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Pattern, challenges and correlates of condom use among Nigerians living with HIV infection.

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PEER REVIEW

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Comments

This is a well performed study in which the authors identified several aspects of the use/non-use of condom among HIV positive in a metropolitan area in Nigeria. The results are interesting and useful for improvement and/or development of new strategies for an effective prevention program.
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ABSTRACT

Objective: To determine the pattern, challenges and correlates of condom use among Nigerians living with HIV Infection.
Methods: A cross sectional questionnaire study among HIV positive adults attending an HIV treatment centre in Lagos, Nigeria. Data entry and analysis were done with Epi-info version 3.5.1.
Results: The mean age of respondents was 35 (SD=7.7; range: 17-58 years) and mean age at sexual debut was 20 years old (range: 7-37 years). Majority were women (66.6%), had at least secondary school education(91.1%), married (68.2%)), on ART (50.7%) and knew their partners HIV status(60.9%). The rate of condom use at last sex act was 65.9%, but only 48.8% used condom consistently. Factors associated with condom use were male gender (OR=2.43, *CI*=1.35-4.33, *P*=0.002), less than secondary school education (OR=3.12, *CI*=1.04-9.28, *P*=0.05) and Not knowing partner's HIV status (OR=1.90, *CI*=1.04-3.80, *P*=0.04). Refusal to use condom (28.4%) were as a result of pregnancy intention, undesirability of condom in marriage and decreased sexual pleasure.
Conclusion: There is low consistent condom use rate of 48.8% among this cohort despite their exposure to behavioural change messages. A review of the present counselling strategy and combination prevention is therefore advocated.

KEYWORDS
Condom use, HIV, Nigeria, Positive prevention

1. Introduction

HIV/AIDS remains a significant public health challenge globally. Nigeria with a high burden of the disease has the second highest number of people living with HIV in Sub-Saharan Africa[1]. Recent Nigerian prevalence study revealed that the national median HIV prevalence from antenatal sentinel survey was 4.1% with the estimated number of people living with HIV/AIDS at 3.1 million. Also, new infection continue to occur mainly through heterosexual contact[2].

Traditionally, efforts at prevention of new HIV infection were focused on protecting the uninfected individuals from acquiring the virus particularly through the promotion of condom use. However, with the increased access to antiretroviral therapy, persons infected with HIV can live longer[3] and with high desire to live a normal life which includes increase desire to have children with occasional engagement in risky sexual behavior[3,4]. It

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then follows that there is a need to promote HIV prevention among persons infected with HIV especially those in sero-discordant relationships as a means of protecting their uninfected partners. And also, there is a need to prevent the transmission of resistant HIV strains and super-infection among sero-concordant couples. This is due to the documented evidence that persistent genital HIV-1 shedding can still occur in some men and women despite undetectable plasma HIV-1 viral RNA[5,6].

It follows from the above that the concept of "prevention with positive" is very relevant particularly in an era of prolonged use of antiretroviral drugs and reduction in the incidence of opportunistic infection. The aim of prevention with positive is to increase the self-esteem, confidence and ability of persons living with HIV/AIDS to protect and maintain personal good health while doing all that is necessary to eliminate the possibility of infecting others. Therefore, it must be implemented under adequate ethical covering which will provide the respects of the rights and needs for people living with HIV to enjoy sexual relationships, have reproductive choices and live a full and healthy life[7].

Therefore, in order to break the chain of HIV transmission, the novel approach will be to target prevention efforts at HIV positive individuals. However, to introduce effective prevention program among this group will require a detailed understanding of their sexual behavior. Previous published works have reported risky sexual behavior among people living with HIV and proposed some methods for risk reduction in this group which includes consistent condom use, reducing number of sexual partners, abstinence, sero-status disclosure, and clean injection equipment[8,9]. Many studies particularly in southern Africa has reported significant rate of unprotected heterosexual intercourse among individuals infected with HIV/AIDS[10,11]. Unfortunately only few studies in our environment have examined in detail the sexual behavior of persons living with HIV infection, especially the condom use[12]. Our study therefore aims at determining the pattern of condom use among HIV infected individuals as well as the challenges and correlates of condom use.

2. Methods

2.1. Study setting

This is a cross-sectional questionnaire study at a large treatment centre, Nigerian Institute of Medical Research, Lagos, Nigeria among adults living with HIV infection. The centre was one of the 25 centers that commenced HIV treatment in the country in 2002. In 2004, it was supported by Harvard School of Public Health, Boston, USA through the PEPFAR grant and later by the AIDS Prevention Initiative of Nigeria. The centre currently provides free comprehensive HIV care services to over 19 000 clients. Patients enrolled into care at the centre were regularly given group counselling on HIV secondary prevention messages and were encouraged to collect free male and female condoms during their routine clinic visits. The centre provides ambulatory care to patients from Monday to Friday every week which includes clinician review, drug pick up appointments and laboratory follow up visits. At each of the visit group, counseling on secondary prevention and importance of condom use is done by trained counselors. The major counseling challenge is the inability to address individual patient's concerns about condom use because of the patient's load at the clinic which only allow for general discussion around condom use.

2.2. Study participants

The study participants were consecutive adult attending their follow up clinic or drug pick-up visit over a period of 8 weeks in 2011. Only patients aged 18 years and above and in care for over 3 months were eligible to participate. Very ill patients and those unable to communicate or declined consent were excluded from the study. Eligible patients who meet the study criteria were recruited at an average of ten participants per each of the four clinic days weekly over a period of eight weeks.

The sample size expression [$n=Z^2P(1-P)/E^2$] was used to determine the minimum number of subjects to be enrolled into the study; where n means required sample size, Z means reliability coefficient at 95% confidence interval (standard value of 1.96), P means expected prevalence of consistent condom use among HIV positive of 25% (Adih and Alexander, 1999)[13], E means margin of error at 5%. A sample size of 288 was determined. We increased the sample size by 5% in anticipation of non-response or withdrawal of consent. A final minimum sample size of 302 obtained.

2.3. Data collection

Pre-tested self administered and semi-structured questionnaires were used to collect information from respondents. However, low literate participants were assisted by trained adherence counselors of assisted reproductive technology (ART). The main outcome variable for the study was "condom use during the last sex act". The independent variables were socio-demographic characteristics including age, sex, ethnicity, education, religion, marital status and occupation. Sexual and reproductive health history: the age of sexual debut, number of sexual partners, relationship type, type of sexual practices and discussion on condom use. Other independent variables included medically related factors like the duration of HIV diagnosis, duration of use of ART and contraceptive history. Behavioral issues about partners status disclosure, alcohol and drug use information as well as motivation factors for condom use were also elicited.

2.4. Data entry and analysis

The data were entered and analyzed using with Epi-info version 3.5.1 (2008). Descriptive statistics were used to present frequency distributions. The *Chi*-squared test was used to evaluate the association between current condom use levels. Bivariate analysis was employed to identify factors associated with current condom use. Multiple logistic regression analysis was performed for those factors that showed a statistically significant association in bivariate analysis in order to control some possible confounders. All statistical tests were two-sided and were considered significantly at alpha level of 0.05.

2.5. Ethical consideration

Approval for the study was obtained from the Nigerian Institute of Medical Research, Institutional Review Board. Participants were duly informed about the study and took part after providing written informed consent.

3. Results

3.1. Socio demographic characteristics

The total samples included 302 respondents who met the eligibility criteria and were willing to participate in the study because some eligible participant declined participation because they are unwilling to discuss their sex life with the interviewers. There were more females of 201 (66.6%) than male 33.4%. Majority of the participant had at least secondary education (91.1%) and most of them are Catholics (43.4%), followed by Pentecostal Christians (35.4%) while others (21.2%) are Protestants, Islam and Traditional African religion. Most of the respondents are married (68.2%) while 20.5% are single and the remaining are either widow or divorced. The mean age of respondents was 35 (SD=7.7) and age group of 25-34 years old was the majority (44.4%). The Igbo ethnic group was in the majority (45.7%) among the respondents followed by the Yoruba ethnic group (36.1%) while Hausa and other ethnic minorities accounted for 18.2% (Table 1).

3.2. Sexual and HIV treatment history

The condom use rate during the last sex act was 65.9% and the rate of consistent use of condom in this cohort is 48.8%. Majority of the respondents have 2 to 5 life sexual partners (46.6%) and 30.9% have always been in monogamous relationship. The mean age of sex debut was 20 years old and majority initiated sex at age of 18 years old. Seventy five percents of the respondents knew condom as a means of preventing pregnancy and sexually transmitted infection of HIV. Before HIV diagnosis, 54.6% have had sex with the use of condom at different times. A significant proportion of the respondents knew their partners' HIV status (60.9%). Of this, majority are in serodiscordant relationship (46%), while 36.9% have HIV positive partners and 17.1% did not know HIV status of their partners. Majority of the respondents were exposed to the use of male condom (91.4%) while 8.6% used female condom. Overall, 50.7% of the respondents are currently on ART showed on Table 2.

Table 1

Socio-demographic Characteristics of Respondents.

Characteristics		Number of respondents (%) n=302
Sex	Male	101 (33.4)
	Female	201 (66.6)
Education	No formal Education	3 (1.0)
	Primary	24 (7.9)
	Secondary	127 (42.1)
	Tertiary	148 (49.0)
Religion	Catholic	131 (43.4)
	Protestants	25 (8.3)
	Pentecostals Christians	107 (35.4)
	Islam	29 (9.6)
	others	10 (3.3)
Marital Status	Single	62 (20.5)
	Married	206 (68.2)
	Divorced/Separated	18 (6.0)
	Widowed	16 (5.3)
Age (years)	18-24	13 (4.3)
	25-34	134 (44.4)
	35-44	112 (37.1)
	45-54	39 (12.9)
	⩾55	4 (1.3)
Occupation	Artisan	31 (10.3)
	Technician	20 (6.6)
	Trading	65 (21.5)
	Business	60 (19.9)
	Professionals	126 (41.7)
Tribe	Hausa	18 (5.9)
	Igbo	138 (45.7)
	Yoruba	109 (36.1)
	Other ethnic minorities	37 (12.3)

3.3. Determinants and barriers of condom use

Nineteen percents of the respondents had different degree of difficulty in discussing condom use with their partners. Major reasons for this were: partners felt condom is unnecessary in stable relationship (45.7%), non-disclosure of HIV status (14.3%), suspicion of spousal infidelity (2.9%), and fear for possible negative reaction with their partner (27.1%). Respondents who are married are more likely to discuss condom use freely with their partners (X^2=14.1, P=0.002 8). Also, respondents with sexual partners of unknown HIV status finds it difficult to discuss condom use (X^2=11.69; P=0.002 9). About 28.4% had partners who refused condom use. Reasons for refusing condom use includes: reduction in sexual pleasure when condom is used (52.5%), no need for condom

use in stable marital relationship (35.6%), pregnancy desire (5.1%) and preventing the suspicion of infidelity from their partners (6.8%). Individuals who have received counseling believed that the counseling has increased their use of condom [odds ratio (OR)=7.04; 95% *CI*=1.75-28.34; *P*=.001]. There was no statistically significant association between religion denomination and condom use during the last sex act as documented in Table 3.

Table 2

Sexual and HIV treatment history of respondents.

Characteristic		Number of Respondents (%)
Life time sexual partners	1	93 (30.9)
	2-5	141 (46.6)
	6-10	33 (11.9)
	>10	32 (10.6)
Awareness about condom before HIV diagnosis	Yes	190 (62.9)
	No	64 (21.2)
	No Response	48 (15.9)
Used male condom before	Yes	278 (92.1)
	No	24 (7.9)
Used female condom before	Yes	26 (8.6)
	No	276 (91.4)
Ever used condom before HIV diagnosis	Yes	165 (54.6)
	No	95 (31.5)
	No Response	42 (13.9)
Used condom during last sex act	Yes	199 (65.9)
	No	103 (34.1)
Used condom always	Yes	147 (48.8)
	No	155 (51.2)
ART use	Yes	153 (50.7)
	No	75 (24.8)
	No Response	74 (24.5)
Know partners' HIV status	Yes	184 (60.9)
	No	66 (21.9)
	No Response	52 (17.2)
Partners' HIV status	HIV Positive	111 (36.9)
	HIV Negative	139 (46.0)
	Don't know	52 (17.1)

In bivariate analysis of the determinants of condom use during the last sex act, socio-demographic characteristics of education, religion, marital status and age were found not to be associated (*P*>0.05), but the sex of the respondent, particularly male gender was found to be associated with condom use during last sex act (OR=2.86, *CI*=1.57-5.25, *P*<0.001) (Table 3). Also, the form of sexual practices *i.e.* vaginal or anal sex as well as being on ART were not associated with condom use (*P*>0.05) while use of condom before HIV diagnosis and the knowledge of HIV status of their partners were found to be associated with condom use (*P*=0.02). The parameters found to be associated with condom use during last sex act were subjected to multiple logistic regressions. After controlling the confounders, respondents who has ever use of condom before HIV diagnosis (OR=1.63, *CI*=0.98-2.74, *P*=0.05), those who had less than secondary school education (OR=3.12, *CI*=1.04-9.28, *P*=0.05) and male sex (OR=2.43, *CI*=1.35-4.33, *P*=0.002) had statistical significant association with condom use (Table 4).

Table 3

Factors associated with condom use during last sex act among the respondents.

Associated Factors		Used condom (%)	Don't use condom (%)	OR	*P* value	95% *CI*
Sex	Female	166 (58.6)	82 (41.4)	2.86	<0.001	1.57-5.25
	Male	81 (80.2)	20 (19.8)	1.00		
Education	None	3 (100.0)	0 (0.0)			
	Primary	19 (82.6)	4 (17.4)	0.40	0.15	0.11-0.33
	Secondary	76 (62.3)	46 (37.7)	1.14	0.70	0.67-1.94
	Tertiary	94 (65.3)	50 (34.7)	1.00		
Religion	Catholic	76 (60.3)	50 (39.7)	1.00		
	Pentecostal	73 (70.9)	30 (39.1)	0.62	0.12	0.35-1.13
	Protestants	17 (70.8)	7 (29.2)	0.63	0.45	0.22-1.75
	Islam	21 (72.4)	8 (27.6)	0.58	0.22	0.51-1.62
	others	6 (60.0)	4 (40.0)	1.00	1.00	0.23- 4.34
Marital status	Single	40 (70.2)	17 (29.8)	0.70	0.35	0.35-1.39
	Married	119 (62.3)	72 (37.7)	1.00		
	Divorced	11 (64.7)	6 (35.3)	0.90	0.94	0.28-2.78
	Widowed	14 (93.3)	1 (6.7)	0.12	0.03	0.01-0.89
Age	18-24	6 (50.0)	6 (50.0)	1.66	0.59	0.44-6.25
	25-34	78 (62.4)	47 (37.6)	1.00		
	35-44	70 (66.7)	35 (33.3)	0.83	0.29	0.46-1.48
	45-54	28 (75.7)	9 (24.3)	0.53	0.19	0.21-1.31
	⩾55	3 (75.0)	1 (25.0)	0.55	1.00	0.02-6.24
Partners HIV status	Positive	63 (62.4)	38 (37.6)	1.61	0.12	0.88-2.95
	Negative	91 (72.8)	34 (27.2)	1.00		
	Unknown	23 (51.1)	22 (48.9)	2.56	0.01	1.19-5.50
Ever used condom before HIV diagnosis	Yes	131 (71.2)	53 (28.8)	1.85	0.02	1.33-3.03
	No	64 (57.1)	48 (42.9)	1.00		
Use of other family planning method	Yes	32 (65.3)	17 (34.7)	0.92	0.95	0.48-1.78
	No	146 (67.0)	72 (33.0)	1.00		
Vaginal sex practice	Yes	186 (65.5)	98 (34.5)	1.89	0.70	0.37-0.97
Anal sex practice	Yes	6 (50.0)	6 (50.0)	1.00	0.39	0.16-1.62
	No	184 (66.2)	94 (33.8)	0.51		
Oral sex practice	Yes	20 (71.4)	8 (28.6)	1.36	0.60	0.57-3.22
	No	170 (64.6)	93 (35.4)	1.00		
Presently on ART	Yes	112 (65.1)	60 (34.9)	1.04	0.80	0.01-1.78
	No	57 (64.0)	32 (36.0)	1.00		
Knowledge of partners status	Yes	147 (68.7)	67 (31.3)	1.90	0.02	1.10-3.29
	No	38 (53.5)	33 (46.5)	1.00		

Table 4

Logistic regression of associated factors to condom use.

Determinants	OR	*P* value	95% *CI*
Ever used condom before HIV diagnosis	1.639	0.050	0.98-2.74
Sex (male gender)	2.430	0.002	1.35-4.33
Less than secondary school education	3.120	0.050	1.04-9.28
Unknown partner's HIV status	1.990	0.040	1.04-3.80

4. Discussion

The study took place in a large HIV treatment centre providing care to heterogeneous population. An evaluation of the sex distribution of the study population revealed a female preponderance (66.6%), which is in accordance with previous reports in Sub Saharan Africa, showing that women constitute the majority in most HIV treatment centre which could be predicated on their better health seeking behavour[14]. Also, since this study was conducted

in an urban area, the majority of respondents had at least secondary school education. Most of our study participants are in stable marital relationship with a potential for open discussion on condom use which could be responsible for the fairly high rate of condom use during last sexual intercourse in this cohort. However, consistent condom use of 48.8% is similar to a previous Nigerian study[15-17]. This concern about the fact that these patients have been exposed to regular counseling session about effective condom use and also had access to free condom distribution during their clinic visits. Our study also reported that knowledge of partners' HIV status is an important associated factor with condom use, which was also reported by a previous study in Kenya[11]. Generally, previous report indicated that HIV positive individuals who do not know partners of unknown HIV status are likely to engage in unprotected sexual intercourse[18], but this assertion was not corroborated in this study. The patriarchal relationship that characterized as the social norm in Nigeria could be responsible for the association of male gender to increase likelihood of condom use. This assertion is also supported by a previous study in south-eastern Nigeria in which male gender was associated with increased use of condom because women in this social setting are lack of the capacity to negotiate and insist on condom use by their male partners[19]. However association of marital status and higher education with increased condom use as reported by another study in south western Nigeria[20], was not demonstrated in this present study because we found that individuals with less than secondary education are likely to use condom when compared to those who had secondary and tertiary education. This is a surprising finding because higher education should inform better knowledge of health risk among individuals infected with HIV. However, this finding could be due to the fact that individuals who had lower education or uneducated are likely to comply more with healthcare provider's instruction on behavioural change and are less likely to be exposed to technology driven risky and complex relationships are seen among those with higher education. This assertion was supported by another study from south-western Nigeria[21].

The main reason in our study for refusal to use condom by partners of respondents was the fact that condom use could be associated with decreased sexual pleasure. This finding is similar to previous report from study done in North America and Southern Africa[22-24]. However, in our study, only 5.1% reported desire for conception as the reason for refusal to use condom which is small when comparing with a study in Ethiopia which reported 18.1%[18].

Though our study reported that only 4.2% of the respondents practiced anal sexual intercourse, about 50% of them do not use condom. This is of great concern because of the previously documented evidence about increased risk of HIV transmission during risky anal sexual intercourse. Hence, there is a need for targeted behavioural change communication strategies for this cohort.

Overall, our findings showed that individuals who had ever used condom before HIV diagnosis is more likely to use condom consistently after HIV diagnosis. Also male gender is associated with consistent condom use which is similar to a published work on sexual risk taking among patiets on antiretroviral therapy from Kenya[25].

The major limitation to our study is the fact that the study took place in a large treatment site in metropolitan Lagos, Nigeria. Therefore most of the participants are educated and the findings could have limited generalization to rural Nigeria. Also, the sensitive nature of discussion around sexuality may results in social desirability bias which could undermine the rate of condom use reported.

The consistent condom use of 48.8% among HIV positive individuals is associated with previous condom use, male gender, lower educational status and knowledge of partner HIV status. Major reasons for non use of condom in this study were the belief that condom use reduces sexual pleasure, poor knowledge of the importance in condom use even in HIV positives individuals and the desire for childbearing. Therefore, there is a need to evolve an innovative counseling strategy that emphasis on the importance of secondary prevention towards the achievement of the zero new HIV infection goals as well as interventions targeted at improving the capacity of women to negotiate condom and safer sex practice. This should work through the interplay of adequate provision of prevention information, motivation to adopt the secondary prevention methods and regular behavioural skill building towards consistent condom use.

Conflict of interest statement

We declare that we have no conflict of interest.

Comments

Background

Although the prevention of HIV transmission to uninfected individuals is crucial to decrease the prevalence of this viral infection, the protected intercourse among persons infected with HIV is also essential to prevent the transmission of resistant virus strains as well as avoid super-infection among sero-concordant couples. Therefore it is necessary to identify the pattern and challenges of the condom used among HIV infected individuals in order to develop new strategies for the management of this important public health issue.

Research frontiers

The present report studied 302 HIV/AIDS individuals in the Nigerian Institute of Medical Reseach, Lagos, an important HIV care service in Nigeria by cross-sectional questionnaire.

Related reports

According to the authors, a few related studies were carried out in Africa and they showed some similarities to other reports.

Innovations and breakthroughs

Although some previous reports addressed the use of condom among HIV infected individuals, this paper shows new information, such as the low percentage of desire for conceptions as the reason for refusal to use condom. Perhaps this finding will go beyond and shows a typical pattern of people who live in the metropolitan area and it must be considered when designing and implementing preventive strategies, especially in large cities in Africa.

Applications

Data regarding as the use of condom among HIV positive individuals is very useful to improve or develops new strategies for an effective prevention program.

Peer review

This is a well performed study in which the authors identified several aspects of the use/non-use of condom among HIV positive in a metropolitan area in Nigeria. The results are interesting and useful for improvement and/or development of new strategies for an effective prevention program.

References

[1] UNAIDS. *AIDS epidemic update: November 2009*. Geneva: UNAIDS; 2009.

[2] National Agency for the Control of AIDs. Factsheet 2011: update on the HIV/AIDS epidemic and response in Nigeria. Abuja, Nigeria: National Agency for Control of AIDS; 2011. [Online] Available from: http://www.nigeriahivinfo.com/fact_sheets/hiv_fact_sheet_2011.pdf. [Accessed on 12 June 2013].

[3] Crum NF, Riffenburgh RH, Wegner S, Agan BK, Tasker SA, Spooner KM, et al. Comparisons of causes of death and mortality rates among HIV-infected persons: analysis of the pre-, early, and late HAART (highly active antiretroviral therapy) eras. *J Acquir Immune Defic Syndr* 2006; **41**(2): 194-200.

[4] Kozal MJ, Amico KR, Chiarella J, Schreibman T, Cornman D, Fisher W, et al. Antiretroviral resistance and high-risk transmission behavior among HIV-positive patients in clinical care. *AIDS* 2004; **18**(16): 2185-2189.

[5] Kovacs A, Wasserman SS, Burns D, Wright DJ, Cohn J, Landay A, et al. Determinants of HIV-1 shedding in the genital tract of women. *Lancet* 2001; **358**(9293): 1593-1601.

[6] Zhang H, Dornadula G, Beumont M, Livornese L Jr, Van Uitert B, Henning K, et al. Human immunodeficiency virus type 1 in the semen of men receiving highly active antiretroviral therapy. *N Engl J Med* 1998; **339**(25): 1803-1809.

[7] International HIV/AIDS Alliance. *Positive prevention: HIV prevention with people living with HIV. A guide for NGOs and service providers*. UK: International HIV/AIDS Alliance: 2007. [Online] Available from: http://www.aidsalliance.org/includes/Publication/Positive_prevention.pdf. [Accessed on 13 Feburary 2013].

[8] Fisher JD, Smith L. Secondary prevention of HIV infection: the current state of prevention for positives. *Curr Opin HIV AIDS* 2009; **4**(4): 279-287.

[9] Schiltz MA, Sandfort TG. HIV-positive people, risk and sexual behaviour. *Soc Sci Med* 2000; **50**(11): 1571-1588.

[10] Beyeza-Kashesya J, Kaharuza F, Ekström AM, Neema S, Kulane A, Mirembe F. To use or not to use a condom: a prospective cohort study comparing contraceptive practices among HIV-infected and HIV-negative youth in Uganda. *BMC Infect Dis* 2011; **11**: 144.

[11] Benki-Nugent S, Chung MH, Ackers M, Richardson BA, McGrath CJ, Kohler P, et al. Knowing a sexual partner is HIV-1-uninfected is associated with higher condom use among HIV-1-infected adults in Kenya. *Sex Transm Dis* 2011; **38**(9): 808-810.

[12] Chama C, Morrupa J, Gashau W. Sex and reproduction among HIV-infected people in Maiduguri, Nigeria. *J Obstet Gynaecol* 2007; **27**(8): 812-815.

[13] Adih WK, Alexander CS. Determinants of condom use to prevent HIV infection among youth in Ghana. *J Adolesc Health* 1999; **24**(1): 63-72.

[14] Dako-Gyeke P, Snow R, Yawson AE. Who is utilizing anti-retroviral therapy in Ghana: an analysis of ART service utilization. *Int J Equity Health* 2012; **11**: 62.

[15] Ikechebelu J, Mbamara SU, Joe-Ikechebebelu NN, Ezenwabachili AO. Sexual practices of people living with HIV in South Eastern Nigeria. *Niger J Clin Pract* 2009; **12**(4): 416-420.

[16] Ezeanochie M, Olagbuji B, Ande A, Oboro V. Fertility preferences, condom use, and concerns among HIV-positive women in serodiscordant relationships in the era of antiretroviral therapy. *Int J Gynaecol Obstet* 2009; **107**(2): 97-98.

[17] Dessie Y, Gerbaba M, Bedru A, Davey G. Risky sexual practices and related factors among ART attendees in Addis Ababa Public Hospitals, Ethiopia: a cross-sectional study. *BMC Public Health* 2011; **11**: 422.

[18] Wamoyi J, Mbonye M, Seeley J, Birungi J, Jaffar S. Changes in sexual desires and behaviours of people living with HIV after initiation of ART: implications for HIV prevention and health promotion. *BMC Public Health* 2011; **11**: 633.

[19] Obi SN, Ifebunandu NA, Onah HE, Onyebuchi AK. The impact of intervention on sexual practices of HIV positive individuals in southeast Nigeria. *Obstet Gynecol Int* 2009; doi: 10.1155/2009/127480.

[20] Akinyemi JO, Awolude OA, Adewole IF, Kanki PJ. Condom use among antiretroviral therapy patients in Ibadan, Nigeria. *J Infect Dev Ctries* 2010; **4**(8): 495-502.

[21] Olowookere SA, Adeleke NA, Fatiregun AA, Abioye-Kuteyi EA. Pattern of condom use among clients at a Nigerian HIV Counseling and Testing Centre. *BMC Res Notes* 2013; **6**: 289.

[22] Wulfert E, Wan CK. Condom use: a self-efficacy model. *Health Psychol* 1993; **12**(5): 346-353.

[23] Spire B, de Zoysa I, Himmich H. HIV prevention: what have we learned from community experiences in concentrated epidemics? *J Int AIDS Soc* 2008; **11**: 5.

[24] Milam J, Richardson JL, Espinoza L, Stoyanoff S. Correlates of unprotected sex among adult heterosexual men living with HIV. *J Urban Health* 2006; **83**(4): 669-681.

[25] Ragnarsson A, Ekström AM, Carter J, Ilako F, Lukhwaro A, Marrone G, et al. Sexual risk taking among patients on antiretroviral therapy in an urban informal settlement in Kenya: a cross-sectional survey. *J Int AIDS Soc* 2011; **14**: 20.