International Journal of Community Medicine and Public Health
Aniwada EC et al. Int J Community Med Public Health. 2022 May;9(5):1973-1979
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20221209

Original Research Article

Tobacco use, determinants and effects on treatment among persons living with HIV/AIDS at Military Hospital in Makurdi, Benue State, Nigeria

Elias C. Aniwada[1]*, Godian C. Ezema[2], Chika N. Onwasigwe[1]

[1]Department of Community Medicine, College of Medicine, Enugu, Nigeria
[2]Centre for Infectious Diseases Control, 161 NAF Hospital Makurdi, Benue, Nigeria

Received: 21 February 2022
Accepted: 15 March 2022

***Correspondence:**
Dr. Elias C. Aniwada,
E-mail: eaniwada@gmail.com

ABSTRACT

Background: Tobacco use is a leading avertable cause of premature death globally. It is commonly used among PLWHIV and with mortality tripling compared to the general population. Its impact on them is multifactorial. This study aims to assess the prevalence, determinants and effects of tobacco and its related products on treatment among persons living with HIV at a military hospital in Makurdi, Benue State, Nigeria
Methods: The study was among HIV positive clients ≥18 years who have accessed care for ≥12 months at Nigerian air force hospital, Makurdi of Benue state, Nigeria. A descriptive cross-sectional study was done using adopted WHO ASSIST (V3.0) questionnaire. Simple random sampling method was used to select 700 clients studied.
Results: About 138(19.7%) have used Tobacco products and 66 (9.4%) in past 3 months of which 10 (90.3%) were mild users. Of those that ever-used tobacco 114 (82.6%) used Tobacco and other substances; 90 (79.0%) Alcohol, 73 (64.0%) Kola nut, 8 (7.0%) Cannabis and 5 (4.4%) Cocaine. Determinants of use were male gender (AOR 0.23; 95% CI 0.15-0.35) and earning <18,000 (AOR 2.23; 95% CI 1.05-4.70). There were no associations of tobacco use with viral load and CD4 count.
Conclusions: Prevalence of Tobacco use was higher than general population. Male gender and low socioeconomic status were determinants of use of tobacco. Addressing this menace of tobacco use is an important political and public health issue.

Keywords: Tobacco use, Prevalence, Determinants, Effects on treatment, Military Hospital, Nigeria

INTRODUCTION

Tobacco and its related products use is a major threat to public health and a leading avertable cause of death globally. It is a preventable cause of premature mortality and a host of morbidities. However, the associated health impacts are attributable to the age of initiation of smoking and amount used.[1-5] Globally, it accounts for about 6 million deaths.[1,2] and projected to be over 8 million deaths per year by 2030.[3,4] About 16100 deaths in Nigeria are linked to tobacco and related products.[6]

Tobacco products is among the commonest substances used among PLWHIV and estimated to be two to three times more common among them compared to general population.[7] Consequently, PLWHIV and on ART lose more life-years to smoking than to HIV, with mortality tripling compared to the general population.[8,9] A national study among general population in Nigeria reported that 6.6% of the respondents smoked cigarettes, 1.7% used snuff, 0.4% smoked pipe, and 0.2% chewed tobacco.[10] Researchers have estimated smoking prevalence among PLWHIV as 31% to 84%.[11]

Tobacco impacts negatively on the overall health of PLWHIV.[11] Among them there is increased morbidity among those that use substance compared with those who do not use.[12] The negative effect of tobacco on PLWHIV is not by a mere reduction in the CD4 count but as a result of complex interaction between HIV and tobacco resulting from the effect of compounds contained in tobacco which exert negative effects on both the innate and adaptive immunity of smokers.[7,12] Cigarette contains as much as 5000 compounds of which as many as 73 compounds are carcinogenic, some enhance colonisation and infection of tissues and some others increase oxidative stress in human cells.[7] The harmful effect of tobacco such as Lung cancer is potentiated by HIV.[11] Nigeria still contributes a major proportion of HIV associated death both in Africa and globally. Therefore it is important to explore all factors that may increase mortality among HIV positive individual such as tobacco use which has been shown to increase their mortality to fourfold when compared to non users.[12] In a nationwide, population-based cohort study of HIV patients in Denmark, carried out among 2,317 HIV positive individuals each matched with 4 non HIV positive individuals, all-cause and non-AIDS-related mortality were substantially increased among smoking compared to non-smoking HIV patients (MRR, 4.4 and 5.3) respectively. Those who were heavy smokers had even higher mortality compared to light smokers (MRR 7.5).[12] This study aims to assess the prevalence, determinants and effects of Tobacco and its related products on treatment among persons living with HIV/AIDS at a Military Hospital in Makurdi, Benue State, Nigeria

METHODS

Study area

The study was carried out at centre for infectious diseases control (CIDC), 161 Nigerian air force hospital, Makurdi of Benue state, Nigeria. The centre started as HIV care site under Nigerian ministry of defence and United States department of defence collaboration in July 2006. The Centre provides services to military personnel, their relatives and other civilian clients from Benue state and other bordering states of Taraba, Nasarawa, Cross River and Kogi caters for over seven thousand (7,000) clients for comprehensive HIV care. There are numerous drinking joints in Makurdi and other parts of Benue state. cigarettes, marijuana and other psychoactive substances are accessible.

Study design, instrument and data collection

A descriptive cross-sectional study was done using a pretested, semi-structured, interviewer administered questionnaire. WHO ASSIST tool (V3.0) which has gone through validation and reliability globally in multi-cultural settings including was adopted.[13] Data was collected by researcher and three trained research assistants.

Study population

These consisted of all HIV positive clients ≥18 years who have accessed care for ≥12 months preceding the study at the center or transferred in with record of being on treatment for ≥12 months who gave consent. However, Clients with frank psychosis, other chronic health conditions known to interfere with CD4 count such as multi-drug resistance tuberculosis (MDR-TB) and cancer, as well as those that have not had at least 2 recorded CD4 count and viral load record since commencing antiretroviral medications were excluded.

Sample size determination and sampling

The sample size was determined using single population proportion formula as mentioned below taking 50% as prevalence of Tobacco use.[14]

$$n = Z2pq/d2$$

A total of 410 clients were needed, however 700 clients were studied. A simple random sampling method was adopted. On each day, each client was given a card bearing a number, from 1 to the maximum attendance number usually about 120. Then random numbers were used to select 15 clients from the daily pull. Each selected client was checked to confirm if he/she meets the inclusion criteria and if not was replaced. The questionnaires were coded from numbers 001 to 700. Each selected clients unique ID in the facility was matched to a questionnaire code by the principal investigator and recorded in a code book. This was to ensure linking of questionnaire with treatment record.

Data management

Data analysis was done using IBM statistical package for social sciences (SPSS) version 23.0. ASSIST version 3.1 is an eight (8) item questionnaire. The tool elicits ever used, current use (in the last 3 months) and the frequency of tobacco use. The CD4 increase was categorised as good increase which is increase of CD4 of at least 50cells/ ml per year from the base line CD4 when client was commenced on ART or poor CD4 increase if the increase per annum was less than 50 cells/ml, or if CD4 started dropping to base line CD4 after initial increase or less than 50% of peek ever attained since commencement of ART. Also, good suppression is viral load less than 1000 copies/ml after six months of commencement of ART, while poor suppression was viral load greater than or equal 1000 copies after six months on HAART. Chi-square test was applied to ascertain if there was any significant association of tobacco use with characteristics of clients as well as use of alcohol with treatment outcome (CD4 count and viral load). Level of significance was at $p<0.05$. Logistic regression was used for further analysis to identify predictors at chi-square test p value of 0.2 and below. Written informed consent was obtained from all those interviewed after the purpose of

the study was explained to them. Information obtained from clients were kept confidential. Client's freedom to withdraw from the study at any point in time in spite of the consent was also respected.

RESULTS

The socio-demographic characteristics of respondents is depicted in (Table 1).

Table 1: Socio-demographic characteristics of respondents (n=700).

Variables	N	%
Age group (years)		
≤30	65	9.3
31-60	618	88.3
>60	17	2.4
Mean (SD) 39.3±0.1		
Sex		
Male	259	37.0
Female	441	63.0
Education		
Primary	164	23.4
Secondary	232	33.1
Tertiary	304	43.4
Marital status		
Married (with spouse)	326	46.6
Married (not with spouse)	133	19.0
Single	101	14.4
Widowed/Separated/Divorced	140	20.0
Religion		
Christianity	693	99.0
Others	7	1.0
Income		
<18000	302	43.1
18100–50000	314	44.9
>50,000	84	12.0
Tribe		
Tiv	688	98.3
Others	12	1.7
Occupation		
Farming	201	28.7
Business	255	36.4
Public servant	173	24.7
Student/none	71	10.1

The mean age of the respondents was 31.7±11.7 years. Majority of the patients were aged 31-60 years 618 (8.3%), females 441 (63.0%), had tertiary education 304 (43.4%), married and with spouse 326 (46.6%), Christians 693 (99.0%), earns 18,100-50,000 naira 314 (44.9%), Tiv 688 (98.3%) and traders 255 (36.4%).

The prevalence of use of tobacco in different forms is shown in (Table 2). About 138 (19.7%) have used Tobacco products. In past 3 months, 66 (9.4%) used and 31(4.4%) uses tobacco product daily. Out of 66 patients that used Tobacco in past 3 months 10 (90.3%) were mild and 5 (0.7%) severe users. Of those that ever used tobacco 24 (17.4%) used tobacco alone while 114 (82.6%) used tobacco and other substances. About 90 (79.0%) used alcohol, 73 (64.0%) used kola nut, 8 (7.0%) used cannabis and 5 (4.4%) used cocaine with tobacco.

Table 2: Use of tobacco products (n=700).

Variables	N	%
Ever used tobacco products		
Yes	138	19.7
No	562	80.3
Currently used tobacco products in past 3 months		
No	634	90.6
Yes	66	9.4
Level of tobacco use in 3 months* (n=66)		
Mild	10	90.3
Moderate	51	9.0
Severe	5	0.7
Frequency of usage in past 3 months (n=66)		
Once/twice	24	3.4
Monthly	10	1.4
Weekly	1	0.1
Daily	31	4.4
Use of tobacco and any other products (n=138)		
Tobacco alone	24	17.4
Tobacco and other substance	114	82.6
Use of tobacco and other products (n=114)		
Tobacco and alcohol	90	79.0
Tobacco and kola nut	73	64.0
Tobacco and cannabis	8	7.0
Tobacco and cocaine	5	4.4
Tobacco and sedatives	3	2.6
Tobacco and inhalants	3	2.6
Tobacco and opioids	2	1.8
Tobacco and hallucinogens	1	0.9

The relationship between socio-demographic characteristics and smoking of cigarettes. There were statistical significant association between use of tobacco and age group (χ^2=6.66; p=0.036), Gender (χ^2=64.90; p<0.001), educational level (χ^2=6.06; p=0.048) and Income (χ^2=9.01; p=0.011). Males were about 0.2 times (AOR 0.23; 95% CI 0.15-0.35) likely to have never used tobacco than females. Those that earn <18,000 were about 2.2 times (AOR 2.23; 95% CI 1.05-4.70) and those that earn 18,100-50,000 about 1.3 times (AOR 1.34; 95% CI 0.69-2.61) more likely to have never used tobacco than those that earn >50,000 naira.

Associations of tobacco use with Viral load and CD4 count is shown in (Table 4). There was no statistical significant associations between ever used tobacco (χ^2=0.40, p=0.508) and currently used tobacco in past 3

months (χ^2=0.01, p=0.984) with viral load, Also there was no statistical significant associations between ever used Tobacco (χ^2 =0.58, p=0.584) and currently used tobacco in past 3 months (χ^2=0.45, p=0.790) with CD4 count, among persons that take tobacco, there was no statistical significant associations between degree of Tobacco use with viral load, (FT, p=0.288) nor with CD4 count (FT, p=0.616).

Table 3: Relationship between socio-demographic characteristics and use of tobacco.

Variables	Use Tobacco product		Bivariate	Multivariate
	Ever used N (%)	Never used N (%)	χ^2 (p value)	AOR (95% CI)
Age group (years)				
18-25	5 (7.7)	60 (92.3)	6.66 (0.036)	2.06 (0.38-11.26)
26-60	130 (21.0)	488 (79.0)		0.96 (0.24-3.79)
>60	3 (17.6)	14 (82.5)		1
Sex				
Male	92 (35.5)	167 (64.5)	64.90 (<0.001)	0.23 (0.15-0.35)
Female	46 (10.4)	395 (89.6)		1
Education				
Primary	142 (86.6)	22 (13.4)	6.06 (0.048)	1.03 (0.50-2.11)
Secondary	54 (23.3)	178 (76.7)		0.74 (0.41 -1.31)
Tertiary	62 (20.4)	242 (79.6		1
Marital status				
Married (with spouse)	67 (20.6)	259 (79.4)	5.16 (0.160)	1.09 (0.59-2.04)
Married (not with spouse)	33 (24.8)	100 (75.2)		0.61 (0.29-1.30)
Single	18 (17.8)	83 (82.2		1.24 (0.57-2.72)
Widowed/Separated/Divorce	20 (14.7)	120 (85.2)		1
Religion				
Christianity	136 (19.6)	155 (80.4)	0.35 (0.629)	3.45 (0.48-24.68)
Others	2 (28.6)	5 (71.4)		1
Tribe				
Tiv	135 (19.6)	553 (80.4)	0.22 (0.713)	1.13 (0.23-5.45)
Others	3 (25.0)	9 (75.0)		
Occupation				
Farming	41 (20.4)	160 (76.6)	2.49 (0.477)	1.01 (0.44-2.36)
Business	44 (17.3)	211 (82.7)		1.59 (0.74-3.44)
Civil/Public Servant	35 (20.2)	138 (79.8)		1.54 (0.72-3.30)
Student/none	18 (25.4)	53 (74.6)		
Income				
<18000	44 (14.6)	258 (85.4)	9.01 (0.011)	2.23 (1.05-4.70)
18100-50000	73 (23.2)	241 (76.8)		1.34 (0.69-2.61)
>50,000	21 (25.0)	63 (75.0		1

DISCUSSION

Current study documented that prevalence of Tobacco use were 19.7% for ever used and 9.4% for use in past 3 months. Out of those that used Tobacco in past 3 months 90.3% were mild users. Also 82.6% used Tobacco and other substances including; 79.0% Alcohol, 64.0% Kola nut, 7.0% Cannabis and 4.4% Cocaine. There was also reduction in prevalence of over 50% from ever use to current use among the clients in this study.

Previous studies have diverse findings on prevalence. The prevalence of tobacco use among PLWHIV in this study was higher than the prevalence of 5.7% recorded among PLWHIV in Sokoto but close to the estimate of 12.9% prevalence among undergraduates in Benin, Edo state Nigeria.[14,15] The tobacco use rates among PLWHIV are two to four times higher (40-80%).[16] Also in contrast a national study in Nigeria reported that 6.6% of the respondents smoked cigarettes, 1.7% used snuff, 0.4% smoked pipe, and 0.2% chewed tobacco. The same study reported that of those that smoked cigarettes, 3.1% smoked pipe, 2.4% chewed tobacco, and 4.6% used snuff, in addition. On the other hand, the prevalence is far lower than estimate 31 to 85% among HIV- infected patients in the USA.[11]

The higher prevalence reported in this study compared to similar study in Sokoto may be because all forms of tobacco use including local tobacco was included in this survey while the Sokoto study considered mainly cigarette smoking. In general, Nigeria is regarded as a low smoking country with a population prevalence of smoking of 5.7% compared to countries like USA with a

country population prevalence of 19.5%.[16] The decline in use from ever used to current use of over 50% may also be attributed to the regular counselling regarding substance use in the facility during follow up visits as well as country wide campaign on tobacco use reduction.

Table 4: Associations of tobacco use with viral load and CD4 count (n=700).

Variables	Viral load		Bivariate	Multivariate
	Good N (%)	Poor N (%)	χ^2 (p value)	AOR (95% CI)
Ever used tobacco				
Yes	127 (92.7)	10 (7.2)	0.40 (0.508)	NA
No	497 (90.4)	53 (9.6)		
Currently used tobacco in past 3 months				
Yes	60 (90.9)	6 (9.1)	0.01 (0.984)	NA
No	564 (90.8)	57 (9.2)		
Level of tobacco use in past 3 months (n=66)				
Mild	10 (100.0)	0 (0.0)	FT (0.288)	NA
Moderate	46 (90.2)	5 (9.8)		
Severe	4 (80.0)	1 (20.0)		
CD4 count				
Ever used tobacco				
Yes	115 (94.3)	7 (5.7)	0.58 (0.584)	NA
No	477 (92.3)	40 (7.7)		
Currently used tobacco in past 3 months				
Yes	55 (94.8)	3 (5.2)	0.45 (0.790)	NA
No	537 (92.4)	44 (7.6)		
Level of tobacco use in past 3 months (n=58)				
Mild	8 (88.0)	1 (11.1)	FT (0.616)	NA
Moderate	43 (95.6)	2 (4.4)		
Severe	4 (100.0)	0 (0.0)		

Worthy of note is that tobacco products are socially acceptable. It is used freely during social activities such as marriage ceremonies and for medicinal reasons like in the treatment of catarrh.This may be part of the the reasons for high prevalence. The implication of the high prevalence to is that it increases their risks to numerous diseases and threatens health gains achieved with antiretroviral treatment (ART).[8] There is need for multi-sectoral approach in implementation of tobacco-control measures to curb the tobacco use among HIV clients since it has been shown to increase their mortality to fourfold when compared to non users.[12] In line with this, global adult tobacco survey has suggested that services for cessation of tobacco use should be integrated into the health system, given that a large portion of smokers are ready to quit smoking.[17]

Predictors of tobacco and related products use in this study includes; males gender about 20% odd of never used compared to females and earning <18,000 about 2.2 odds of never used compared to those that earn >50,000 naira. Since they are socializing agents, it is expected that males have a higher tendency than females to use tobacco products. This is partly due to outgoing nature of males than female. Previous studies have a contrasting findings. A study in Sweden reported that females have about 1.64 odd than male while in Bangladesh male gender has about 41.46 odds than females of using same products.[18,19] Similarly, other studies had mixed results regarding socioeconomic status (SES). The same study in Bangladesh reported that lowest socioeconomic status has 2.48 odds compared to the highest socioeconomic status.[19] Studies in Brazil and Ghana showed that prevalence of smoking was higher among the poor even after controlling for other variables.[20,21] Another in disagreement reported higher use among high socio-economic status.[22] However, a previous study in Nigeria showed an association between socioeconomic status and tobacco use but could not identify it as a predictor of tobacco use.[10] This shows that addressing this inequity in tobacco use is an important political and public health issue.[23]

Tobacco use either current use or ever used did not show any significant effect on CD4 count or viral load suppression of clients in this study. Previous studies have linked tobacco smoking to increase mortality of HIV positive patients who are on HAART, but the increase in mortality was not as a result of CD4 count decline or failed viral load suppression, but rather through other processes such as increased oxidative stress in human cells of smokers.[7] This implies that the harmful effect of smoking to HIV positive persons follows different partway other than by reducing CD4 count or preventing viral load suppression of patients on care. This is supported by other studies that highlighted some possible mechanisms. These includes the complex interaction between HIV and tobacco contents which effects both the innate and adaptive immunity of users.[7,12] carcinogenic effect of tobacco products, increase

colonisation and infection of tissues as well as increase oxidative stress in human cells.[7] This implies that assessment of HIV clients should be all encompassing rather than relying only on CD4 count and viral load. However other studies found that smoking is associated with increased viral burdens and poor viral responses among those receiving ART.[24,25]

CONCLUSION

Prevalence of tobacco products use was higher than general population. Male gender and low socioeconomic status were determinants of use of tobacco. Tobacco use showed no significant effect on CD4 count or viral load suppression of clients. Compelling evidence concerning the risks of tobacco use to persons living with HIV urges the inclusion of smoking treatment protocols in contemporary models of HIV care.

ACKNOWLEDGEMENTS

Authors would like to thank the director Nigeria ministry of defence (NMOD- HIP), the commander and entire staff of centre for infectious disease control 161 NAF hospital Makurdi, for support and encouragement. Authors would like to thank the clients that were studied for the understanding and cooperation.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. A history of the HIV/AIDS epidemic with emphasis on Africa. Available at: https://www.un.org/en/development/desa/population/events/pdf/expert/5/UNAIDS_WHO. Accessed on 20 February 2021.
2. Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents. Available at: http://aidsinfo.nih.gov/guidelines. Accessed on 20 February 2021.
3. WHO warns countries of growing risk of HIV drug resistance. Available at: https://www.who.int/hiv/media centre/news/warning-hiv-drug-resistance/en/. Accessed on 20 February 2021.
4. Hamers RL, Sigaloff KCE, Kityo C, Mugyenyi P, de Wit TFR. Emerging HIV-1 drug resistance after roll-out of antiretroviral therapy in sub-Saharan Africa. Curr Opin HIV AIDS. 2013;8(1):19-26.
5. WHO HIV Drug Resistance Report 2012. Available at: www.who.int/hiv/pub/drugresistance/report2012/en/. Accessed on 20 February 2021.
6. Eriksen M, Mackay J, Ross H. The Tobacco Atlas. Available at: https://tobaccoatlas.org. Accessed on 20 February 2021.
7. Calvo M, Laguno M, Martinez M, Martinez E. Effects of tobacco smoking on HIV-infected individuals. Aids Rev. 2015;17(1):47-55.
8. Kariuki W, Manuel JI, Kariuki N. HIV and smoking: Associated risks and prevention strategies. HIV/AIDS. 2016;8:17-36.
9. Lifson AR, Neuhaus J, Arribas JR. Smoking-related health risks among persons with HIV in the strategies for management of antiretroviral therapy clinical trial. Am J Public Health. 2010;100:189-93.
10. Aniwada EC, Uleanya ND, Ossai EN, Nwobi1 EA, Anibueze M. Tobacco use: prevalence, pattern, and predictors, among those aged 15-49 years in Nigeria, a secondary data analysis. Tob Induc Dis. 2018;16(7):1-8.
11. Edelman EJ, Tetrault JM, Fiellin DA. Substance use in older HIV-infected patients. Curr Opin HIV AIDS. 2014;9(4):317-24.
12. Helleberg M, Afzal S, Kronborg G. Mortality attributable to smoking among HIV-1-infected individuals: a nationwide, population-based cohort study. Clin Infect Dis. 2013;56(5):727-34.
13. The alcohol, smoking and substance involvement screening test. Available at: https://www.who.int/publications/i/item/978924159938-2. Accessed on 15 February 2021.
14. Yunusa M, Obembe A, Ibrahim T, Njoku C. Prevalence and specific psychosocial factors associated with substance use and psychiatric morbidity among patients with HIV infection at Usmanu Danfodiyo University Teaching Hospital, Sokoto State, Nigeria. Afr J Drug Alcohol Stud. 2011;10(1):45-9.
15. Adeyemo F, Ohaeri B, Okpala PU, Oghale O. Prevalence of drug abuse amongst university students in Benin City, Nigeria. Public Heal Res. 2016;6(2):31-7.
16. Prevalence of tobacco smoking. Available at: http://www.who.int/gho/tobacco/use/en/. Accessed on 15 February 2021.
17. Global Adult Tobacco Survey. Available at: https://www.who.int/tobacco/ surveillance/survey/gats/nigeria_country_report.pdf. Accessed on 15 February 2021.
18. Joffer J, Burell G, Bergström E. Predictors of smoking among Swedish adolescents. BMC Public Health. 2014;14:1296.
19. Palipudi KM, Sinha DN, Choudhury S, Zaman MM, Asma S, Andes L, et al. Predictors of tobacco smoking and smokeless tobacco use among adults in Bangladesh. Indian J Cancer. 2012;49(4):387-92.
20. Brazil National Cancer Institute. Global Adult Tobacco Survey Brazil 2008. Available at: http://www.who.int/tobacco/surveillance/en_tfi_gats_2010_brazil.pdf. Accessed on 15 February 2021.
21. Doku D, Koivusilta L, Raisamo S, Rimpela A. Do socioeconomic differences in tobacco use exist also in developing countries? A study of Ghanaian adolescents. BMC Public Health. 2010;8(10):758.
22. Simetin P, Kern J, Kuzman M, Pfortner TK. Inequalities in Croatian pupils' risk behaviours

associated to socioeconomic environment at school and area level: a multilevel approach. Soc Sci Med. 2013; 98:154-61.
23. Hosseinpoor AR, Parker LA, Tursan d'Espaignet E, Chatterji S. Social determinants of smoking in low- and middle-income countries: results from the world health survey. PLoS One. 2013;6:e20331.
24. Kumar S, Jin M, Ande A. Alcohol consumption effect on antiretroviral therapy and HIV-1 pathogenesis: Role of cytochrome P450 isozymes. Exp Opin Drug Metab Toxicol. 2010;8:1363-75.
25. Zhao L, Li F, Zhang Y. Mechanisms and genes involved in enhancement of HIV infectivity by tobacco smoke. Toxicology. 2010;278:242-8.

Cite this article as: Aniwada EC, Ezema GC, Onwasigwe CN. Tobacco use, determinants and effects on treatment among persons living with HIV/AIDS at Military Hospital in Makurdi, Benue State, Nigeria. Int J Community Med Public Health 2022;9:1973-9.