Infectious Diseases

Demographic and clinical characteristics associated with tobacco smoking and alcohol use disorder among heterosexual people living with HIV in West Papua, Indonesia

MIRNA WIDIYANTI[1], MUSTIKA PRAMESTIYANI[2], SETYO ADININGSIH[3], JUNTIMA NAWAMAWAT[4]
[1] Research Center for Public Health and Nutrition, National Research and Innovation Agency Cibinong Science Center, Cibinong, West Java, Indonesia; [2] Department of Midwifery, Jayapura Health Polytechnic, Ministry of Health, Jayapura City of Papua, Indonesia; [3] Center for Biomedical Research, National Research and Innovation Agency. Cibinong Science Center, Cibinong, West Java, Indonesia; [4] Department of Community nursing, Boromarajonani College of Nursing, Sawanpracharak Nakhonsawan, Faculty of Nursing, Praboromarajchanok Institute, Thailand

Keywords

Tobacco • Smoking • Alcohol use • Heterosexual • HIV

Summary

Introduction. *Tobacco smoking and Alcohol use disorder (AUD) are common among people living with the human immunodeficiency virus (PLHIV), and therefore are linked to increased mortality and morbidity. This study aimed to determine the prevalence of tobacco smoking and AUD, as well as to examine the factors associated with tobacco smoking and AUD among heterosexual PLHIV in West Papua.*

Methods. *A cross-sectional study was conducted among PLHIV on antiretroviral therapy (ART) at the voluntary counselling and testing (VCT) clinics in Manokwari, Sorong City, and Fakfak district. Data were gathered through interviews with 237 PLHIV who were chosen using a consecutive sampling technique. A binary logistic regression analysis was used to determine the prevalence and estimate the factors associated with current tobacco smoking and AUD.*

Results. *The prevalence of tobacco smoking and AUD among PLHIV was 30.8% and 34.6%, respectively. There were statistically significant associated between tobacco smoking and gender (OR = 2.881, CI = 2.201-3.772), occupation (OR = 1.375, CI = 1.116-1.622), CD4+ count (OR = 1.865, CI = 1.865, CI = 1.068-3.259) and opportunistic infections (OR = 1.348, CI = 1.054-1.7240. There were also statistically significant associated between AUD and gender (OR = 2.951, CI = 2.16-3.930), occupation (OR = 1.392, CI = 1.178-1.645), CD4+ count (OR = 1.769, CI = 1.031-3.073), and opportunistic infections (OR = 1.445, CI = 1.134-1.842).*

Conclusions. *Gender, occupation, CD4+ count levels, and opportunistic infection were associated to tobacco smoking and AUD among heterosexual PLHIV in West Papua. These findings emphasize the critical need for an effective cigarette and alcohol use control program for people living with HIV in developing countries such as Indonesia, particularly West Papua.*

Introduction

Tobacco use causes health problems as well as social, economic, and environmental issues, not only for smokers but also for non-smokers. Overall, current tobacco use and smoking prevalence did not change significantly between 2011 and 2021. The prevalence of current tobacco use in 2011 and 2021 were 36.1% and 34.5%, respectively; and the prevalence of current tobacco smoking in 2011 and 2021 were 34.8% and 33.5%, respectively. However, tobacco smoking is still prevalent among men in Indonesia. More than half of men did smoke [1]. Current smokers were more likely to have a higher risk of all-cause death (hazard ratio = 1.48, 95% confidence interval = 1.11 to 1.98) than non-current smokers [2].

Tobacco smoking is a bad activity, it harms almost all organs of the body, causes many diseases, and affects the health of smokers in general. Serious health risks are much higher in People living with HIV (PLHIV). PLHIV who smoke is more likely to get HIV-related infections including oral candidiasis, hairy leukoplakia, bacterial pneumonia, and pneumocystis pneumonia. However, they also got other serious illnesses such as the chronic obstructive pulmonary disease (COPD), heart disease and stroke, lung cancer, head and neck cancer, cervical cancer, and anal cancer than non-smokers with HIV. These illnesses can make them too sick to work or even lead to an early death [3]. The use of antiretroviral therapy (ART) reduces morbidity and mortality, as well as increases the life expectancy of PLHIV [4]. As a result, comorbidities not related to AIDS, such as cardiovascular disease (CVD), are becoming increasingly important in the management of long-term HIV infection. This is of particular concern because PLHIV are prone to developing coronary heart disease, myocardial infarction and other CVD events as a consequence of a combination of aging, other traditional CVD risk factors, and HIV-related risk factors, such as chronic inflammation and ART use [5]. Patients retained after five years on ART, subsequently died rate 0.56/100 person-years. Increased mortality was associated with age, HIV

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exposure through injecting drug use, HIV viral load, drug regimen, HBV co-infection, fasting plasma, and estimated glomerular filtration rate. Decreased mortality was associated with transmission through male-to-male sexual contact compared to heterosexual transmission and higher CD4 count [6].

Smoking can alter the immune response and viral development leading to the susceptibility of PLHIV to opportunistic infections such as tuberculosis, as well as their tendency to have low ART adherence [7]. Smoking and heavy smoking rates amongst PLWH were significantly higher even in subjects who reported diabetes, hypertension and extreme obesity [8]. The use of tobacco products by PLHIV is associated with higher mortality compared to those infected with HIV alone [9]. Based on a study, several factors affect significantly the use of tobacco cigarettes among PLHIV, including unemployment, Alcohol use disorder (AUD) and illegal drugs, low ART adherence, low social support, low education, and decreased CD4+ count as well as stigma and discrimination [10].

AUD or alcoholism among PLWHA was higher than the reported prevalence of AUD among the general population of the globe (29.80%) [11] and increased among PLHIV who smoke tobacco and had sexual contact with sex workers [12]. Alcohol use disorder results in short and long term impacts on the physical, mental and socio-economic aspects of individual life [13]. AUD has been associated with interruptions in all steps of the HIV care continuum, including lower adherence to ART. [14]. Previous studies summarized the factors that are associated significantly with AUD among PLHIV include low adherence to ART, the loss of durable viral suppression, increased risk of viral rebound, and increased mortality [15]. In addition, AUD is associated with deviant sexual behaviour which increases the risk of HIV transmission. It is important to consider the trajectories of substance use and sexual risk behaviours concurrently in order to decrease the transmission of HIV [16]. The HIV epidemic is still high in developing countries like Indonesia, especially in West Papua Province. Health risks related to tobacco smoking and AUD among PLHIV have not been studied much. There are very few studies in Indonesia, especially in West Papua regarding the problem of tobacco smoking and AUD among PLHIV. This study aimed to determine the prevalence of tobacco smoking and AUD, and also assess the factors associated with tobacco smoking and AUD among heterosexual PLHIV in West Papua, Indonesia.

Methods

Study design and sampling

This was a cross-sectional study conducted in 2019, involving 237 PLHIV who received ART at the Voluntary counselling and testing (VCT) clinic at Manokwari Hospital, Sele Be Solu Sorong City Hospital, and Fak-Fak Hospital in West Papua Province.

The sample study as the subject study was PLHIV aged more than 18 years old and fulfilled the inclusion criteria. The sample size uses a 95% confidence level formula, with a margin of error of 10%, and the number of samples obtained is 270. Due to incomplete data variables, the number of samples is reduced to 237.

Study variables and data collection

The dependent variables were tobacco smoking and alcohol use disorder (AUD). The dependent variables were demographic and clinical factors. Demographic variables include gender, age, education, occupation, marital status, ethnicity, and risk factors for HIV transmission. Demographic variables were obtained through interviews and medical records. Clinical variables include CD4+ levels, WHO clinical stage of HIV infection, body mass index, opportunistic infections, and viral load. CD4+ levels were measured using PIMA (CD4+ counter), viral load measurement using qPCR, and body mass index is determined by measuring body height and body weight using standard instruments. Opportunistic infection data were obtained from medical records.

Statistical analysis

Microsoft Excel is used for data entry. Completeness and accuracy of data were checked before and after the data entry process. SPSS software is used to estimate and calculate the proportion of variables to be assessed. Logistic regression was used to determine the most influential demographic and clinical factors with tobacco smoking and AUD. The p-value < 0.05 indicates the level of significance with a 95% confidence level.

Ethics statement

Interviews were conducted in separate rooms and were confidential using a structured questionnaire. The explanation before consent was read to each patient before signing the consent to participate. The ethical approval was obtained from the Ethics Committee of the National Institute of Health Research and Development, Ministry of Health of the Republic of Indonesia with the number: LB.02.01/2/KE.008/2019.

Results

Demographic and clinical characteristics of study participants

Characterization of demographic and clinical variables among PLHIV described that most of them were females (55.7%), aged > 35 years old (54.5%), Senior high school-university in education (72.6%), employment (66.7%), married (78.9%), heterosexual (96.6%), CD4+count more than 350 cell/mm^3 (53.2%), stadium III&IV (68.4%), suffer from tuberculosis as an opportunistic infection (50.6%), and smoking rate (30.8%).

Prevalence of tobacco smoking by demographic and clinical characteristics of study participants

Results showed that gender, occupation status, CD4+ counts, and opportunistic infection were statistically significantly associated with tobacco smoking among PLHIV. PLHIV who were female had smoked more than males (OR 2.88, 95% CI 2.20-3.77), employed more than unemployed (OR 1.37, 95% CI 1.17-1.62), CD4 ≥ 350 cell/mm^3 more than others (OR 1.86, 95% CI 1.07-3.26), and got tuberculosis more than non-tuberculosis (OR 1.35, 95% CI 1.05-1.72) (Tab. I).

Prevalence of alcohol use disorder by demographic and clinical characteristics of study participants

Results showed that gender, occupation status, CD4+ counts, and opportunistic infection were statistically significantly associated with alcohol use among PLHIV. PLHIV who were female had smoked more than males (OR 2.95, 95% CI 2.22-3.93), employed more than unemployed (OR 1.39, 95% CI 1.18-1.64), CD4 ≥ 350 cell/mm^3 more than others (OR 1.77, 95% CI 1.03-3.07), and got tuberculosis more than non-tuberculosis (OR 1.44, 95% CI 1.13-1.84). (Tab. II).

Discussion

The prevalence of tobacco smoking among PLHIV was higher than among the common population. Our study found the tobacco smoking proportion among PLHIV was high (30.8%). Gender factor as male was associated significantly with tobacco smoking activity ($p < <0.05$). The relationship between gender and tobacco smoking is complex, originating in culture. To this day, gender differences in the relationship between smokers and tobacco products persist. Nicotine plays a more prominent role in smoking patterns in men [17] and found a higher prevalence in HIV-positive women of any tobacco smoking than in HIV-negative women [10]. Tobacco smoking has become the second leading risk factor for premature death and disability in recent years, globally [18]. Smoking is a major factor associated with cardiovascular disease, cancer, and chronic respiratory disease among men and women [19]. Our study found the proportion of AUD among PLHIV in West Papua was also quite high (34.6%). Drinking alcohol was associated with tobacco smoking among PLHIV. In our study, male PLHIV, apart from smoking, also consumed alcohol. We found around 64 males (78%) drank alcohol, while the rest were 18 females (22%) who consumed alcohol. Another study revealed that tobacco smoking rates among PLHIV were higher when those PLHIV smoked concurrently with alcohol consumption [12]. In addition, AUD is consistently correlated with the risk of HIV transmission through decreased adherence to ART and increased susceptibility to HIV infection. People who consumed alcohol were 1.5-2.0 times more likely to be infected with HIV than individuals who did not consume alcohol [20].

Tobacco smoking and AUD were also positively correlated with occupation among PLHIV in our study, where the most types of their occupation were private and farmers. People with occupations outside the home area

Tab. I. The estimated prevalence of tobacco smoking by demographic and clinical characteristics among PLHIV (n = 237).

Variable	Smoking (n = 73)	No smoking (n = 164)	OR	P	95% CI
Gender			2.88	0.000*	2.20-3.77
Male	59	46			
Female	14	118			
Age group			0.82	0.507	0.49-1.39
15-35 years old	41	66			
> 35 years old	57	73			
Occupation			1.37	0.001*	1.17-1.62
Unemployment	13	66			
Employment	60	98			
Risk factor			0.99	0.704	0.94-1.04
Heterosexual	70	159			
Other	3	5			
CD4+ counts			1.86	0.030*	1.07-3.26
< 350 cell/mm^3	42	69			
≥ 350 cell/mm^3	31	95			
WHO clinical stage			0.99	0.551	0.66-1.49
Stadium I & II	23	52			
Stadium III & IV	50	112			
Opportunistic infection			1.35	0.025*	1.05-1.72
Non-tuberculosis	28	89			
Tuberculosis	45	75			

* Significance level with p-value < 0.05.

Tab. II. The estimated prevalence of AUD by demographic and clinical characteristics among PLHIV (n = 237).

Variable	Alcohol (n = 82)	No alcohol (n = 155)	OR	P	95% CI
Gender			2.95	0.000*	2.22-3.93
Male	64	41			
Female	18	114			
Age group			0.64	0.107	0.37-1.09
15-35 years old	34	73			
> 35 years old	54	76			
Occupation			1.39	0.000*	1.18-1.64
Unemployment	15	61			
Employment	67	86			
Risk factor			0.63	0.718	0.13-1.06
Heterosexual	80	149			
Other	2	6			
CD4+ counts			1.77	0.041*	1.03-3.07
< 350 cell/mm^3	46	65			
≥ 350 cell/mm^3	36	90			
WHO clinical stage			0.78	0.304	0.52-1.19
Stadium I & II	22	53			
Stadium III & IV	69	102			
Opportunistic infection			1.44	0.006*	1.13-1.84
Non-Tuberculosis	30	87			
Tuberculosis	52	68			

* Significance level with p-value < 0.05.

would tend to behave tobacco smoking because of the influence of the environment with high population-level smoking prevalence may increase likelihood of smoking and impede quitting [21]. In addition, people usually smoke to relax while taking a break from their daily work. Smoking is also influenced by extrinsic factors which include the influence of family, the surrounding environment, the influence of peers, and the influence of cigarette advertising [22].

Our study found that employment and consume alcohol among PLHIV were also higher than among those who were unemployed. This indicated that AUD was closely related to work status. Another study reported that the high level of alcohol consumption among workers is due to the easy opportunity to get alcoholic beverages, especially when joining colleagues for drinking together. Moreover, people who lower income was significantly associated with a lower risk of non-problematic heavy drinking, but not of problem drinking, compared with the highest income [23].

We found that CD4+ counts were positively correlated with tobacco smoking and AUD among PLHIV in this study. PLHIV who had tobacco smoking and drinking alcohol tend to have CD4+ levels < 350 cells/mm^3. A study reported that tobacco smoking was associated significantly with CD4+ counts and viral load in blood among PLHIV [24]. Evidence that tobacco smoking increases viral load demonstrates the importance of smoking cessation medication as part of HIV care. Another study stated the explanation that described the decline in immunological function among PLHIV who smoke, i.e. tobacco smoking was associated with lower adherence to antiretroviral therapy and substance use such as cocaine and alcohol was associated with the development and acceleration of HIV severity among them [25]. Another study also reported that AUD was associated with reduced adherence to combination antiretroviral therapy, decreased viral suppression, and increased mortality among PLHIV [26].

Our study found that tobacco smoking and AUD among PLHIV were positively correlated with opportunistic infections of tuberculosis. PLHIV who smoked tobacco and consumed alcohol were more at risk of developing opportunistic tuberculosis infection. A study reports that smoking and tuberculosis are the biggest health problems in the world. Smoking and alcohol intake significantly affected for the development of tuberculosis in HIV-positive patients under treatment [27]. Furthermore, smoking had a strong influence on TB and was a major barrier towards treatment success. In multivariate analysis, treatment completion, death rate, defaulters and treatment interruption showed significant associations with smoking habit. The chances of treatment success rate were less for smokers [28]. While alcohol intake was significant risk factors for MDR-TB development [29].

Tobacco smoking and AUD were associated significantly with gender, occupation, CD4+ levels, and tuberculosis opportunistic infections among heterosexual PLHIV in West Papua. The need for intervention programs to stop tobacco smoking and AUD through Voluntary counselling and testing clinics to support PLHIV to comply with antiretroviral therapy and have a better quality of life.

Conclusion

This study demonstrated the prevalence of tobacco smoking and AUD, and the factors associated with tobacco smoking and AUD among heterosexual PLHIV in West Papua, Indonesia. Female, employed, and CD4 ≥ 350 cell/mm^3 had higher prevalence of tobacco smoking and AUD than others. Gender, occupation status, CD4+ counts, and opportunistic infection were associated with tobacco smoking and alcohol use among PLHIV. These findings suggest that heterosexual PLHIVs are a heterogeneous group that needs further differentiation in studies and should be included in behavioural health assessments as part of clinical care and research. Moreover, this result emphasise the critical need for an efficient cigarette and alcohol use control program for PLHIV in developing countries such as Indonesia.

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Conflict of interest statement

The authors have no conflicts of interest associated with the material presented in this paper.

Authors' contributions

MW and SA: conceptualization, completed the data, design methodology, and writing the original draft.
MP and MW: Formal analysis, and funding acquisition.
JN and MW managed the whole project and visualization.
MW, MP, SA, and JN: writing – review & editing and prepared the manuscript to publish.

References

[1] World Health Organization. Global adult tobacco survey: comparision factsheet Indonesian 2011 & 2021. Available at: https://cdn.who.int/media/docs/default-source/ncds/ncd-surveillance/data-reporting/indonesia/indonesia-national-2021----2011-comparison-factsheet.pdf?sfvrsn=46869411_1 (Accessed on: 10/6/2022).

[2] Holipah H, Sulistomo HW, Maharani A. Tobacco smoking and risk of all-cause mortality in Indonesia. PLoS One 2020;15:e0242558. https://doi.org/10.1371/journal.pone.0242558

[3] Centers for Disease Control and Prevention. Smoking and HIV. Available at: https://www.cdc.gov/tobacco/campaign/tips/diseases/smoking-and-hiv.html (Accessed on: 27/5/2022).

[4] National Institutes of Health. HIV treatment: the basics. Available at: https://hivinfo.nih.gov/understanding-hiv/fact-sheets/hiv-treatment-basics (Accessed on: 27/5/2022).

[5] Bijker R, Jiamsakul A, Uy E, Kumarasamy N, Ditango R, Chaiwarith R, Wong WW, Avihingsanon A, Sun LP, Yunihastuti E, Pujari S, Do CD, Merati TP, Kantipong P, Nguyen KV, Kamarulzaman A, Zhang F, Lee MP, Choi JY, Tanuma J, Ng OT, Sim B, Ross J, Kiertiburanakul S; TREAT Asia HIV Observational Database (TAHOD) of IeDEA Asia-Pacific. Cardiovascular disease-related mortality and factors associated with cardiovascular events in the TREAT Asia HIV Observational Database (TAHOD). HIV Med 2019;20:183-91. https://doi.org/10.1111/hiv.12687

[6] Bijker R, Kiertiburanakul S, Kumarasamy N, Pujari S, Sun LP, Ng OT, Lee MP, Choi JY, Nguyen KV, Chan YJ, Merati TP, Cuong DD, Ross J, Jiamsakul A; IeDEA Asia-Pacific. Survival after long-term ART exposure: findings from an Asian patient population retained in care beyond 5 years on ART. Antivir Ther 2020;25:131-42. https://doi.org/10.3851/IMP3358

[7] Sisay MM, Ayele TA, Gelaw YA, Tsegaye AT, Gelaye KA, Melak MF. Incidence and risk factors of first-line antiretroviral treatment failure among human immunodeficiency virus-infected children in Amhara regional state, Ethiopia: a retrospective follow-up study. BMJ Open 2018;8:e019181. https://doi.org/10.1136/bmjopen-2017-019181

[8] De Socio GV, Pasqualini M, Ricci E, Maggi P, Orofino G, Squillace N, Menzaghi B, Madeddu G, Taramasso L, Francisci D, Bonfanti P, Vichi F, dell'Omo M, Pieroni L; CISAI study group. Smoking habits in HIV-infected people compared with the general population in Italy: a cross-sectional study. BMC Public Health 2020;20:734. https://doi.org/10.1186/s12889-020-08862-8

[9] Murphy JD, Liu B, Parascandola M. Smoking and HIV in Sub-Saharan Africa: A 25-Country Analysis of the Demographic Health Surveys. Nicotine Tob Res 2019;21:1093-102. https://doi.org/10.1093/ntr/nty176

[10] Mdege ND, Shah S, Ayo-Yusuf OA, Hakim J, Siddiqi K. Tobacco use among people living with HIV: analysis of data from Demographic and Health Surveys from 28 low-income and middle-income countries. Lancet Glob Health 2017;5:e578-92. https://doi.org/10.1016/S2214-109X(17)30170-5

[11] Duko B, Ayalew M, Ayano G. The prevalence of alcohol use disorders among people living with HIV/AIDS: a systematic review and meta-analysis. Subst Abuse Treat Prev Policy 2019;14:52. https://doi.org/https://doi.org/10.1186/s13011-019-0240-3

[12] Bhatta DN, Subedi A, Sharma N. Tobacco smoking and alcohol drinking among HIV infected people using antiretroviral therapy. Tob Induc Dis 2018;16:16. https://doi.org/10.18332/tid/86716

[13] Probst C, Parry CDH, Rehm J. HIV/AIDS mortality attributable to alcohol use in South Africa: a comparative risk assessment by socioeconomic status. BMJ Open 2018;8:e017955. https://doi.org/10.1136/bmjopen-2017-017955

[14] Williams EC, McGinnis KA, Edelman EJ, Matson TE, Gordon AJ, Marshall BDL, Bryant KJ, Rubinsky AD, Lapham GT, Satre DD, Richards JE, Catz SL, Fiellin DA, Justice AC, Bradley KA. Level of Alcohol Use Associated with HIV Care Continuum Targets in a National U.S. Sample of Persons Living with HIV Receiving Healthcare. AIDS Behav 2019;23:140-51. https://doi.org/10.1007/s10461-018-2210-6

[15] National Institutes of Health. Substance Use Disorders and HIV. Available at: https://clinicalinfo.hiv.gov/en/guidelines/hiv-clinical-guidelines-adult-and-adolescent-arv/substance-use-disorders-and-hiv (Accessed on: 9/5/2022).

[16] Newville H, Sorensen JL, Hatch-Maillette M, Calsyn DA. Temporal Relationship of Sex Risk Behaviors and Substance Use Severity Among Men in Substance Use Treatment. J Sex Res 2018;55:1056-64. https://doi.org/10.1080/00224499.2017.1321101

[17] Mdege ND, Makumbi FE, Ssenyonga R, Thirlway F, Matovu JKB, Ratschen E, Siddiqi K, Nyamurungi Namusisi K. Tobacco Smoking and Associated Factors Among People Living With HIV in Uganda. Nicotine Tob Res 2021;23:1208-16. https://doi.org/10.1093/ntr/ntaa262

[18] Xu W, Tang W, Zhang J, Shi X, Zheng Y, Kaufman MR. Cigarette Smoking and Its Associations with Substance Use and HIV-Related Sexual Risks among Chinese Men Who Have Sex with Men. Int J Environ Res Public Health 2020;17:1653. https://doi.org/10.3390/ijerph17051653

[19] GBD 2015 Tobacco Collaborators. Smoking prevalence and attributable disease burden in 195 countries and territories, 1990-2015: a systematic analysis from the Global Burden of Disease Study 2015. Lancet 2017;389:1885-906. https://doi.org/10.1016/S0140-6736(17)30819-X

[20] Woolf-King SE, Fatch R, Cheng DM, Muyindike W, Ngabirano C, Kekibiina A, Emenyonu N, Hahn JA. Alcohol Use and Unprotected Sex Among HIV-Infected Ugandan Adults: Findings from an Event-Level Study. Arch Sex Behav 2018t;47:1937-48. https://doi.org/10.1007/s10508-017-1131-1

[21] Dunbar MS, Nicosia N, Kilmer B. Exposure to new smoking environments and individual-level cigarette smoking behavior: Insights from exogenous assignment of military personnel. Soc Sci Med 2021;280:113983. https://doi.org/10.1016/j.socscimed.2021.113983

[22] Yanti DE, Aprilia A, Jaya A, Pratama RY, Candesa NB. Relationship between work and smoking behavior in the working area of Bumi Emas Public Health Center, East Lampung. Jurnal Dunia Kesmas 2021;10:51-5. http://ejurnalmalahayati.ac.id/index.php/duniakesmas/index

[23] Murakami K, Hashimoto H. Associations of education and income with heavy drinking and problem drinking among men: evidence from a population-based study in Japan. BMC Public Health 2019;19:420. http://doi.org/10.1186/s12889-019-6790-5

[24] Belay DM, Bayisa B, Abera M. Association of Substance Use with Immunological Response to Antiretroviral Therapy in HIV-Positive Patients from Southwest Ethiopia: A Prospective Observational Study. Int J Gen Med 2022;15:8437-50. http://doi.org/10.2147/IJGM.S389010

[25] Winhusen T, Feaster DJ, Duan R, Brown JL, Daar ES, Mandler R, Metsch LR. Baseline Cigarette Smoking Status as a Predictor of Virologic Suppression and CD4 Cell Count During One-Year Follow-Up in Substance Users with Uncontrolled HIV Infection. AIDS Behav 2018;22:2026-32. http://doi.org/10.1007/s10461-017-1928-x

[26] Bensley KM, Fortney J, Chan G, Dombrowski JC, Ornelas I, Rubinsky AD, Lapham GT, Glass JE, Williams EC. Differences in Receipt of Alcohol-Related Care Across Rurality Among VA Patients Living With HIV With Unhealthy Alcohol Use. J Rural Health 2019;35:341-53. http://doi.org/10.1111/jrh.12345

[27] Tegegne AS, Minwagaw MT. Risk Factors for the Development of Tuberculosis Among HIV-Positive Adults Under Highly Active Antiretroviral Therapy at Government Hospitals in Amhara Region, Ethiopia. Int J Gen Med 2022;15:3031-41. http://doi.org/10.2147/IJGM.S358517

[28] Khan AH, Sulaiman SAS, Hassali MA, Khan KU, Ming LC, Mateen O, Ullah MO. Effect of smoking on treatment outcome among tuberculosis patients in Malaysia; a multicenter study. BMC Public Health 2020;20:854. http://doi.org/https://doi.org/10.1186/s12889-020-08856-6

[29] Yaghi AR, Shaheed HS, Harun SN, Hyder Ali IA, Khan AH. Survival trend of tuberculosis patients and risk factors associated with mortality and developing drug-resistant tuberculosis in hospital Pulau Pinang, Malaysia: a retrospective study. Adv Respir Med 2022;90:467-82. https://doi.org/10.3390/arm90060054

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Correspondence: Juntima Nawamawat, Pak Nam Pho, Mueang, Nakhon Sawan, Atthakawi Road 45, Thailand, 60000. Tel. +66 0964239914 - E-mail: juntima@bcnsprnw.ac.th

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