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Risk of HIV Infection among Men Aged 50 to 75 Years using Erectile Dysfunction Drugs Attending at Kenyatta National Hospital: A Case Control Study, Kenya

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Abstract
Background: Erectile dysfunction drug (EDD) use has gained popularity among older men for enhancement and treatment of erectile dysfunction in recent years. Increased number of sexual partners and sexual activity due to EDD use concerns about the rising rate of HIV infection among older men. Men who use EDD for erectile dysfunction are found to be two to three times more likely to have sexually transmitted diseases (STDs), particularly human immunodeficiency virus (HIV) or chlamydia, than those who did not use the drugs. In Kenya, the prevalence of HIV among men of age 50 to 54 years has increased from 5.7% in 2003 to 9.1% in 2008. **Objectives:** This study was aimed at determining the association between EDD use and risk of HIV infection among men aged 50 to 75 years. **Patients and Methods:** A hospital based case-control study was conducted among men aged 50 to 75 years. A total of 274 men (137 cases confirmed as HIV positive and same number of controls confirmed as HIV negative), consented to participate in the study. Pearson's chi-square test and odds ratio with corresponding 95% confidence interval were computed to establish the association between the dependent variable (HIV status) and independent variables (Key independent variable being EDD use). The level of statistical significance was set at p-value <0.05. Binary logistic regression analyses were performed to adjust for confounding factors in the relationship between HIV status and EDD use. **Results:** Out of 137 cases, 18(13.1%) used EDD before they found out that they were HIV +ve compared to 8(5.8%) of the controls. Even though the use of erectile dysfunction drugs was found to be significantly associated with serum HIV positivity in bivariate analysis (OR= 2.44; 95%CI: 1.04-5.93; p=0.039), it was not significant after adjustment for other factors at the multivariate analysis (AOR= 1.52; 95%CI: 0.43- 5.34; p=0.519). Multiple logistic regression revealed the following factors as independent predictors of HIV: having had sexually transmitted diseases (AOR=5.96; 95%CI: 2.43 – 14.63; p<0.001), taking alcohol/drunkenness (AOR=6.84; 95%CI: 3.22 – 14.56; p<0.001) and having multiple sexual partners (AOR=21.69; 95%CI: 8.82 – 53.33; p<0.001).**Conclusion:** This study shows that there is an increased risk of HIV infection among older men using EDD. However, this observation is not sustained after controlling for other associated factors. It is therefore recommended that a more robust study design (prospective cohort) with a large sample size to be undertaken to shed more light on this pressing topic.
Keywords: Erectile Dysfunction Drugs, HIV infection, Older Men, Risk

1. INTRODUCTION

Erectile dysfunction drugs (EDD) or phosphodiesterase type 5 (PDE-5) are approved pharmacotherapies for the treatment of erectile dysfunction (ED) in men [1]. ED is the persistent inability to achieve and maintain an erection sufficient for satisfactory sexual performance [2]. It is a common medical problem and is estimated to affect 34 million men in the United States and more than 150 million men worldwide [3]. It is age associated, with prevalence rates ranging from 5% to 9% for men 18–39 years, 11–18% for men 40–59 years, and 44–70% for men 60 years and older [4]. In Kenya, although no epidemiological study has been carried out, it is presumed to be common among older men.

Erectile dysfunction drugs are selective and highly effective peripheral vasodilator drugs that have been available worldwide since the late 1990s. In recent years they have gained widespread popularity among older men [5]. Three agents in this class (sildenafil, tadalafil, vardenafil) are currently available worldwide. The introduction of these drugs has brought relief to many millions of men with ED and they become an increasingly popular drug of abuse among men without a medical indication. Although generally regarded as effective and safe, these drugs have also been associated with increased rates of high risk sexual behaviour and HIV transmission in some men [6]. Since 1998, EDD have been extending the sex life of many older individuals and, at the same time, may be extending the HIV epidemic into older age groups [7]. There is increased number of sexual partners among EDD users [8] and about a twofold rate in STIs, including HIV infection [9,10]. Moreover, World Health Organization (WHO) in 2009 indicated that the reason for the increasing incidence of HIV infection among older men is the use of impotence treatments that have allowed men to have more sexual

partners [33]. Furthermore, for the fact that EDD are associated with risky sexual behaviour, some have argued that EDD should be classified as controlled substances [11].

Among men who have sex with men (MSM), using EDDs are between two and six times greater than non-users to engage in unprotected anal intercourse with a partner of unknown or sero-discordant HIV status [11]. A 2005 review of all scientific and journal abstracts from United States of America (USA) and international conferences on STDs by Swearingen and Klausner among MSM revealed that increased odds of unprotected anal sex with a partner of unknown or sero-discordant HIV status ranged from 2.0 to 5.7 times (mean = 3.9) for sildenafil users versus nonusers. The risk of sildenafil use and STD diagnosis among HIV positive MSM was 1.92 (P =0.05), and the odds of sildenafil use among those newly HIV infected was 2.5 (95% CI 1.1– 4.1) [11]. Focusing more specifically on HIV transmission, researchers analyzed HIV sero-conversion among anonymous male repeat clients at HIV clinic in San Francisco, CA. HIV incidence was significantly higher among sildenafil (Viagra) users compared to non-users (4.4 HIV incidences per 100 person years vs. 1.2 per 100 person years, P<0.001). In multivariate analysis, Viagra users were twice more likely to be diagnosed with HIV than non- users (OR 2.5, 95%CI = 1.5-4.1), with particularly high risk among MSM using both Viagra and amphetamines [18].

Recent reports from the United Kingdom and the United States show that the prevalence of HIV infection in people aged over 50 years has risen rapidly in recent years [31]. South Africa's 2008 HIV survey found that 10.4% of 50-54 year old men have HIV, whereas only 2.5% of 15-19 year old and 5.1% of 20-24 year old men are infected with HIV [32]. In Kenya, although not capturing all men 50 and above years, HIV infection indicates an increased prevalence from 5.7% in 2003[14] to 9.1% in 2008/9 [15] in 50 to 54 year old males. This is thought to be due to anti-retroviral drugs helping people live longer, greater use of EDD (meaning that older people are having more sex) and a low level of awareness of HIV in older men. However, the growing evidence for the increasing incidence of STDs, including HIV/AIDS, diagnosed at an older age [12], EDDs have received attention for their possible contribution to these trends [13].This study was therefore aimed at determining the risk of HIV infection among men aged 50 to 75 years using erectile dysfunction drugs.

2. Patients and Methods

The study was conducted at the Voluntary Counseling and Testing (VCT) and Comprehensive Care Center (CCC) of Kenyatta National Hospital (KNH). KNH is the largest teaching and research hospital in Kenya with an average of 600,000 outpatient visits and 89,000 inpatients annually. It serves the local population as well as referrals from other parts of Kenya and neighboring countries (Annual report, 2009). It has a comprehensive center for voluntary counseling and testing and comprehensive care center that handles HIV/AIDS patients, dispensing of antiretroviral medicine, monitoring viral load, and HIV testing and counseling. Approximately 20,000 HIV patients receive their medication at the CCC with an average daily attendance rate of 200 patients.

The study design was unmatched case-control. It was unmatched by individual but matched by group (50 -75 years). A sample of 137 cases and 137 controls was calculated using Casagrande *et al.* (1978) formula [17] with an assumed proportion of EDD use among HIV positive men (50%) and assumed proportion of EDD use among HIV negative men (30%). Participants were recruited consecutively after they have received their HIV test results as HIV sero-negative for controls at VCT and HIV sero-positive for cases at both VCT and CCC while they were within the age range of 50 to 75 year. The study was conducted between 3rd January and 11th April, 2014.

Data was collected using pre-tested semi-structured questionnaire designed in English then translated into Swahili. Staff members (counselors) working in the VCT and CCC departments of KNH were recruited to collect the data to ensure confidentiality and reliability of the participants' response. During the structured interviews, participants were asked about their socio-demographic characteristics, EDD use, sexual behavior and the confounding factors in the EDD use and HIV infection.

Regarding measuring EDD use, participants were asked whether they had ever used EDD. Furthermore, cases recruited from CCC can be categorized into three groups according to EDD use. This can be as never used EDD, use of EDD after they tested HIV positive and use of EDD before they get to know their positive HIV status. However, in this study ever use of EDD before they get to know their positive HIV status was considered as the risk of exposure to HIV infection.

Data captured in questionnaires was double entered into a computer database designed using MS-Access application. Regular file back-up was done to avoid any loss or tampering. Data cleaning and validation was performed in order to achieve a clean dataset that was exported into a Statistical Package format (using SPSS version 20.0) ready for analysis.

Descriptive analysis was done for the demographic variables in both cases and controls using frequencies and proportions. Pearson's Chi-square test was used to establish the association between the dependent variable (HIV status) and independent variables in order to determine which ones had significant association. Unadjusted and adjusted Odds ratio (OR) with corresponding 95% confidence interval was

estimated. The level of statistical significance was set at p-value <0.05. Binary logistic regression analysis was performed to adjust for confounding factors in the relationship between HIV status and EDD use. The significant factors (confounding factors) with p-value <0.05 at bivariate analysis were subjected to binary logistic regression by specifying *'backward conditional'* method with removal at p<0.05.

Approval to carry out the study was sought and obtained from Kenya Medical Research Institute (KEMRI) Scientific/Steering and Ethical Review Committees. Only those men, who met the study requirements, verbally consented and voluntarily signed the consent forms were enrolled into the study.

3. RESULTS

A total of 274 men aged between 50 to 75 years consented to participate in the study and were interviewed using a pretested semi-structured questionnaire. Of the 274 participants 137 were HIV positive represented cases and 137 HIV negative participants represented controls.

3.1 Distribution of socio-demographic characteristics among cases and controls

Table 1 illustrates some of the socio-demographic characteristics among cases and controls. The table shows that cases were statistically significantly (p<0.001) younger than controls within the age range of 50-58 years. With respect to level of education, cases had significantly (p<0.006) higher level of education, where 73(53.3%) had attained secondary level of education compared to 48(35.0%) controls. Majority of the study participants were married 232(84.7%) with more controls 126(92%) being married compared to cases 106(77.4%) (p <0.001). However, there were more widowers 19(13.9%) among cases than controls 5(3.6%). Most of the respondents were self-employed 171(62.4%). However, significantly more controls 37(27.0%) were unemployed compared to cases 14(10.2%) (p <0.001). Majority 118(43.1%) of the respondents reported that being able to sometimes get and keep an erection adequate for satisfactory intercourse, with more cases 71(51.8%) had this experience compared to controls 47(34.3%) (p= 0.008).

3.2 Bivariate analysis of EDD use and other common predisposing factors of HIV infection

Data on EDD use and predisposing factors of HIV were obtained from cases and controls. Bivariate analysis of EDD use and predisposing factors for HIV in relation to HIV sero-status (cases or controls) is shown in Table 2. In regard to EDD use, there was a significant increase in proportion of EDD use among cases 18(13.1%) compared to the controls 8(5.8%) (OR= 2.44; 95%CI: 1.04-5.93; p=0.039).

The table further indicates that cases were less likely to have been circumcised 119(86.9%) than controls 130(94.9%), (OR=0.36; 95%CI: 0.14-0.88; p=0.021). History of STIs were more likely to be reported among cases 67(50.8%) compared to the controls 13(9.8%), (OR=9.52; 95%CI: 4.89-18.53; p<0.001). The use of alcohol/drunkenness was also examined and it was high among cases 100(73.0%) compared to controls 21(15.3%) (OR= 14.93; 95%CI: 8.21-27.16; p= < 0.001). Having multiple sexual partners was significantly higher in cases 128(93.4%) than controls 39(28.5%), (OR= 35.74; 95%CI: 16.53-77.27; p= < 0.001). There was significant lesser use of condoms all the time during sexual intercourse among those who engaged in multiple sexual partners. This was 4(3.1%) among cases compared to controls 15(38.5%), (OR= 0.052; 95%CI: 0.02-0.18; p= < 0.001). However, there was no significant difference with respect to using injection drugs (p= 0.314) and sex orientation (being heterosexual or homosexual) (p=0.316) among cases and controls.

Table 1: Distribution of socio-demographic characteristics among the cases and controls

Socio-demographic Characterstics	Total n(%) n=274	Cases n(%) n=137	Control n(%) n=137	χ^2	df	p value*
Age						
50-58	172(62.8%)	112(81.8%)	60(43.8%)	52.25	2	**< 0.001**
59-66	62(22.6%)	23(16.8%)	39(28.5%)			
67-75	40(14.6%)	2(1.5%)	38(27.7%)			
Level of education						
No formal education	22(8.0%)	4(2.9%)	18(13.1%)	18.87	3	**< 0.001**
Primary	98(35.8%)	40(29.2%)	58(42.3%)			
Secondary	121(44.2%)	73(53.3%)	48(35.0%)			
Higher/University	33(12.0%)	20(14.6%)	13(9.5%)			
Marital status						
Single	4(1.5%)	2(1.5%)	2(1.5%)	12.64	3	**0.006**
Married	232(84.7%)	106(77.4%)	126(92.0%)			
Divorced	14(5.1%)	10(7.3%)	4(2.9%)			
Widower	24(8.8%)	19(13.9%)	5(3.6%)			
Occupation						
Unemployed	51(18.6%)	14(10.2%)	37(27.0%)	17.44	2	**< 0.001**
Civil servant	36(13.1%)	23(16.8%)	13(9.5%)			
Self-employed	171(62.4%)	87(63.5%)	84(61.3%)			
Retired	16(5.8%)	13(9.5%)	3(2.2%)			
Religion						
Christian	261(95.3%)	131(95.6%)	130(94.9%)	4.115	4	0.391
Muslim	9(3.3%)	4(2.9%)	5(3.6%)			
Hindu	1(0.4%)	1(0.7%)	0(0%)			
Traditional	1(0.4%)	1(0.7%)	0(0%)			
No religion	2(0.7%)	0(0%)	2(1.5%)			
Level of sexual desire						
Low sexual desire	118(43.1%)	57(41.6%)	71(44.5%)	1.812	2	0.404
Moderate sexual desire	108(39.4%)	59(43.1%)	49(35.8)			
High sexual desire	48(17.5%)	21(15.3%)	27(19.7%)			
Ability to get and keep an erection						
Always/Usually able to get and keep an erection	104(38.0%)	41(29.9%)	63(46.0%)	9.612	2	**0.008**
Sometimes able to get and keep an erection	118(43.1%)	71(51.8%)	47(34.3%)			
Never able to get and keep erection	52(19.0%)	25(18.2%)	27(19.7%)			

*Significant P Value Bolded

Table 2: Bivariate analysis of EDD use and other common predisposing factors of HIV

Variable	Total n(%)	Cases n(%)	Control n(%)	OR (95% CI)	p value*
EDDs use (for cases before					
Yes	26(9.5%)	18(13.1%)	8(5.8%)	**2.44(1.04-5.93)**	**0.039**
No	248(90.5%)	119(86.9%)	129(94.2%)		
Circumcision status					
Circumcised	249(90.9%)	119(86.9%)	130(94.9%)	**0.36(0.14-0.88)**	**0.021**
Un-circumcised	25(9.1%)	18(13.1%)	7(5.1%)		
Sex orientation					
Heterosexual	273(99.6%)	137(100.0%)	136(99.3%)	0.50(0.44-0.56)	0.316
Homosexual/gay	1(0.4%)	0(0%)	1(0.7%)		
Sexually transmitted diseasses					
Yes	80(30.2%)	67(50.8%)	13(9.8%)	**9.52(4.89-18.53)**	**< 0.001**
No	185(69.8%)	65(49.2%)	120(90.2%)		
Taking alcohol/drunk					
Yes	121(44.2%)	100(73.0%)	21(15.3%)	**14.93(8.21-27.16)**	**< 0.001**
No	153(55.8%)	37(27.0%)	116(84.7%)		
Use of injection drugs					
Yes	4(1.5%)	3(2.2%)	1(0.7%)	3.05(0.31-29.64)	0.314
No	270(98.5%)	134(97.8%)	136(99.3%)		
Multiple sexual partners					
Yes	167(60.9%)	128(93.4%)	39(28.5%)	**35.74(16.53-77.27)**	**< 0.001**
No	107(39.1%)	9(6.6%)	98(71.5%)		
Use of Condom					
All the time	19(11.4%)	4(3.1%)	15(38.5%)	**0.05(0.02-0.18)**	**< 0.001**
Sometimes	50(29.9%)	42(32.8%)	8(20.5%)	1.02(0.41-2.59)	0.751
Never	98(58.7%)	82(64.1%)	16(41.0%)	**Reference**	

*Significant P Value Bolded

3.3 Multivariate analysis of EDD use and other common predisposing factors of HIV

Multiple regression analysis was performed in order to identify factors associated with HIV sero-positivity among men aged 50 – 75 years (Table 3). Five (5) factors that associated with HIV sero-positivity at $p<0.05$ during bivariate analysis were considered together in a multiple regression analysis. These include: (1) EDD use, (2) Circumcision status, (3) Sexually transmitted diseases, (4) Taking alcohol/drunk, and (5) Having multiple sexual practices. Upon fitting the factors using Binary logistic regression and specifying *'backward conditional'* method with removal at $p<0.05$, three (3) factors remained in the final analysis as shown in Table 3. These are having had history of sexually transmitted diseases (AOR=5.96; 95%CI: 2.43 – 14.63; $p<0.001$), taking alcohol/drunkenness (AOR=6.84; 95%CI: 3.22 – 14.56; $p<0.001$) and engaging in multiple sexual practices (AOR=21.69; 95%CI: 8.82 – 53.33; $p<0.001$).

However, after adjusting for other factors, EDD use was not significantly associated with HIV sero-positivity (AOR= 1.52; 95%CI: 0.43- 5.34; $p=0.519$) as shown in Table 3.

Table 3: Multivariate of EDD use and other common predisposing factors of HIV

Variables/factors	AOR	95% CI		p value*
		Lower	Upper	
Full model				
EDDs use (for cases before they get to know their +ve HIV status)				
Yes	1.52	0.43	5.34	0.519
No	1.00			
Circumcision status				
Circumcised	0.32	0.09	1.14	0.078
Un-circumcised	1.00			
Sexually transmitted diseases				
Yes	5.92	2.40	14.58	**<0.001**
No	1.00			
Taking alcohol/drunk				
Yes	7.73	3.57	16.76	**<0.001**
No	1.00			
Multiple sexual partners				
Yes	20.82	8.35	51.89	**<0.001**
No	1.00			
Reduced model				
Sexually transmitted diseases				
Yes	**5.96**	**2.43**	**14.63**	**<0.001**
No	1.00			
Taking excessive alcohol/drunk				
Yes	**6.84**	**3.22**	**14.56**	**<0.001**
No	1.00			
Multiple sexual partners				
Yes	**21.69**	**8.82**	**53.33**	**<0.001**
No	1.00			

*Significant P Value Bolded

3.4 Age at onset, frequency, reason, access and sexual desire in cases and controls among those using EDD

Table 4 summarizes the distribution of age at onset, frequency, reason, access and sexual desire in cases and controls among those using EDD. Among those who were using EDD, 11(42.3%) started using EDD while they were 45 to 50 years old. Majority 22(84.0%) indicated that they were using EDD to treat erectile dysfunction with 17(94.4%) among cases compared to 5(62.5%) among controls. Others 3(11.5%), reported that they used EDD to experiment or satisfy their partners with 1(5.6%) among cases and 2(25.0%) among controls. Sildenafil (Viagra) was one of the most 16(61.5%) used type of EDD however, 7(26.9%) did not know the type of EDD they have used. Most 18(69.2%) of respondents indicated high level of sexual desire after using EDD. Majority 24(92.4%) of the participants (cases and controls) were using EDD sometimes. In relation to access of EDDs, 14(53.8%) of the respondents obtained the EDD from pharmacies without prescription and 7(26.9%) through friends. Alcohol was the only substance used concomitantly with EDD 9(34.6%).

Table 4: Distribution of age at onset, frequency, reason, access and sexual desire in cases and controls among those using EDD

Variable	Total n(%)	Cases n(%)	Control n(%)
Age at onset of using EDD			
45-50	11(42.3%)	10(55.6%)	1(12.5%)
51-55	6(23.1%)	6(33.3%)	0(0.0%)
56-60	6(23.1%)	2(11.1%)	4(50.0%)
61-65	1(3.8%)	0(0.0%)	1(12.5%)
66-70	2(7.7%)	0(0.0%)	2(25.0%)
Reason for using EDD			
To treat erectile dysfunction	22(84.6%)	17(94.4%)	5(62.5%)
Counteract effects of drugs/alcohol	1(3.8%)	0(0.0%)	1(12.5%)
Other (experimenting or satisfy	3(11.5%)	1(5.6%)	2(25.0%)
Type of EDDs use			
Sildenafil (Viagra)	16(61.5%)	11(61.1%)	5(62.5%)
Tadalafil (Cialis)	3(11.5%)	3(16.7%)	0(0.0)
Don't know	7(26.9%)	4(22.2%)	3(37.5%)
Frequency of EDD use			
Always/often	1(3.8%)	1(5.6%)	0(0.0%)
Sometimes	24(92.4%)	16(88.9%)	8(100.0%)
No response	1(3.8%)	1(5.6%)	0(0.0%)
Level of sexual desire after using EDD			
High sexual desire	18(69.2%)	11(61.1%)	7(87.5%)
Moderate sexual desire	5(19.2%)	4(22.2%)	1(12.5%)
Low sexual desire	3(11.5%)	3(16.7%)	0(0.0%)
Access to EDDs			
Doctor's prescription	4(15.6%)	3(16.7%)	1(12.5%)
From pharmacy without prescription	14(53.8%)	9(50.0%)	5(62.5%)
Through friends	7(26.9%)	5(27.8%)	2(25.0%)
No response	1(3.8%)	1(5.6%)	0(0.0%)
EDD use + recreational drugs/alcohol			
Yes (Only Alcohol)	9(34.6%)	6(33.3%)	3(37.5%)
No	17(65.4%)	12(66.7%)	5(65.4%)

4. DISCUSSION

4.1 Socio-demographic characteristics among cases and controls

Comparison of cases (HIV +ves) and controls (HIV -ves) with regard to demographic characteristics showed that there was statistically significant difference between cases and controls with respect to age (P <0.001), educational status (P= 0.006), marital status (P <0.001), occupation (P <0.001) and ability to keep an erection adequate for satisfactory intercourse (P= 0.008). However, there was no significant difference in relation to religion and level of sexual desire.

Surprisingly, a statistically significant number of men with educational level of secondary school and above were found to be HIV sero-positives. This is against the fact that people that are more knowledgeable could take care of HIV infection, as they easily understood both the transmission and prevention methods. Hence knowledge alone, as seen in this study, may not be protective unless behavioral change is attained. The unemployment was also significantly higher in controls than in cases this could be cases were significantly younger than controls within the age range of 50 to 75 years. However, as expected among the cases there were significantly more widowers and divorced men than controls.

4.2 EDD use and risk of HIV infection

This study has revealed that using EDD has increased proportion and risk of HIV infection among men aged 50 to 75 years in the bivariate analysis (OR= 2.44; 95%CI: 1.04-5.93; p=0.039). It has been reported that use of

EDD appeared to be linked to high-risk sexual behaviour among men having sex with men (MSM) and enabled older men to rejuvenate their sexual activity. However, after controlling for confounding factors, the association of EDD use with serum HIV positivity was found to be insignificant (AOR= 1.52; 95%CI: 0.43- 5.34; p=0.519). There is some evidence that Viagra is used more by MSM than by heterosexual men, although there is a finding that heterosexual men who take Viagra are more likely to have insertive anal intercourse with women [19]. Viagra users were more than twice more likely to be diagnosed with HIV than non- users (OR 2.5, 95% CI 1.5-4.1) in a multivariate analysis at an HIV clinic in San Francisco CA, with particularly high risk among MSM using both Viagra and amphetamines [18]. Similarly in a search carried out using all scientific and journal abstracts from USA and international conferences, showed that the risk of HIV infection among MSM using sildenafil (Viagra) was 2.5 (95% CI 1.1– 4.1) [11]. Moreover, in a study conducted among gay men in Australia, only use of Viagra was significantly predictive of HIV infection after controlling for sexual risk behaviors [22] and there was a replication of these findings in a US study conducted in Chicago and Los Angeles among MSM [23]. However, there are no studies carried out on the risk of HIV infection among older men of the general population using EDD to be directly compared with this study.

In this study among all those who were using EDD, majority indicated that they had experienced high sexual desire (56.3%) and moderate sexual desire (21.9%) after using EDD. Likewise other studies have shown that EDD use increases high-risk sexual behaviour and HIV transmission in some men [6,8]. Regarding to access of EDD, 80.7% obtained them from pharmacies and friends (53.8% from pharmacy without prescription and 26.7% through friends) which is comparable to a survey done in the United Sates, in which over 86% of respondents obtained them from the friends, dealers or pharmacies and 1.3% through physician prescriptions [20]. Obtaining EDD from friends, pharmacies, and sex shops are among the most commonly reported places.

4.3 Other factors associated with HIV sero-positivity among the respondents

The presence of sexually transmitted infections (STIs) was one of the most important risk factors associated with HIV infection (AOR=5.96; 95% CI: 2.43 – 14.63; p<0.001). Similar to this finding, the association between HIV and herpes simplex virus type 2 was found significant after controlling for multiple sex partners, paying for sex, and history of STIs (AOR= 8.0; 95%CI= 4.8-13.1) among 224 HIV-negative and 191 HIV-positive male factory workers in Zimbabwe [16]. There are several biological mechanisms thought to account for the synergy between HIV and STI epidemics. Infections that disrupt the epithelial surface of the genital tract may increase acquisition through facilitating the access of HIV-1 to target cells under epithelial surface thus increasing the probability that HIV-1 is able to establish a systemic infection. Ulcers in both partners can facilitate blood to blood contact and thereby transmission, while STI in the HIV infected partner can increase viral shedding in the genital tract [21]. Furthermore, inflammatory STDs recruit activated CD4 cells to the surface of the genital tract, increasing the pool of cells susceptible to HIV infection [24]. Thus, prompt STDs treatment is an important HIV prevention strategy in the general population.

In this study reported alcohol consumption/drunkenness was significantly associated with HIV sero-positivity (AOR=6.84; 95% CI: 3.22 – 14.56; p<0.001). This is comparable to a meta-analysis carried out by Baliunas et al. 2010 on alcohol consumption and risk of incident HIV infection where the overall alcohol consumption increased the risk of HIV (RR 1.98, 95% CI 1.59-2.47) [25]. The main reason for this association is that alcohol can act directly on the brain to reduce inhibitions and diminish risk perception [27].

Engaging in multiple sexual practices was also significantly associated with HIV sero-positivity (AOR=21.69; 95% CI: 8.82 – 53.33; p<0.001). This is consistent with the pooled sub-Saharan Africa sample that men who had two or more overlapping partners in the past 12 months were significantly more likely to be HIV-infected than those who had only one lifetime sexual partner (AOR=2.87, p<0.001) [26]. Therefore, it can be concluded that having multiple sexual partners is the main route of HIV transmission among older men.

In contrast to the industrialized world where the epidemic of HIV is reported to be entrenched among homosexual men and injecting drug users [29], they were not significantly associated with serum HIV positivity in this study (OR= 0.50; 95%CI: 0.44-0.56; p= 0.316) and (OR=3.05; 95%CI: 0.31-29.64; p=0.314) respectively. HIV transmission by non-sterilized injecting equipment and intravenous drug use has not been documented as a major mode of HIV transmission in Africa. Little is known about the practice of anal intercourse in sub-Saharan Africa, but there is a taboo on it and it is believed to be uncommon.

Even though circumcision was significantly protective at the bivariate analysis (OR= 0.36; 95% CI: 0.14-0.88; p=0.021), it was not significant after adjustment was made for other variables at multivariate analysis (AOR= 0.32; 95% CI: 0.09-1.14; p=0.078). The findings of this study contradict to a number of studies conducted principally among African populations finding an association between circumcision status and HIV infection [30]. A recent meta-analysis of randomized controlled trials suggested that circumcision reduces a man's risk of contracting HIV by around 56% with confidence interval of 40-67% [28].

Use of condoms all the time was found to be protective among those who were engaged in sexual practices with a prostitute or with anyone other than wife (OR= 0.05; 95% CI: 0.02-0.18; p<0.001). Among all

respondents engaged in multiple sexual practices, 58.7% had never used condoms, 29.9% used condoms sometimes and only 11.4% used condoms all the time. This suggests that condom use is not popular among older men.

5. CONCLUSION

This study shows that there is an increased risk of HIV infection among older men using EDD. However, this observation is not sustained after controlling for other factors at multivariate analysis. It is therefore recommended that a more robust study design (prospective cohort) with a large sample size to be conducted to shed more light on this pressing topic.

Multiple regression analysis in this study shows that presence of STDs, alcohol consumption/drunkenness and having multiple sexual partners were strongly and independently associated with HIV infection among men aged 50 to 75 years. Thus the study highlights the need for the Ministry of Health and other concerned stakeholders to increase awareness on the need for regular screening and prompt treatment of STDs, increase awareness of using available protective methods such as use of condoms, abstinence, having one sexual partner among others, as well as educate about the effects of taking alcohol/drunkenness on HIV infection.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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