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Substance Abuse: Research and Treatment

Prevalence of Cannabis Residues in Psychiatric Patients: A Case Study of Two Mental Health Referral Hospitals in Uganda

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ABSTRACT: Various studies have reported that abuse of cannabis is a risk factor for psychosis. The aims of this study were to determine the prevalence of delta 9-tetrahydrocanabinol (Δ^9-THC), a major metabolite of cannabis, in psychiatric patients in Uganda, and to assess the diagnostic capacity of two referral mental health hospitals to screen patients for exposure to cannabis in Uganda. Socio-demographic characteristics of the patients were collected through questionnaires and review of medical records. Urine samples were collected from 100 patients and analyzed using Δ^9-THC immunochromatographic kit (Standard Diagnostics®, South Korea). Seventeen percent of the patients tested positive for Δ^9-THC residues in their urine. There was strong association ($P < 0.05$) between history of previous abuse of cannabis and presence of Δ^9-THC residues in the urine. Alcohol, cocaine, heroin, pethidine, tobacco, khat and kuber were the other substances abused in various combinations. Both referral hospitals lacked laboratory diagnostic kits for detection of cannabis in psychiatric patients. In conclusion, previous abuse of cannabis is associated with occurrence of the residues in psychiatric patients, yet referral mental health facilities in Uganda do not have the appropriate diagnostic kits for detection of cannabis residues as a basis for evidence-based psychotherapy.

KEY WORDS: cannabis delta 9-tetrahydrocanabinol psychiatric patients, Uganda

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Introduction

Mental and behavioral disorders affect more than 25% of all people at some time.[1] In Uganda, 15–40% of the population experience some form of psychiatric disorder at least once in their lifetime.[2] A study in rural south western Uganda shows that the total number of first-time admission of psychiatric patients from 2002 to 2004 increased by about four-fold.[3] It was reported that 0.7% of Uganda's health budget was spent on mental health, although this budget is considered insufficient because of the increasing burden of mental health cases.[4] Globally, it is estimated that mental and neurological disorders accounted for 10% of the total Disability Adjusted Life Years (DALYs) lost due to all diseases and injuries. Cannabis, called by different users as 'ganja', 'weed', 'dope', 'pot', 'grass', 'reefer', 'mary-jane', 'njaaga' and 'nzai', among others, contains chemical substances known as cannabinoids, of which delta-9-tetrahydrocannabinol (Δ^9-THC) is the most psychoactive substance.[5] Three main types of cannabis products exist: cannabis herb (marijuana), cannabis resin (hashish) and cannabis oil (hash oil) with the oil being the most potent cannabis product.[5] All parts of the plant contain varying amounts of Δ^9-THC, with the highest amount found in flowers.[6] The major route of exposure to cannabis is through inhalation, oral or rarely by parenteral means.[7] Cannabis is the most widely used illicit substance globally,[8] and cannabis and related illicit psychotropic substances are among risk factors

for psychosis.[9–11] In Uganda, no studies have been done to detect the presence of cannabis residues in psychiatric patients as a basis for evidence-based psychotherapy. The aim of the current study was to determine the prevalence of Δ^9-THC in psychiatric patients in two referral mental health hospitals in Uganda and assess their diagnostic capacity to screen patients for exposure to cannabis.

Materials and Methods

Study setting. This study was carried out in two hospitals in Uganda: Butabika National Referral Mental Hospital (BNRMH) and Arua Regional Referral Hospital (ARRH). The BNRMH is situated in the capital city Kampala, Central Uganda, while ARRH is found in Arua district, West Nile sub-region, Northern Uganda. The rationale for selecting the two hospitals is that by virtue of being a national referral hospital, BNRMH receives patients from all over the country, and ARRH not only admits patients from West Nile Sub region but also the two neighboring countries, South Sudan and Democratic Republic of Congo (DRC).

Study design. In this cross-sectional study, all psychiatric patients aged at least 10 years old, upon their admission to the hospitals, were purposely selected for the study. Only patients who consented to the study or patients whose caretakers consented were eventually included for data collection. A questionnaire was used for interviewing the patients or their caretakers on their socio-demographic characteristics and history of exposure to cannabis and other psychoactive substances. Caretakers of the patients participated in the interviews whenever the condition of the patients did not warrant them to be interviewed, as advised by the clinician on duty. Additional information regarding the patients' medical history was obtained through review of their medical records.

Collection of urine samples for analysis. Upon consenting, the patients were instructed by a nurse on how to collect urine samples. Patients were then requested to void about 5 mL of the first part of urine in a clean, sterile, leak-proof, wide-mouthed specimen container. The first part of urine was ideal as per the recommendations of the test kit manufacturer (Standard Diagnostics®, South Korea). The samples were immediately taken to the hospital laboratory for analysis. The kit is a rapid, one step, lateral flow chromatographic immunoassay kit designed with 50 ng/mL cut-off for detection of Δ^9-THC. The procedure involved dispensing three to four drops of the urine sample onto the sample area of the kit. The sample was allowed to move under capillarity to the test site and the control site of the kit. The result was read after five minutes. A positive result was indicated by one colored band in the control site and no band in the test site of the kit. This is because antibodies against Δ^9-THC in the urine sample react with the Δ^9-THC conjugate, thus preventing reaction at the test site. For a negative result, colored bands are produced at both the test site and the control site. This is due to the fact that absence of Δ^9-THC antibodies allows the Δ^9-THC conjugate to react with Δ^9-THC at the test site to produce a colored band.

Data analysis. The data collected through questionnaires was entered in a Microsoft Excel spreadsheet and further analyzed using STATA (version 10) software. The association between cannabis residues in urine with dependant variables (such as socio-demographic) was analyzed using chi square test at 95% confidence. P value < 0.05 was considered statistically significant.

Ethical considerations. Before commencement of the study, written ethical authorization was obtained from both hospitals. In addition, informed consent of the psychiatric patients or their caretakers was obtained before the patients could participate in the study. The informed consent allowed for review of the patient's medical records, face-to-face oral interview, voluntary submission of a urine sample for laboratory analysis, and use of data resulting from the study. Patients' identity was kept confidential and the data obtained was used only for this study.

Results

Socio-demographic characteristics. A total of 100 patients with mental and behavioral disorders participated in this study, 75 (75%) of whom were from BNRMH while 25 (25%) were from ARRH. All the 25 psychiatric patients in ARRH were male while 4 (5.3%) of the 75 patients in BNRMH were females. The geographical distribution of the patients was; 36.0% from Central Uganda, 35.0% from the North, 14.0% from the West, 9.0% from Eastern Uganda, and 6.0% from neighboring countries such as Rwanda (3), Kenya (2) and Democratic Republic of Congo (1). The most common age group (40%) of the patients were young adults aged 20–29 years, followed by adults (29%) whose age ranged from 30 to 44 years. Most of the patients were peasants (31%), casual workers (19%), teachers (14%), small scale businessmen (13%), students (12%) and commercial drivers (5%). Altogether, 17 (17%) patients tested positive for Δ^9-THC residues. Cannabis residue was detected in the urine sample of five casual workers, four businessmen, four peasants, two students and two drivers. Generally, there was no statistical difference ($P > 0.05$) in the distribution of Δ^9-THC residues with age, marital status, occupation, level of education or religion of the patients. The distribution of cannabis residues according to level of education and religion is shown in Table 1.

Frequency of admission of the patients and presence of cannabis residues. Cases of first-time admission for mental and behavioral disorders were 57.0%, compared to 43.0% for re-admissions. The majority of the patients that tested positive were either admitted for the first time (9/17) or second time (6/17). None of the patients who had been admitted more than three times had detectable residues of Δ^9-THC in their urine. However, there was no statistical difference ($P > 0.05$) in the occurrence of Δ^9-THC residues with the number of times a patient was readmitted, as shown in Table 2.

Table 1. Socio-demographic characteristics and cannabis residues among the patients.

AGE GROUP	GENDER			Δ^9-THC RESIDUES IN URINE			PEARSON X^2
	FEMALE	MALE	TOTAL	NEGATIVE	POSITIVE	TOTAL	
0–19	0	7	7	6	1	7	$\chi^{20} = 2.9181$ $P = 0.713$
20–29	1	40	41	33	8	41	
30–39	3	29	32	25	7	32	
40–49	0	15	15	14	1	15	
50–59	0	4	4	4		4	
60–69	0	1	1	1		1	
Marital Status							
Married	2	52	54	46	8	54	$\chi^2 = 0.3973$ $P = 0.529$
Single	2	44	46	37	9	46	
Occupation							
Business	1	12	13	9	4	13	$\chi^2 = 9.5927$ $P = 0.567$
Casual worker	1	18	19	14	5	19	
Fisherman	0	1	1	1	0	1	
Lawyer	0	1	1	1	0	1	
Medical Doctor	0	1	1	1	0	1	
Driver	0	5	5	3	2	5	
Peasant	0	31	31	27	4	31	
Preacher	0	2	2	2	0	2	
Soldier	0	1	1	1	0	1	
Student	0	12	12	10	2	12	
Teacher	2	12	14	14	0	14	
Education Level							
Never schooled	0	4	4	4	0	4	$\chi^2 = 0.6276$ $P = 0.178$
Primary	1	27	28	24	4	28	
Secondary	1	42	43	34	9	43	
Tertiary	1	14	15	14	1	15	
University	1	8	9	7	2	9	
Declined	0	1	1	0	1	1	
Religion							
Anglican	3	27	30	25	5	30	$\chi^2 = 8.9912$ $P = 0.109$
Catholic	0	35	35	32	3	35	
Moslem	1	19	20	15	5	20	
Pentecostal	0	11	11	8	3	11	
S.D.A	0	3	3	3	0	3	
Declined	0	1	1	0	1	1	

Note: χ^2 chi square.

History of abuse of cannabis and other psychotropic substances. Out of the 100 patients who participated in this study, 21 had a history of abuse of cannabis and/or other psychotropic substances. Of these cases, 80.8% reported abuse of cannabis, 7.7% cocaine and heroin, and 3.8% pethidine. There was a strong association ($P < 0.05$) between history of previous abuse of cannabis and presence of the residues in the urine of psychiatric patients. Alcohol and tobacco were among the most frequently (49%) consumed drugs by the patients. The different combinations of psychoactive substances consumed by the patients were as shown in Table 3.

Availability of diagnostic kits for detection of cannabis residues in the two hospitals. In both hospitals, there was no laboratory diagnostic test used for screening patients for cannabis abuse before or after the patients were admitted. The

Table 2. Presence of cannabis residues with frequency of admission.

NUMBER OF TIMES ADMITTED	Δ^9-THC RESIDUES IN URINE			PEARSON X^2
	NEGATIVE	POSITIVE	TOTAL	
First	48	9	57	$\chi^2 = 2.7173$ $P = 0.743$
Second	20	6	26	
Third	6	2	8	
Forth	4	0	4	
Fifth	1	0	1	
Sixth	3	0	3	
Over six times	1	0	1	

Note: χ^2 chi square.

clinicians relied mainly on patients' medical history of drug abuse to determine their exposure to cannabis.

Discussions

Generally, the majority of the psychiatric patients who participated in the study were young. This could be attributed to social factors like unemployment or stressful work, domestic unrest and political factors such as civil wars that predisposed them to psychological trauma. It was also noted that 21.0% of the study participants, the largest age group of whom were 20 to 29 years old, had history of previous exposure to cannabis. This finding is in agreement with a previous study in the United States in which young adults had the highest rate of emergency department visits related to cannabis.[12] Peer influence, curiosity, pleasure and the desire for enhanced physical and intellectual performance amongst young adults could explain this scenario.[13] Contrary to the cited perception of the benefits of cannabis, there are reports that students who smoke cannabis get lower grades and are more likely to drop out of school than their non-smoking counterparts.[14] This could be attributed to the ability of the psychoactive constituents of the plant to cause learning and memory impairment.[15] It is also a precursor for inefficiency at work places and in schools. Additionally, several studies have shown that workers who smoke cannabis are more likely than their co-workers to have work-related problems.[16] Moreover, it has been reported that the adverse impact of cannabis on memory and learning can last for days or weeks after the acute effects of the drug wear off.[16]

Table 3. Distribution of cannabis residues and history of abuse of other psychotropic substances.

NUMBER OF TIMES ADMITTED	Δ^9-THC RESIDUES IN URINE			PEARSON X^2
	NEGATIVE	POSITIVE	TOTAL	
Previous abuse of cannabis				
No	71	8	79	$\chi^2 = 12.5958$ $P = 0.000$**
Yes	12	9	21	
Other psychotropic substances abused (history of exposure)				
Alcohol only	3	2	5	$\chi^2 = 15.3927$ $P = 0.118$
Alcohol and Khat	9	0	9	
Alcohol, Khat and Tobacco	6	2	8	
Alcohol, Pethidine and Tobacco	1	0	1	
Alcohol and Tobacco	42	7	49	
Cocaine, Heroin and Tobacco	1	0	1	
Cocaine and Tobacco	0	1	1	
Heroin and Tobacco	1	0	1	
Kuber, Tobacco	0	1	1	
None	17	4	21	
Declined	3	0	3	

Notes: χ^2 chi square; **$P < 0.05$.

Adults (30–39 years old) were the second largest group of participants that tested positive for Δ^9-THC residues. This was probably because of the nature of activities performed by adults that predisposes them to cannabis abuse. Such activities include building, welding, carpentry and long distance driving, all of which are strenuous jobs. Unfortunately, consumption of cannabis by the above age group may not only affect their mental health but also their reproductive health. This is mainly due to the fact that cannabis affects reproductive functions by inducing hormonal imbalance that can affect libido and fertility.[17]

Amongst the study group, first-time admissions for mental and behavioral disorders were higher (57.0%) than re-admissions (43.0%). This result corroborates with a previous report in rural, South Western Uganda that the total number of new admissions of psychiatric patients increased by approximately four-fold.[3] In this study, Δ^9-THC residues were detected in 17.0% of the psychiatric patients. Of the seventeen, nine were first-time admissions and eight were re-admissions. This figure is slightly higher than 14.23% reported in India.[18] The difference in prevalence between the two countries could be attributed to cannabis being widely available in Uganda, weaknesses in legislation concerning cannabis, idleness, poverty and ignorance about the dangers of cannabis abuse. Although the present study could not directly associate cannabis abuse to psychosis, studies have shown that exposure to cannabis increases the risk of psychosis.[9–11] However, it is also reported that psychosis may be a risk factor for cannabis use, because individuals who suffer from psychosis begin to self-medicate with cannabis.[19] Regardless of whether cannabis abuse is a risk factor for psychosis[9–11] or its abuse is a consequence of psychosis,[19] there is need for rigorous control measures to prevent abuse of cannabis in Uganda.

This study also revealed that Butabika National Referral Mental Hospital and Arua Regional Referral Hospital do not carry out any laboratory diagnostic tests for screening of patients for cannabis residues. Such tests would help clinicians in making critical decisions on evidence-based psychotherapeutic

interventions. Lack of routine cannabis screening services in the two mental health referral hospitals could be attributed to inadequate funding.

In conclusion, this is the first study in Uganda that has demonstrated the presence of cannabis residues in psychiatric patients. This study revealed that previous abuse of cannabis is associated with occurrence of cannabis residues in psychiatric patients. In addition, mental health facilities in Uganda do not have any laboratory diagnostic kits for detection of cannabis residues. This raises concerns on specificity and effectiveness of psychotherapy regimes for mental health patients in Uganda. Alcohol, cocaine, heroin, pethidine, tobacco, khat and kuber were the other substances abused in various combinations. We therefore recommend further studies on the effect of cannabis, as well as the synergistic effects of multiple exposure to psychotropic substances, on psychiatric patients.

Author Contributions

Conceived and designed the study: EAA, EK, PV. Collected data: EAA. Entered the data: EAA, PV. Wrote the initial draft: PV, EK. Reviewed and approved final version: PV, EAA, EK.

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DISCLOSURES AND ETHICS

As a requirement of publication the authors have provided signed confirmation of their compliance with ethical and legal obligations including but not limited to compliance with ICMJE authorship and competing interests guidelines, that the article is neither under consideration for publication nor published elsewhere, of their compliance with legal and ethical guidelines concerning human and animal research participants (if applicable), and that permission has been obtained for reproduction of any copyrighted material. This article was subject to blind, independent, expert peer review. The reviewers reported no competing interests.

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