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CONCORDANCE BETWEEN SELF-REPORT PSYCHOACTIVE SUBSTANCE USE AND URINE DRUG TEST AMONG STUDENTS OF UNIVERSITY OF ILORIN, NIGERIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

The prevalence of psychoactive substance use is increasing globally, and university students are not left behind. Self-report, using questionnaire has been the common method of assessing substance use amongst the students' population. This is, however, fraught with problems of poor reporting and intentional lie. Urine Drug Test (UDT) is a biochemical method that tests the recent use of substances either as a direct test of the psychoactive substance or its metabolite(s). This cross-sectional study aims to study the concordance between self-report and UDT amongst students' population. Two thousand five hundred and fifty students of the University of Ilorin, Nigeria completed a questionnaire based on the World Health Organization (WHO) guidelines for student substance-use surveys. Substances investigated in the survey were alcohol, cigarettes, cannabis, strong and mild stimulants, hypno-sedatives, cocaine, opiate, organic solvents, and hallucinogens. A subset of the total population, made of three hundred and two of the students were, subsequently, selected to participate in the urine drug test using a commercially available 12-items UDT kit. The reported lifetime and current prevalence of the substances were: tobacco, 11.5% and 3.7%; alcohol, 38.4% and 15.4%; cannabis, 9.0% and 3.8%; stimulants 32.5% and 15.8%; sedatives 11.7%, 4.8%, opioids 25.3% and 7.6%; cocaine was 4.7% and 1.6%; Hallucinogenic substances lifetime prevalence was 6.6% and a current prevalence of 1.4%. The lifetime prevalence for solvent use was 7.4% while current use was 1.6%. There was discordance between the outcome of the self-report and the result of UDT. Many respondents who tested positive for one substance or the other did not self-report ever using the substance. In conclusion, there is discordance between self-report and results of the UDT. Many students who did not report ever use of psychoactive substances tested positive for substances. This study further emphasized the superiority of UDT over self-report for psychoactive substances among university students. We

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recommend that whenever suspicion of possible psychoactive substance use is made among university students, UDT should be the method of assessment. UDT is equally encouraged in school clinics and sports centres.

Key Words: UDT, Self-Report, Psychoactive Substances, Students

INTRODUCTION

Psychoactive substance use is a major global public health issue (UNODC, 2018). The United Nations Office on Drugs and Crimes (UNODC) reported in 2013 that between 167 and 315 million people or 3.6%–6.9% of the adult population between the ages of 15 and 64 years used an illicit substance in that preceding year (UNODC, 2013). Among the youth, it has become an epidemic problem and already impacting deleteriously on health, family, society, education, and professional life of the affected youths (Moss, 2013; Hans et al, 2018; Chadi et al, 2019). The university period is a phase when students gain relative independence and self-determination while away from direct adult and family supervisions and, thus, able to make some self-decision even while under academic pressures. At this time, they share living quarters with strangers, form new social groups, balance social engagements with academic and other life responsibilities, and may be exposed to normative values cherished by the youth culture that differ from parental values (Makanjuola et al, 2007; Deressa & Azazh, 2011; Babalola et al, 2014). These apparent norms inspire the youth to indulge in harmful behaviours such as substance use (Steyl & Phillips, 2011). Similarly, University students make the transition from the restricted life dictated by parents to a more self-directed life influenced by the university environment (Skidmore et al, 2016). Hence, the possibility of substance use is increased in university environments (Skidmore et al, 2016; Viohl et al, 2019). Putting these together, university students are, at elevated risk of substance use due to social and education (instrumental use) related factors.

Substance abuse in adolescence increases the possibility of harmful behaviours at that stage of development and extends into adulthood (Deressa & Azazh, 2011; Steyl & Phillips, 2011; Viohl et al, 2019). Examples of behaviours that have been related with substance abuse include impaired driving, interpersonal violence, poor educational performance, disturbed family and interpersonal relationships, and criminal activities (Skiba et al, 2004). Studies have reported that students who used illegal drugs (such as cocaine LSD, amphetamine, etc.) and about the same proportion who used alcohol had committed substance-related crimes in the present academic year. The commonest offenders as it concerns both drug and alcohol-related crimes were males, those who often went out to socialize, frequent users of nightclubs off campus, and those in poor physical or mental health (Bennett, &

Holloway, 2018). They are also likely to have self-care problems and have difficulties with sleep (Colomer-Pérez, 2019; Navarro-Martínez et al, 2020). The negative effects associated with substance use in adolescence also include low school results, delinquency, and risky sexual behaviours (Ellickson et al, 2003; Baskin-Sommers & Sommers, 2006). Because of these myriads of probable adverse consequences, studying substance use and misuse among students is highly imperative.

Reports have shown that assessments of substance use in the community are fraught with refutation and under-reporting (NIDA, 2021). Self-report (questionnaire assessment) is a cheaper means of assessing substance use and is particularly apt for studies involving many respondents (Richter & Johnson, 2021). As a result of the significant concern that societal, family, and legal pressures against drug and alcohol use and fear of reprimand by authorities (such as schools) may lead to non-disclosure or incomplete disclosure by adolescents and adults raises questions about the adequacy of using self-report (Large et al 2012). Under-reporting may be authenticated with biological measures such as urine drug tests for the substance of abuse because most of them are detectable in urine (de Beaurepaire et al, 2007). However, the snag is that most substances in the urine have a limited period of detection of about 72 hours after the last use, though varies from one substance to the other (Levy & Schizer, 2015). For example, cocaine metabolites have short period of being detected, usually 1 to 2 days; marijuana discovery in urine samples varies from a few days in case of infrequent smokers to several weeks after the last use by protracted users, because marijuana metabolites are kept in adipose tissue from where they are subsequently excreted (Levy & Schizer, 2015).

There is a dearth of study on the use of urine drug testing in the assessment of substance use among university students in Nigeria. Hence, this study aimed to assess substance use among university students using both questionnaire and urine toxicology and to compare the two outcome measures. The study determined the concordance between urine drug tests and questionnaire assessment for psychoactive substance use among students of the University of Ilorin, Nigeria.

The specific objectives were:

To determine the prevalence (lifetime and recent) of substance use among university of Ilorin students using a self-assessment questionnaire

To conduct urine tests for psychoactive substance use among University of Ilorin students.

To determine the concordance between the two methods in the assessment of substance use among students at the university of Ilorin.

METHOD

Settings

The study was carried out during the 2018/2019 academic session at the University of Ilorin, one of the Public

Universities in Nigeria. The city of Ilorin, the capital of Kwara State, is about 300 km from Lagos and 500 km from Abuja, the country's administrative capital.

The University had a stable academic calendar spanning close to two decades of an uninterrupted calendar and ranked among the best five Universities in Nigeria, at the time of the study. These two attributes made the institution one of the most sought in Nigeria.

Participants

The participants (respondents) were undergraduate students of the University of Ilorin who consented to take part in the study. The students must have matriculated and pursuing a course of study, preliminary students and pre-matriculation students were, thus, exempted

Sample Size

Sample size for populations > 10, 000 was calculated using the formula by Kish (Kish, 1965).

$$n = \frac{z^2 pq}{d^2}$$

Where n = the desired sample size
Z = the standard normal deviate set at 1.96 (95% confidence level)
P= the estimated lifetime prevalence of substance use in this population (assumed unknown), so 50% used in calculation (Kish, 1965).
q=1-p. Therefore, q= 1-0.5= 0.5
d= absolute precision or sampling error tolerated =5%
n=1.962 x 0.50 x 0.5/0.052
n=384.16, approximately 384, which was the minimum sample size.

Assuming an attrition rate- 10%; 10% of 384 is 38.4, approximately 38, giving a final minimum sample size (sample size plus attrition rate) of 422.

Sample Bias

When conducting drug studies among students, a sample size between 2000 and 3000 students (irrespective of the population size) produces a reliable assessment of the prevalence of substance use in the target population (UNODC, 2003). The total sample was clustered based on the faculties. Each Faculty was clustered according to the Departments and the Departments were stratified according to the levels. At each level, after due consultations and arrangements for a suitable time, a random sample of respondents who consented to partake in the study were interviewed using the socio-demographic data collection sheet and the WHO Students Drug Use Survey Questionnaire by Smart et al (Smart et al, 1980). Subsequently, a subset of about 10% of respondents was done and their freshly voided urine was tested for common substances of abuse using the "One Step Drug Screen Card in Multi-Panel" made by the IND Diagnostic Incorporation of Canada, according to the manufacturer's instructions (IND Diagnostic Incorporation, 2018). The intention here was to select a subset of the total sample haphazardly. The research assistant, a laboratory scientist, was instructed to select about 10% of the students wherever he went. At the end of the study 302 (11.8%) had been selected.

All consenting students completed a modified semi-structured self-report questionnaire based on World Health Organization's guidelines for student substance use survey. The instrument had been previously used and found reliable and valid among Nigerian students (Adelekan et al, 2001; Makanjuola et al, 2007).

Variables

Respondents were asked questions on ever use of specific groups of psychoactive substances, to which they responded with a "Yes" or "No". They were also asked about the regularity of use of psychoactive substances with the following options: Not applicable, I have never taken it before, I took it only on a few occasions but stopped more than 12 months ago, I still take it only occasionally (1-2x/month), I take it fairly regularly (2-3x/week) and I take it daily. The substances referred to in the questionnaire include: Cigarettes /Tobacco (Including Sisha) Alcohol (i.e Beer; Stout, Wine, Smirnof, Hot drinks, Palm wine. Ogogoro, etc) Cannabis (Indian Hemp, Igbo, Ganja, Marijuana, Wee-Wee, Skunk, arizona) Drugs and substances which keep you awake and make you read or work more (e.g. Ephedrine, Pro-Plus, Amphetamine (Dexa), Ritalin, Kolanut, Coffee) Sleeping Drugs (Rohypnol, Refnol, , Roche, Valium, Librium, Mogadon, Mandrax, Soneryl) Opioids (Tramadol, Cough Syrup with Codeine, Df118, Heroin, Morphine, Pethidine, Penthazocine Cocaine Hallucinogen (LSD, Mescaline, Psylocybin etc), Sniffing petrol, organic solvents, solution, glue, soak away, etc.

At the second stage of the study, the subjects were requested to void urine into a clean urine cup and tested on the spot for presence and types of substance (s) using the commercially available urine dipsticks (IND Diagnostic Incorporation, 2018).

It should be noted that there are two different cut-off levels for opiate tests, and each cut-off has two abbreviations. MOP/OPI 300 (Morphine) tests for opiates at a cut-off level of 300 ng/mL, while OPI/OPI 2000 signifies that the cut-off level is 2,000 ng/ml. The two tests for the same substances but at different urine concentrations (IND Diagnostic Incorporation, 2018).

Statistical methods

Data were analysed using SPSS-20 (IBM Corp, 2011). Cross tabulation, chi-square statistics, and student t-test were determined for district and continuous variables as appropriate. P-value was set at 0.05 confidence level.

Ethical Approval

Ethical issues surround rise in use of urine drug testing to detect or prevent abuse. Some of the issues include the accuracy of the tests, financial benefits from the vendors of the UDT kits, the capturing of genuine individuals taking prescribed pain killers like opioids that could be interpreted as drug abuse (if not properly enquired about drug history) and lastly, what are the benefits to the respondents or society after such studies that utilized UDTs. The kits used in this study were accurate as shown by high specificity and sensitivity according to

the manufacturer.

The Protocol was approved by the University Ethical Research Committee (UERC) of the University of Ilorin. The detail of the study was explained to the participating students who signed consent to participate and were told they could opt out of the study as they wished.

The Deans of the Faculties, the Head of Departments, and the Lecturers whose terminal periods were used were also informed about this study after UERC approval.

Anonymity was ensured throughout and after the study.

RESULTS

Participants

Three thousand questionnaires were distributed but only 2550 (75%) respondents' questionnaires were analysable. Of the 2550, 1159 (45.5%) were males and 1391 (54.5%) were females. The age ranged between 15 and 47 years with a mean of 20.6 and a standard deviation, 2.6. The median age was 20 years with a mode of 20 years. The mean age of male respondents was 21.06 ($\pm$2.9) while that of the females was 20.24 ($\pm$2.2). F=66.93, p-value=0.000. Most of the students were in the age range 20-24 (61.3%).

Table 1: Socio-demographic Characteristics of Respondents

Variable	Frequency	Percentage
Age group		
<20	815	31.9
20-24	1563	61.3
25-29	150	5.9
>=30	22	0.9
Total	2550	100
Gender		
Female	1391	54.5
Male	1159	45.5
Total	2550	100
Religion		
Christianity	1278	50.1
Islam	1248	48.9
Traditional	14	0.5
Non	16	0.6
Total	2550	100
Level of Education		
100L	277	10.9
200L	719	28.2
300L	791	31.0
400L	680	26.7
500L	61	2.4
600L	21	0.9
Total	2550	100

NB: Only Pharmacy, Medicine, Engineering, Nursing and Law are beyond 400 level, others are just up to the fourth year.

Descriptive Data

About 11.5% of the respondents had used or were still using tobacco products. The lifetime prevalence of tobacco was, therefore, 11.5% while current use (regular, occasional, and daily use was 3.7%). The lifetime prevalence of alcohol was 38.4% while current use was 15.4%. The lifetime prevalence of use of cannabis was 9.0% and the current prevalence of 3.8%. About 32.5% of the students agreed to lifetime use of stimulants and current prevalence of 15.8%. A lifetime prevalence of 11.7% was obtained for sleeping drugs (sedatives) but the current prevalence was 4.8%. The lifetime prevalence of opioids use was 25.3% with a current use prevalence of 7.6%. While the lifetime prevalence of cocaine was 4.7%, the current use prevalence was 1.6%. Hallucinogenic substances had been previously used (lifetime prevalence) by 6.6% of the students, 0.2, % occasionally, 0.5% regularly (2-3 times per week) while 0.7% used hallucinogen on daily basis (current prevalence of 1.4%). The lifetime prevalence for solvent use was 7.4% while current use was 1.6%.

Use of Psychoactive Substances and gender

Male respondents were more likely to have smoked cigarette than female respondents (X^2 = 22.8, df=1, p-value = 0.00). Also, male respondents were more likely to be current (occasionally, regularly or take it daily) users of cigarette than females (X2 = 16.2, df = 4, p-value = 0.003). While more males were likely to have ever used alcohol (X2 = 14.8, df=1, p-value = 0.000), marginally more females were likely to be current users of alcoholic products (X2 = 17.7, df=4, p-value =0.001). More males were, similarly, likely to have ever used cannabinoids than females (X2 = 13.00, df=1, p-value= 0.000) and more males than females as current users, though the latter was not significant.

Though not significant, more females reported ever use of stimulants, sleeping drugs, and opioids and were more represented among current users. There was also no statistically significant relationship between the gender of the respondents and the use of cocaine. There was an almost equal distribution of both genders in "ever use" and current use of this substance.

More males were more likely to have used hallucinogen in their lifetime (X2 = 5.2, df=1, p-value= 0.0233). The use of solvent had no relationship with gender.

Level of university education and use of psychoactive substances

More students in the 3rd and 4th grade were more likely to have used cigarettes (X2=24.22, df=5, p-value= 0.00) and were more likely to be current (occasional, regular, or daily) users (X2 =32.409, df= 20, p-value 0.035). They were, similarly, likely to be current users of alcohol than other levels of education (X2 =36.889, df= 20, p-value= 0.012). Respondents in the third and fourth year were more likely to be current users of cannabis than others (X2 =44.478, df= 20, p-value= 0.001)

No relationship between the use of stimulants, sleeping drugs, opioids, cocaine, and level of education but the students in the 4th year of their education were more likely to report current use of hallucinogenic substances than others (X2 =31.94, df= 20, p-value= 0.04). Current solvent use was also more likely among respondents in the 4th year of education than in the other class levels (X2 =48.25, df= 20, P-value= 0.000).

Age of the respondents and use of psychoactive substances

Respondents within the age group 20-24 were likely to have ever used cigarette (X2 =8.8,
df=3, P-value=0.03) and were more likely to be current users of cigarettes (X2 =22.47, df=12, P-value=0.033) while there was no significant relationship between the age group of respondents and alcohol use. This same age group, 20-24 were also more likely to have used cannabis substances (X2 =10.46, df=3, p-value=0.015) and were similar to the current users of cannabis such as Indian hemp (X2 =36.82, df=12, p-value=0.000). The age group of the respondents was not statistically related to the use of stimulants, sleeping drugs, and opioids. The use of the substance, cocaine and the age group of respondent students were statistically significant with respondents in the age group 20-24 being more likely to have used cocaine (X2 =44.10, df=6, p-value=0.0000) and more likely to be current users (X2 =24.95, df=12, p-value =0.015).

Like most of the other substances, lifetime use of hallucinogens was statistically significant to the age group of the students with students in the age group 20-24 being most likely to have used a hallucinogenic substance (X2 =11.38, df=3, p-value=0.009)

Respondents in the age group 20-24 were more likely to be current users of solvents (X2 =31.43, df=12, p-value=0.002)

Outcome Data

Tests of Urine for Evidence of Recent Use of Psychoactive Substances

Within the subsample of 302 respondents, the use of the psychoactive substances was as in Table 2, based on urine testing for the substances. Urine drug testing for "Opioids" demands special mention here: morphine and methadone are opioids but are reported separately because they are listed on the test kit separately. The "opioid" in the test kit used signifies morphine equivalence of >= 2000ng/ml of opiate substances according to the manufacturer's guiding leaflet. (IND Diagnostic Incorporation, 2018). Similarly, amphetamine, methamphetamine, MDMA, and Cocaine are stimulants but are listed and tested in the kit separately.

Table 2: Results of Urine Tests for Evidence of Recent Use of Psychoactive Substances n=302

Class of substances	Items tested	Test Positive (%)	Test Negative (%)	Total
Opiates				
	Morphine	18 (6.0)	284 (94.0)	302
	Methadone	9(3.0)	293 (97.0)	302
	Opioids	3 (1.0)	299 (99.0)	302
Stimulants				
	Amphetamine	5 (1.7	297 (98.3)	302
	Methamphetamine	1 (0.3)	301 (99.7)	302
	MDMA	3 (1.0)	299 (99.0)	302
Sleeping drugs				
	Barbiturate	8 (26)	294 (97.4)	302
	Benzodiazepine	9 (3.0)	293 (97.0)	302
	TCA	9 (3.0)	293 (97.0)	302
Cannabinoids	Cannabinoids	34 (11.3)	268 (88.7)	302
Cocaine	Cocaine	11 (3.6)	291 (96.4)	302
Hallucinogens	Phencyclidine	5 (1.7)	297 (98.3)	302

Urine Drug Test, Gender, level of education and age group of respondents

The gender of the respondents was statistically related only to cocaine where more males tested positive than females on the use of the substance, cocaine (X2 = 5.46, df=1, p-value= 0.019).

On the level of Education and Urine Drug Test, none of the substances was statistically related to the academic levels (p-value >0.05). However, the age group of the respondents was significantly related to cocaine: those who were positive for cocaine were likely to be in their earlier years in the university (X2 = 12.94 df=3, P-value=0.005).

Stimulants: Out of the 5 respondents who tested positive for amphetamine none self-reported ever use of any stimulants while the only person that tested for methamphetamine did not report previous use of the substance. The corollary is the fact that out of the 211 respondents who did not report ever use of stimulants, 5, 1, and 3 were positive for amphetamine, methamphetamine, and MDMA, respectively. The implication of these is that UDT is a better test of current use of substances than self-report, though none of the comparisons was statistically significant.

Table 3: Concordance between UDT and self-assessment for psychoactive substances

Substances tested		Have you ever taken any of these substances in your life?			
		Yes	No	Total	Statistics
STIMULANTS					
Amphetamine					
	Test Positive	0			
	Test negative	91	206	297	
	Total	91	211	302	
Methamphetamine					
	Test Positive	0	1		2 = 0.19, df=1, p-value= 0.66
	Test Negative	91	210	301	
	Total	91	211	302	
MDMA					
	Test Positive	1	2		2 = 0.00, df=1, p-value = 1.00
	Test Negative	90	209	299	
	Total	91	211	302	
OPIOIDS					
Morphine					
	Test Positive	3	15	18	2 = 0.13 df=1, P-value = 0.72
	Test negative	66	218	284	
	Total	69	233	302	
Methadone					
	Test Positive	2	7		2 = 0.00, df=1, p-value= 1.00
	Test Negative	67	226	293	
	Total	69	233	302	
Opioids (morphine>2000ng/ml)					
	Test Positive	0			2 = 0.66, df=1, p-value = 1.00
	Test Negative	69	230	299	
	Total	69	233	302	

Opioids: For all the substances tested the number of respondents who reported "ever use" was much less than the number that tested positive for the opioid items tested, with some having morphine equivalent of more than 2,000ng/ml. However, none was statistically significant.

Sleeping drugs: Though none was significant, more respondents came out positive than those that reported the use of sleep-inducing drugs.

Table 4: Concordance between UDT and self-assessment for psychoactive substances

Substances tested		Have you ever taken any of these substances in your life?			
		Yes	No	Total	Statistics
SLEEPING DRUGS					
Benzodiazepines					
	Test Positive				X2 = 0.18, df=1, P-value = 0.676
	Test negative	29	264	293	
	Total	29	273	302	
Barbiturates					
	Test Positive				X2 = 0.11, df=1, p-value= 0.744
	Test Negative	28	266	294	
	Total	29	273	302	
TCAs					
	Test Positive				X2 = 0.18, df=1, p alue= 0.676
	Test Negative	29	264	293	
	Total	29	273	302	
THC					
	Test positive		31	34	X2 = 0.05, df=1, P-value= 0.82
	Test negative	25	243	268	
	Total	28	274	302	
HALLUCINOGEN					
Phencyclidine					
	Test positive				X2 = 4.49, df=1, **p-value=0.04***
	Test negative	18	279	297	
	Total	20	282	302	
COCAINE					
	Test positive		11	11	X2 = 0.53, df=1, P-value=0.054
	Test negative	10	281	291	
	Total	10	292	302	

TCAs: Tricyclic Antidepressants; THC: Tetrahydrocannabinol

Cannabinoids: Like other substances tested, there was discordant between the reported use of cannabinoids and the UDT test results.

Hallucinogen: There was a statistical relationship between self-reported use of hallucinogen and urine drug test in which an almost equal number of respondents reported and denied "ever use" of any hallucinogen despite 5 of the respondents testing positive.

Cocaine: On substance cocaine, none of the respondents reported ever use of cocaine despite 11 testing positive though this was not statistically significant.

DISCUSSION

With close to ten percent of the total students' population sampled, the 2550 respondents in this study were a fair representation of the students' population with a slight female preponderance. The minimum age in this study was fifteen. This is not surprising because the age of university enrolment in Nigeria is 16 but some candidates still get admitted at a younger age as there is no legal minimum or maximum age for entering a university in Nigeria. In this study, most of the students, about six in every ten, were in the age range 20-24, with the same mean and the modal age of 20 years. However, the mean age of the females was slightly lower than the males. These findings are like the findings of similar earlier studies in Nigeria (Makanjuola et al., 2007; Onifade et al., 2014).

Prevalence of reported psychoactive substance use

The lifetime prevalence of cigarette use was 11.5% while current use (regular, occasional, and daily use) was 3.7%. Makanjuola et al. (2007) obtained a lifetime and current prevalence of tobacco use of 10.5% and 3.2% respectively. Onifade and colleagues (2014), however, got lifetime prevalence figures for cigarettes varying between 6 and 18% among university students in Nigeria. A national prevalence of cigarette use was respectively put at 12.2% for a lifetime, 6.4% for 12-month, and 5.3% for 30-day (Adamson, 2015).

Thus, our finding lies between values that have been previously obtained among university students in Nigeria and close to the national values. Cigarette (tobacco) is a licit drug in Nigeria, freely purchased and its sale not tied to age, though with instructions not to smoke in public places. So, it is not surprising to see university students and others smoke a cigarette which, to many, is a gateway substance of abuse. (Onifade and colleagues, 2014; Adamson, 2015).

The lifetime prevalence of alcohol was 38.4% while current use was 15.4%. A study (Onifade et al, 2014) among students of three universities in Nigeria reported prevalence figures ranging from 16.7% and 47.7%. Ajayi et al. (2019) found the level of ever and current use of alcohol of 43.5% and 31.1%, respectively. The lower prevalence of alcohol use in this study might be related to the effect of the community where the study was carried

out. This thinking is supported by the findings of Taylor et al that found Ilorin, the host city of the university where this study was done, to have the lowest prevalence (33.3%) for alcohol among four cities in different continents of the world (Taylor et al, 2017). Despite these findings, the level of alcohol use among university students is unacceptable and efforts should be made to further reduce these prevalence figures amongst our university students to the barest minimum.

The reported lifetime prevalence of use of cannabis was 9.0% and the current prevalence of 3.8% in this study is lower than the lifetime prevalence values (30.9%) reported by students in a South African University (Jain et al, 2018) but higher than 4.5% in Ethiopia (Gebremariam et al, 2018) and 2.1% among medical students in Nigeria (Makanjuola et al, 2007) The reason for these different figures is not known but the lower figure among Nigerian medical students might be related to the better moral standard always displayed by medical students compared to other university students (Verrinder et al, 2016).

Stimulants are perceived as performance-enhancing substances. Among students, they may be wrongly used to promote study and activities such as sports and in drama or other courses where physical prowess is desirable. About 32.5% of the students reported lifetime use of stimulants and a current prevalence of 15.8%. This lifetime figure is high compared to 6.9% in a national survey of college students in the United States (McCabe et al, 2005) but lower than 41.4% and 23.6% for coffee and energy drinks in a study from Australia (Lucke et al, 2018). The array of stimulants studied in these reported studies ranged from methylphenidate, amphetamine, coffee, etc while the stimulants studied in our study also included local stimulants like Kolanut, a caffeine-containing nut of evergreen trees of the genus Cola, primarily of the species Cola acuminata and Cola nitida. This nut is traditionally taken in most Nigerian communities and is not perceived as a substance of abuse despite the knowledge that it keeps users awake when eaten. This belief might be responsible for the wider use by the students in this part of the world, hence the higher prevalence of stimulants in this study.

In this study, a lifetime prevalence of 11.7% was obtained for sleeping drugs (sedatives) with a current prevalence of 4.8%. Earlier studies among Nigerian university students showed varying figures. While Makanjuola and colleagues (2007), reported a lifetime prevalence of 27.0% and current use of 7.3% for sedatives Onifade et al (2014) reported a lifetime of 12% for tranquilizers. Nigeria's national lifetime prevalence of 11.3%, past year 5.5%, and past month 2.9% prevalence of tranquilizers were reported by Adamson (2015). Our finding for sedatives is, therefore, about the national prevalence figure for Nigeria.

The lifetime prevalence of opiates use was 25.3% with a current use prevalence of 7.6%. Earlier studies on the use of substances by university students had reported varying figures. While

Makanjuola et al. (2007) reported a lifetime prevalence of 0.7% for heroin use among medical students in Nigeria, Onifade et al. (2014) reported 11.9% . A study from the United States reported a lifetime prevalence of nonmedical prescription use of opioids of 12% and a past-year prevalence of 7% (McCabe et al, 2005). Similarly, a study from China put the lifetime prevalence of opioids at 14.6% (Tang et al, 2016). Our figure is higher than those in the cited studies from Nigeria, the United States, and China. It is also higher than the national lifetime opioid use prevalence of 7.2 (Adamson, 2015). This is possibly an upward trend in the use of opioids. It is worrisome and needs to be checked in order not to witness an opioid epidemic amongst our students.

Our respondents reported a lifetime prevalence of use of cocaine of 4.7% and a current use prevalence of 1.6%. A national survey in Nigeria reported 3.3% lifetime use of cocaine. Therefore, our finding nearly agrees with a previous study in Nigeria, which reported a range of 1.9% - 4.0% (UNDCP, 199). It was higher than the 0.7% and 0.14% (Makanjuola et al, 2007; Gureje et al, 2007) reported earlier in Nigeria respectively but lower than the figures (4.0% – 16.2%) reported for the countries in Oceania and Americas (Degenhardt et al, 2008).

Anecdotal evidence had been that hallucinogenic substance use was rare in Nigeria. This study showed that this may be transitory or showing a new trend. It showed that one form of hallucinogen had been previously used (lifetime prevalence) by 6.6% of the students, 0.2, % occasionally, 0.5% regularly (2-3 times per week) while 0.7% used hallucinogen on daily basis (making a current prevalence of 1.4%). LSD and other hallucinogens lifetime national prevalence of 2.8% and 3.3% respectively were reported by Adamson (2015) making a total lifetime prevalence of 6.1%. This is similar to what this study found among the responding university students.

The lifetime prevalence of solvents use was 7.4% while current use was 1.6%. This is similar to the Nigerian national finding that reported a lifetime prevalence of 6.8% for the use of solvents/inhalants in Nigeria. (Adamson, 2015). It thus appears that for cocaine, hallucinogens, and solvents the prevalence figure among our students mirrors the national prevalence values.

Gender of respondents and use of psychoactive substances

Male respondents were likely to have smoked cigarettes than female respondents and male respondents were more likely to be current (occasionally, regularly, or take it daily) users of cigarettes than females. This male dominance in the use of cigarettes had been reported by many previous studies (Adelekan et al, 2001; Makanjuola et al, 2007; Onifade et al, 2014; Adamson, 2015). While more males were likely to have ever used alcohol, marginally more females were likely to be current users of alcoholic products. This partly confirmed the finding that drinking was consistently more prevalent among men than among women but differed from the finding of

the same study that showed that lifetime abstention from alcohol was consistently more prevalent among women. (Wilsnack et al, 2009).

More males were, similarly, likely to have ever used cannabinoids than females and more than females as current users. This finding of male dominance in the use of cannabis has been variously made in earlier studies and this further attests to the fact of male dominance.

Level of University Education and Use of Psychoactive Substances

This study showed that more students in the 3rd and 4th grades were more likely to have used cigarettes and were more likely to be current (occasional, regular, or daily) users. Similarly, students in the 3rd and 4th years were likely to be current users of alcohol than other levels of education. Similar findings of the use of other psychoactive substances by the senior students were also reported for hallucinogens and solvents use. These findings have been supported by an Ethiopian study that found students of the fourth year and above to be 2.4 times more likely to use substances than first-year students (Gebremariam et al, 2018). These were senior students in the final or penultimate graduating year in the university for those pursuing four-year courses. A probable reason for the more prevalent use of substances by the senior students could be for performance (study) enhancement.

Age Group of Respondents and Use of Psychoactive Substances

Respondents within the age group 20-24 were likely to have ever used cigarettes and were more likely to be current users of cigarettes. They were also more likely to have used cannabis and cocaine and were similarly to be current users of cannabis and cocaine. The age group was not related to the use of stimulants, sleeping drugs, or opioid use. Like most of the other substances, lifetime use of hallucinogens was statistically significant to the age group of the students with students in the age group 20-24 being most likely to have used a hallucinogenic substance and likely to be current users of solvents. Since most students graduate at about age 23/24, it tends to correlate with the earlier finding that students in the 3rd or 4th years of their study were more involved in substance use.

When we cross-tabulate the Urine Drug Test (UDT) with the gender, academic level, and age group of the respondents only phencyclidine was statistically related to the academic levels with more positive tests recorded amongst 200 and 300 levels (second and third year). This isolated finding needs more studies.

Concordance between UDT and self-report of use of psychoactive substances.

We have been able to show that UDT is a may be a more accurate test of recent use of psychoactive substances than self-report. Although none of the comparisons was statistically significant, a trend has been laid for a better understanding of the superiority of UDT over self-report, despite the apparent ease and lower cost of the latter. On

opioids, respondents who reported ever use were much less than the number that tested positive for the opiate items tested, with some having morphine equivalent of more than 2,000ng/ml which cannot be estimated by a self-report, further emphasizing the supremacy of UDT over self-report.

Conclusion

This study underscores the need for caution in interpreting the results of self-report methods documenting the prevalence of drug use among youths. There is discordance between self-report and results of the UDT whence many students who did not report ever use of psychoactive substances tested positive for substances, thus emphasizing the superiority of UDT over self-report for psychoactive substances among university students.

We would like to recommend that whenever there is an inkling of a possible recent use of psychoactive substance (s) among university students UDT should be the method of assessment, within the legal limit of ethical consideration. UDT is equally encouraged in school clinics and sports centres.

Limitation

The UDT test was not designed as a test of lifetime use of psychoactive but as a test of recent or active use of the specific items.

The UDT was not applied to all students due to financial difficulties of doing this. The UDT reports could, therefore, not be a direct representation of the entire students in this study nor in the university. A major limitation was the difficulty in accessing the UDT kits due to financial strain at the time of carrying out the study. The cost of a kit which was about $10 then is now available at almost half of that price.

What is already known on this topic?

Self-report had been the traditional methods of studying substance use among the students and general community. Concealment of truth and bias in reporting have made self-report of psychoactive substances a difficult method in assessing the true prevalence of recent substance use among students.

What this study adds

The study showed that self-reporting of psychoactive substance use may not be accurate, particularly, when recent use is being studied. The strength of our study lies in the fact that this study was in the frontline in the use of urine testing (UDT) to determine the recent use of psychoactive substances in Nigeria and would serve as a reference point to other researchers who could then improve on the method by increasing the number of participants. This is limited by poor financial resources.

Competing interests

The authors declare no competing interest.

Authors' contributions

The authors played equal roles in the conceptualization, execution, writing,

reading of the manuscript and submission of the final manuscript.

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