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CONJOINT TOBACCO AND ALCOHOL USE, AND DEPRESSIVE SYMPTOMS AMONG HIV POSITIVE PATIENTS IN SEDIBENG DISTRICT, GAUTENG

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Declaration

I, Dr Kenneth Enwere Akahilem hereby declare that this research is my own unaided work, except where due acknowledgement for assistance received has been made. It is being submitted for the degree of Master of Family medicine at the University of the Witwatersrand Johannesburg. It has not been submitted previously for any other degree or examination at this or any other University.

Signed … Dr K. E. Akahilem……

Date: April 2023

Signature of Supervisor …Prof. O B Omole……

April 2023 at Johannesburg

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I would like to thank Dr A Kalain for help with statistical analysis

Dedication

I dedicate this research report to my wife Mrs Jovita Akahilem and my children Kevin, Nneka and Chioma for their unwavering support.

An article submitted according to the style guide and requirements of the South African Family Practice Journal (SAFPJ)

Conjoint tobacco and alcohol use, and depressive symptoms among HIV positive patients in Sedibeng district, Gauteng

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Abstract

Background

Psychosocial challenges among HIV positive patients may promote substance use disorders. In this study, we explored the relationship between conjoint tobacco and alcohol use and depression symptoms among HIV positive patients in Sedibeng district, South Africa.

Methods

In a cross-sectional study of 404 participants, a questionnaire collected information on socio-demography, tobacco and alcohol use, and depression symptoms. Outcome measures included the prevalence of conjoint tobacco and alcohol use, and its association with depression.

Results

The mean participant age was 43.2 years. Most completed secondary school 62.9% (253/402), were black 99.0% (400/404), female 65.8% (266/404), unemployed 53.6% (216/403) and on ART for >1 year 97.8% (393/402).

Current tobacco use was reported by 23.3% (94/404) participants with most smoking cigarette (73.7%) and having low nicotine dependence (75.5%).

Current alcohol use was reported by 43.6% (176/404) participants, and 36.9% were categorised as harmful users.

Only 7.7% (31/404) participants screened positive for depression; most of these (83.3%) previously undiagnosed.

The prevalence of conjoint tobacco and alcohol use was 19.6% (79/404) and this was not associated with depression (p=0.438). Harmful alcohol users were more than five times likely to report conjoint tobacco and alcohol use (p=0.000) but women were less likely to report it (p=0.000).

Conclusion

Conjoint tobacco and alcohol use is common among patients with HIV infection. Although not significantly associated with positive screen for depression, its relationship with harmful alcohol use reiterates the need for an integrated tobacco and alcohol use screening and treatment strategy in the HIV treatment program in primary care.

Keywords

conjoint, tobacco, alcohol, depression, HIV

Introduction

Tobacco use and alcohol misuse are established independent risk factors for adverse health outcomes and their combined or conjoint use may increase the risks of adverse health outcomes exponentially[(1)]. This has huge clinical, financial and quality of life implications for patients and the healthcare systems[(2)]. In the context of chronic diseases like HIV, the need to adjust to physical symptoms such as pain, and psychosocial challenges such as stigma and acceptance of diagnosis, may promote substance use and misuse, and increase the risks of mental health disorders such as depression [(3–5)].

South Africa has the highest HIV infection burdens in the world, making it a public health priority [(6,7)]. HIV diagnosis has also been reported to be associated with social stigma, anxiety and depression [(3–5)]. Depression as a comorbidity in the setting of HIV disease could be challenging for the patient, often stretching the patient's capacity to cope. This may in-turn, predispose the patient to unhealthy coping behaviours such as tobacco use and alcohol misuse. Each of these behaviours increases the risks of adverse health outcomes and when used together (conjoint tobacco and alcohol use), these risks increase exponentially [(8)]. In a study done among tuberculosis patients in a primary health care facility in South Africa, the prevalence of Conjoint tobacco and alcohol use was estimated at 10.1% [(9)]. However, some of the participants in the study were HIV negative or their HIV status were not known.

In South Africa, the predominant form of tobacco use is cigarette smoking [10,11], other forms include smokeless tobacco (snuff), waterpipe, e-cigarettes and cigars. In the recent Global Adult Tobacco Survey in South Africa published 2022, the prevalence of tobacco use was 29.4%[12]. According to WHO, cigarette smoking is the leading preventable risk factor for premature mortality. Cigarette smokers are likely to die younger than non-smokers [13–15] ,due to various adverse health effects such as cancers, respiratory and atherosclerotic cardiovascular diseases. HIV positive patients who smoke tobacco are also more predisposed to tobacco attributable diseases[16].

Alcohol is also a commonly used substance and its consumption is increasing in developing countries, including South Africa [17]. In a national survey in South Africa, the prevalence of alcohol use was estimated at 41.5% (men) and 17.1% (women), with 9% of users reported to have problematic or harmful alcohol use [18]. Harmful alcohol use constitutes a huge health and economic burden worldwide with increased risks for cardiac problems, liver diseases, anxiety, and depression. It was previously reported that there were health benefits from a 'low or moderate' level of alcohol consumption. These health benefits were thought to arise from the effects of alcohol on increasing cardioprotective high density lipoproteins (HDL-C) and its effects on certain inflammatory markers [8]. However, some subsequent studies have disputed these health benefits [19,20].

In the United States, cigarette smoking causes 480 000 preventable deaths yearly [21] and excessive alcohol drinking cost nearly $250 billion in 2010 [22]. According to the National Institute for Health and Care Excellence (NICE) in the UK, alcohol misuse costs the National Health Service(NHS), GBP 3.5 billion per year and resulted in 1.2 million hospital admissions and 15 000 deaths between 2010 and 2011[23]. A study in South Africa reported that in the year 2016, an estimated 25 708 deaths were due to cigarette smoking, accounting for a healthcare cost of R14.48 billion [24]. In a similar manner, the tangible financial cost of harmful alcohol use was estimated at R37.9 billion in 2009 [25].

As already alluded to, the physical demands and psychosocial dynamics of living with HIV infection, and the need to adjust, may not only increase the risk of depression but also that of substance use disorders, including conjoint tobacco and alcohol use. Despite this, no study in South Africa has explored the relationship between conjoint tobacco and alcohol use and depressive disorders among HIV infected patients, particularly so in primary

healthcare (PHC), where most of these patients are cared for. The aim of this study was to determine the prevalence of conjoint tobacco and alcohol use and its association with screening positive for depression among HIV positive patients in Sedibeng district. It is envisaged that the findings of this study may inform strategies aimed at addressing substance use and misuse and depressive disorders in the HIV treatment program in South African PHC and similar settings.

Methods

Study design and setting

This was a cross-sectional study conducted during the years 2020/ 2021 at Levai Mbatha and Johan Heyns Community Health Centres (CHCs) located in Evaton township and Vanderbijlpark respectively. Both CHCs render 24-hour services, seven days a week and act as referral centre for several clinics. Levai Mbatha CHC serve a catchment population of about 90 724 mainly black patients [(26)]. Johan Heyns serve a mixed racial population of 74 045 [(26)]. Both CHCs provide comprehensive primary healthcare services including health promotion and prevention, curative care, maternity and child healthcare, rehabilitation, and mental health services. A non-government organisation offers support to both CHCs on substance abuse prevention and HIV/ AIDS.

Sample size and sampling

According to the TIER.NET information system, there were 4204 and 2105 adult HIV positive patients receiving care at Levai Mbatha and Johan Heyns respectively during the period of this study. Using EPI INFO ™ Version 7.2.2.6 and assuming a 95% confidence interval, an expected frequency of 50% and margin of error of 5%, the required sample size was estimated as 362. The final sample size was increased to 404 to compensate for any potential incomplete and missing data. This was allocated pro-rata as 269 and 135 participants between Levai Mbatha and Johan Heyns CHCs respectively.

All patients who were 18 years and older, and who were attending the HIV clinic at Levai Mbatha and Johan Heyns CHCs, were eligible to participate. To be included in the study, the patient must have given written consent. Sampling enlisted consecutive patients until the sample size was completed.

Measurement tools

A questionnaire composed of two parts was used to collect data. The first part collected sociodemographic information of participants, and any documented medical condition such as diabetes, hypertension, COPD etc, was extracted from the participant's file. The second part adapted three tools - Patient Health Questionnaire (PHQ-2 and PHQ-9), the Alcohol use disorder identification test (consumption) AUDIT-C, and the Heaviness of smoking index (HSI):

- The Patient health questionnaires (PHQ-2 and PHQ-9) have been validated as a screening tool for depression in several studies in primary care settings both in South Africa and other countries [27–30]. The PHQ-2 is a short version of PHQ-9 and consists of the first two questions of the PHQ9 used for screening for depressive symptoms in the last two weeks. A zero score in the PHQ-2 excludes depression. A score of 3 or more screens positive for depression [30-31]. The remaining seven questions of the PHQ-9 are thereafter administered to those who screen positive for depression, to categorize their depression (mild or severe) for appropriate management. The frequency of these symptoms over the days in the last two weeks are scored from 0 = Not at all; 1= Several days; 2= more than half the days; and 3= Nearly every day. The maximum score is 27.
- The AUDIT-C tool was used to assess alcohol consumption among participants. This tool has been validated in studies, including those in primary care settings [33,34]. AUDIT-C is suitable for quick screening for harmful/ hazardous alcohol use. A score of 5 or more indicates a positive screen [35]. It's three-item score makes it less cumbersome yet an effective tool for screening for harmful alcohol consumption. The questions are asked on the typical frequency and quantity of alcohol consumption during the past one year. Each question on the three items has five alphabetical answer choices - from 0-4, a=0; b=1; c=2; d=3; e=4; which gives a maximum total score of 12. One standard alcohol drink/ unit is 10 – 12 grams of ethanol, equivalent to 340-355 ml of beer (5% by volume), 150ml of wine (12% by volume), or 44ml of spirits 40% by volume (80 proof).
- Tobacco use was assessed by self-report on the form of tobacco used, the quantity, the frequency of use and the duration. The Heaviness of Smoking Index (HSI) tool

was used to assess for the presence or absence of nicotine. The HSI is a short version of Fagerstrom test for nicotine dependence (FTND) and its validity as a measurement tool for nicotine dependence among cigarette smokers has been shown in studies[36]. Although a study found a positive correlation of FTND on SLT users [37] , it has not been validated as a tool for assessing nicotine dependence for SLT use.

Data collection process

The principal investigator liaised with the Health Promoters and Queue Marshals in each CHC, who daily informed patients about the study during the health talk. A trained Research assistant who is fluent in the local languages (Zulu, Sotho, English and Afrikaans) assisted with interpretation during data collection. The Research assistant approached the patients individually while they waited in the queue and engaged them on the nature and purpose of the study. Those who indicated interest were taken to the researcher in a private room nearby, where consent was obtained. Thereafter, the questionnaire was administered by the principal investigator. The trained Research assistant acted as an interpreter where a participant did not understand English language. Information on medical conditions additional to the HIV infection were extracted from the participant's medical record. A unique number code was assigned to each participant and a sticker was placed on the file to prevent resampling. The researcher then thanked the participants and returned them to their spot on the queue or the next top position, so they don't lose time.

Ethical considerations

Ethics approval was obtained from Human research ethics committee (HREC medical) of the University of the Witwatersrand (clearance number: M1911116). Permission was also obtained from the management of the Sedibeng district health services and facility managers of the study sites. A participant information sheet was given to all consecutive potential participants and the nature of the study was further explained to them by the principal investigator and trained research assistant. Thereafter, written consent was obtained from those who agreed to participate. To ensure anonymity, each participant was given a unique number code and there were no personal identifiers. A separate sheet that linked the code to the participant's file number was kept securely and only accessible to the researcher.

Analysis

All data collected in the paper-based questionnaires were entered into EPI Info ™ statistical software version 7.2.2.6 for analysis with the assistance of a Biostatistician. Descriptive statistics was used to analyse the distribution of participant's sociodemographic and clinical characteristics, and their tobacco and alcohol use patterns. Participants were divided into those that screened positive and negative for depression. Participants who reported alcohol use either conjointly with tobacco or alone were scored and categorised as harmful alcohol users or not. The relationship between conjoint tobacco and alcohol use, and depression was explored with bivariate and logistic regression analyses. Statistical significance was set at a p value of < 0.05.

Results

A total of 410 eligible participants were approached but only 404 consented to participate. Six declined on account of pressure of time, because they were in a hurry and did not want to be delayed.

The sociodemographic and clinical characteristics of participants are presented in Table 1 and shows that the mean age was 43.2 years, with most participants completing secondary education (62.9%), being black (99.0%), female (65.8%) and unemployed (53.6%). Most participants had been on ART for more than one year (97.8%) and only 15.1% had co-morbid conditions, among which hypertension was the commonest (77.1 %).

The patterns of tobacco use are presented in table 2. Current tobacco use was reported by 23.3% (94/404) with cigarette smoking being the most common form (73.7%, 70/94). Most cigarette smokers (75.5%; 53/70) had low nicotine dependence. Only 4.5% (18/404) of participants used SLT, and most were women (94.4%; 17/18) and used snuff 10 or fewer times a day.

Current alcohol use was reported by 43.6% (176/404), with 36.9% (65/176) categorised as hazardous/ harmful use.

The prevalence of conjoint tobacco and alcohol use was 19.6% (79/404).

In table 3, an estimated 7.7% (31/404) of participants screened positive for depression, out of whom 71.0% (22/31) were categorized as having mild depression and most 83.3% (25/31), were previously undiagnosed and had not received any form of care or treatment.

Bivariate analysis shows in table 4, that there was no statistically significant association between depression and conjoint tobacco and alcohol use (OR=1.48, p=0.438). However, those who were categorized as harmful alcohol users were more than five times likely to report conjoint tobacco and alcohol use (OR=5.72; CI: 2.92- 11.20; p=0,000). In univariate logistic regression (Table 5), of all sociodemographic variables, being female (compared to male) was the only variable significantly associated with lower odds of conjoint tobacco and alcohol use (p=0.000).

Discussion

This study found that a substantial proportion of HIV patients are conjoint users of tobacco and alcohol, and screened positive for depression in primary care. While there was no statistically significant association between the two measures, participants who were harmful alcohol users were significantly more likely to report conjoint tobacco use.

The prevalence of conjoint tobacco and alcohol use in our study is higher than previously reported in South Africa (23.3% vs 10.1) [(9)], but is lower than a study in Thailand that reported a prevalence of 34.5% [(38)]. The latter study was conducted among male hospital out-patients and could have had a higher prevalence because both lifestyle behaviours are commoner among males than females [(9)]. Although price and tax hikes are effective ways of curbing these lifestyles, a high prevalence of conjoint use in a setting of high unemployment, suggests that the tax and rate hikes interventions in South Africa may not be strong enough deterrent. Additional policy interventions need to ensure that “sin taxes” are aligned to wage increases and improve the enforcement of other tobacco control regulations. On the clinical front, the high prevalence underscores the urgent need for an integrated screening package that includes substance use and mental health within the HIV management program.

The finding of no significant association between conjoint tobacco and alcohol use, and depression in our study, correlates with the report of a previous study that found that mental health problems were not among the factors associated with concurrent tobacco use and harmful alcohol use [39]. Previous associations between depression and conjoint tobacco and alcohol use have been mediated via poor health status [40], and may not apply now as access to ART have improved in South Africa, and consequently the health status of the HIV-infected population. However, conjoint tobacco and alcohol use, and problematic alcohol use have been highly associated with non-adherence to treatment in another large South African study, with implications for poor HIV treatment outcomes[41]. Considering the clinical and policy implications of self-medication with conjoint tobacco and alcohol use, more studies are required to clearly delineate the relationship between conjoint use of tobacco and alcohol and depression in South Africa especially as access, coverage and treatment outcomes improve.

Literature reports that the prevalence of tobacco use is higher among people with mental health problems than in the general population [42]. However, our study found marginal differences in tobacco use and cigarette smoking prevalence between our study population and the general South African population (23.3% vs 20.1% for tobacco use, and 17.3% vs 17.6% for cigarette smoking respectively)[10]. These minimal differences especially in cigarette smoking, could be due to a virtually homogenously black population in our study. Compared to black people, other racial/population groups were reported to have higher smoking rates [42,43]. It is perhaps important to note that much higher prevalence (29.4% for current tobacco use, and 23.9% for current cigarette smoking) were reported for the general population in the recent first South African GATS [12].

Consistent with previous South African studies at population level [44], we found low nicotine dependence among cigarette smokers, suggesting that patients with HIV infections, with or without depression, may be amenable to non-pharmacological smoking cessation interventions. SLT users in this study were mostly women, a finding consistent with the literature in South Africa[45]. Although most of the snuff users reported dipping 10 or fewer times on a typical day and took their first dip after 60 minutes on waking up, nicotine is very addictive and may promote nicotine dependence [14]. SLT also contains carcinogens that may increase the risk of many cancers, superimposed on an already elevated risk from HIV.

Though there appears to be an increase in social acceptability of waterpipe tobacco use in South Africa, this study found a lower prevalence than reported in other South African studies [46–48]. Summed together, irrespective of tobacco form, healthcare providers in South African PHC need to offer tobacco cessation treatment(s) to their patients who use tobacco , particularly brief motivational counselling [44].

The prevalence of depression in this study was lower than previously reported in the general population (7.7% vs 9.7%)[49]. Landon Myer et al however reported a higher prevalence of depression of 14% among HIV positive patients in a study conducted in Cape Town, South Africa [50]. While this difference may be due to differences in measurement tool (PHQ-9 vs CES-D, the centre for epidemiological studies depression scale), the underrepresentation of other racial groups in our study, among whom previous studies[49], have reported higher prevalence of depression, could have resulted in our lower estimates. However, more proportions of females than males screened positive for depression in our study (71.0% vs 29.0%) consistent with the literature [49]. Of note is that most of these participants had neither being diagnosed before nor received treatment. This underscores the importance of having high index of suspicion; and paying more attention to females with HIV for screening and diagnosis of depression and once diagnosed, ensuring that evidence-based management is instituted. Lastly, depression has been reported to be higher among individuals who are separated, divorced or widowed, compared to those who are married or living in a co-habit relationship [49]. However, our study found no statistically significant association between those who screened positive for depression and their marital status (p=0.43).

Limitations

The limitations related to this study warrant discussion: Firstly, this study used a consecutive sampling technique which is prone to sampling bias. The tools used are self-reporting questionnaires and are prone to information and social desirability bias. Because the study settings serve a predominantly black population group, other South African population groups may not have been adequately represented, therefore, caution should be exercised in generalizing the findings of this study to the general South African population. Nevertheless, the estimates in our study as par population group of HIV positive patients

(Whites 0.7%, Mixed race 0.3%) were close to what was reported for Gauteng, in the 2017 South African National HIV prevalence survey (Whites 1%, Mixed race 0.8%)[6].

The bad news of HIV diagnosis could result in acute stress and adjustment disorders that may manifest with anxiety and depression symptoms. This may lead to over-reporting of depressive symptoms by participants. However, such acute manifestation usually settles within a year of people knowing their HIV diagnosis, and in this study, almost all participants had known their HIV diagnosis and/or had been on ART for greater than a year before their participation in the study. Therefore, such influence was most unlikely. Regardless of the above potential limitations, this is one of few studies that have explored the relationship between conjoint tobacco and alcohol use and depression among patients with HIV in South African PHC and the findings have implications for clinical practice and health policy for HIV, mental health and substance use disorder management.

Conclusion

Conjoint tobacco and alcohol use is common among patients with HIV infection, and it is significantly associated with hazardous/harmful alcohol consumption. Depression was underdiagnosed and often unrecognised among HIV positive patients in this study. These findings call for an integrated approach to strengthen the screening and treatment of tobacco and alcohol use disorders, and depression among patients with HIV infection in South African PHC and similar settings.

References

1. Adams S. Psychopharmacology of Tobacco and Alcohol Comorbidity: a Review of Current Evidence. Curr Addict Rep. 2017;4(1):25–34.

2. Kukalová G, Moravec L, Bína Filipová D, Kučírková L. Evaluation of estimated direct health expenses on tobacco- and alcohol-related diseases in context of excise taxes revenues in the Czech Republic. Cent Eur J Public Health. 2021 Jun;29(2):143–52.

3. Pappin M, Wouters E, Booysen FLR. Anxiety and depression amongst patients enrolled in a public sector antiretroviral treatment programme in South Africa: a cross-sectional study. BMC Public Health. 2012 Mar 27;12:244.

4. Kagee A, Martin L. Symptoms of depression and anxiety among a sample of South African patients living with HIV. AIDS Care. 2010 Feb;22(2):159–65.

5. Camara A, Sow MS, Touré A, Sako FB, Camara I, Soumaoro K, et al. Anxiety and depression among HIV patients of the infectious disease department of Conakry University Hospital in 2018. Epidemiol Infect. 2020 Jan 14;148:e8.

6. Simbayi L, Zuma K, Zungu N, Moyo S, Marinda E, Jooste S, et al. South African national HIV prevalence, incidence, behaviour and communication survey, 2017: towards achieving the UNAIDS 90-90-90 targets. 2019;

7. UNAIDS CBO. Joint United nations programme on HIV/AIDS (UNAIDS). 1995;

8. Rosoff DB, Davey Smith G, Mehta N, Clarke TK, Lohoff FW. Evaluating the relationship between alcohol consumption, tobacco use, and cardiovascular disease: A multivariable Mendelian randomization study. PLoS Med. 2020 Dec;17(12):e1003410.

9. Peltzer K. Conjoint alcohol and tobacco use among tuberculosis patients in public primary healthcare in South Africa. South Afr J Psychiatry. 2014;20(1):21–6.

10. Reddy P, Zuma K, Shisana O, Jonas K, Sewpaul R. Prevalence of tobacco use among adults in South Africa: results from the first South African National Health and Nutrition Examination Survey. S Afr Med J. 2015;105(8):648–55.

11. Bokoro AI, Reji E, Omole OB. Quit attempts among current tobacco users attending the outpatient department of Dr Yusuf Dadoo district hospital, South Africa. South Afr Fam Pract. 2020;62(1):1–6.

12. GATS (Global Adult Tobacco Survey) Fact Sheet, South Africa, 2021. Fact Sheet. 2021;2.

13. Doll R, Peto R, Boreham J, Sutherland I. Mortality in relation to smoking: 50 years' observations on male British doctors. BMJ. 2004 Jun 26;328(7455):1519.

14. Benowitz NL. Nicotine addiction. N Engl J Med. 2010 Jun 17;362(24):2295–303.

15. Jha P, Ramasundarahettige C, Landsman V, Rostron B, Thun M, Anderson RN, et al. 21st-century hazards of smoking and benefits of cessation in the United States. N Engl J Med. 2013 Jan 24;368(4):341–50.

16. Petrosillo N, Cicalini S. Smoking and HIV: time for a change? BMC Med. 2013 Jan 22;11:16.

17. Burki T. Changing drinking patterns: a sobering thought. The Lancet. 2010;376(9736):153–4.

18. Peltzer K, Davids A, Njuho P. Alcohol use and problem drinking in South Africa: findings from a national population-based survey. Afr J Psychiatry. 2011;14(1).

19. Chikritzhs T, Fillmore K, Stockwell T. A healthy dose of scepticism: four good reasons to think again about protective effects of alcohol on coronary heart disease. Drug Alcohol Rev. 2009 Jul;28(4):441–4.

20. Biddinger KJ, Emdin CA, Haas ME, Wang M, Hindy G, Ellinor PT, et al. Association of Habitual Alcohol Intake With Risk of Cardiovascular Disease. JAMA Netw Open. 2022 Mar 1;5(3):e223849.

21. GBD 2019 Tobacco Collaborators. Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and attributable disease burden in 204 countries and territories, 1990-2019: a systematic analysis from the Global Burden of Disease Study 2019. Lancet Lond Engl. 2021 Jun 19;397(10292):2337–60.

22. Sacks JJ, Gonzales KR, Bouchery EE, Tomedi LE, Brewer RD. 2010 National and State Costs of Excessive Alcohol Consumption. Am J Prev Med. 2015 Nov;49(5):e73–9.

23. 2010 to 2015 government policy: harmful drinking [Internet]. GOV.UK. [cited 2022 Jul 19]. Available from: https://www.gov.uk/government/publications/2010-to-2015-government-policy-harmful-drinking/2010-to-2015-government-policy-harmful-drinking

24. Boachie MK, Rossouw L, Ross H. The Economic Cost of Smoking in South Africa, 2016. Nicotine Tob Res Off J Soc Res Nicotine Tob. 2021 Jan 22;23(2):286–93.

25. Matzopoulos RG, Truen S, Bowman B, Corrigall J. The cost of harmful alcohol use in South Africa. S Afr Med J. 2013 Nov 28;104(2):127.

26. Routine Health Data: Gauteng Province [Internet]. [cited 2019 Jul 18]. Available from: https://gp.dhis.dhmis.org/dhis-web-commons/security/login.action

27. Cholera R, Gaynes BN, Pence BW, Bassett J, Qangule N, Macphail C, et al. Validity of the Patient Health Questionnaire-9 to screen for depression in a high-HIV burden primary healthcare clinic in Johannesburg, South Africa. J Affect Disord. 2014;167:160–6.

28. Bhana A, Rathod SD, Selohilwe O, Kathree T, Petersen I. The validity of the Patient Health Questionnaire for screening depression in chronic care patients in primary health care in South Africa. BMC Psychiatry. 2015 May 23;15:118.

29. Gelaye B, Williams MA, Lemma S, Deyessa N, Bahretibeb Y, Shibre T, et al. Validity of the patient health questionnaire-9 for depression screening and diagnosis in East Africa. Psychiatry Res. 2013;210(2):653–61.

30. Kocalevent RD, Hinz A, Brähler E. Standardization of the depression screener patient health questionnaire (PHQ-9) in the general population. Gen Hosp Psychiatry. 2013;35(5):551–5.

31. Kroenke K, Spitzer RL, Williams JBW. The Patient Health Questionnaire-2: validity of a two-item depression screener. Med Care. 2003 Nov;41(11):1284–92.

32. Mitchell AJ, Coyne JC. Do ultra-short screening instruments accurately detect depression in primary care?: A pooled analysis and meta-analysis of 22 studies. Br J Gen Pr. 2007;57(535):144–51.

33. Saunders JB, Aasland OG, Babor TF, De la Fuente JR, Grant M. Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. Addiction. 1993;88(6):791–804.

34. Piccinelli M, Tessari E, Bortolomasi M, Piasere O, Semenzin M, Garzotto N, et al. Efficacy of the alcohol use disorders identification test as a screening tool for hazardous alcohol intake and related disorders in primary care: a validity study. Bmj. 1997;314(7078):420.

35. Vitesnikova J, Dinh M, Leonard E, Boufous S, Conigrave K. Use of AUDIT-C as a tool to identify hazardous alcohol consumption in admitted trauma patients. Injury. 2014;45(9):1440–4.

36. Borland R, Yong HH, O'Connor RJ, Hyland A, Thompson ME. The reliability and predictive validity of the Heaviness of Smoking Index and its two components: Findings from the International Tobacco Control Four Country study. Nicotine Tob Res. 2010 Oct;12(Suppl 1):S45–50.

37. Ebbert JO, Patten CA, Schroeder DR. The Fagerström Test for Nicotine Dependence-Smokeless Tobacco (FTND-ST). Addict Behav. 2006 Sep;31(9):1716–21.

38. Pengpid S, Peltzer K, Puckpinyo A, Thammaaphiphol K. Conjoint moderate or high-risk alcohol and tobacco use among male out-patients in Thailand. South Afr J Psychiatry SAJP J Soc Psychiatr South Afr. 2016;22(1):763.

39. Peltzer K, Chao LW, Ramlagan S, Szrek H. Daily tobacco use and problem drinking among urban adults in South Africa: a longitudinal study. Pan Afr Med J. 2019;32:51.

40. Peltzer K, Szrek H, Ramlagan S, Leite R, Chao LW. Depression and social functioning among HIV-infected and uninfected persons in South Africa. AIDS Care. 2015;27(1):41–6.

41. O'Cleirigh C, Valentine SE, Pinkston M, Herman D, Bedoya CA, Gordon JR, et al. The unique challenges facing HIV-positive patients who smoke cigarettes: HIV viremia, ART adherence, engagement in HIV care, and concurrent substance use. AIDS Behav. 2015 Jan;19(1):178–85.

42. Saban A, Flisher AJ, Grimsrud A, Morojele N, London L, Williams DR, et al. The association between substance use and common mental disorders in young adults: results from the South African Stress and Health (SASH) Survey. Pan Afr Med J. 2014;17 Suppl 1:11.

43. Phaswana-Mafuya N, Peltzer K, Pengpid S. Concurrent tobacco use and risky drinking in South Africa: Results from the South African National Health and Nutrition Examination Survey. J Psychol Afr. 2018 Jul 4;28(4):316–22.

44. Ayo-Yusuf OA, Omole OB. Nicotine dependence, socioeconomic status, lifestyle behaviours and lifetime quit attempts among adult smokers in South Africa. S Afr Med J. 2020;110(8):796–801.

45. Elf JL, Variava E, Chon S, Lebina L, Motlhaoleng K, Gupte N, et al. Prevalence and Correlates of Snuff Use, and its Association With Tuberculosis, Among Women Living With HIV in South Africa. Nicotine Tob Res. 2019 Jul 17;21(8):1087–92.

46. Combrink A, Irwin N, Laudin G, Naidoo K, Plagerson S, Mathee A. High prevalence of hookah smoking among secondary school students in a disadvantaged community in Johannesburg. S Afr Med J. 2010 May 4;100(5):297.

47. Senkubuge F, Ayo-Yusuf OA, Louwagie GMC, Okuyemi KS. Water Pipe and Smokeless Tobacco Use Among Medical Students in South Africa. Nicotine Tob Res. 2012 Jun 1;14(6):755–60.

48. Daniels KE, Roman NV. A descriptive study of the perceptions and behaviors of waterpipe use by university students in the Western Cape, South Africa. Tob Induc Dis. 2013;11(1):4.

49. Herman AA, Stein DJ, Seedat S, Heeringa SG, Moomal H, Williams DR. The South African Stress and Health (SASH) study: 12-month and lifetime prevalence of common mental disorders. South Afr Med J Suid-Afr Tydskr Vir Geneeskd. 2009 May;99(5 Pt 2):339–44.

50. Myer L, Smit J, Roux LL, Parker S, Stein DJ, Seedat S. Common mental disorders among HIV-infected individuals in South Africa: prevalence, predictors, and validation of brief psychiatric rating scales. AIDS Patient Care STDs. 2008;22(2):147–58.

51. Parry CD, Plüddemann A, Steyn K, Bradshaw D, Norman R, Laubscher R. Alcohol use in South Africa: findings from the first Demographic and Health Survey (1998). J Stud Alcohol. 2005;66(1):91–7.

52. Arseniou S, Arvaniti A, Samakouri M. HIV infection and depression. Psychiatry Clin Neurosci. 2014 Feb;68(2):96–109.

53. Beyamo A, Bashe T, Facha W, Moshago T. Depression and Associated Factors Among Adult HIV/AIDS Patients Attending Antiretroviral Therapy at Wolaita Sodo University Teaching and Referral Hospital, Southern Ethiopia. HIVAIDS Auckl NZ. 2020;12:707–15.

54. Morrison SD, Banushi VH, Sarnquist C, Gashi VH, Osterberg L, Maldonado Y, et al. Levels of self-reported depression and anxiety among HIV-positive patients in Albania: a cross-sectional study. Croat Med J. 2011 Oct 15;52(5):622–8.

55. Duko B, Geja E, Zewude M, Mekonen S. Prevalence and associated factors of depression among patients with HIV/AIDS in Hawassa, Ethiopia, cross-sectional study. Ann Gen Psychiatry. 2018;17:45.

56. Feuillet P, Lert F, Tron L, Aubriere C, Spire B, Dray-Spira R, et al. Prevalence of and factors associated with depression among people living with HIV in France. HIV Med. 2017;18(6):383–94.

57. Schneider M, Chersich M, Temmerman M, Degomme O, Parry CD. The impact of alcohol on HIV prevention and treatment for South Africans in primary healthcare. Curationis. 2014 Aug 1;37(1):1137.

58. Parry CD, Londani M, Shuper PA, Myers B, Kekwaletswe CT, Nkosi S, et al. Characteristics and drinking behaviour of patients on antiretroviral therapy who drink and attend HIV clinics in Tshwane, South Africa: Implications for intervention. South Afr Med J Suid-Afr Tydskr Vir Geneeskd. 2019 Sep 30;109(10):784–91.

59. Magidson JF, Saal W, Nel A, Remmert JE, Kagee A. Relationship between depressive symptoms, alcohol use, and antiretroviral therapy adherence among HIV-infected, clinic-attending patients in South Africa. J Health Psychol. 2017;22(11):1426–33.

60. Etter JF, Duc TV, Perneger TV. Validity of the Fagerstrom test for nicotine dependence and of the Heaviness of Smoking Index among relatively light smokers. Addiction. 1999;94(2):269–81.

Appendix A: List of Tables

Table 1: Participants' sociodemographic and clinical characteristics

Variable	N	%
Age		
Mean = 43.2 years (SD=11.6) Range: (19 to 77 years)		
Age groups (years) (n=404)		
19 - 34	98	24.2
35 - 50	192	47.5
51 – 66	109	26.9
67 – above	5	1.4
Sex (n=404)		
Female	266	65.8
Male	138	34.2
Population group (n=404)		
Black people	400	99.0
Mixed race people	1	0.3
White people	3	0.7
Education level (n=402)		
None	16	3.9
Primary	80	19.9
Secondary/Matric	253	62.9
Tertiary	53	13.1
Marital status (n=401)		
Divorced/Separated	51	12.8
Married/Co-habit	124	30.9
Single	197	49.1
Widowed	29	7.2
Employment status (n=403)		

Employed	162	40.2
Self-employed	25	6.2
Unemployed	216	53.6
ART duration in years (n=402)		
<1	9	2.2
1 – 10	319	79.4
11 and above	74	18.4
Presence of other medical conditions (n=404)		
Yes	61	15.1
No	343	84.9
Type of other medical condition (n=61)		
Asthma	1	1.6
Depression	4	6.6
Diabetes	6	9.8
Hypertension	51	83.6
Epilepsy	1	1.6

#: Type of other medical condition; total may exceed (n) since some patients had more than one medical condition.

Table 2: Tobacco and alcohol use pattern

Category Frequency

	N	%
All participants (n=404)		
Alcohol only users	97	24.0
Conjoint tobacco and alcohol users	79	19.6
Tobacco only users	15	3.7
Non (no tobacco/no alcohol) users	213	52.7
Tobacco use	94	23.3
Cigarette smokers	70 *(+1)	73.7
Snuff users	18	18.9
Water pipe users	7	7.4

Heaviness of smoking index (HSI) among cigarette smokers (n=70)		
High dependence	1	1.4
Low dependence	53	75.7
Moderate dependence	16	22.9
Alcohol use	176	43.6
Hazardous/harmful drinking	65	36.9
Non-hazardous drinking	111	63.1

**(+1)* = One participant who used waterpipe was also a cigarette smoker.

Table 3: Results of screening for depression.

Variable	Frequency (n)	%
PHQ-2 screen for depression Yes/No (n=404)		
Yes	31	7.7
No	373	92.3
PHQ-9 depression classification (n=31)		
Mild – Minimal depression	22	71.0
Moderate – Moderately severe depression	8	25.8
Severe depression	1	3.2
Sex distribution (n=31)		
Male	9	29.0
Female	22	71.0
On treatment for depression (n=30)		
Yes	5	16.7
No	25	83.3

Table 4: Bivariate analysis: Depression and Conjoint tobacco and alcohol use

	Conjoint tobacco and alcohol use		Total	Odds ratio (C I)
	YES	NO		
Depression (YES)	9	8	17	1.484 (0.544 – 4,043) p=0,438
(NO)	69	91	160	
Total	78	99	177	

Table 5: univariate logistic regression: sociodemographic variables and conjoint tobacco and alcohol use

Variable	Odds Ratio	95% C. I	p value
Educational level			
Reference none	1		
Primary	0.87	0.09 - 8.58	0.91
Secondary	0.82	0.09 - 7.68	0.86
Tertiary	0.90	0.08 - 9.70	0.93
Employment status			
Reference employed	1		
Self-employed	1.36	0.38 – 4.89	0.63
Unemployed	0.89	0.44 – 1.77	0.74
Marita status			
Reference divorced	1		
Married / Co-habit	0.98	0.16 – 5.84	0.98
Separated	1.35	0.18 – 9.85	0.77
Single	1.24	0.21 – 7.29	0.81
Widowed	0.62	0.07 – 5.58	0.67
Population group			
Reference Black people	1		
Mixed race	100180.98	0.00 - >1.0E12	0.97
White people	0.00	0.00 - >1.0E12	0.97
Sex			
Reference male	1		
Female	0.41	0.21 - 0.77	0.00

Appendix B: Ethical clearance certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R14/49 Dr K Akahilem

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M1911116

NAME: (Principal Investigator)	Dr K Akahilem
DEPARTMENT:	School of Clinical Medicine Department of Medicine Division of Family Medicine Medical School University
PROJECT TITLE:	Conjoint tobacco and alcohol use and depressive symptoms among HIV positive patients in Sedibeng district, Gauteng Province
DATE CONSIDERED:	2019/11/29
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Professor O Omole
APPROVED BY:	CB Penny Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2020/02/20

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the 3rd Floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to submit details to the Committee. I agree to submit a yearly progress report. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **November** and will therefore reports and re-certification will be due early in the month of **November** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature _____ Date _____

PLEASE QUOTE THE CLEARANCE CERTIFICATE NUMBER IN ALL ENQUIRIES

Appendix C1: Letter of permission

The Facility manager

Levai Mbatha CHC

Evaton

Dear Ma,

Request for permission to conduct my research project in this facility.

I am Dr Kenneth Akahilem, a registrar in Family medicine department of The University of Witwatersrand.

The title of my research is **Conjoint tobacco and alcohol use and depressive symptoms among HIV positive patients in Sedibeng district, Gauteng province.**

I have attached here with a copy of my research proposal document, including the participant information sheet, consent form and the research questionnaire for your perusal.

My research supervisor is Prof. OB Omole. Phone: 0169506192. E-mail: alagbaomole@gmail.com

I am available for any further clarifications that you may require.

I request your permission.

Thank you.

Please tick appropriate box and sign.

Permission granted [X]

Permission not granted [ ]

Signature .....

Facility manager

Date 02.11.2019

LEVAI MBATHA CHC
2019 -11- 2
814 CORNER HAMILTON &
EASTON ROAD EVATON

Appendix C2: Letter of permission

The Facility manager

Johan Heyns CHC

Vanderbijlpark

Dear Ma,

Request for permission to conduct my research project in this facility.

I am Dr Kenneth Akahilem, a registrar in Family medicine department of The University of Witwatersrand.

The title of my research is **Conjoint tobacco and alcohol use and depressive symptoms among HIV positive patients in Sedibeng district, Gauteng province.**

I have attached here with a copy of my research proposal document, including the participant information sheet, consent form and the research questionnaire for your perusal.

My research supervisor is Prof. OB Omole. Phone 0169506192. E-mail: alagbaomole@gmail.com

I am available for any further clarifications that you may require.

I request your permission.

Thank you.

Please tick appropriate box and sign.

Permission granted [X]

Permission not granted [ ]

Signature .....

Facility manager

Date 28/10/2019

Appendix D: Consent form

WITS UNIVERSITY

PARTICIPANT CONSENT SHEET

Conjoint tobacco and alcohol use, and depressive symptoms among HIV positive patients in Sedibeng, Gauteng.

1. I have been given a Participant Information Sheet which explains the nature and processes involved in this study, which is attached hereto;
2. I was given time to read it, or had it read to me, in the language I best understand;
3. I was given time to ask any questions I wanted to and found any answers given to me to be reasonable and satisfactory;
4. I believe I fully understand why the study is being conducted and what the intended outcomes will be;
5. I understand that there will be no immediate benefit to me, should I agree to participate, nor will I receive any payment; conversely, participation will not cost me anything but my time;
6. I understand that, even if I initially consent to take part in the study, I may subsequently withdraw at any time and would not be required to give any reasons; if that happened, any data collected about me for the purposes of the study would immediately be destroyed, unless I give consent for it to be retained
7. I have been given a range of contact details, listed below. If I require further information or become concerned about any aspect of this study, I am free to speak to any of these contacts.
8. If I give consent to participate, I will be asked questions about use of alcohol and tobacco smoking or snuff use. I will also be asked questions about

depression and the records on my clinic file may be checked. This information will be collected anonymously and treated with confidentiality.

Contact details:

Dr Kenneth Akahilem, Principal Investigator, telephone no. 0737834413 or by e-mail at kenakas@gmail.com

Prof, OB Omole (Supervisor) on telephone no. 0169506192 or by e-mail at Olufemi.Omole@wits.ac.za

Professor CB Penny, Chairperson of the Human Research Ethics Committee (Medical) at the University of Witwatersrand, on telephone no. 011 717 2301, or by e-mail at Clement.Penny@wits.ac.za.
Ms. Z Ndlovu or Mr Rhulani Mkansi, Committee Secretariat, telephone nos.: 011 717 2700 or 1234, or by e-mail at: Zanele.Ndlovu@wits.ac.za or Rhulani.Mkansi@wits.ac.za

Name of Participant: _____

Signature or mark _____

Phone: ----------

Date _____

Place: _____

Witnessed by:

Name of Witness: _____

Signature: _____

Appendix E: Research questionnaire

QUESTIONNAIRE

Conjoint tobacco and alcohol use and depressive symptoms among HIV positive patients in Sedibeng, Gauteng province

SECTION A: Participant demographics

1. **Age (years):** …….
2. **Sex:** Male …….. Female……..
3. **Population group:** Black …. White …… Coloured …… Indian/Asian …… Others ……
4. **Educational attainment:** None …… Primary ……. Secondary …… Tertiary …….
5. **Marital status:** Single…... Married… Co-habit…. Separated……. Divorced…... Widowed…...
6. **Employment status:** Employed…… Unemployed…….. Self-employed……

SECTION B: CLINICAL INFORMATION

1. **How long ago were you diagnosed HIV positive:** Year……

If less than 1 year, specify number of months ……. (months)

2. **Other Co-morbidity Yes [ ] ; No [ ].**

If yes, specify

……

SECTION C: ALCOHOL AND TOBACCO USE

1. **Which of the following options fits your use of alcohol and or tobacco products?**

a. I use both tobacco and alcohol

b. I use alcohol only

c. I use tobacco only

d. None

Alcohol use: AUDIT-C (If you do not use alcohol, skip to Section D**)**

1. **How often do you have a drink containing alcohol?**

a. Monthly or less

b. 2 to 4 times a month

c. 2 to 3 times a week

d. 4 or more times a week

2. **How many standard drinks containing alcohol do you have on a typical day?**

a. 1 or 2

b. 3 or 4

c. 5 or 6

d. 7 or 9

e. 10 or more

3. **How often do you have six or more drinks in one occasion?**

a. Never

b. Less than monthly

c. Monthly

d. Weekly

e. Daily or almost daily

TOBACCO USE (If you do not use any tobacco, skip to Section E)

Cigarette smoking

1. **On the days you smoke, how soon after you wake up do you have your first cigarette?**

a. Within five minutes
b. 6 to 30 minutes
c. 31 to 60 minutes
d. After 60 minutes

2. **How many cigarettes do you typically smoke per day?**

a. 10 or fewer
b. 11 to 20
c. 21 to 30
d. 31 or more

3. **How long have you been smoking? (Months or years)**

.....

Snuff use

1. **On the days you use snuff, how soon after you wake up do you have your first dip?**

a. Within five minutes
b. 6 to 30 minutes
c. 31 to 60 minutes
d. After 60 minutes

2. **How many snuff dips do you typically dip per day?**

a. 10 or fewer

b. 11 to 20
c. 21 to 30

d. 31 or more

Other forms of tobacco use:

1. Do you use other forms of tobacco? Yes [ ] No [ ]
   If you answered "Yes", please specify which other form(s)
   ……
   ……
2. How often do you use this form per day?
   .....
3. How long ago have you been using this form of tobacco? …… (Years)

SECTION E: PHQ-9: DEPRESSIVE SYMPTOMS

OVER THE PAST 2 WEEKS, HOW OFTEN HAVE YOU BEEN BOTHERED BY ANY OF THE FOLLOWING PROBLEMS?	NOT AT ALL	SEVERAL DAYS	MORE THAN HALF THE DAYS	NEARLY EVERY DAY
1.Little interest or pleasure in doing things				
2.Feeling down, depressed or hopeless				
3.Trouble falling or staying asleep, or sleeping too much				
4.Feeling tired or having little energy				
5.Poor appetite or overeating				
6.Feeling bad about yourself or that you are a failure or have let yourself or family down				

7.Trouble concentrating on things, such as reading the newspaper or watching television				
8.Moving or speaking so slowly that other people could have noticed. Or the opposite- being so fidgety or restless that you have been moving around a lot more than usual				
9.Thoughts that you would be better off dead, or of hurting yourself				

Appendix F: Research proposal

RESEARCH PROPOSAL

Conjoint tobacco and alcohol use, and depressive symptoms among HIV positive patients in Sedibeng District, Gauteng province

Dr Kenneth E. Akahilem

Student number: 2068311

MMed

Department of Family medicine

Wits

Supervisor: Prof. OB Omole

List of acronyms/abbreviations

AUDIT …… Alcohol use disorders identification test

DHIS…… District health information system

FTND…… Fagerstrom test of nicotine dependence

HSI ……. Heaviness of smoking index

PHQ ……. Patient health questionnaire.

HREC …… Human research ethics committee

NHRD ……. National health research database

Introduction

Tobacco use or alcohol misuse is an established risk factor for adverse health outcome. Therefore, the combined use of both (Conjoint tobacco and alcohol use) tremendously increases the adverse health outcomes. Such deleterious effects on health may be further exacerbated in those with co-morbidities such as HIV.

In South Africa, the predominant form of tobacco use is cigarette smoking(10,11) .Other forms of tobacco use include smokeless tobacco (snuff), waterpipe tobacco, e-cigarettes and vapours. The South African national health and nutrition examination survey of 2015 reported a prevalence of tobacco use among adults to be 17.6%(10). Alcohol consumption is increasing in developing countries including South Africa (17). In the general South African population 15 years and older, alcohol use is estimated at 41.5% (men) and 17.1% (women)(18). About 9% were reported to have problematic or harmful alcohol use. These findings were also similar to what was reported in a previous survey(51).

HIV diagnosis is known to be associated with social stigma, social isolation, anxiety and depression as shown in studies (3–5,52–56). In addition to mental health problems, substance use, such as tobacco and alcohol among people living with HIV have also been studied by researchers (41,45,57,58) . In a study at one of the public hospitals in South Africa, Magidson et al, examined depressive symptoms, alcohol use and other psychosocial factors in relation to non-adherence to ART among 101 HIV positive patients. The authors, among other findings, reported that alcohol use was strongly associated with non-adherence to ART(59). In primary care settings, among HIV positive patients, there was dearth of studies that concurrently explored conjoint tobacco and alcohol use together with depressive symptoms. Though there was a study done on conjoint alcohol and tobacco use, however this study was among tuberculosis patients some of whom were HIV negative or HIV status were not known(9). The bulk of HIV disease burden is encountered in primary care, therefore knowledge on this topic can inform input into new strategies or strengthening of existing ones on appropriate intervention at primary care level

Aim. To explore conjoint tobacco and alcohol use, and depression among HIV positive patients in Sedibeng District, Gauteng.

Objectives

- To describe the sociodemographic characteristics of participants

- To determine the proportion of participants who report conjoint tobacco and alcohol use, and to assess their pattern of tobacco and alcohol use.

- To determine the proportion of participants who screened positive for depression and classify the degree of depression
- To examine the possible associations between depression, conjoint tobacco and alcohol use, and socio-demographic factors

Methods

Study design

The proposed study will be a cross-sectional study

Setting

This study will be conducted in the two major community health centres (CHCs) in Sedibeng district, Levai Mbatha CHC and Johan Heyns CHC. Levai Mbatha is located in Evaton, a peri-urban township with a mainly black population. The catchment population is about 90,724(26). In addition to self-referred patients, the CHC receives patients from 8 nearby clinics; Mpumelelo, Osizweni, Beverly Hills, Boitumelo, Zone 3, Main, Dr Helga Kuhn and Johan Deo. Johan Heyns CHC is located in Vanderbijlpark, a suburban town with a mixed population of blacks and whites. It receives patients from nearby areas, serving a population of 74,045(26). Both CHCs provide preventive, promotive and curative health services.

Study population and sample

According to TIER.NET information system at the period of this proposed study, there are 4204 and 2105 adult HIV positive patients in Levai Mbatha CHC and Johan Heyns CHC respectively. Using EPI INFO ^{TM} Version 7.2.2.6, set at a 95% confidence interval, the expected frequency at 50% and margin of error of 5%, the required sample size will be 362. Adjusted for proportion of each study population, a total of 227 participants will come from Levai Mbatha, while the remaining 135 participants will be drawn from Johan Heyns. The sampling technique will be the next consecutive patient until the sample size is completed.

Inclusion and exclusion criteria

All adult HIV positive patients 18 years or older who are accessing services at each of the two CHCs are eligible to participate. Patients who did not give consent or are too sick to participate will be excluded.

Data collection tool

A questionnaire will be used to collect data. The first part of the questionnaire contains the socio-demographic information of participants. The subsequent parts are questions that ask about the presence of depressive symptoms and pattern of alcohol and or tobacco use. These questions are derived from three validated tools; PHQ-2 and PHQ-9, AUDIT-C and the Heaviness of smoking index (HSI). PHQ-2 is a short version of PHQ-9 adapted for quick and brief assessment of presence of depressive symptoms. A zero score in PHQ-2 rules out depression. A score of 3 is optimal cut-point to screen positive for depression(31,32). The reliability and validity of PHQ-2 and PHQ-9 has been shown in various studies done in many countries including in South African primary care settings(27–30,50). This study questionnaire adapted the full version PHQ-9. AUDIT-C (Alcohol use disorder identification test-consumption) assesses alcohol use intensity. A score of 5 is a positive screen, optimal for identifying hazardous/harmful alcohol use. Audit-C is a modified form of the AUDIT questionnaire. It is used for quick and brief assessment of harmful/hazardous alcohol use(35). The AUDIT questionnaire was developed by the world health organization (WHO) and its

reliability and validity has been shown in many studies(33,34). The heaviness of smoking index (HSI) assesses cigarette smoking intensity. HSI is a short version of Fagerstrom test for nicotine dependence (FTND) questionnaire. It is a reliable and validated tool(36,60). Other forms of tobacco use will also be explored. Smokeless tobacco also known as snuff is non-smoked tobacco used intranasally or intraorally. In South Africa, the majority of black women living with HIV do not smoke cigarette, rather they use smokeless tobacco which is inhaled nasally(45).

Data collection

The questionnaire will be administered by the interviewer (the researcher). The researcher will employ and train a research assistant, who should be fluent in local languages. The research assistant will serve as interpreter for participants who do not understand English language. The researcher will ensure that the questions are asked in a consistent manner. The researcher will liaise with the health promoter in each CHC to daily inform patients who attend the clinic about the proposed study.

A flow diagram (see below) shows the point of data collection. The health promoter announces intended research during a morning health talk in the waiting area. Patients queue to collect files after the health talk. Patients queue for vital signs. Those interested to participate will be directed to meet with the researcher in a private room, the researcher will ensure that those participants do not lose their place in the queue by the use of tally numbering. The process of administering the questionnaire will take about 20 minutes.

<u>Flow chart</u>

Health promoter announces intended research during morning health talk in the waiting area

↓

Patients queue to collect files after health talk

↓

Patients queue for vital signs

Those interested to participate will be directed to meet with researcher in private room where consent will be obtained and the questionnaire administered.

Estimated time -up to 20 minutes (part of the average waiting time of about 40 minutes)



Patients re-integrated back to their previous place in the queue.

Data analysis

Data collected will be entered into EPI INFO ^{TM} version 7.2.2.6. The data will then be checked for accuracy and completeness. Descriptive statistics will be used to summarize data information. Tables, charts or graphs may be used as appropriate.

For inferential statistical analyses, a medical statistician will be consulted. Chi-squared test will be used to check for possible associations between variables. Logistic regression will be used to adjust for confounders among covariates. Results will be reported as odds ratios with p-values and 95% confidence intervals. The statistical significance will be set at $p<0.05$.

Limitation and bias

Questionnaire tools collect self-report information which is inherently a limitation therefore the researcher will ensure that participants are at ease to give factual information. Sample bias may arise due to the consecutive sampling technique, as it may not ensure a representative sample.

Ethical considerations/ Approval

A participant information sheet and participant informed written consent sheet will be given to each eligible participant. The researcher will ensure that the information is fully understood. All the eligible participants will be informed that they are at liberty to withhold consent or withdraw their participation at any time during the study. Any participant who is identified with severe depression or problematic alcohol use will be referred urgently for appropriate care. A letter of permission to carry out the study will be requested from facility

managers of both CHCs. Ethical approval will be sought from Wits HREC (Medical) and provincial NHRD.

Confidentiality

The participants will be assured that all information supplied by them will be treated with confidentiality. Anonymity will be achieved by the use of a study code in place of personal identifier. There will be a separate sheet linking the study code to the participants file number. This sheet will be kept securely by the researcher.

Time frame

	2019 (APRIL-JUL)	**2019 (NOV)-2020 (FEB)**	**2020 (NOV)-2021(JUNE)**	**2021 (JULY)-2022(NOV)**	**2022 (NOVEMBER)**
PROTOCOL					
ETHICS					
DATA COLLECTION					
DATA ANALYSIS					
WRITING AND CORRECTIONS					
REPORT SUBMISSION					

11.Funding and budget

The proposed study will be self-funded by the researcher. The anticipated budget will be as follows;

ITEMS	COST (RANDS)
Transport	R2500
Stationary (paper, ink, photocopying)	R3000
Stipends for research assistant	R3000
Logistics	R500
Total	R9000

References

1. Adams S. Psychopharmacology of Tobacco and Alcohol Comorbidity: a Review of Current Evidence. Curr Addict Rep. 2017;4(1):25–34.

2. Kukalová G, Moravec L, Bína Filipová D, Kučírková L. Evaluation of estimated direct health expenses on tobacco- and alcohol-related diseases in context of excise taxes revenues in the Czech Republic. Cent Eur J Public Health. 2021 Jun;29(2):143–52.

3. Pappin M, Wouters E, Booysen FLR. Anxiety and depression amongst patients enrolled in a public sector antiretroviral treatment programme in South Africa: a cross-sectional study. BMC Public Health. 2012 Mar 27;12:244.

4. Kagee A, Martin L. Symptoms of depression and anxiety among a sample of South African patients living with HIV. AIDS Care. 2010 Feb;22(2):159–65.

5. Camara A, Sow MS, Touré A, Sako FB, Camara I, Soumaoro K, et al. Anxiety and depression among HIV patients of the infectious disease department of Conakry University Hospital in 2018. Epidemiol Infect. 2020 Jan 14;148:e8.

6. Simbayi L, Zuma K, Zungu N, Moyo S, Marinda E, Jooste S, et al. South African national HIV prevalence, incidence, behaviour and communication survey, 2017: towards achieving the UNAIDS 90-90-90 targets. 2019;

7. UNAIDS CBO. Joint United nations programme on HIV/AIDS (UNAIDS). 1995;

8. Rosoff DB, Davey Smith G, Mehta N, Clarke TK, Lohoff FW. Evaluating the relationship between alcohol consumption, tobacco use, and cardiovascular disease: A multivariable Mendelian randomization study. PLoS Med. 2020 Dec;17(12):e1003410.

9. Peltzer K. Conjoint alcohol and tobacco use among tuberculosis patients in public primary healthcare in South Africa. South Afr J Psychiatry. 2014;20(1):21–6.

10. Reddy P, Zuma K, Shisana O, Jonas K, Sewpaul R. Prevalence of tobacco use among adults in South Africa: results from the first South African National Health and Nutrition Examination Survey. S Afr Med J. 2015;105(8):648–55.

11. Bokoro AI, Reji E, Omole OB. Quit attempts among current tobacco users attending the outpatient department of Dr Yusuf Dadoo district hospital, South Africa. South Afr Fam Pract. 2020;62(1):1–6.

12. GATS (Global Adult Tobacco Survey) Fact Sheet, South Africa, 2021. Fact Sheet. 2021;2.

13. Doll R, Peto R, Boreham J, Sutherland I. Mortality in relation to smoking: 50 years' observations on male British doctors. BMJ. 2004 Jun 26;328(7455):1519.

14. Benowitz NL. Nicotine addiction. N Engl J Med. 2010 Jun 17;362(24):2295–303.

15. Jha P, Ramasundarahettige C, Landsman V, Rostron B, Thun M, Anderson RN, et al. 21st-century hazards of smoking and benefits of cessation in the United States. N Engl J Med. 2013 Jan 24;368(4):341–50.

16. Petrosillo N, Cicalini S. Smoking and HIV: time for a change? BMC Med. 2013 Jan 22;11:16.

17. Burki T. Changing drinking patterns: a sobering thought. The Lancet. 2010;376(9736):153–4.

18. Peltzer K, Davids A, Njuho P. Alcohol use and problem drinking in South Africa: findings from a national population-based survey. Afr J Psychiatry. 2011;14(1).

19. Chikritzhs T, Fillmore K, Stockwell T. A healthy dose of scepticism: four good reasons to think again about protective effects of alcohol on coronary heart disease. Drug Alcohol Rev. 2009 Jul;28(4):441–4.

20. Biddinger KJ, Emdin CA, Haas ME, Wang M, Hindy G, Ellinor PT, et al. Association of Habitual Alcohol Intake With Risk of Cardiovascular Disease. JAMA Netw Open. 2022 Mar 1;5(3):e223849.

21. GBD 2019 Tobacco Collaborators. Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and attributable disease burden in 204 countries and territories, 1990-2019: a systematic analysis from the Global Burden of Disease Study 2019. Lancet Lond Engl. 2021 Jun 19;397(10292):2337–60.

22. Sacks JJ, Gonzales KR, Bouchery EE, Tomedi LE, Brewer RD. 2010 National and State Costs of Excessive Alcohol Consumption. Am J Prev Med. 2015 Nov;49(5):e73–9.

23. 2010 to 2015 government policy: harmful drinking [Internet]. GOV.UK. [cited 2022 Jul 19]. Available from: https://www.gov.uk/government/publications/2010-to-2015-government-policy-harmful-drinking/2010-to-2015-government-policy-harmful-drinking

24. Boachie MK, Rossouw L, Ross H. The Economic Cost of Smoking in South Africa, 2016. Nicotine Tob Res Off J Soc Res Nicotine Tob. 2021 Jan 22;23(2):286–93.

25. Matzopoulos RG, Truen S, Bowman B, Corrigall J. The cost of harmful alcohol use in South Africa. S Afr Med J. 2013 Nov 28;104(2):127.

26. Routine Health Data: Gauteng Province [Internet]. [cited 2019 Jul 18]. Available from: https://gp.dhis.dhmis.org/dhis-web-commons/security/login.action

27. Cholera R, Gaynes BN, Pence BW, Bassett J, Qangule N, Macphail C, et al. Validity of the Patient Health Questionnaire-9 to screen for depression in a high-HIV burden primary healthcare clinic in Johannesburg, South Africa. J Affect Disord. 2014;167:160–6.

28. Bhana A, Rathod SD, Selohilwe O, Kathree T, Petersen I. The validity of the Patient Health Questionnaire for screening depression in chronic care patients in primary health care in South Africa. BMC Psychiatry. 2015 May 23;15:118.

29. Gelaye B, Williams MA, Lemma S, Deyessa N, Bahretibeb Y, Shibre T, et al. Validity of the patient health questionnaire-9 for depression screening and diagnosis in East Africa. Psychiatry Res. 2013;210(2):653–61.

30. Kocalevent RD, Hinz A, Brähler E. Standardization of the depression screener patient health questionnaire (PHQ-9) in the general population. Gen Hosp Psychiatry. 2013;35(5):551–5.

31. Kroenke K, Spitzer RL, Williams JBW. The Patient Health Questionnaire-2: validity of a two-item depression screener. Med Care. 2003 Nov;41(11):1284–92.

32. Mitchell AJ, Coyne JC. Do ultra-short screening instruments accurately detect depression in primary care?: A pooled analysis and meta-analysis of 22 studies. Br J Gen Pr. 2007;57(535):144–51.

33. Saunders JB, Aasland OG, Babor TF, De la Fuente JR, Grant M. Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. Addiction. 1993;88(6):791–804.

34. Piccinelli M, Tessari E, Bortolomasi M, Piasere O, Semenzin M, Garzotto N, et al. Efficacy of the alcohol use disorders identification test as a screening tool for hazardous alcohol intake and related disorders in primary care: a validity study. Bmj. 1997;314(7078):420.

35. Vitesnikova J, Dinh M, Leonard E, Boufous S, Conigrave K. Use of AUDIT-C as a tool to identify hazardous alcohol consumption in admitted trauma patients. Injury. 2014;45(9):1440–4.

36. Borland R, Yong HH, O'Connor RJ, Hyland A, Thompson ME. The reliability and predictive validity of the Heaviness of Smoking Index and its two components: Findings from the International Tobacco Control Four Country study. Nicotine Tob Res. 2010 Oct;12(Suppl 1):S45–50.

37. Ebbert JO, Patten CA, Schroeder DR. The Fagerström Test for Nicotine Dependence-Smokeless Tobacco (FTND-ST). Addict Behav. 2006 Sep;31(9):1716–21.

38. Pengpid S, Peltzer K, Puckpinyo A, Thammaaphiphol K. Conjoint moderate or high-risk alcohol and tobacco use among male out-patients in Thailand. South Afr J Psychiatry SAJP J Soc Psychiatr South Afr. 2016;22(1):763.

39. Peltzer K, Chao LW, Ramlagan S, Szrek H. Daily tobacco use and problem drinking among urban adults in South Africa: a longitudinal study. Pan Afr Med J. 2019;32:51.

40. Peltzer K, Szrek H, Ramlagan S, Leite R, Chao LW. Depression and social functioning among HIV-infected and uninfected persons in South Africa. AIDS Care. 2015;27(1):41–6.

41. O'Cleirigh C, Valentine SE, Pinkston M, Herman D, Bedoya CA, Gordon JR, et al. The unique challenges facing HIV-positive patients who smoke cigarettes: HIV viremia, ART adherence, engagement in HIV care, and concurrent substance use. AIDS Behav. 2015 Jan;19(1):178–85.

42. Saban A, Flisher AJ, Grimsrud A, Morojele N, London L, Williams DR, et al. The association between substance use and common mental disorders in young adults: results from the South African Stress and Health (SASH) Survey. Pan Afr Med J. 2014;17 Suppl 1:11.

43. Phaswana-Mafuya N, Peltzer K, Pengpid S. Concurrent tobacco use and risky drinking in South Africa: Results from the South African National Health and Nutrition Examination Survey. J Psychol Afr. 2018 Jul 4;28(4):316–22.

44. Ayo-Yusuf OA, Omole OB. Nicotine dependence, socioeconomic status, lifestyle behaviours and lifetime quit attempts among adult smokers in South Africa. S Afr Med J. 2020;110(8):796–801.

45. Elf JL, Variava E, Chon S, Lebina L, Motlhaoleng K, Gupte N, et al. Prevalence and Correlates of Snuff Use, and its Association With Tuberculosis, Among Women Living With HIV in South Africa. Nicotine Tob Res. 2019 Jul 17;21(8):1087–92.

46. Combrink A, Irwin N, Laudin G, Naidoo K, Plagerson S, Mathee A. High prevalence of hookah smoking among secondary school students in a disadvantaged community in Johannesburg. S Afr Med J. 2010 May 4;100(5):297.

47. Senkubuge F, Ayo-Yusuf OA, Louwagie GMC, Okuyemi KS. Water Pipe and Smokeless Tobacco Use Among Medical Students in South Africa. Nicotine Tob Res. 2012 Jun 1;14(6):755–60.

48. Daniels KE, Roman NV. A descriptive study of the perceptions and behaviors of waterpipe use by university students in the Western Cape, South Africa. Tob Induc Dis. 2013;11(1):4.

49. Herman AA, Stein DJ, Seedat S, Heeringa SG, Moomal H, Williams DR. The South African Stress and Health (SASH) study: 12-month and lifetime prevalence of common mental disorders. South Afr Med J Suid-Afr Tydskr Vir Geneeskd. 2009 May;99(5 Pt 2):339–44.

50. Myer L, Smit J, Roux LL, Parker S, Stein DJ, Seedat S. Common mental disorders among HIV-infected individuals in South Africa: prevalence, predictors, and validation of brief psychiatric rating scales. AIDS Patient Care STDs. 2008;22(2):147–58.

51. Parry CD, Plüddemann A, Steyn K, Bradshaw D, Norman R, Laubscher R. Alcohol use in South Africa: findings from the first Demographic and Health Survey (1998). J Stud Alcohol. 2005;66(1):91–7.

52. Arseniou S, Arvaniti A, Samakouri M. HIV infection and depression. Psychiatry Clin Neurosci. 2014 Feb;68(2):96–109.

53. Beyamo A, Bashe T, Facha W, Moshago T. Depression and Associated Factors Among Adult HIV/AIDS Patients Attending Antiretroviral Therapy at Wolaita Sodo University Teaching and Referral Hospital, Southern Ethiopia. HIVAIDS Auckl NZ. 2020;12:707–15.

54. Morrison SD, Banushi VH, Sarnquist C, Gashi VH, Osterberg L, Maldonado Y, et al. Levels of self-reported depression and anxiety among HIV-positive patients in Albania: a cross-sectional study. Croat Med J. 2011 Oct 15;52(5):622–8.

55. Duko B, Geja E, Zewude M, Mekonen S. Prevalence and associated factors of depression among patients with HIV/AIDS in Hawassa, Ethiopia, cross-sectional study. Ann Gen Psychiatry. 2018;17:45.

56. Feuillet P, Lert F, Tron L, Aubriere C, Spire B, Dray-Spira R, et al. Prevalence of and factors associated with depression among people living with HIV in France. HIV Med. 2017;18(6):383–94.

57. Schneider M, Chersich M, Temmerman M, Degomme O, Parry CD. The impact of alcohol on HIV prevention and treatment for South Africans in primary healthcare. Curationis. 2014 Aug 1;37(1):1137.

58. Parry CD, Londani M, Shuper PA, Myers B, Kekwaletswe CT, Nkosi S, et al. Characteristics and drinking behaviour of patients on antiretroviral therapy who drink and attend HIV clinics in Tshwane, South Africa: Implications for intervention. South Afr Med J Suid-Afr Tydskr Vir Geneeskd. 2019 Sep 30;109(10):784–91.

59. Magidson JF, Saal W, Nel A, Remmert JE, Kagee A. Relationship between depressive symptoms, alcohol use, and antiretroviral therapy adherence among HIV-infected, clinic-attending patients in South Africa. J Health Psychol. 2017;22(11):1426–33.

60. Etter JF, Duc TV, Perneger TV. Validity of the Fagerstrom test for nicotine dependence and of the Heaviness of Smoking Index among relatively light smokers. Addiction. 1999;94(2):269–81.