The prevalence of smoking and the knowledge of smoking hazards and smoking cessation strategies among HIV positive patients in Johannesburg, South Africa

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Abstract

Background—While the detrimental effects of smoking among HIV positive patients have been well documented, there is a paucity of data regarding cigarette smoking prevalence among these patients in South Africa.

Objectives—To establish the frequency, demographics, and knowledge of harmful effects and of smoking cessation strategies among HIV-positive patients in Johannesburg, South Africa.

Methods—A prospective cross-sectional survey, using a structured questionnaire interview, of HIV-positive patients attending the HIV Clinic at the Charlotte Maxeke Johannesburg Academic Hospital between 1 July 2011 and 31 October 2011.

Results—Of 207 HIV positive patients attending an ARV roll-out clinic, 31 (15%) were current smokers (23% of the males and 7.5% of the females) and a further 45 (21.7%) were ex-smokers. Most of the current smokers (30/31 patients) indicated their wish to quit smoking, and among the group as a whole most patients were aware of the general (82.5%) and HIV-related (77.8%) risks

of smoking and of methods of quitting smoking. Despite this, however, most (61.8%) were not aware of whom they could approach for assistance and advice.

Conclusions—Given the relatively high prevalence of current and ex-smokers amongst HIV positive patients there is a need for the introduction of smoking cessation strategies and assistance at HIV-rollout clinics in South Africa.

Introduction

The success of anti-smoking policies implemented in many developed countries has to a large extent been countered by the efforts of a highly resilient tobacco industry to target developing countries, many of which have less stringent anti-smoking strategies. Indeed developing countries are now estimated to account for >70% of global tobacco consumption.[1,2] The increase in the frequency of smoking has coincided with the HIV/ AIDS pandemic in developing countries, presenting an ominous, interactive threat to public health. This is based on a number of studies, mainly from the USA and Europe, reporting that HIV-infected persons have extremely high rates of cigarette smoking,[3,4] associated, in turn, with a higher than expected increase in the frequency of co-morbidities, including cardiovascular diseases, bacterial pneumonia, and cancers, as well as increased mortality.[3–6] Despite unrestricted access to advanced care and therapy, HIV-positive smokers appear to lose more life years from smoking than from HIV infection. [5] Moreover, smoking not only impacts negatively on the efficacy of anti-retroviral therapy,[7] but is also associated with treatment failure in tuberculosis.[8]

Although the frequency of cigarette smoking in the general population in South Africa, home to the largest number of HIV-positive people in the world, is estimated to be 16%,[9] the frequency in HIV positive persons is uncertain. In a small pre-antiretroviral therapy (ART) study conducted in a group (n=41) of predominantly male (n=34) subjects with pulmonary tuberculosis, the frequencies of cigarette smoking, measured according to urine cotinine concentrations, in the entire group, as well as in a sub-group of HIV-seropositive patients (n=10) were reported to be 63% and 70% respectively, with the cotinine concentrations rising significantly after 6 months of therapy.[10] These figures are comparable with a more recent study in a larger number of South African patients with active or latent TB in which the reported frequencies of cigarette smoking for the entire group (n=424) and the HIV-positive sub-group (n=119) were 68% and 71% respectively.[11]

Given the relative paucity of data on this priority public health issue,[12] the current study was undertaken to establish the frequency and demographics of cigarette smoking and other types of substance abuse among HIV-positive patients attending the HIV Clinic at Charlotte Maxeke Johannesburg Academic Hospital, in Johannesburg, South Africa.

Patients and Methods

This was a prospective cross-sectional survey of HIV-positive patients attending the HIV Clinic at the Charlotte Maxeke Johannesburg Academic Hospital in Johannesburg, South Africa, between 1 July 2011 and 31 October 2011. The hospital is a tertiary academic institution, which has an HIV clinic providing antiretrovirals. All patients entered into the

study gave signed informed consent for participation in the study, which was approved by the Human Research Ethics Committee of the University of the Witwatersrand.

All patients who agreed to participate were interviewed using a structured questionnaire with recording of demographic and clinical details and a detailed history of smoking status. Patients were also questioned about their knowledge of overall harmful effects of smoking, as well as the effects of smoking on the HIV infection, their knowledge of smoking cessation strategies and previous attempts to quit. In 147 patients, who provided a urine sample, this specimen was subsequently tested for cotinine levels using a solid phase competitive ELISA procedure (Calbiotech Inc., Spring Valley, CA, USA) the results of which are expressed as nanograms (ng)/millilitre (ml). For the purpose of this study, a value of >25ng/ml was considered to be indicative of active smoking, as it has been suggested that values up to 30ng/ml may be associated with passive smoking.

Data collected was entered into data sheets. Basic frequency analyses were used to describe the mean values and ranges on continuous variables, whereas proportions were used in the case of non-continuous variables.

Results

A total of 207 patients was entered into the database, of which 108 (52.2%) were female. The overwhelming majority of patients were black (94.2%), reflecting the overall demographics of the clinic (white patients 2.9% and coloured patients 2.9%). The mean age of the patients was 39.9 years with a range of 19–62 years.

Overall, 31/207 (15%) were self-described current smokers, of which 23/100 were male (23% of males) and 8/107 were female (7.5% of females). An additional 45/207 cases (21.7%) indicated that they were ex-smokers and 130/207 (62.8%) indicated that they had never smoked. Two patients indicated that they were current smokers of cannabis in addition to cigarettes. In addition 6 patients indicated that they also currently used snuff. The average age of onset of smoking was 20 years of age (range 9–46 years). The average number of cigarettes smoked per day was 9 (range 1–30 cigarettes per day).

Overall 30/31(96.7%) of the smokers indicated that they wished to stop smoking. The reasons indicated by the current and ex-smokers for wishing to quit smoking are shown in Table 1. The majority of patients wished to quit because of concerns regarding health issues, but there were other motivations, including HIV infection diagnosis, concurrent illness, costs and also personal, family, and religious concerns. A majority of the total patient population (170/206 (82.5%)) indicated that they knew about the potential harmful effects of cigarette smoking in general (Table 2), although several participants could not name a specific health hazard when questioned further (Table 2). A majority (161/207 (77.8%)) also indicated their knowledge of the potential harmful effects of cigarette smoking, specifically in relation to HIV infection. Of the latter group of patients, 34/207 (16.4%) believed there were no harmful effects of smoking on HIV infection and 12/207 (5.8%) were unsure.

Overall, 64/76 (84.2%) current and ex-smokers had attempted quitting, while 12/76 (15.8%) had not. A majority of the total patient population (58%) indicated an awareness of methods

of quitting smoking, while 40.1% did not know (data not available in 1.9%). Most patients (62.3%) were unaware of the resources available for advice and assistance.

As indicated in Table 3, 82 patients were unaware of smoking cessation agents/adjuncts, 66 patients indicated that various food substances and drinks were of value, 35 patients indicated their knowledge of going "cold turkey", 33 patients were unable to name techniques even though they had indicated their knowledge of such, 33 patients indicated various other forms of assistance including psychotherapy, avoiding smokers and drinkers, keeping busy, exercise, religion and prayer, rehabilitation and hypnotherapy, 20 described various forms of nicotine replacement therapy (patches, gum, and sprays), 11 patients described various drugs, such as buproprion, 9 patients described weaning from smoking and 9 patients described various forms of cigarettes (electronic, nicotine-containing or nicotine-free cigarettes), and no data were recorded in 5 patients.

Urine specimens were available for the measurement of cotinine levels in 141 of the patients. Of these 21 patients had indicated that they were current smokers, 31 that they were ex-smokers and 91 that they were non-smokers (Table 4). Cotinine levels were raised (> 25ng/ml) in 43/141 patients (30.5%), of whom 21 had indicated that they were non-smokers, 10 that they were ex-smokers and 12 that they were current smokers. An additional 9 of those patients that had indicated that they were smokers did not have raised cotinine levels. All female patients indicating that they were smokers had raised cotinine levels, while 6 of the male patients who indicated they were smokers had raised levels, and an additional 9 male smokers had cotinine levels that were not in the positive range

Discussion

The main findings of this study of 207 HIV-infected patients attending an ARV roll-out clinic were that 15% were current smokers and that most of the patients who were current or ex-smokers had indicated their wish to quit smoking. Furthermore, among all the patients, most were aware of the general (82.5%) and HIV-related (77.8%) risks of smoking, and of methods of quitting smoking, but most (61.8%) also indicated that they were not aware of resources available for assistance and advice.

The overall prevalence of current smoking in the present study, based on the patient history, was 15%. This is similar to the frequency of smoking previously estimated in the general population in South Africa,[9] but much lower than that found in previous studies of HIV-infected persons in South Africa.[9–11] Factors that may have contributed include the fact that this is a predominantly black South African population known to smoke less than any of the other population groups in the country, and furthermore that there was a greater proportion of females in the present study, with a previous study[9] having indicated that black females are much less likely to smoke.

However, the true frequency of smoking in this study group may have been underestimated, since it was based on the patient history alone, whereas the urine cotinine levels were actually raised in 43/141 patients (30.5%). The discrepancy rate between the smoking history recorded and the measured urine cotinine levels was 28.4% (40/141 patients) in the

study cohort, as indicated in Table 4. In 19 of the males who indicated that they were either ex-smokers or non-smokers, the cotinine levels were actually raised (Table 4). Thus the frequency of smoking would have been recorded as being higher if this was based on the urine cotinine levels alone or the urine cotinine levels together with the history. The exact reasons for these discrepancies are uncertain, and while a discrepant history alone may be the major reason, it would be interesting to speculate that this may possibly relate to the relatively low numbers of cigarettes smoked or even to intermittent smoking. Exposure to biomass fuel is not a consideration since nicotine is contained only in tobacco leaves (and in the leaves of some other plants). Furthermore, passive exposure to cigarette smoke could have played a role, but we did not record details of possible passive smoking among the patients, either in the community or in their homes.

Interestingly, there were additional discrepancies between the patient history and the urine cotinine levels in that in 9 males who indicated they were current smokers the urine cotinine levels were not found to be raised (Table 4). Once again the exact reasons for this are uncertain, but there is no indication in the current study as to what time of day the urine cotinine specimens were taken, particularly in relation to the last cigarette smoked. Cotinine is the major metabolite of nicotine. It has a comparatively long half-life of about 17 hours in body fluid and is widely accepted as a sensitive and reliable marker of exposure to cigarette smoke and is considered to be more reliable than smoking history in determining smoking status[12]. Thus while these discrepant results are in contrast to previous studies which have suggested there was a good correlation between smoking history and serum cotinine levels[11] there are other studies indicating that there is a relatively poor correlation between patient history and the urine cotinine levels, especially in ex-smokers in whom smoking history can be very misleading.[13]

Encouragingly, most of the study population had insight into the general health and HIV-associated risks of smoking and almost all the ever-smokers indicated their willingness to quit smoking, but most of the study population indicated their lack of knowledge of resources that they could access for assistance and advice, suggesting an immediate public health intervention possibility

The impact of cigarette smoking in HIV-infected persons is considerable, and remains so even subsequent to the introduction of highly active antiretroviral therapy.[4] Cigarette smoking impacts on mortality, quality of life and comorbid illnesses in HIV-infected patients.[3] It is extremely well documented in HIV-infected individuals that there are a myriad of serious medical conditions associated with cigarette smoking, including cardiovascular disease, pulmonary diseases and cancers,[14] with further good evidence in a number of these conditions that these risks decrease on smoking cessation. Although the prevalence of smoking in the current study is substantially lower than that reported in developed countries, the overwhelming infectious disease burden in the developing world compounds its adverse effects. For this reason it is incumbent on all healthcare workers looking after HIV-infected persons to actively encourage and support efforts among their patients to stop smoking.[4,15]

References

1. Giovino GA, Mirza SA, Samet JM, Gupta PC, Jarvis M, Bhala N, et al. Tobacco use in 3 billion individuals from 16 countries: an analysis of nationally representative cross-sectional household surveys. Lancet. 2012; 380:668–79. [PubMed: 22901888]

2. Eriksen, M.; MacKay, J.; Ross, H. The Tobacco World Atlas. 4. World Lung Foundation and American Cancer Society; 2012.

3. Crothers K, Griffith T, McGinnis KA, Rodriguez-Barradas MC, Leaf DA, Weissman S, et al. The impact of cigarette smoking on mortality, quality of life, and comorbid illness among HIV-positive veterans. J Gen Intern Med. 2005; 20:1142–45. [PubMed: 16423106]

4. Lifson AR, Lando HA. Smoking and HIV: Prevalence, health risks, and cessation strategies. Curr HIV/AIDS Rep. 2012; 9:223–30. [PubMed: 22618079]

5. Helleberg M, Afzal S, Kronborg G, Larsen CS, Pedersen G, Pedersen C, et al. Mortality attributable to smoking among HIV-1 infected individuals: A nationwide, population-based cohort study. Clin Infect Dis. 2013; 56:727–34. [PubMed: 23254417]

6. De P, Farley A, Lindson N, Aveyard P. Systematic review and meta-analysis: influence of smoking cessation on incidence of pneumonia in HIV. BMC Medicine. 2013; 11:15. [PubMed: 23339513]

7. Shuter J, Bernstein L. Cigarette smoking is an independent predictor of nonadherence in HIV-infected individuals receiving antiretroviral therapy. Nicotine Tob Res. 2008; 10:731–6. [PubMed: 18418794]

8. Tachfouti N, Nejjari C, Benjelloun MC, Berraho M, Elfakir S, El Rhazi K, et al. Association between smoking status, other factors and tuberculosis treatment failure in Morocco. Int J Tuberc Lung Dis. 2011; 15:838–43. [PubMed: 21575308]

9. Peer N, Bradshaw D, Laubscher R, Steyn K. Trends in adult tobacco use from two South African demographic and health surveys conducted in 1998 and 2003. S Afr Med J. 2009; 99:744–9. [PubMed: 20128274]

10. Plit ML, Theron AJ, Fickl H, van Rensburg CEJ, Pendel S, Anderson R. Influence of antimicrobial chemotherapy and smoking status on the plasma concentrations of vitamin C, vitamin E, β-carotene, acute phase reactants, iron and lipid peroxides in patients with pulmonary tuberculosis. Int J Tuberc Lung Dis. 1998; 2:590–6. [PubMed: 9661828]

11. Brunet L, Pai M, Davids V, Ling D, Paradis G, Lenders L, et al. High prevalence of smoking among patients with suspected tuberculosis in South Africa. Eur Respir J. 2011; 38:139–46. [PubMed: 21148230]

12. Jarvis MJ, Tunstall-Pedoe H, Feyerabend C, Vesey C, Saloojee Y. Comparison of tests used to distinguish smokers from nonsmokers. Am J Public Health. 1987; 77:1435–1438. [PubMed: 3661797]

13. Bodmer CW, MacFarlane JA, Flavell HJ, Wallymahmed M, Calverley PM. How accurate is the smoking history in newly diagnosed diabetic patients? Diabetes Res Clin Pract. 1990; 10:215–220. [PubMed: 2073868]

14. Rahmanian S, Wewers ME, Koletar S, Reynolds N, Ferketich A, Diaz P. Cigarette smoking in the HIV-infected population. Proc Am Thorac Soc. 2011; 8:313–319. [PubMed: 21653534]

15. Horvath KJ, Eastman M, Prosser R, Goodroad B, Worthington L. Addressing smoking during medical visits: patients with human immunodeficiency virus. Am J Prev Med. 2012; 43:14–21.

Table 1

Reasons given by current and ex-smokers for wishing to quit (n=76).

Health concerns	37
Finances	8
HIV diagnosis	7
Personal reasons	7
Concurrent illness	6
Other	5
Did not indicate a reason	2
Family reasons	2
Religion	2

Table 2

The health-related effects identified by those patients indicating a knowledge of harmful effects of cigarette smoking (n=170)[*]

Cancer	52
Tuberculosis	41
Emphysema	37
Not able to name a harmful effect	32[+]
Bad body odour	24
Effects on HIV medication	3

[*] sometimes multiple

[+] not able to name a harmful effect even those they had indicated they were aware of harmful effects

Table 3

Knowledge of methods used as part of smoking cessation strategies (n = 207)[*]

Patient not know of any techniques	82
Use of food-related items	66[+]
Going "cold turkey"	35
Unable to name a technique	33[++]
Varied other methods	33
Forms of nicotine replacement therapy	20
Tablets/buproprion	11
Specialised cigarettes	9
Weaning	9
Data unknown	5

[*] Sometimes multiple. Please refer to text for more complete details

[+] Most commonly the use of sweets and chewing gum were indicated

[++] Unable to name a technique even though they had indicated knowledge of different techniques

Table 4

Associations between smoking histories and cotinine levels

Cotinine levels (ng/ml)	< 25	> 25 – 50	> 50 – 75	75 – 100	> 100
Males	9 smokers 18 ex-smokers 24 non-smokers	0 smokers 1 ex-smokers 1 non-smokers	1 smokers 2 ex-smokers 0 non-smokers	0 smokers 0 ex-smokers 0 non-smokers	5 smokers 6 ex-smokers 9 non-smokers
Females	0 smokers 3 ex-smokers 44 non-smokers	0 smokers 0 ex-smokers 4 non-smokers	0 smokers 0 ex-smokers 1 non-smokers	1 smokers 0 ex-smokers 0 non-smokers	5 smokers 1 ex-smokers 6 non-smokers