



Association between HIV infection and the over 18 year old people who use drugs in Mwanza urban, Tanzania

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Abstract:

Background: Drug abuse is common all over the world. Abused drugs are psychoactive and make abusers engage into activities which are unacceptable in the community. For injecting drugs, the apparatus used is often shared and is unsterile. Unsterile injecting apparatus predispose the users to blood borne infections. People who use drugs often indulge in unprotected sex which is a risk factor for acquiring sexually transmitted infections. **Methods:** A cross-sectional study of people who use drugs (PWUDs) aged 18 years and above, was done in Mwanza urban. People who use drugs who were either too sick or unable to answer questions and those who refused to give consent to the study were excluded. Data collection involved use of a questionnaire (Face to face approach) and collection of blood and urine samples. The blood samples were used to determine the serological status of the participants, while the urine samples were used to detect presence of illegal drugs. Complete data was obtained for seven hundred and seventy out of the 774 PWUDs who were initially recruited into the study. **Results:** The project has shown that cannabis and alcohol are highly abused 83.0% n= 581 and 74.2% n= 519 respectively followed by khat 38.3 % n= 268. Heroin use was recorded in 34.0% n= 238 and heroin injection was noted in 5.6% n= 43 of the illegal drug users. HIV infection was detected in 8.6% of the drug abusers, while hepatitis B was seen in 3.8%, hepatitis C was detected in 2.9% and syphilis was detected in 2.5% of the participants. **Conclusion:** HIV infection in people who use drugs was high (8.6%) compared to that seen in the general population (5.1%) and also high rates of positive results for hepatitis C and syphilis were recorded. Among the intravenous drug users 6.3% were HIV positive. **Recommendations:** Education should be given to the substance abusers on the consequences of taking illegal drugs. Safe sex should be advocated, a methadone clinic and sober houses should be established in Mwanza. The Ministry of Home Affairs should increase efforts to prohibit importation of illegal drugs.

Key words: Drug abuse, injecting drugs, HIV infection, hepatitis, Mwanza, Tanzania

Introduction

Background

The use of illegal drugs is a problem that is found in many countries in the world. Substance or drug abuse is a patterned use of a drug in which the user consumes the substance in amounts or uses methods which are harmful to the user or the community [1]. Abused drugs may cause the user to engage into criminal activities and unsound sexual behavior [1, 3]. Illegal drugs are expensive and many users do not have the money to pay for the drugs. Search for money for purchasing the drugs may compel abusers into transactional, heterosexual and homosexual sex, thus increasing their risk for HIV acquisition and transmission [1].

The risk of HIV infection also depends on the route of drug administration and the intravenous route is frequently used by substance abusers. People who inject drugs (PWIDs) often use unsterile needles and some use flashblood [4]. Unsterile injecting apparatus predisposes the abusers to blood borne infections such as HIV and Hepatitis B & C [4-6]. Use of flashblood does not only increase the opportunity for HIV acquisition but is fatally dangerous. Psychoactive drugs abused may lead the abusers to indulgence into unprotected sex which is a risk factor for acquisition of HIV, syphilis and other sexually transmitted diseases [4-6].

Studies done in Europe and North America have shown an association between drug abuse and HIV infection [5-8]. Similar observations have been made in studies carried out in Africa [9-11] and injecting substance abuse has been observed to increasing in East Africa [12,13]. Estimates of HIV infection in Kenya indicated that the number of cases of HIV infection attributed to injection in PWUDs was increasing and outreach programmes have been developed to provide HIV risk reduction in such people [14].

The national HIV infection prevalence in Tanzania of 5.1% shows a 0.6% decline from the 2007-2008 survey [15]. However the clandestine nature of substance abuse and criminalization of these activities, this data does not give a true picture of the situation in people who use drugs in the country. In populations such as that of Zanzibar where HIV in the general population is below 1%, among the most at risk populations (MARPS) is as high as 16% [16].

This project studied the prevalence of HIV infection in the over 18 year old people who use drugs within the two districts of Mwanza urban.

Studies of this kind have been done in Zanzibar [16] and in Dar es Salaam [17-19], no such studies, prior to this, have been done in Mwanza. Many patients admitted to the psychiatric ward at Bugando Medical Centre (BMC) have histories of drug abuse as an underlying problem [20] and this is one of the observations that prompted this study.

The objective of the study was to determine the pattern of drugs abused the prevalence and predictors of HIV infection among people who use drugs in the city of Mwanza.

Materials and Methods

A cross-sectional study of people who use drugs aged 18 years and above was carried out in Mwanza urban. Data for the study was collected between March 2012 and August 2012. Participants were recruited using aspects of targeted, snowball and respondent driven sampling [21]. Data collection began by interviewing one known person who uses drugs in each of the 12 selected centers. Further recruitment was continued by snowball and respondent driven sampling. Seven hundred and seventy four participants were recruited in the study. Mwanza urban has two districts Nyamagana and Ilemela.

The sample size was estimated from the formula:

$$N = \frac{2(P)(1-P)(Z_{\beta} + Z_{\alpha/2})^2}{(P_1 - P_2)^2}$$

$P_1 = 0.051$ (HIV prevalence in the general population [15])

$P_2 = 0.16$ (HIV prevalence among people who use drugs [16])

β = Power of study is 80%

α = Level of significance is 5%

$N = 143$ for each group (Nyamagana and Ilemela)

Considering prevalence of HIV in the general population (0.051) and HIV prevalence among people who use drugs (16%), 143 participants were required for each district. That is $286 + 28.6 = 315$ in total after including 10% for any missing information/refusal.

Taking into account of the design effect (1.5)

$$315 * 1.5 = 473$$

The figure 473 was the total number of participants for the two districts (237 participants from Nyamagana and 237 participants from Ilemela). When the population size was considered,

participants to be recruited were around 387 from each district making a total of 774.

The study involved PWUDs who were 18 years old and above and were able to give consent. PWUDs who were too sick and unable to answer questions and those who refused to give consent were excluded. Non- PWUDs were not included in the study.

A questionnaire (face to face approach) was used; the questionnaire had four sections, section A was on socio-demographic data, while section B dealt with information on substances abused. Section C was looking for information on sex practices and Section D enquired information about knowledge of HIV transmission and prevention.

Pre-testing of research tools was carried out in Geita to make sure that all field workers knew what they were supposed to do when they were in the field and that they could fill the questionnaires properly. The feasibility of blood and urine collection from substance abusers was also assessed. With the help of lead persons the participants were met at street corners in locations close to a drug supplier. The field workers (counselors and data collectors) introduced themselves to the PWUDs and then the field workers gave a brief description of the purpose of the visit to the area. The PWUDs were told that blood and urine samples would be collected from each of them. They were informed about the availability of free HIV, hepatitis B & C and syphilis testing and they were also told that urine testing for substances abused would be done free of charge.

Before signing a consent form each PWUD had a session with a sociologist who was in the study team and was also counseled against substance abuse and HIV infection. The PWUDs then proceeded to meet data collectors where the questionnaires were completed and blood and urine samples collected for serological and drug testing.

The results of these tests were made known to the PWUDs during a subsequent visit when counseling was again done. PWUDs who tested positive for HIV or for any other infections being investigated were referred to appropriate clinics for treatment and management. All this was aimed at trying to change the participants' behaviour towards use of illegal drugs and unsafe sexual practices and hence avoid HIV infection. A small amount of cash was paid to each PWUD to compensate for transport cost and time spent at the study site.

People who use drugs who wished to be weaned off the drugs were referred to the psychiatric unit at

Bugando Medical Centre (BMC) for a drug detoxification programme.

Seven hundred and seventy four (774) blood samples were sent to Bugando Medical Centre laboratory for HIV, syphilis, Hepatitis B & C testing. Hepatitis C was tested using HCs Ag and Hepatitis B using HbS Ag both manufactured by Alfa Scientific design. HIV was tested using Determine (Alere) test and confirmatory test was done with Unigold test manufactured by Trinity biotech and Syphilis was tested using VDRL test.

Urine samples were sent to the government chemist laboratory agency in Mwanza for determining the presence of abused drugs. The laboratory tests provided information about metabolites of the drugs abused. The laboratory had methods for detecting metabolites of cannabis, heroin, cocaine and amphetamine. Testing for illegal drugs in urine is expensive and the budget available could only cover the cost of less than half of the urine samples collected.

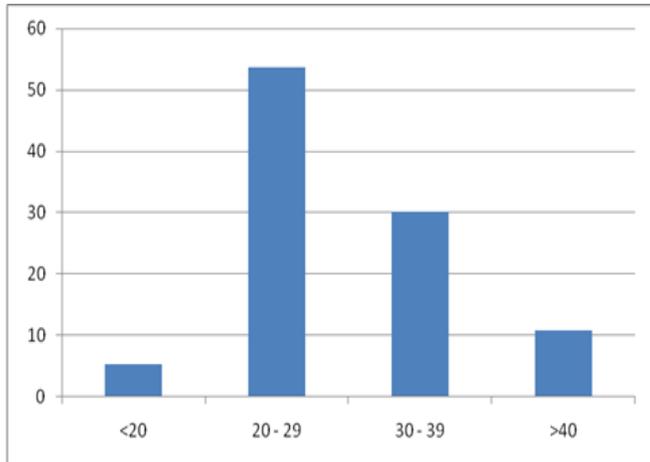
All data obtained was entered in the computer using EPI-DATA program and cleared data was analyzed by STATA Version 17.

Ethical approval was obtained from the Joint Catholic University of Health and Allied Sciences /Bugando Medical Centre Research and Publication Committee and also from the National Institute for Medical Research, Tanzania. Permission to conduct the research in Mwanza urban was obtained from Regional and District Commissioners' offices. Written informed consent was obtained from each person who uses drugs who agreed to take part in the study. People who use drugs who tested positive for HIV, hepatitis C, hepatitis B and syphilis were referred to appropriate clinics for management.

Results:

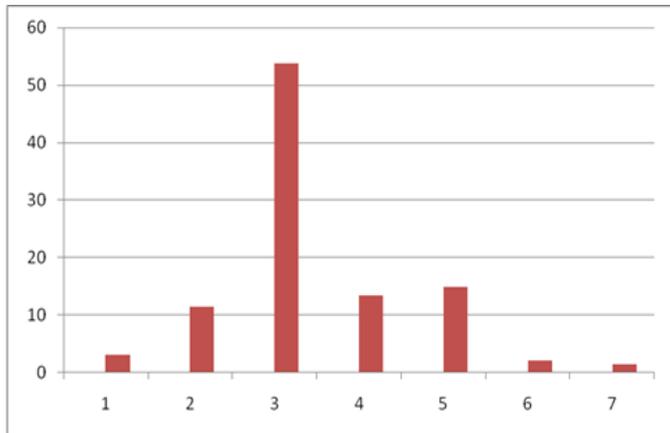
Seven hundred and seventy four substance abusers gave informed consent and were recruited in the study. Four out of 774 completed questionnaires were misplaced and only 770 were available for analysis. Of the 770 PWUDs, 749 were males and 21 were females. Their age distribution is as shown in figure 1 below:-

Figure 1: Age distribution (%) of the participants (n = 770)



The education level ranged from those without education to those with University education as is shown in figure 2 below:-

Figure 2: Level of education of the participants (n=770)



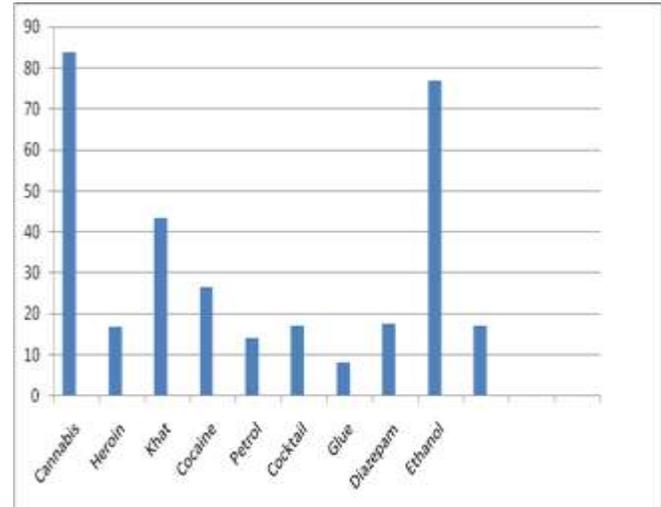
Key

- 1 = Never went to school
- 2 = Did not complete primary education
- 3 = Had primary education
- 4 = Did not complete ordinary level secondary education
- 5 = Completed ordinary level secondary education
- 6 = Completed advanced level secondary education
- 7 = Had University education.

Most of the PWUDs were engaged in the informal sector (92.9%, n= 650) and only 7.1% were engaged in the formal sector. Interviews with the 770 PWUDs revealed that seven substances (cannabis, heroin, khat, petrol, glue, diazepam and ethanol)

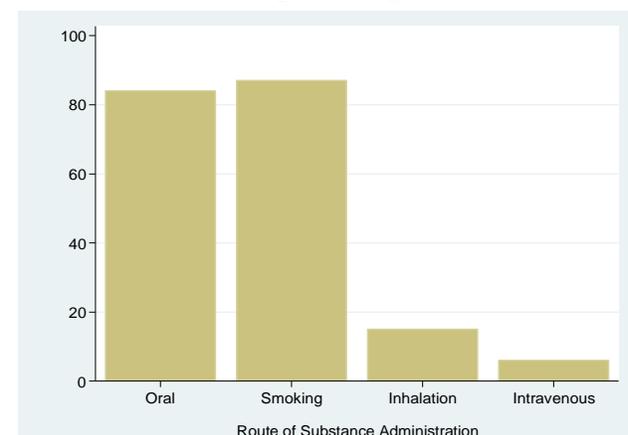
were abused in Mwanza. Of the seven substances abused cannabis was the most commonly abused (83.0%, n= 581), ethanol was the second most commonly abused (74.2% , n=519). Khat was abused by 38.3 % (n= 268) and heroin abuse was noted in 34% (n=238) of the PWUDs (fig 3).

Figure 3: Substances abused in Mwanza urban (percentages)

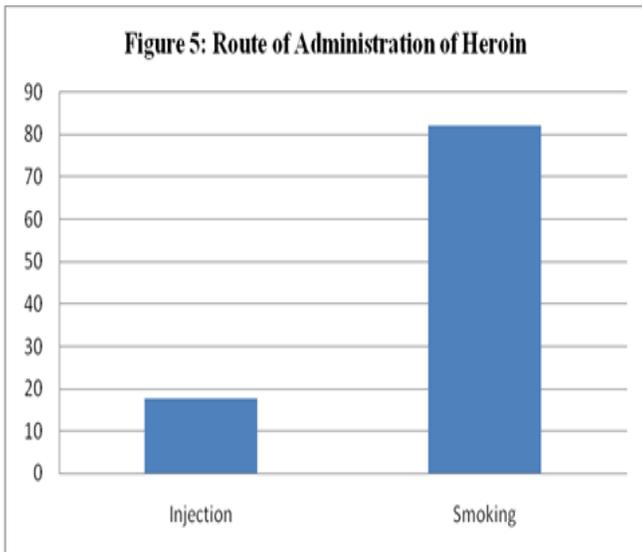


Most of the drugs abusers who participated in the study were taking more than one substance. The routes of administration were smoking 86.9%, n= 608, and oral administration 84.2%, n= 589. Inhalation was practiced by 14.8%, n= 104 of the participants while the intravenous route was used by 5.6%. Substances that were taken orally included khat, diazepam and alcohol. Substance smoked were cannabis and heroin while inhaled substances were glue and petrol. The only drug that was administered intravenously was heroin (figure 4).

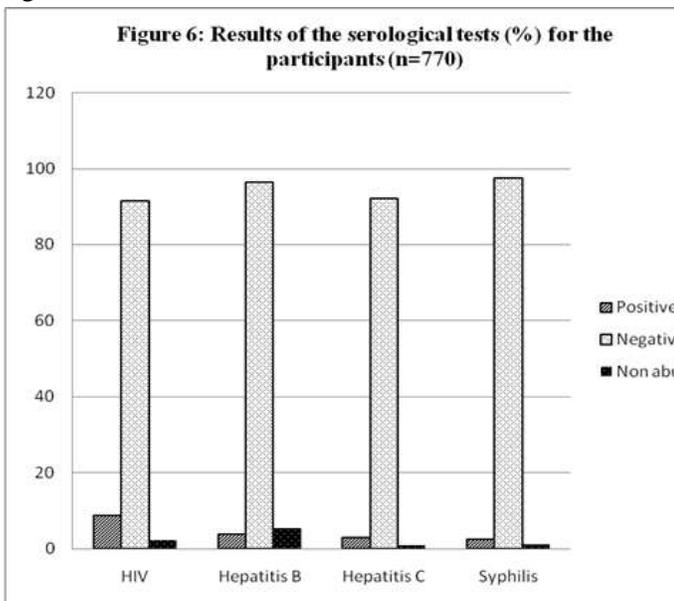
Figure 4: Routes of drug administration used by substance abusers in percentages (n = 770)



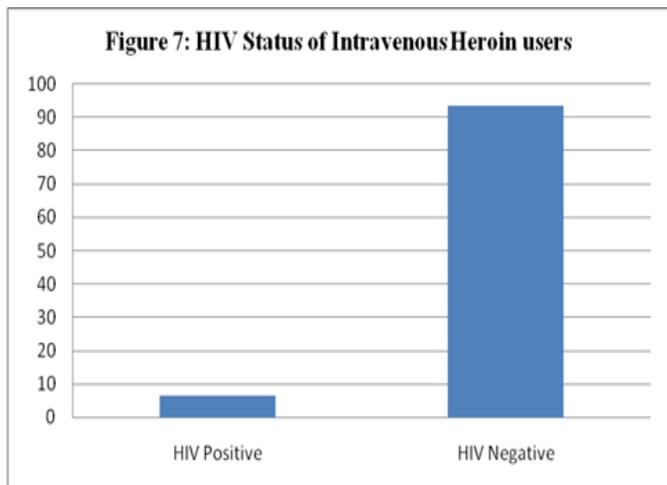
Two hundred and thirty eight were using heroin 17.9%, n=43 were using it intravenously, while 82.1%, n=195 were smoking it (fig 5).



Blood samples which were collected from the 770 participants were tested for HIV, Syphilis and Hepatitis B&C and the results are shown in figure 6.

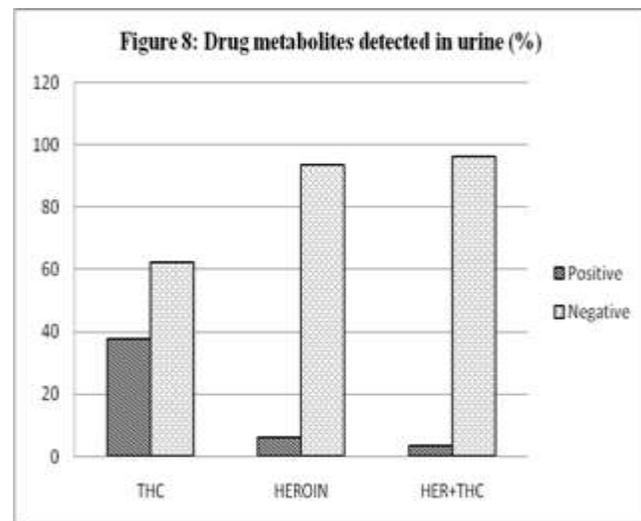


There was no significant association between the use of cannabis (bangi) or khat (mirungi) with HIV infection just as there was no significant association between the use of heroin and HIV infection. Among 43 intravenous heroin users 6.3% tested positive for HIV infection (Fig 7).



The prevalence of HIV in the 770 substance abusers was 8.6% compared to 2.1% in blood donors who were non substance abusers and that of hepatitis B was 3.8% compared to 5.3% in non-substance abuse blood donors. The prevalence of hepatitis C was 2.9% compared to 0.9% in non-substance abuse blood donors while that of syphilis was 2.5% compared to 1.1% in non substance abuse blood donors. The data for prevalence of the four infections in non substance abusers was obtained from tests done on blood from voluntary blood donors for two years 2009-2010 [22].

Three hundred and twenty nine urine samples were submitted to the Government chemist Laboratory Agency in Mwanza. In the samples cannabis metabolites were most frequently detected 37.7 %, heroin metabolites were detected in 6.4 % while 3.7 % of the samples had metabolites of both heroin and Cannabis (Fig 8).



Hence 47.8% of the urine samples tested positive for drugs, the rest 52.2% urine samples tested negative. The negative tests could mean that some participants may have given false information that they had taken drugs when they had not done so or that they had taken drugs that decomposed before the test was done. Self reported heroin use was higher than what was detected in urine because not all urine samples were sent for drug tests and the same reason applies for cannabis. The limitation of drug tests in urine was that some drug some metabolites are labile and could not survive long enough in urine to be detected.

The methods available at the Government Chemist Laboratory Agency in Mwanza could only detect cannabis (THC), heroin, cocaine and methamphetamine (MET) metabolites. The laboratory did not have methods for detecting metabolites of diazepam, petrol, ethanol and khat. PWUDs who were taking cocktail where in fact taking a mixture of cannabis and heroin, this fact was taken into account while constructing Table 1. No cocaine metabolites were detected in the urine samples and PWUDs who claimed to be taking cocaine were mistaking brown heroin for cocaine.

Twenty one females and 749 males volunteered to take part in the study. During comparisons for the HIV status in the two sexes the Pearson Chi- Square test could not be applied because some cells had less than 5 attributes (table 1) and hence Fisher’s exact test was used. There was no significant statistical difference (p-value 0.551) between females (9.5%) and males (8.5%) who tested positive for HIV infection. Examination of HIV status in the different age groups showed that the 18 to 20 year old age group was less affected by HIV than the other age groups (p-value 0.028, Fisher, exact test) table 1. Marital status had no significant effect on HIV status (p-value 0.987 Fisher’s exact test) Table 1.

Table 1: Factors associated with HIV status

Participant Characteristic	HIV Status		Chi square	P-value
	Positive (%)	Negative (%)		
Sex				
Female	2 (9.5)	19 (90.5)		0.551*
Male	64 (8.5)	685 (91.5)		

Age group				
Less than 20	1 (2.4)	40 (97.6)		0.028*
20 – 29	27 (6.6)	385 (93.4)		
Above 40	27 (11.6)	206 (88.4)		
	11 (13.1)	73 (86.9)		
Marital status				
Married	19 (8.2)	214 (91.8)		0.987*
Single	30 (8.6)	318 (91.4)		
Cohabiting	8 (9.6)	74 (90.2)		
Divorced	1 (7.1)	13 (92.9)		
Separated	8 (8.6)	85 (91.4)		
Having children				
No	50 (10.6)	423 (89.4)	6.319	0.012
Yes	16 (5.4)	282 (94.6)	6	
Education				
Informal/Incomplete - primary education	16 (14.2)	97 (85.8)	5.276	0.022
Primary education and above	50 (7.6)	607 (92.4)	7	
Knowledge on HIV				
Poor	6 (10.9)	49 (89.1)	0.413	0.520
Good	60 (8.4)	655 (91.6)	0	

*P-value by Fisher’s exact test

People who used drugs who had no children were more affected with HIV (10.6%) than those who had children (5.4%) and the difference was significant (p-value 0.012 Pearson Chi- Square) Table 1.

People who used drugs but had either informal education or did not complete primary education were more affected with HIV (14.2%) than those who had either completed primary or had

higher education (7.6%) and the difference is significant (p-value 0.022 Pearson Chi- Square test) Table 1.

About 10.9% of people who used drugs with poor knowledge of HIV tested positive for HIV infection while those with good knowledge of HIV, 8.4% of them tested positive for HIV. There was no significant difference between the two groups (p value = 0.520 Pearson Chi- Square test) Table1.

Use of petrol was associated with a higher positive HIV status (15.1%) than non petrol abusers (7.7%) p-value 0.017. Table 2

Table 2: Association between substance of abuse and HIV status

Substance abused	HIV Status		Chi square	P-value
	Positive n (%)	Negative n (%)		
Cannabis				
Yes	57 (8.9)	582 (90.1)	0.5830	0.445
No	9 (6.9)	122 (93.1)		
Heroin				
Yes	21 (8.0)	241 (92.0)	0.1567	0.692
No	45 (8.9)	463 (91.1)		
Khat				
Yes	23 (7.8)	272 (92.2)	0.3663	0.545
No	43 (9.1)	432 (90.9)		
Petrol				
Yes	14 (15.1)	79 (84.9)	5.6717	0.017
No	52 (7.7)	625 (92.3)		
Glue				
Yes	4 (7.4)	50 (92.6)	0.1004	0.751
No	62 (8.7)	654 (91.3)		
Diazepam				
Yes	9 (7.0)	119 (93.0)	0.4647	0.495
No	57 (8.9)	585 (91.1)		
Ethanol				
Yes	51 (8.9)	521 (91.1)	0.3372	0.561
No	15 (7.6)	183		

		(92.4)		
Others				
Yes	11 (9.1)	110 (90.9)	0.0494	0.824
No	55 (8.5)	594 (91.5)		

Discussion

Seven hundred and seventy people who use drugs (PWUD) from twelve different areas in Mwanza urban were interviewed. In the interview it was revealed that seven substances were being abused as indicated in the results section. Cocaine which was claimed to be one of the drugs used could not be confirmed by urine tests and what was identified as cocaine was a variety of brown heroin. Other drugs abused (khat and betel which were chewed, petrol which was inhaled, ethanol which was drunk and diazepam tablets which are taken orally) could not be confirmed because of lack of appropriate tests at the Government Chemist Laboratory Agency in Mwanza. Metabolites of cannabis were most frequently detected followed by heroin and a mixture of metabolites of heroin and cannabis. The mixture of heroin and cannabis metabolites was detected in the urine of PWUDs who said they were taking cocktail. It can be seen in Fig.3 that cannabis was more frequently smoked than the drinking of ethanol which was second in frequency and khat chewing was in the third place. Heroin injection was used by 6.3% of the substance abusers in this study. PWUDs who admitted to be using heroin 17.9% were taking it intravenously while 82.1% smoked it.

Serological tests carried out in the 770 blood samples revealed that 8.6% of the samples were positive for HIV. This is 3.5% higher than the National figure 5.1% [15]. The drugs the PWUDs were using could have affected them psychologically resulting in indulgence in unprotected sex. Use of unsterile needles could also be a factor in this. A study in Zanzibar revealed that 16% of people who inject drugs were HIV positive [16] while in Dar es Salaam 42% of the blood samples of people who inject drugs tested positive for HIV [19]. In this study 6.3% of blood samples from of people who inject drugs (PWIDs) tested HIV positive, this is in contrast to the observation in Zanzibar and Dar es Salaam [16 and 19].This difference may probably be due to the fact that (PWIDs) in Mwanza use more sterile injecting apparatus than those in Zanzibar and

Dar es Salaam. Interviews with people who inject drugs begin by smoking heroin in hangout areas with their friends, either because of peer pressure, desire, or trickery. One hangout place referred to as 'gheto' was the main place where the organization and rules governing heroin use were produced. It appears that PWIDs began by smoking heroin and then proceed to heroin injection and with time heroin injection can become as popular in Mwanza as it is in Zanzibar and Dar es Salaam.

The study revealed that younger substance abusers (<20 years) were less infected with HIV than older individuals. It is possible that older individuals indulge in sexual activities more frequently than the younger age group. The study has also shown that substance abusers with no children were much more affected with HIV than those with children. Individuals in desperate need to have children will indulge more in sex with multiple partners in an attempt to get children and in the process acquire HIV infection. A person without a child is free to move from place to place and have more lifetime sexual partners is likely to have more marital breakdowns and is at risk of acquiring sexually transmitted diseases [23].

In the study it was observed that there was an association between the level of education and acquisition of HIV infection. People who use drugs and had no education were more infected with HIV than the group with education (table 1) p-value 0.022. People with education can read and comprehend literature on HIV and this could contribute to the low infection rate in the group. Substance abusers who inhaled petrol had a higher rate of HIV infection compared to those who did not inhale petrol. Petrol inhalers are economically poor people with no proper homes and many are street dwellers and therefore more at risk of acquiring HIV.

There were no published studies on the prevalence rates of Hepatitis B and Syphilis in non-substance abusers in Tanzania. The figures quoted in this study are based on findings in blood donors and these have been used for comparison purposes only. In this study it was revealed that Hepatitis B infection rate in PWUDs was 3.8% which is lower than that observed in blood donors (5.3%). Blood donors come from all walks of life and therefore provide a better picture of what is going on in the community while PWUDs represents only a special group in the society. It is a small group and may not give a true picture of what is going on in the general population. Infection rate for Hepatitis C was high in

substance abusers (2.9%) compared to non substance abusers (0.9%). Hepatitis C infection rate seen in this study is not different from rates reported in Sub-Saharan Africa; higher rates have been reported in some African countries. In Central Africa region the prevalence of hepatitis C is 6%, West Africa has an estimated prevalence of 2.4% and Southern and East Africa have a prevalence rate of 1.6% [24]. Among 770 PWUDs only 17.9% were using the drugs intravenously. It appears that intravenous drug use is not yet common in Mwanza. Out of the 17.9% of the (PWID) none was found to be positive for hepatitis C. Bowring *et al* 2012 [25] observed 27.7% PWID were positive for hepatitis C. The differences in the two studies could be attributed to few numbers of PWIDs in Mwanza compared to those in Dar es Salaam.

For Syphilis the infection rate was higher (2.5%) in PWIDs than those who are non substance abusers (1.1%). The influence of drugs may play a part in the high infection rate in substance abusers.

Conclusions

HIV infection in substance abusers was found to be higher (8.6%) compared to that seen in the general population (5.1%) and also high rates of hepatitis C (2.9 %) infection and hepatitis B infection (3.8%) were recorded.

Seven substances were found to be abused in Mwanza and the most commonly abused drugs were cannabis, alcohol, Khat and heroin. PWIDs were 6.1% in the study population. Of the PWUDs, 17.9% of them were injecting heroin intravenously and 5.6% tested positive for HIV.

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Conflict of Interest: The authors declare that they have no competing interests.

Study limitations

Data in this report was obtained from questionnaires; substance abusers had to answer questions. There was no way in which the correctness of the answers could be verified. Substance abusers produced urine samples for analysis of drug metabolites. The Government Chemistry Laboratory Agency in Mwanza which was used to analyse drug metabolites did not have reagents for analysis of some substances. It is possible that substance abusers could have been using substances that could not be detected by the laboratory for lack of appropriate methods.

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