foyet L. Patterns of HIV risk behaviour and condom use among youth in Yaounde and Douala, Cameroon. *AIDS Behav*. 2003;7(4):413–20.
64. Sieving RE, Eisenberg ME, Pettingell S, Skay C. Friends influence adolescents' first sexual intercourse. *Perspect Sex Reprod Health*. 2006;38(1):13–9.
65. Zuma K, Setswe G, Ketye T, Mzolo T, Mbelle N. Age at sexual debut: a determinant of multiple partnership among South African Youth. *Afr J Reprod Health*. 2010;14(2):47–54.
66. Mmbaga JE, Leonard F, Leyna GH. Incidence and predictors of adolescent's early sexual debut after 3 decades of HIV interventions in Tanzania: A time to debut analysis. *PLoS One*. 2013;7(7):e14700.
67. Sa Z, Larsen U. Gender inequality increases women's risk of HIV infection in Moshi, Tanzania. *J Biosoc Sci*. 2008;40(4):505–25.
68. Kelly RJ, Gray RH, Sewankambo NK, Serwadda D, Wabwire-Mangen F, Lutalo T, Wawer MJ. Age differences in sexual partners and risk of HIV-1 infection in rural Uganda. *J Acquir Immune Defic Syndr*. 2003;32(4):446–51.
69. Ankomah A, Adebayo SB, Anyanti J, Ladipo O, Ekweremadu B. Determinants of condom use by men in extramarital relationships in Nigeria. *HIV/AIDS Res Palliative Care*. 2013;5:97–109.
70. Rwenge M. Sexual risk behaviour among young people in Bamenda, Cameroon. *Int Fam Plann Persp*. 2000;26(3):118–23.
71. Meekers D, Klein M, Foyet L. Patterns of HIV risk behaviour and condom use among youth in Yaounde and Douala, Cameroon. *AIDS Behav*. 2003;7(4):413–20.
72. Meekers D, Klein M. Determinants of condom use among young people in urban Cameroon. *Stud Fam Plann*. 2003;33(4):335–46.
73. Tarkang EE. Factors associated with perception of risk of contracting HIV among secondary school female learner in Mbonge subdivision of rural Cameroon. *Pan Afr Med J*. 2014b; 17: 259
73. Haddison EC, Nguetack – Tsague G, Noubom M, Mbacham W, Ndumbe PM, Mbopi-Keou FX. Voluntary Counseling and testing for HIV among high school students in Tiko health district, Cameroon. *Pan Afr M J*. 2012;13:18.
74. Tarkang EE. Age at sexual debut and associated factors among high school female learner in Limbe urban area of Cameroon. *Glob Adv Res J Soc Sci*. 2013a; 2(7): 163 – 168
75. Thanavanh B, Rashid HO, Kasuya H, Sakamoto J. Knowledge, attitudes and practices regarding HIV/AIDS among male high school students in Lao Peoples Democratic Republic. *J Int AIDS Soc*.

2013;16:17387.

76. Koksai S, Narmal N, Vehid S, Yurtsever E. Knowledge and attitude towards HIV/AIDS among Turkish students. *Infecti Dis J Pak.* 2005;14:118–23.

77. Tan X, Pan J, Zhou D, Wang C, Xie C. HIV AIDS Kunled, attitudes and behaviours assessment of Chinese students: questionnaire study. *Int J Environ Res Public Health.* 2007;4:248–3.

78. Andargie G, Kassu A, Moges F, Kebede Y, Gedefaw M, Wale F, Alem A, Andualem B, Adungna S. Low prevalence of HIV infection, and knowledge, attitude and practice on HIV/AIDS among high school students in Gondar, Northwest Ethiop. *J Health Dev.* 2007;21(2):1–3.