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Original Article

Anti-Retroviral Therapy Adherence at a Rural Hospital in Plateau State, Nigeria.

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ABSTRACT

Background: The use of locally brewed alcohol in rural settings is on the increase.This study sought to determine the prevalence of harmful alcohol use (local and commercially brewed) and its association with ART adherence among HIV infected patients in a rural setting in Plateau State, Nigeria. **Method**: This was a descriptive cross-sectional study carried out among HIV sero-positive adults receiving anti-retroviral therapy at the Vom Christian Hospital between February and July 2018. A structured interviewer-administered questionnaire was used to obtain relevant data from 297 selected persons. Alcohol Use Disorders Identification Test tool was used to determine the level of alcohol consumption while Self-Reported Adherence tool was used to measure drug adherence. Data was analysed using IBM Statistical Product and Service Solution (SPSS) Statistics version 25. Probability (p) values of ≤ 0.05 was considered statistically significant. **Results**: The prevalence of harmful use of alcohol was found to be one seventh (14.3%) of the study population. Bivariate analysis did not show any significant relationship between the harmful use of alcohol with ART adherence. Binary logistic regression showed that those who take more than a pill per day were less likely to adhere to ART compared to those who take one. (OR 0.15 95% CI = 0.03-0.91). **Conclusion**: Even though the prevalence of harmful Alcohol use was high in this study, its effect had no effect on adherence to ART.

Keywords: Alcohol use, Harmful, Antiretroviral therapy, Adherence, Human Immunodeficiency Virus.

INTRODUCTION

The Human Immunodeficiency Virus (HIV) has been an important topic in public health since its discovery in 1981. Globally, about thirty-nine million people are infected with the virus, causing several Acquired Immune Deficiency Syndrome (AIDS) deaths.[1] Sub-Saharan Africa (SSA) records the highest disease burden, affecting 25 million people with Nigeria as the third leading country in the world with the highest population of people affected by the virus.[2,3]

The distribution of antiretroviral therapy (ART) has remarkably reduced the number of people dying from the virus and this has led to the institutionalisation of many treatment sites in Nigeria, including Vom Christian Hospital (VCH).[4,5] However, the increasing rate of drug resistance is a current global concern and non-adherence to medication has been identified as one of the factors responsible for this growing challenge.[4]

There is an increase in the harmful use of alcohol in Nigeria and the use of locally brewed alcohol is on the increase.[6] Several authors have demonstrated that the harmful use of alcohol is a significant factor responsible for non-adherence to ART among HIV patients.[7-9] The reasons for this association are hinged on the negative impact of alcohol on this sub-population. The negative effect of mixing alcohol and ART manifests as marked side effects, which makes patients refrain from taking their medication.[10] Furthermore, alcohol causes forgetfulness, leading to skipped doses of the medication.[10] Other negative effects of alcohol abuse among HIV patients include the high risk of HIV transmission through unprotected sex and reduction of host immunity, which may facilitate progression to AIDS.[7, 11] The negative impact of alcohol consumption

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in Jos can be seen in its association with the development of alcohol-related diseases.[12]

Both alcohol and HIV modulate innate and adaptive immunity, and alcohol consumption by HIV-positive individuals increase the likelihood of viral replication and lead to increased susceptibility to opportunistic infections and other co-morbid conditions such as tuberculosis. The situation is further compounded by the interaction between medications used for the treatment of these opportunistic infections and alcohol. The liver metabolizes both alcohol and antiretroviral (ARV) drugs and alcohol-related liver toxicity results in compromised liver function with ARVs not being effective, leading to toxicity from the medications.[13,14] It is, however, important to emphasise that the most significant consequence of alcohol intake in this population is non-adherence to ART.[15]

There is paucity of data on alcohol and ART research in Africa and so research on this subject may lead to interventions to support HIV infected patients that consume alcohol.[16] Therefore, it is imperative to investigate the magnitude of harmful use of alcohol (local and commercially brewed) and its relation to adherence to antiretroviral therapy at VCH, Jos.

METHODS

This cross sectional study was conducted at the Vom Christian Hospital which is located in Vwang, Jos South Local Government Area of Plateau State between February and July 2018. The hospital which is a faith-based secondary health care institution, serves the immediate communities of Jos South, Riyom and Bassa Local Government Areas of Plateau State and some communities in the southern part of Kaduna State. Vom Christian Hospital is a site for HIV care in Nigeria courtesy of AIDS Prevention Initiative in Nigeria.[5] At the time of the study, 812 adult patients have been recruited and on ART. Patients were recruited into the study if they were 18 years old and above and had been on ART for at least six months.

The study design was a descriptive cross-sectional study carried out between February and July 2018. The sample size calculated was 270 using the formula for cross sectional studies ($n = z^2pq/e^2$)[17] where n = minimum sample size, z = 1.96: standard normal deviate at 95% confidence limit, p = 22.8 prevalence of alcohol use disorder among people living with HIV/AIDS in Nigeria,[18] q = 1 – p, e = margin of sampling error tolerated (5%). Adjusting for possible loss of data of 10%, the sample size was 297 participants. Using a table of random numbers, patients were recruited by simple random sampling method. The list of adult patients registered in the health facility for care was used as the sampling frame. If a patient selected was ineligible or did not consent to participate, the next patient on the list was selected.

Data was obtained using a structured interviewer- administered questionnaire enquiring information on their socio-demographic, alcohol and drug intake practices using the AUDIT and SERAD questionnaires. The Alcohol Use Disorders Identification Test (AUDIT) is a screening tool developed by the World Health Organization (WHO) to assess alcohol consumption, drinking behavior and alcohol-related problems. It consists of 10 questions with scores awarded based on response given and summed up to give a total. A score of 8 or more indicates hazardous or harmful alcohol use. The AUDIT has been validated across genders and in a wide range of racial/ethnic groups and is well suited for use in primary care settings.[19] Participants were encouraged to answer the AUDIT questions in terms of the volume of the locally available receptacle for traditional alcohol intake called “langa”. Since the volume of a “langa” is known, and the concentration of locally brewed drink is known,[20] this was converted to the number of standard drinks. For those who took commercial drinks, standard drink determination was made using the labels on the drinks. Only participants who took alcohol at the time of the study were assessed for AUDIT.

The Self-Reported Adherence (SERAD) questionnaire is a self-reported instrument designed to provide drug adherence measurement among patients. When drug adherence in the last month is assessed, there is a less than 3% difference between the use of SERAD and electronic monitoring.[21] The percentages of adherence can be calculated using the formula: (total number of dosage units prescribed – total number of times reported)/total number of dosage units prescribed) X100. Adherence is graded as optimal if it is 96% or more and sub optimal if it is less than 96%,[22] however in this study it was based on the mean drug adherence rate of 99.05%.

Data was analysed using IBM Statistical Product and Service Solution (SPSS) Statistics version 25 and presented as frequencies, percentages and means. A bivariate analysis, chi square test, to determine the association between variables such as history of ever taking alcohol in the past, history of present alcohol intake, type of alcohol consumed, safety of alcohol consumption and adherence to ART. On bivariate analysis, variables with outputs $p \leq 0.25$ were imputed into a binary logistic regression. Probability values of $p \leq 0.05$ was considered statistically significant.

Ethical clearance was obtained from the Research and Ethics Committee of the Jos University Teaching Hospital, Jos and informed written consent was obtained from the participants after explaining the nature and purpose of the study in detail. All data was treated confidential.

RESULTS

The study had 297 participants enrolled however four participants had incomplete data as such the results presented is for 293 participants. The mean age was 41.4 ± 10.1 years and age range was 20 – 74 years and about three quarters, 221 (75.4%) were female. The majority of

Table 1: Socio-demographic characteristics of the study population

Variable	N	%
Mean Age 41.4 ± 10.1 (Years)		
Age Group (Years)		
18 - 27	17	5.9
28 - 37	100	34.1
38 - 47	93	31.7
48 - 57	58	19.8
≥58	25	8.5
Sex		
Female	221	75.4
Male	72	24.6
Marital Status		
Divorced	3	1.0
Married	216	73.7
Separated	3	1.0
Single	33	11.3
Widow/Widower	38	13.0
Education Level		
No formal education	6	8.9
Primary	122	41.6
Secondary	92	31.4
Tertiary	53	18.1
Occupation		
Artisan	37	12.6
Civil servant	20	6.8
Farmer	125	42.6
Professional	30	10.2
Trader/Business	81	27.6
Average Monthly Income (₦)		
0-4,999	88	30.0
5,000-49,999	165	56.3
50,000-99,999	35	12.0
100,000-499,999	5	1.7
Location		
Urban	97	33.1
Rural	96	66.9

Table 2: Alcohol Use Relate Characteristics of the Study Population

Variable	N	%
Have you ever taken alcohol in the past?		
No	113	38.6
Yes	180	61.4
Do you currently drink alcohol?		
No	218	74.4
Yes	75	25.6
Type of alcohol consumed among those who currently drink alcohol		
Both	25	33.3
Commercial	22	29.4
Local	28	37.3
AUDIT (Those who currently drink alcohol)		
Safe Alcohol Use	33	44.0
Harmful Alcohol Use among those who currently take alcohol	42	56.0
Alcohol use combination 1		
Both Local and Commercial + Commercial	47	62.7
Local	28	37.3
Alcohol use combination 2		
Both Local and Commercial + Local	53	70.7
Commercial	22	29.3
Alcohol use combination 3		
Both Local and Commercial	25	33.3
Commercial + Local	50	66.7

Table 3: HIV Treatment Related Characteristics of the Study Population

Variable	N	%
ART Regimen		
Second line	3	1.0
First line	290	99.0
Duration on HAART		
0 - 6 years	149	50.9
> 6 years	144	49.1
Number of pills/day		
> 1 pill per day	117	39.9
1 pill per day	176	60.1
Adherence to ART		
Less than 99.05% adhererence	48	16.4
Mean Adherence rate of 99.05 % or more	245	83.6
Mean monthly drug adherence 99.05% SD 2.87 IQR 80-100		
CD4 Count		
CD_4 Count of 200 cells/mm^3 or more	109	37.2
CD_4 Count less than 200 cells/mm^3	184	62.8
Viral Load		
Viral load of 500 copies/mL or more	32	10.9
Viral load less than 500 copies/mL	261	89.1

Table 4: Bivariate Analysis of Sociodemographic and Clinical Characterist against ART Adherence among Participants with Harmful Alcohol Use.

			ADHERENCE				
Variable	N	%	POOR	GOOD	OR	95% CI	P
Age (Years)							
Less than or equal to 41 years	28	66.7	6 (21.4)	22 (78.6)	1.64	0.29-9.40	0.70
Greater than 41.years	14	33.3	2 (14.3)	12 (85.7)			
Sex							
Female	26	61.9	6 (23.1)	20 (76.9)	2.1	0.37-11.96	0.69
Male	16	38.1	2 (12.5)	14 (87.5)			
Marital Status							
Not in marrital relationship	10	23.8	3 (30.0)	7 (70.0)	2.31	0.44-12.11	0.37
Married	32	76.2	5 (15.6)	27 (84.4)			
Education Level							
Not more than Primary School education	24	57.1	6 (25.0)	18 (75.0)	2.66	0.47-15.14	0.43
At least a Secondary School education	18	42.9	2 (11.1)	16 (88.9)			
Occupation							
Other occupations	22	52.4	6 (27.3)	16 (72.7)	3.38	0.60-19.16	0.24
Farmer	20	47.6	2 (10.0)	18 (90.0)			
Average Monthly Income2 (N)							
Less than 5,000	15	35.7	2 (13.3)	13 (86.7)	0.54	0.09-3.08	0.69
Greater than or equal to 5,000	27	64.3	6 (22.2)	21 (77.8)			
Location *							
Urban	11	26.2	0 (0.0)	11 (100.0)	1.35	1.10-1.66	0.09
Rural	31	73.8	8 (25.8)	23 (74.2)			
Duration on HAART							
0 - 6 years	19	45.2	5 (26.3)	14 (73.7)	2.38	0.49-11.63	0.43
> 6 years	23	54.8	3 (13.0)	20 (87.0)			
Number of pills/day							
> 1 pill per day	16	38.1	6 (37.5)	10 (62.5)	7.20	1.24-41.94	**0.04**
1 pill per day	26	61.9	2 (7.7)	24 (92.3)			
AUDIT (Currently taking alcohol)							
Safe	33	44.0	5 (15.2)	28 (84.8)	0.76	0.22-2.58	0.76
Harmful	42	56.0	8 (19.0)	34 (81.0)			

NB* Unable to input location into the binary logistic model because a cell has a zero and this was giving an error message

Table 5: Binary Logistic Regression of Predictors of ART Adherence

Variable	OR	95% CI	P
Occupations other than Farmers	0.35	0.06-2.20	0.26
> 1 Pill/day	0.15	0.03-0.91	**0.04**

the participants, 216 (73.7%) were married and about half, 145 (49.5%) had at least a secondary school level of education. Less than half of the study population; 125 (42.7%) were farmers, and a third; 88 (30.0%) having an average monthly income of < five thousand naira a month. About two-thirds; 196 (66.9%) of the participants were rural dwellers. Table 1.

More than half; 180 (61.4%) had taken alcohol in the past and a quarter; 75 (25.6%) currently take alcohol. Of those that currently take alcohol, a third; 25 (33.3%) took both locally and commercially produced alcohol, about a third, 22 (29.4%), commercial alcohol only and slightly over a third; 28 (37.5%) local alcohol only. The prevalence of harmful intake of alcohol was

14.3% among the study population. The mean monthly drug adherence rate was 99.05% ± 2.87 with IQR 80.0% – 100.0%. Tables 2 and 3.

Bivariate analysis did not show any significant relationship between the safety of alcohol consumed (AUDIT score) and drug adherence. The bivariate analysis however showed that number of pills/day was significantly associated ($p \leq 0.05$) with ART adherence (Table 4). When variables with a $p \leq 0.25$ (Occupation and Number of pills/day) from the bivariate analysis were plotted into a binary logistic regression, it showed that persons who take more than a pill/day were less likely to adhere to ART compared to those who take one. (OR 0.15 95% CI = 0.03-0.91). Table 5.

DISCUSSION

Several studies have been carried out on the effect of alcohol consumption on ART adherence among adults living with HIV/AIDS.[23, 24-27] However, not many studies have investigated the effect of harmful alcohol use on adherence to ART and among those that investigated the effect of alcohol on ART, very few have considered the effects of consumption on both locally and commercially produced alcohol in rural settings.[28,29]

About three-fifths (61.4%) of the study population had a lifetime history of alcohol consumption and about a quarter drank alcohol at the time of the study. The prevalence of harmful use of alcohol was one-seventh (14.3%) of the study population. Using the AUDIT questionnaire, Goar and colleagues in Jos, Nigeria reported a prevalence of 10.6%, Gebre and co-workers in South West Ethiopia reported a prevalence of 18.4%.[30,31] Using the ASSIST tool, in a comparable study Goar and fellow-workers found a prevalence of 16.9%.[32] In a study conducted at Abuja by Egbe and colleagues a prevalence of 7.0% was obtained using the World Mental Health Composite International Diagnostic Interview (WMH CIDI) which is diagnostic, thus explaining the relatively lower prevalence.[33] In a systematic review and meta-analysis among patients on ART in Africa, the harmful use of alcohol was found to be 22.03% whereas that in Nigeria, 22.8%.[18] The difference between the prevalence of harmful use of alcohol obtained in this study compared to similar studies may be as a result of the increase in prevalence in recent years and the fact that this has been found to be higher in males than females. It has also been found to be more in rural than urban communities and would differ based on cultural and religious norms and the tool of assessment.[6,34,35]

In a study conducted at the Plateau State Specialist Hospital, Jos, where adherence was self-reported and assessed over a day period, about a third (27.6%) of HIV positive patients who abused substances were adherent to antiretroviral therapy and of those who had harmful use of alcohol, about a tenth were adherent to ART.[32] In another study carried out at the Jos University Teaching Hospital, self-reported adherence was measured based on a 4-day recall, about one-seventh (14.3%) of the study respondents had an adherence rate of 95.0% and the mean ART adherence rate was 90.3%.[36] An adherence rate of 92.6% similar to that in our study was obtained at the University of Ilorin Teaching Hospital Nigeria self-reported treatment adherence over the preceding 7 days was used.[37] At the Lagos state University Teaching Hospital, the mean adherence rate was 99.1% in the two weeks preceeding the study.[38] In the same study, majority, 79.5% had 100% adherence while a larger proportion (92.9%) were optimally (≥ 95%) adherent.[38]

Abdulsamad and co workers at the Sokoto State Specialist Hospital found that 83.2% of the respondents had an adherence rate of at least 95.0% in the 7 days preceding the survey.[39] At the University of Nigeria Teaching Hospital, Enugu State, 67.9% reported an adherence of 95.0% or more in the last one month.[40] At a rural setting in Cross River State, South-South Nigeria, a self-reported adherence based on a one-week of taking 95% of their prescribed doses was 50.4%.[41] In, a systematic review in SSA, the average adherence rate was found to be 72.9%.

The finding in our study of a high ART adherence rate may be because of reportage bias since unlike most studies, this was conducted in a rural setting among participants with a low level of education, and the questionnaire was interviewer-administered. The duration of assessment of adherence in the study was one month and this compared to several studies which had an assessment period of a few days to two weeks may have led participants failing to recall days they might have missed taking their medication as such leading to a high adherence rate. A combination of the framework of an effective health care system, treatment protocol and support system for patients could also explain the high adherence rates found in our study compared to other studies.

However, the adherence rate for both categories of level of alcohol use falls short of the UNAIDS target of 95-95-95 which emphasizes that 95% of patients on ART should be adherent to medications. Therefore, other causes of non-adherence should be explored among this study population.

Several studies have reported that alcohol consumption, (degree of intake not taken into account) is a negative predictor of ART adherence,[38,24-27] whereas other similar studies have shown no relationship between alcohol consumption and adherence.[42] Studies have reported the harmful use alcohol as a negative predictor of ART adherence,[32,43-46] however, some have shown that this did not influence ART adherence.[47] There could also be some difference in the subpopulation with safe and harmful alcohol intake namely: family support, peer support, health awareness, co-morbidities, clinic

appointment visits and drug alcohol interaction as these have been found to have a negative influence on ART adherence.[14,48,49]

The harmful use of alcohol in our study is one of great concern because of its negative effect on health outcomes and challenge in disease management, increased risky behavior, social and economic consequences. This calls on the need for a wholistic, integrated approach to promoting healthier behavior and lifestyles that would improve long term health outcomes.

CONCLUSION

Alcohol abuse had no association on ART adherence in the study population. There is an urgent need for a wholistic and integrated approach to promoting healthier behavior and lifestyles in patients on ART who so as to improve long term health outcomes.

Acknowledgement

The authors wish to sincerely thank the the permission granted to them by the management of Vom Christian Hospital and by extension the AIDS Prevention Initiative in Nigeria to conduct the study. Special thanks go to the staff of the clinic, especially Mrs Rebecca Tong, Mrs Nvou Dachung, Mrs Hudung Yakubu, Mr Samuel Victor and Mr Sunday Bok for their support and contribution to the study.

Author's Contributions

MG, SM, AM and MD conceived and designed the study. MG, SM and FD collected data. MG, SM and JD analyzed the data. All authors contributed to the interpretation of results, writing of the manuscript and approve the final version of the manuscript.

Disclosures

The study was funded by the researchers.

Conflict of Interest

There is no conflict of interest.

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