

## Factors Associated with the Use of Sexual Enhancers and Erectile Dysfunction Medications among Male Undergraduates aged 18-35yrs at Jomo Kenyatta University of Agriculture and Technology, Kenya

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### Abstract

*Background:* Oral erectile dysfunction medications and sexual enhancers have increasingly been used among young men without a medical indication. Recreational use of erectile dysfunction medication (EDMs) and sexual enhancers is associated with risky sexual behaviour and substance use. In recognition of the sexual health challenges facing the youth, this study sought to establish the level of utilization of sexual enhancers and EDMs and factors associated with their use among the male undergraduates at Jomo Kenyatta University of Agriculture and Technology, Kenya.

*Methods:* A concurrent nested design was used. It adopted a cross-sectional quantitative study design (through self-administered questionnaires) and a concurrent qualitative study (through Focus Group Discussions). Simple random sampling was used to obtain the required study participants for quantitative data (420 respondents) and convenience sampling for the qualitative data (48 respondents).

*Results:* Among the 420 respondents (aged  $21.7 \pm 2.03$  years), 82.9% ( $n=348$ ) had heard about EDMs and/or sexual enhancers but only 10% ( $n=42$ ) had used them. There was a significant relationship between EDMs and/or sexual enhancers use and age ( $P<0.001$ ), religion ( $P=0.013$ ), number of sexual partners ( $P=0.027$ ), number of 'one-night' stands ( $P=0.003$ ), and use of condom or knowledge of partner's status before intercourse ( $P=0.011$ ).

*Conclusion:* The prevalence of EDMs and/or sexual enhancers' use among the students was 10%. Risky sexual behaviour and substance abuse including alcohol consumption was associated with EDMs and/or sexual enhancers' use. The university social environment influenced sexual risk behaviour. Continuous awareness campaigns aimed at educating undergraduate students about the risks involved in the recreational use of EDMs and/or sexual enhancers should be done.

**Keywords:** Erectile dysfunction medication; sexual enhancers; risky sexual behaviour; recreational drug users.

### Introduction

The Food and Drug Administration (FDA)-approved drugs for Erectile Dysfunction (ED) include sildenafil (Viagra), tadalafil (Cialis), Cialis for daily use, vardenafil (Levitas), and Stendra (FDA, 2015). These erectile dysfunction medications (EDMs) are effective and well-tolerated for the treatment of erectile dysfunction of various etiologies (Rosen & Kostis, 2003; Goldstein *et al.*, 1998). It has been estimated that over 25 million men

worldwide have had a sildenafil prescription (Pfizer Inc.). Apart from the FDA-approved EDMs, vitamins, foods, supplements, herbs, and other natural sexual enhancers are also used to enhance the sexual experience.

Although erectile dysfunction medications are FDA-approved to treat erectile dysfunction, there is substantial evidence indicating that these drugs have increasingly been used as a sexual enhancement aid among men without any medical indication (Harte & Meston, 2011). This new phenomenon has raised public health

concerns regarding its association with increased sexual risk behavior (Gebreyohannes *et al.*, 2016). Studies that used samples of men who have sex with men (MSM) have shown that individuals who recreationally use sildenafil are between two and six times more likely to engage in unprotected intercourse with a partner with unknown or serodiscordant HIV status than non-users (Swearingen & Klauser, 2005). Recreational EDM users also report a higher number of sex partners (Kim, Kent, & Klausner, 2002; Cachey, Mar-Tang & Mathews, 2004) and approximately double the rate of sexually transmitted infections (STIs) including HIV infections (Kim *et al.*, 2002; Jackson, 2005).

Further studies have indicated that many men who seek medical help for sexual health issues have reported using sexual enhancers (Campbell *et al.* 2013). A study carried out by Gebreyohannes *et al.* (2016), showed that the prevalence of PDE5 inhibitor use among undergraduate students in an Ethiopian University was 5.5 % while cigarette smoking, other substance use, and a greater number of sexual partners was associated with PDE<sub>5</sub> inhibitor use. There is little regulation on the ingredients or dosage of the sexual enhancing supplements and thus, the health effects of these products are unknown. Some of the dietary supplements contain traces of Viagra which can be dangerous to men since Viagra enhances blood flow and can result in cardiovascular complications (Campbell *et al.* 2013). Studies have indicated that most of the sexual enhancers have no scientific evidence supporting claims that they can improve libido, erectile dysfunction, or sexual performance (Gebreyohannes *et al.*, 2016). The supposedly 'natural' products have traces of phosphodiesterase-5-inhibitors (PDE5Is), the medication found in prescription drugs such as Viagra used to treat impotence (Musacchio, Hatrich & Garafalo, 2006). PDE5Is are not legally allowed to be sold over the counter and men who use these medications without a physician's supervision run the risk of taking them inappropriately.

In Kenya, according to Gisesa (2012), most young men and especially college students buy sex enhancement drugs regularly, a trend that is worrying the health experts. The Kenya Pharmaceuticals Distributors Association acknowledges that the use of sex enhancement

drugs and other sex enhancers has been on the rise in recent years and its popularity was outperforming the most common painkillers. Men as young as 16 years are influenced into using these drugs and most of them do not suffer from erectile dysfunction that would necessitate the use of these drugs. Most sexually active young men are casually and recreationally using these drugs ignorant of their main purpose and the long-term effects on their sexual and overall health.

The lack of strong regulations on these drugs has made them easily accessible for people without a proper prescription from physicians. While the use of erectile dysfunction medication and sexual enhancers has become a common practice among Kenyan University students, no studies have assessed the prevalence of the EDMs and sexual enhancers use and associated factors among the undergraduate students at the Jomo Kenyatta University of Science and Technology, Kenya.

## Materials and Methods

The study was conducted at Jomo Kenyatta University College of Agriculture and Technology, main campus, a public university in Kenya, situated in Juja. The university offers courses in Technology, Engineering, Science, Architecture, and Building sciences. The university has a strong research interest in the areas of biotechnology and engineering.

A mixed-method study design, particularly a concurrent nested design was used. The study population consisted of male undergraduate students aged 18-35 years from JKUAT main campus in Juja, Thika District who willingly accepted to participate in the study. Self-administered questionnaires were used to collect quantitative data including the demographics information, the utilization, the acquisition, and the factors associated with the utility of the EDMs and sexual enhancers. For the questionnaires, simple random sampling was used to obtain the required number of respondents from the sampling frame using Epi Info. Focus group discussions (FGDs) were used to get qualitative data that provided in-depth information about the lifestyle, individual, structural, and socio-cultural factors that influence the use of sexual enhancers and EDMs among university students. Convenient sampling through the snowballing technique was used to

obtain the students to be included in the Focus Group Discussions.

SPSS was used for qualitative data analysis. In SPSS, several assessments such as descriptive statistics were done to obtain the required outcomes. Frequencies and percentages were used to present summary statistics of sociodemographic data, sexual intercourse history, and extent of PDE5 inhibitor use. Bivariate analysis was conducted to determine the relationship between the use of the EDMs and/or sexual enhancers and all variables. The significant variables identified by the bivariate analysis were included in Binary logistic regression analysis for further analysis. A  $p < 0.05$  was set to be statistically significant. The data from focus group discussions (FDGs) was first transcribed before subjecting it to a manual thematic content analysis using Nvivo software.

## **Results**

### **Characteristics of the Study Participants**

#### **Socio-demographic characteristics**

A total of 420 participants were enrolled in the study. The mean age of the participants was  $21.7 \pm 2.03$  ranging between 18 and 35 years. The data indicated that 65.0% (n=273) of the participants were single; 75.7% (n=318) were Christians; 51.9% (n=218) were from middle income households; 48.8% (n=205) were from semi-urban areas; 29.5% (n=155) were in 3<sup>rd</sup> year; 23.6% (n=99) were from the College of Human Resource Development; and 70.5% (n=296) were living outside campus.

A total of 48 participants took part in the four FDGs conducted. The mean average of the study participants was 21 years ranging between 18 and 25 years. Most of the participants were aged between 21 and 22 years. The majority of the study participants were Christians (30), followed by other religions (12) and the least were Muslims (6). Most of the participants were single (35) while few were in a relationship (13).

#### **EDMs and/or sexual enhancers use**

When asked about knowledge of EDMs and/or sexual enhancers, 65.5% (n=275) of the respondents reported that they had learned about them before joining campus. Of the participants, 10.0% (n=42) reported that they had used EDMs and/or sexual enhancers. Of EDMs and or sexual enhancers users, 50 % (n=21) used Viagra and

the remaining used other types of EDMs and sexual enhancers. Among the users, 40.5 % (n=17) mentioned a friend as their source of information, 57.1% (n=24) reported that they used them rarely (less than half the time), 26.6% (n=12) reported that they knew the dosage of the EDMs or sexual enhancers while the rest did not know. Among the 42 who reported use of EDMs and/or sexual enhancers, 26.2% (n=11) used them to increase erectile sensation; 21.4% (n=9) out of curiosity; 21.4% (n=9) to impress or satisfy partner; 16.7% (n=7) to enhance self-esteem; 7.1% (n=3) to decrease libido; and 7.1% (n=3) to increase rigidity. On concomitant use of the EDMs and/or sexual enhancers with other drugs, 78.6% (n=33) of the users reported that they had combined them with illicit drugs with most of them taking alcohol 73.8% (n=31).

According to the findings, 83.3% (n=35) of users mentioned that it is easier to access the EDMs and/or sexual enhancers. Most of the students 33.3% (n=14) acquired them from a friend and 23.8% (n=10) from online pharmacies. Among the EDM and/or sexual enhancers users, 64.3 % (n=27) felt that they are satisfactory and 66.9% (n=28) of the users wished to use them again. The study participants mentioned the major side effects after taking the EDMs and/or sexual enhancers as 40.5% (n=17) headache; 21.4% (n=9) dizziness; 16.7% (n=7) longer erections than expected; 14.3% (n=6) sensitivity to light; 4.8% (n=2) flushing; and 2.4% (n=1) blurred vision.

#### **Sexual Behaviour**

The findings indicate that 28.7% (N=119) of the study participants reported having had 2 sexual partners in the past six months followed by 25.5% (n=107) who reported having had 3-5 sexual partners within the same period. From the participants, 60.7% (n=255) reported that their total number of lifetime sexual partners was 1-10 followed by 35.0% (n=147) who reported 11-20 sexual partners. Furthermore, 31.0% (n=134) reported to have never had any 'one-night stand,' 27.9% (n=117) mentioned that had 1, while 26.7% (n=112) mentioned that had 2-5 'one-night stands.' The results also show that 50.5% of the participants used a condom or had knowledge of partners' HIV status before intercourse; 36.7% (n=154) did it sometimes, and 12.9% (n=54) did not do it. The majority 86.7% (n=364) of the participants mentioned

that they had not engaged in unprotected sex with a partner when showing symptoms of an STI.

### **Factors associated with EDM and/or sexual enhancers use**

The Independent T-test indicated a significant difference in the mean age of users and non-users ( $t_{418} = 4.217$ ,  $p < 0.001$ ). The mean age for users was 1.37 [95% CI 0.729-2.001] higher than the mean age for non-users. Therefore, older students were more likely to use EDMs and/or sexual enhancers.

Bivariate analysis indicated that most of the socio-demographic factors were not associated with EDMs or sexual enhancers use except religion and year of study. The findings indicated that Muslim students were 5.201 [ $P = 0.006$ , {95% CI= 0.797- 31.616}] times less likely to use EDMs or sexual enhancers compared to other religions. The year of study also demonstrated an association. Fifth-year students were 6.250 [ $P = 0.003$ , 95% CI=1.725-40.749] more likely to use EDMs and/or sexual compared to first-year students. Second-year students were 1.882 [ $P < 0.001$ , 95% CI= 1.132 - 3.127] less likely to use EDMs and/or sexual enhancers compared to fifth-year students. Third-year students were 1.485 [ $P < 0.001$ , 95% CI= 1.066-2.069] times less likely to use EDMs and/or sexual enhancers than fifth-year students. Fourth-year students were 1.603 [ $P = .002$ , 95% CI= 1.037-2.477) times less likely to use EDMs than fifth-year students.

Risky sexual behaviour was also associated with EDMs and/or sexual enhancers' use. For instance, students who reported no sexual partner in the past six months were 3.650 [ $P < 0.001$ , 95%CI= 1.368-9.744] times less likely to use EDMs or sexual enhancers compared to those who reported more than 5 sexual partners. Respondents who reported 0 'one-night' stands were 4.895 [ $P = < 0.001$ , 95 CI = 1.987-12.060] times less likely to use EDMs and/or sexual enhancers compared to those who reported more than 5 'one-night' stands. Risky sexual behaviours such as having many lifetime sexual partners, not using a condom, and having sexual intercourse with a partner who is showing symptoms of STI were also associated with the use of EDMs and/or sexual enhancers.

Multivariate logistic regression indicated that Muslim students were 0.058 [ $P = 0.013$ , 95%CI=

0.006-0.545] times less likely to use EDMs and/or sexual enhancers compared to those not identifying with a religion. Other factors that showed an association with a P-value  $< 0.05$  include a high number of sexual partners, a high number of 'one-night stands' and not using a condom, or knowing about partner's HIV status before sexual intercourse. Students who reported that they did not use a condom or have knowledge of a partner's status before intercourse were 3.970 [ $P = 0.011$ , 95%CI 1.379-11.427] times more likely to use EDMs and/or sexual enhancers compared to those who did.

### **Focus Group Discussions**

#### **Attitude and Practice**

The two themes identified were attitude and practice. Under attitude, we identified the respondent reasons for using EDMs and/or sexual enhancers were mainly to boost self-esteem and confidence. The respondents also indicated that pressure from partners to perform well increased the need for use. Furthermore, alcohol facilitates the use of EDMs and/or sexual enhancers. Under the practice theme, we identified the different types of EDMs and/or sexual enhancers used to include Viagra, Cialis, and Vega 100. Students indicated that the EDMs were readily available and accessible. Factors that influence use among university students include drugs and alcohol; peer pressure; university life; influences from the media; religion; age; independent living; curiosity; social expectations; and family values. The students reported reduced or lack of access to sexual services and education in the university.

#### **Discussion**

Shortly after Viagra was launched in 1998, researchers started reporting its recreational use among young men. For the last two decades, an increasing number of young men without a proper diagnosis of erectile dysfunction have been taking EDMs and other sexual enhancers aiming to increase their sexual performance. Smith and Romanelli (2005) identify an increasing use among young and healthy men. Korke et al. (2008); Bechara et al. (2010); Harte & Meston (2012); and Freitas et al. (2012) have also reported the use of EDMs by young healthy men (especially college students) without any medical indication. One of the major concerns regarding the purchase of EDMs

without proper prescription from a physician is the lack of knowledge about the existing comorbidities and contraindications. The present study investigated the use of EDMs and/or sexual enhancers in a Kenyan university student population and established whether the use was recreational or medical as well as other factors associated with use.

Factors associated with the use of sexual enhancers and/or EDMs among the students ( $P < 0.05$ ) were older students, not identifying with a religion, sexual risk behaviour (high number of sexual partners in the past six months, a high number of sexual partners in life, a high number of 'one-night' stands, and unprotected sex), drinking alcohol, smoking marijuana, and using khat (miraa).

The findings, further demonstrated that 10% ( $n=42$ ) of the participants used EDMs and/or sexual enhancers. Most of the EDM users consumed the drugs without a proper medical indication and prescription. The 10% prevalence is an indication that the recreational use of EDMs and/or sexual enhancers has become a problem in Kenya. EDM use among young men without any medical indication leads to reduced confidence in gaining and holding erections without the EDMs and/or sexual enhancers. These findings are not consistent with the studies by Harte and Meston (2011) at 4%; Santtila et al. (2007) at 2.6 %; Gebreyohannes et al. (2016) at 5.5%; and Musacchio et al. (2006) at (6%). The prevalence is slightly higher for this study because it included both erectile dysfunction medications and other sexual enhancers while the other study primarily focused on EDMs especially Viagra.

The results further indicated that young male students use EDMs and/or sexual enhancers to increase erectile sensation (26.2%); out of curiosity (21.4%); and to impress a partner (21.4%). The findings are consistent with Pantalone, Bimbi, & Parsons (2008) who indicated that the young males used Viagra to increase erectile sensation and for curiosity purposes. Further explanation regarding the use of EDMs to impress the partner emerged from the FDGs indicating:

*"In the current world of unstable relationships, most young men live in constant fear of their girlfriends walking out if sexual performance does not meet their sexual desires. Women openly criticize you if you underperform*

*in the bedroom, you just have to seek help elsewhere when it is necessary."*

The type of EDMs used include: Viagra at 50.0% ( $n=21$ ) and herbal aphrodisiacs at 28.6% ( $n=12$ ). Viagra is the most common and different studies conducted in Brazil -Korkes et al. (2008) and McCambridge, Mitcheson, Hunt, and Winstock (2006); the United States- Fisher et al. (2006); the United Kingdom- Daskalopoulou et al. (2014); Spain- Garin et al. (2017); Vienna- Grabovac et al. (2018); and Ethiopia- Gebreyohannes et al. (2016) have primarily focused on Viagra. However, Prostate.com (2015) identifies other herbal aphrodisiacs and supplements that are being sold commercially. The following also emerged from the FDGs:

*"The blue pill, Viagra is the most common"*  
*"I also know of Vega 100, African Viagra, Alvoy, Enzoy, Cialis, and Mkhombero (a herbal aphrodisiac)"*

In this study, most of the users (64.3 %) indicated that they felt like the EDMs and/or sexual enhancers were 'satisfactory' regarding how they enhanced their sexual performance. These findings are consistent with a study conducted in Saudi Arabia by Alshahrani et al. (2016) who reported that 69.2% of the EDM users indicated that these drugs improved their sexual performance which was manifested by increased erectile duration or enhanced erections.

From the study, 33.3% acquired EDMs from a friend; and 23.8% from online pharmacies. Only 4.8% of the users reported that they obtained the drugs from the pharmacies with a prescription from a physician. The findings corroborate the results by Gebreyohannes et al. (2016), which indicated that 56.5% of the participants indicated that they could access PDE5 inhibitors drugs easily through friends while others reported easy access to the EDMs as other non-prescribed drugs. Bechara et al. (2010) indicated that 75.4% of the recreational EDMs users acquired them from a friend while only 2.9% through the internet. The internet source was not as pervasive as it is now, hence, the significant difference from the present study which identifies the internet as a key source of acquisition. The following also emerged from the FDGs:

*“Currently, these drugs come cheap and with as little as Kshs 50, you can get one kind or the other. Like Enzoy is sold at Kshs. 50 a sachet.”*

*“Some of these drugs and supplements are sold online. I have encountered a lot of business pages on Instagram and Facebook selling these products. In fact, Jumia also sells these pills to online shoppers.”*

The study indicated that 73.8% used alcohol and 26.2% used marijuana concomitantly with the EDMs and/or sexual enhancers. These results are consistent with the studies done by Pantalone, Bimbi, & Parsons (2008) as well as Gebreyohannes et al. (2016) who established that 71.5% of the EDM users preferred using them with alcohol and other illicit drugs. The following also emerged from the FGDs:

*“There is this notion that when one is really drunk, they may underperform sexually and some of us go for the blue pill to boost our confidence. When you smoke bhang, chew Miraa (khat), or use other drugs, you end up losing your manly strength. When you are too drunk, in most cases you don't have so much energy to satisfy a woman.”*

In the present study, the relationship between EDMs and/or sexual enhancer use and the age of the respondents was significant ( $P < 0.001$ ). From the findings, EDMs and/or sexual enhancers use was reported more in older students than younger ones. The independent T-test showed that older students were more likely to use EDMs compared to younger ones. These findings are further buttressed by the FDGs which determined that older students were more likely to engage in risky sexual behaviour compared to the younger ones.

*“Older students know where to get the EDMs and sexual enhancers, they also know where to get casual sex.”*

The bivariate analysis also showed that first-year students were less likely to use EDMs and/or sex enhancers compared to fifth-year students. The following statements also emerged from the FDGs to corroborate these findings:

*“First-year students are the least exposed ones and may not engage in risky sexual behaviours. But after some time and succumbing to the peer pressure, they get into the system. Older students know where to get the EDMs and sexual enhancers, they also know how and where to get casual sex.”*

Religion was statistically significant ( $P = 0.006$ ) with Muslim students being less likely to use EDMs. Bivariate analysis indicated that Muslim students were 5.201 [95% CI = 0.797- 31.616] times less likely to use EDMs or sexual enhancers compared to other religions. These findings support the results from a study by Daskalopoulou et al. (2014) who identified that not identifying with religion was significantly associated with the use of multiple drugs including EDMs. From the FDGs the following statement emerged:

*“Our religion does not encourage engaging in sexual activities before marriage and our parents also remind us about not engaging in promiscuity and abstinence”*

Bivariate analysis exhibited a significant relationship between EDM and/or sexual enhancers' use and sexual behaviour. For instance, students who reported no sexual partner in the past six months were 3.650 [ $P < 0.001$ , 95%CI = 1.368-9.744] times less likely to use EDMs or sexual enhancers compared to those who reported more than 5 sexual partners. Respondents who reported 0 'one-night' stands were 4.895 [ $P < 0.001$ , 95 CI = 1.987-12.060] times less likely to use EDMs and/or sexual enhancers compared to those who reported more than 5 'one-night' stands. The following statements emerged from the FDGs.

*“When drunk, especially after nights of clubbing, it is very possible to engage in unprotected sex. Some of us have even had unprotected sex with prostitutes, orgies, and even casual sex while drunk.”*

From the multivariate analysis, students who reported that they did not use a condom or have knowledge of a partner's status before intercourse were 3.970 [ $P = 0.011$ , 95%CI 1.379-11.427] times more likely to use EDMs and/or sexual enhancers compared to those who sometimes used the condom or knew the partner's status before intercourse. These findings are consistent with a study done in the United States that indicated a relationship between Viagra use and risky sexual behaviours like engaging in unprotected sex (Fisher et al., 2006).

The respondents from the current study who reported 0-10 lifetime sexual partners were 1.472 [ $P < 0.000$ , 95% CI = 1.066-2.032] times less likely to use EDMs and/or sexual enhancers compared to those who reported 21 and above

lifetime sexual partners. These findings are consistent with a study by Sherr et al. (2000) who concluded that EDM users had a greater number of sex partners in comparison to non-users. Swearingen and Klausner (2005) showed an association between Viagra use and sexual risk behaviour, as well as a higher risk for STDs, such as HIV infection.

These findings were further supported by a study indicating that the use of Viagra recreationally was associated with sexual risk behaviour and was not used exclusively to increase sexual performance (Colfax et al., 2001). A study conducted in Australia further demonstrated an association between PDE<sub>5</sub> inhibitor use and increased risk of HIV infection among adventurous gay communities (Prestage et al., 2009). Respondents from the current study who reported not to have engaged in unprotected sex while showing symptoms of an STI were 1.368 [P=0.010, 95% CI .979 -1.910] times less likely to use EDMs and/or sexual enhancers compared to those who reported having engaged in unprotected sex while showing STI symptoms. Daskalopoulou (2014) corroborates these findings by indicating that polydrug use including EDMs is strongly associated with unprotected sex. The study was conducted in the UK and showed that polydrug users including EDMs users are likely to be a group at an especially high risk of transmission of HIV and other STIs.

Healthy young men have continued to use EDMs and/or other sexual enhancers due to easy access of the drugs. These drugs have well-identified risks that these young men need to know about including cardiovascular risks and drug dependence. Reports of dangers of EDMs abuse range from unsafe sex practices and increased risk of sexually transmitted infections (STIs) to fatal drug interactions. Harte and Meston (2012) also determined that most of the recreational users mixed ED drugs with other illegal drugs and engaged in sexual risk behaviour. This current study corroborates these findings as it demonstrates that EDMs and/or sexual enhancers use is associated with a higher number of sexual partners, a greater number of

‘one-night’ stands, heightened levels of unprotected sex as well as substance use.

University lifestyle encourages sexual risk behaviours as established in the FGDs. Independent living for the students denotes a lack of social censure from community members which enables them to experiment with drugs and alcohol and engage in sexual activities.

*“In the university, binge drinking, casual sex, multiple sexual partners, and use of drugs is expected and is part of our social life.”*

*“If we lived with our parents, it would be almost impossible to enjoy some of these things.”*

Studies by Kithuka (2014) and Chanakira et al. (2014) indicated that the university lifestyle’s social context was observed to affect risky sexual behaviours through increased sex opportunities, high consumption of alcohol, expectations of a stereotypical highly sexually active student, and liberation from moral scrutiny.

## **Conclusion**

*In this study, the prevalence of erectile dysfunction medication (EDMs) and/or sexual enhancer use among the students was 10%. Socio-demographic factors such as age, year of study, and religion had a significant association with EDMs and/or sexual enhancers’ use. Alcohol consumption and substance use as well as risky sexual behaviours including engaging in unprotected sex, and a high number of ‘one-night stands’ were associated with EDMs and/or sexual enhancers use among the students. Structural, individual, and lifestyle factors that make up the university social environment play a significant role in influencing sexual risk behaviours and the use of EDMs and/or sexual enhancers among university students. The findings demonstrate a need for continuous awareness campaigns aimed at educating undergraduate students about the risks involved in the recreational use of EDMs and/or sexual enhancers should be done. Further longitudinal follow-up studies of young healthy men who start using EDMs and/or sexual enhancers for recreational purposes should be done to determine the effects of these drugs in young and healthy men.*

## Figures and Tables

**Table 1.** EDMs and sexual enhancers use in relation to socio-demographic factors

Variables	Used EDMs	Did not use EDMs	95% CI of O.R.			
	<b>N=42</b>	<b>N=378</b>				
	<b>N %</b>	<b>N %</b>	<b>OR</b>	<b>Lower</b>	<b>Upper</b>	<b>P-value</b>
<b>Relationship</b>						
Single	24 (57.1%)	249(65.9%)	1.297	.423	3.977	.649
In a relationship	13 (31.0%)	91(24.1%)	0.967	.728	1.285	.826
Married	1(2.4%)	2(0.5%)	.294	.032	2.679	.269
Engaged	0(0.0%)	4(1.1%)	.889	.792	.998	.482
Unspecified	4 (9.5%)	32 (8.5%)	Ref			
<b>Religion</b>						
Christian	34 (81.0%)	284 (75.1%)	1.074	.689	4.052	.252
Muslim	1(1.7%)	59 (98.3%)	5.021	.797	31.616	<b>.006</b>
Other	7 (16.7%)	35 (83.3%)	Ref			
<b>Socio-economic status</b>						
Low Income	10 (23.8%)	92 (24.3%)	.950	.636	1.419	.807
Middle Income	19 (45.2%)	199 (52.6%)	.999	.794	1.259	.996
High Income	7 (16.7%)	24 (6.3%)	.512	.279	.941	.056
Unspecified	6 (14.3%)	63 (16.7%)	Ref			
<b>Place of origin</b>						
Urban	10 (23.8%)	95 (25.1%)	1.138	.699	1.853	.586
Semi-urban	19 (45.2%)	186 (49.2%)	1.107	.539	1.322	.475
Rural	13 (31.0%)	97 (25.7%)	Ref			
<b>College</b>						
Pure and Applied Sciences	5 (11.9%)	84 (22.2%)	1.353	.683	2.682	.324
Agriculture	6 (14.3%)	67 (17.7%)	1.100	.597	2.025	.751
Engineering and technology	10 (23.8%)	72 (19.0%)	.893	.582	1.371	.625
Human Resource and Development	14 (33.3%)	90 (23.8%)	.871	.626	1.212	.452
Health Sciences	7 (16.7%)	65 (17.2%)	Ref			
<b>Year</b>						
1 <sup>st</sup> Year	1 (2.4%)	25(6.6%)	6.250	1.725	40.749	<b>.003</b>
2 <sup>nd</sup> Year	8 (19.0%)	116 (30.7%)	1.882	1.132	3.127	<b>&lt;.001</b>
3 <sup>rd</sup> Year	14 (33.3%)	141 (37.3%)	1.485	1.066	2.069	<b>&lt;.001</b>
4 <sup>th</sup> Year	10 (23.8%)	81 (21.4%)	1.603	.170	.641	<b>.002</b>
5 <sup>th</sup> Year	9 (21.4%)	15 (4.0%)	Ref			
<b>Residence</b>						
Resident on campus	12 (28.6%)	112 (29.6%)	1.880	.477	7.410	.340
Non-resident	30 (71.4)	266 (70.4%)	Ref			

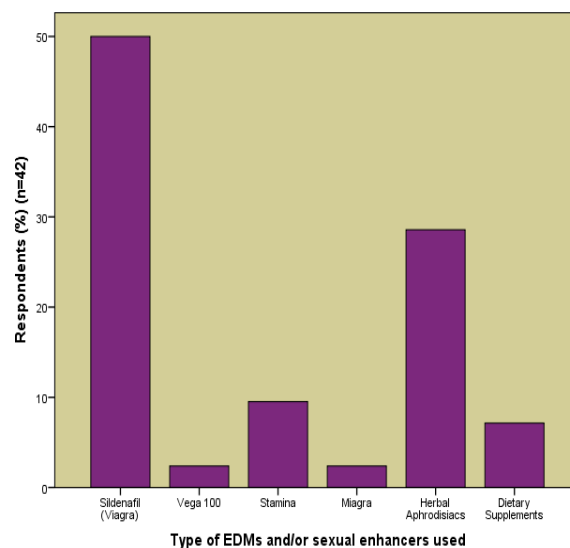


**Table 2.** EDMs and sexual enhancers use in relation to Sexual behaviour

Variables	Used EDMs	Did not use EDMs	95% CI of O.R			
	n=42	n=378				
	N %	N %	OR	Lower	Upper	P-value
<b>No. of sexual partners in the past six months</b>						
0	3 (7.1%)	94 (24.9%)	3.650	1.368	9.744	< <b>0.001</b>
1	2 (4.8%)	77 (20.4%)	4.924	1.403	17.286	< <b>0.001</b>
2	8 (19.0%)	111(29.3%)	1.966	1.184	3.263	< <b>0.001</b>
3-5	20 (47.6%)	87 (23.0%)	1.314	1.021	1.691	<b>.004</b>
More than 5	9 (21.4%)	9 (2.4%)	Ref			
<b>No. of lifetime sexual partners</b>						
0-10	13 (31.0%)	242 (64.0%)	1.472	1.066	2.032	< <b>0.001</b>
11-20	22 (52.4%)	125 (33.1%)	1.212	.981	1.497	<b>0.012</b>
21 and above	7 (16.7%)	11 (2.9%)	Ref			
<b>No. of 'one-night' stands</b>						
0	4 (9.5%)	130 (34.4%)	4.895	1.987	12.060	< <b>0.001</b>
1	6 (14.3%)	111 (29.4%)	3.398	1.668	6.923	< <b>0.001</b>
2-5	11 (26.2%)	101 (26.7%)	2.145	1.315	3.497	< <b>0.001</b>
More than 5	21 (50.0%)	36 (9.5%)	Ref			
<b>Use of a condom/knowledge of partners status before intercourse</b>						
No	10 (23.8%)	44 (11.6%)	.547	.321	.932	<b>0.042</b>
Yes	19 (45.2%)	193 (91.0%)	.973	.720	1.315	0.862
Sometimes	13 (31.0%)	141 (37.3%)	Ref			
<b>Engaging in Unprotected sex while showing symptoms of an STI</b>						
No	27 (64.3%)	337 (89.2%)	1.368	.979	1.910	<b>0.010</b>
Yes	15 (35.7%)	41(10.8%)	Ref			

**Table 3.** Binary Logistic Regression

Predictor variables	B	S.E (β)	Df	Adjusted OR	95% CI for OR		
					Lower	Upper	P-Value
<b>Religion</b>							
Christian	-0.669	.525	1	.512	.183	1.434	.203
Muslim	-2.849	1.144	1	.058	.006	.545	<b>.013</b>
Other	Ref						
<b>No. of sexual partners in the past 6 months</b>							
0	-2.015	.912	1	.133	.022	.797	<b>.027</b>
1	-2.557	.964	1	.078	.012	.513	<b>.008</b>
2	-1.682	.717	1	.186	.046	.759	<b>.019</b>
3-5	-0.628	.618	1	.534	.159	1.793	.310
More than 5	Ref						
<b>No. of 'one-night' stands</b>							
0	-2.066	.706	1	.127	.032	.505	<b>.003</b>
1	-1.531	.578	1	.216	.070	.671	<b>.008</b>
2-5	-1.205	.482	1	.300	.116	.773	<b>.013</b>
More than 5	Ref						
<b>Use of a condom/knowledge of partner's status before intercourse</b>							
No	1.379	.539	1	3.970	1.379	11.427	<b>.011</b>
Yes	.518	.431	1	1.679	.722	3.908	.229
Sometimes	Ref						



**Figure 1.** Types of EDMs and/or sexual enhancers used

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