Published in final edited form as:

AIDS Care. 2016 ; 28(3): 365–369. doi:10.1080/09540121.2015.1090536.

Cigarette smoking among Chinese PLWHA: An exploration of changes in smoking after being tested HIV positive

Yuanhui Wang^{a,*}, Xinguang Chen^a, Xiaoming Li^b, Yan Wang^a, Qiao Shan^b, Yuejiao Zhou^c, and Zhiyong Shen^c

^aDepartment of Epidemiology, University of Florida, Gainesville, FL 32610, USA

^bPediatric Prevention Research Center, Wayne State University, Detroit, MI 48201, USA

^cGuangxi Center for Disease Control and Prevention, Nanning, Guangxi 530028, China

Abstract

Tobacco use prevention and cessation among persons living with HIV/AIDS (PLWHA) represents a significant challenge for HIV/AIDS patient care in China and across the globe. Awareness of HIV positive status may alter the likelihood for PLWHA smokers to change their smoking habit. In this study we tested the *risk enhancement* and *risk reduction hypotheses* by assessing changes in cigarette smoking behavior among PLWHA after they received the positive results of their HIV tests. Cross-sectional survey data collected from a random sample of 2973 PLWHA in care in Guangxi, China were analyzed. Changes in cigarette smoking after receiving the HIV positive test results, as well as the current levels of cigarette smoking were measured. Among the total participants, 1,529 (51.7%) were self-identified as cigarette smokers, of whom, 436 (28.9%) reduced smoking and 286 (19.0%) quit after receiving their HIV positive test results. Among the quitters, 210 (73.9%) remained abstinent for a median duration of two years. There were also 124 (8.2%) who increased cigarette smoking. Older age, female gender, more education and receiving antiretroviral therapy were associated with quitting. In conclusion, our study findings support the risk reduction and risk enhancement hypotheses. A large proportion of smoking PLWHA reduced or quit smoking; while a small proportion increased smoking. Findings of this study suggest that the timing when a person receives his or her HIV positive test result may be an ideal opportunity for care providers to deliver tobacco cessation interventions. Longitudinal studies are indicated to verify the findings of this study and to support smoking cessation intervention among PLWHA in the future.

Keywords

Cigarette smoking; Persons living with HIV/AIDS; HIV/AIDS patient care; Tobacco cessation; China

*Corresponding author: Yuanhui Wang, ywang0813@gmail.com, Phone: (352)284-6676.

1. Introduction

Tobacco use prevention and cessation among persons living with HIV/AIDS (PLWHA) represents a top priority for HIV/AIDS patient care. Tobacco use is highly prevalent with substantial negative consequences among PLWHA (Petrosillo & Cicalini, 2013). Data from developed countries indicate that 40% to 60% of PLWHA use tobacco (Gritz, Vidrine, Lazev, Amick & Arduino, 2004; Mamary, Bahrs, & Martinez, 2002; Tesoriero, Gieryic, Carrascal, & Lavigne, 2010). Smoking increases the likelihood for PLWHA to develop AIDS-defining conditions (i.e. Kaposi's sarcoma and non-Hodgkin's lymphoma) (Feldman et al., 2006) and other conditions such as hairy leukoplakia, oral candidiasis, and community-acquired candidiasis (Conley et al., 1996). Furthermore, PLWHA who use tobacco are less likely to adhere to antiretroviral therapy (ART) (Shuter & Bernstein, 2008) and respond poorly to the treatment (Feldman et al., 2006).

Many factors are associated with tobacco use among PLWHA, including socioeconomic factors, substance use and mental disorders (Batista et al., 2013; Reynolds, 2009); but little is known whether being aware of HIV+ status as a stressful life event, may also alter the risk for tobacco use. Stress has been recognized as a risk factor for smoking (Nielsen, Curtis, Kristensen, & Rod Nielsen, 2008; Rod, Gronbaek, Schnohr, Prescott, & Kristensen, 2009). Being diagnosed with other severe diseases is documented to be stressful (Gallo et al., 2014; Cohen, Deverts & Miller, 2007). Knowing HIV+ may also be stressful, leading to unhealthy coping, and cigarettes smoking could be one convenient option (Gallo et al., 2014). If this *risk enhancement hypothesis* is true, receiving the HIV+ result will increase the risk to smoke. One study with a sample of 1,094 PLWHA in the United States found a positive association between smoking and HIV+ diagnosis (Tesoriero et al., 2010); while a reverse finding was reported in another study with a hospital sample of PLWHA in Australia (Cummins, Trotter, Moussa, & Turham, 2005). No studies have investigated this issue among PLWHA in China.

Diagnosed with HIV infection may also lead to reduced risk of smoking – a *risk reduction hypothesis*. According to the Information-Motivation- Behavioral Skills (IMB) model (Fisher & Fisher, 1992), knowing the HIV+ test results (information) may increase self-awareness of one's own health and motivate self-appraisal of health risks. When a PLWHA starts to accept his/her condition as serious and life-threatening, he/she may be motivated to take action to control the disease process by quitting smoking (Collins et al., 2001; Gritz et al., 2006). In supporting this hypothesis, diagnosis-associated smoking cessation among PLWHA is reported in other counties (Collins et al., 2001; Tesoriero et al., 2010). Tobacco cessation behavior is also reported for a local ethnic minority PLWHA in China (Luo et al., 2014).

There are approximately 780,000 PLWHA in China (Ministry of Health of the People's Republic of China [MoH], 2012). We anticipate a very high rate of smoking and very low rate of smoking cessation among PLWHA in China because 28.1% of Chinese in the general population (52.9% men and 2.4% women) are smoking (Li, Hsia, & Yang, 2011) and there is a lack of changes in cultural acceptance to smoking, lack of public knowledge regarding smoking harms, and inadequate tobacco control effort (Zhang, Ou, & Bai, 2011). The main

purpose of this study is to investigate whether knowing HIV+ status is associated with smoking behavior changes and to provide relevant data supporting more effective tobacco cessation.

2. Materials and Methods

2.1 Study site, participants and procedure

The survey was conducted from October 2012 to August 2013 in Guangxi Autonomous Region, one of the southern provinces with the largest number of PLWHA in China (Zhang et al., 2013). Participants were randomly sampled from 12 sites covering 29,606 recorded HIV/AIDS cases. With the assistance and collaboration of Guangxi Center for Disease Control and Prevention (CDC), 12 project coordinators, one from each site were trained to sample participants. A total of 3,002 patients approached agreed to participate by signing the informed consent, of whom 2,987 completed the survey. Data for 2,973 participants were analyzed after 14 were excluded due to missing data on smoking.

Data were collected through in-person interview in a private room in HIV clinics with an anonymous questionnaire. The trained interviewers read the questions to the participants and recorded their responses. IRB approval of the survey protocol was obtained from Wayne State University and Guangxi CDC.

2.2 Measurement

Sociodemographic and other variables were gender (male/female), age (in years), race (Han, Zhuang, and others), years of education, marital status (unmarried, married and others), and income (Chinese Yuan/month), participation in ART (yes/no), duration after receiving the HIV+ result.

Participants were first asked “Have you ever smoked cigarettes (including a few puffs)?” For those who responded positively to this question they were further asked to report the number of days smoking in the past month and the number of cigarettes smoked per day on a typical day. Participants were coded as *current smokers* if they reported having ever smoked and also smoked in the past month; current smokers were further coded as *daily smokers* if smoked every day, and *heavy smokers* if smoked at least 20 cigarettes per day. Participants who reported having ever smoked cigarettes were asked: “Have you changed your smoking behavior after you got to know you were infected with HIV?” Five answer options were: (a) “started smoking again”, (b) “increased smoking”, (c) “the same as before”, (d) reduced smoking, and (e) “stopped smoking”. Nine participants who selected option (a) were combined with those who select option (b) as a group and coded as *relapse/increased smokers*; participants who selected option (c) were coded as *persistent smokers*, (d) as *reduced smokers* and (e) as *quitters*. Quitters who reported having not smoked in the past month were coded as *abstinent smokers*.

2.3 Statistical analysis

Statistical analyses were conducted using the statistical software SAS, version 9.3 (SAS Institute, Inc., Cary, NC). Chi-square test was used to assess HIV+ diagnosis-associated

changes in smoking (relapse/increased, reduced, and quit), and Fisher exact test was used in cases where the expected frequency of a cell was less than 5.

3. Results

Among the 2,973 participants, 62.8% were male, 70.7% Han (China's predominant ethnic group) and 25.9% Zhuang (China's largest ethnic minority group), with a mean age (SD) = 42.5 (12.8); 53.6% had more than six years of education, 53.2% with monthly household income < 1,000 Yuan (~\$160). In addition, and 78.8% of the participants were aware of their HIV+ status for one+ year, 72.2% on ART, and 51.4% reported having ever smoked.

Figure 1 indicates 28.9% PLWHA smokers reduced smoking, 19% quit and 8.2% relapsed/increased smoking with substantial gender differences. Among the quitters, 73.9% were abstinent.

Results in Table 1 indicate that: (1) younger age, ethnic groups other than Han, unmarried, and longer durations of knowing HIV+ status were associated with relapsed and increased smoking; (2) older age, being female, more years of education, and short durations of knowing HIV+ status were associated with quitting; (3) ethnic Han and being married were associated with abstinence; and (4) receiving ART was associated with reduced smoking and quitting.

4. Discussion

In this study, we investigated changes in cigarette smoking after being diagnosed with HIV infection and other influential factors. Consistent with research findings from other countries (Collins et al., 2001; Tesoriero et al., 2010), we found substantial changes (primarily reductions with a small proportion of increases) in tobacco use among Chinese PLWHA associated with the awareness of HIV+ status. Supporting the IMB model-based risk reduction hypothesis, 47.9% of the PLWHA smokers either reduced or quit smoking after they received their HIV+ results. The percentage of reduced smoking (28.9%) in our sample is close to 29.0%, the rate among PLWHA smokers in the United States (Tesoriero et al., 2010). The quitting rate of 19.0% in our sample was much higher than that among other PLWHA in China (7%) (Luo et al., 2014) and the United States (14%) (Burkhalter, Springer, Chhabra, Ostroff, & Rapkin, 2005). Furthermore, 73% of the quitters in our sample remained abstinent.

Findings of increased tobacco cessation are of great significance for healthcare providers to consider tobacco cessation. The quitting rate of 19.0% among PLWHA smoker in our study sample is substantial, compared to the average successful quit rate of approximately 25% (ranged from 10% to 30%) in most evidence-based tobacco cessation programs (nicotine-replacement therapy, or plus behavioral counseling) in the general population (Aveyard et al., 2007; Ahluwalia1, 2006; Jorenby et al., 2006). This finding also provide data supporting the cross-cultural utility of the IMB model (Fisher et al, 1993) in describing the power of knowing one's HIV+ status in motivating PLWHA smokers to quit in the Chinese settings without purposeful external assistance and training.

Despite the observed reductions in smoking, 41.6% of our sample are currently smoking, substantially higher than 28.1%, the prevalence for the Chinese population in general (Li et al., 2011). Findings of our study support that the timing when a person knows his/her HIV test result is more important than the afterward adjustments in motivating PLWHA smokers to quit. In addition, extra attentions should be paid to PLWHA smokers who are young, male, less educated and unmarried since they were less likely to quit smoking.

One important limitation to this study is that changes in smoking behavior were assessed retrospectively despite the recognition of adequate reliability and validity of self-reported data (Patrick et al., 1994; Rebagliato, 2002). Another limitation is that the cross-sectional data for this study do not warrant any causal conclusions. Despite these limitations, findings of this study provide data from a large sample of PLWHA, informing future studies.

Acknowledgments

This study was supported by the National Institute of Health [R01AA18090] and [R01HD74221]. We are grateful to the staff at Guangxi Centers for Disease Control and Prevention and their local offices and HIV clinics for the assistance and cooperation in subject recruitment and data collection.

References

- Ahluwalia JS, Okuyemi K, Nollen N, Choi WS, Kaur H, Pulvers K, Mayo MS. The effects of nicotine gum and counseling among African American light smokers: a 2 × 2 factorial design. *Addition*. 2006; 101(6):883–891. DOI: 10.1111/j.1360-0443.2006.01461.x
- Aveyard P, Brown K, Saunders C, Alexander A, Johnstone E, Munafo MR, Murphy M. Weekly versus basic smoking cessation support in primary care: a randomised controlled trial. *Thorax*. 2007; 62(10):898–903. DOI: 10.1136/thx.2006.071837 [PubMed: 17483139]
- BatistaJd, de Militao de AlbuquerqueMF, , XimenesRA, , de Miranda-FilhoDB, , Lacerda de MeloHR, , MaruzaM, , ... RodriguesLC. Prevalence and socioeconomic factors associated with smoking in people living with HIV by sex, in Recife, Brazil. *Rev Bras Epidemiol*. 2013; 16(2):432–443. DOI: 10.1590/S1415-790X2013000200018 [PubMed: 24142014]
- Burkhalter JE, Springer CM, Chhabra R, Ostroff JS, Rapkin BD. Tobacco use and readiness to quit smoking in low-income HIV-infected persons. *Nicotine Tob Res*. 2005; 7(4):511–522. DOI: 10.1080/14622200500186064 [PubMed: 16085522]
- Cohen S, Deverts DJ, Miller GE. Psychological Stress and Disease. *JAMA, American Medical Association*. 2007; 298(14):1685–1687. DOI: 10.1001/jama.298.14.1685
- Collins RL, Kanouse DE, Gifford AL, Senterfitt JW, Schuster MA, McCaffrey DF, ... Wenger NS. Changes in health-promoting behavior following diagnosis with HIV: prevalence and correlates in a national probability sample. *Health Psychol*. 2001; 20(5):351–360. DOI: 10.1037/0278-6133.20.5.351 [PubMed: 11570649]
- Conley LJ, Bush TJ, Buchbinder SP, Penley KA, Judson FN, Holmberg SD. The association between cigarette smoking and selected HIV-related medical conditions. *Aids*. 1996; 10(10):1121–1126. DOI: 10.1097/00002030-199609000-00010 [PubMed: 8874629]
- Cummins D, Trotter G, Moussa M, Turham G. Smoking cessation for clients who are HIV-positive. *Nurs Stand*. 2005; 20(12):41–47. DOI: 10.7748/ns2005.11.20.12.41.c4016
- Feldman JG, Minkoff H, Schneider MF, Gange SJ, Cohen M, Watts DH, Anastos K. Association of cigarette smoking with HIV prognosis among women in the HAART era: a report from the women's interagency HIV study. *Am J Public Health*. 2006; 96(6):1060–1065. DOI: 10.2105/AJPH.2005.062745 [PubMed: 16670229]
- Fisher JD, Fisher WA. Changing AIDS risk behavior. *Psychological Bulletin*. 111(3):455–474.
- Gallo LC, Roesch SC, Fortmann AL, Carnethon MR, Penedo FJ, Perreira K, ... Isasi CR. Associations of chronic stress burden, perceived stress, and traumatic stress with cardiovascular disease

prevalence and risk factors in the Hispanic community health study/study of latinos sociocultural ancillary study. *Psychosom Med*. 2014; 76(6):468–475. DOI: 10.1097/PSY.0000000000000069 [PubMed: 24979579]

Gritz ER, Fingeret MC, Vidrine DJ, Lazev AB, Mehta NV, Reece GP. Successes and failures of the teachable moment: smoking cessation in cancer patients. *Cancer*. 2006; 106(1):17–27. DOI: 10.1002/cncr.21598 [PubMed: 16311986]

Gritz ER, Vidrine DJ, Lazev AB, Amick BC, Arduino RC. Smoking behavior in a low-income multiethnic HIV/AIDS population. *Nicotine Tob Res*. 2004; 6(1):71–77. DOI: 10.1080/14622200310001656885 [PubMed: 14982690]

Jorenby DE, Hays JT, Rigotti NA, Azoulay S, Watsky EJ, Williams KE. ... Varenicline Phase 3 Study, Group. Efficacy of varenicline, an alpha4beta2 nicotinic acetylcholine receptor partial agonist, vs placebo or sustained-release bupropion for smoking cessation: a randomized controlled trial. *JAMA*. 2006; 296(1):56–63. DOI: 10.1001/jama.296.1.56 [PubMed: 16820547]

Li Q, Hsia J, Yang G. Prevalence of smoking in China in 2010. *N Engl J Med*. 2011; 364(25):2469–2470. DOI: 10.1056/NEJMc1102459 [PubMed: 21696322]

Luo X, Duan S, Duan Q, Pu Y, Yang Y, Ding Y, ... He N. Tobacco use among HIV-infected individuals in a rural community in Yunnan Province, China. *Drug Alcohol Depend*. 2014; 134:144–150. DOI: 10.1016/j.drugalcdep.2013.09.023 [PubMed: 24144787]

Mamary EM, Bahrs D, Martinez S. Cigarette smoking and the desire to quit among individuals living with HIV. *AIDS Patient Care STDS*. 2002; 16(1):39–42. DOI: 10.1089/108729102753429389 [PubMed: 11839217]

Ministry of Health of the People's Republic of China. 2012 China AIDS Response Progress Report 2012 Retrieved from UNAIDS website: [http://www.unaids.org/sites/default/files/en/dataanalysis/knowyourresponse/countryprogressreports/2012countries/ce_CN_Narrative_Report\[1\].pdf](http://www.unaids.org/sites/default/files/en/dataanalysis/knowyourresponse/countryprogressreports/2012countries/ce_CN_Narrative_Report[1].pdf)

Patrick DL, Cheadle A, Thompson DC, Diehr P, Koepsell T, Kinne S. The validity of self-reported smoking: a review and meta-analysis. *American Journal of Public Health*. 1994; 84(7):1086–1093. DOI: 10.2105/AJPH.84.7.1086 [PubMed: 8017530]

Petrosillo N, Cicalini S. Smoking and HIV: time for a change? *BMC Med*. 2013; 11:16.doi: 10.1186/1741-7015-11-16 [PubMed: 23339539]

Rebagliato M. Validation of self reported smoking. *J Epidemiol Community Health*. 2002; 56(3):163–164. DOI: 10.1136/jech.56.3.163 [PubMed: 11854332]

Reynolds NR. Cigarette smoking and HIV: more evidence for action. *AIDS Educ Prev*. 2009; 21(3 Suppl):106–121. DOI: 10.1521/aeap.2009.21.3_suppl.106 [PubMed: 19537958]

Rod NH, Gronbaek M, Schnohr P, Prescott E, Kristensen TS. Perceived stress as a risk factor for changes in health behaviour and cardiac risk profile: a longitudinal study. *J Intern Med*. 2009; 266(5):467–475. DOI: 10.1111/j.1365-2796.2009.02124.x [PubMed: 19570055]

Shuter J, Bernstein SL. Cigarette smoking is an independent predictor of nonadherence in HIV-infected individuals receiving highly active antiretroviral therapy. *Nicotine Tob Res*. 2008; 10(4):731–736. DOI: 10.1080/14622200801908190 [PubMed: 18418794]

Tesoriero JM, Gieryc SM, Carrascal A, Lavigne HE. Smoking among HIV positive New Yorkers: prevalence, frequency, and opportunities for cessation. *AIDS Behav*. 2010; 14(4):824–835. DOI: 10.1007/s10461-008-9449-2 [PubMed: 18777131]

Zhang J, Ou JX, Bai CX. Tobacco smoking in China: Prevalence, disease burden, challenges and future strategies. *Respirology*. 2011; 16(8):1165–1172. DOI: 10.1111/j.1440-1843.2011.02062.x [PubMed: 21910781]

Zhang L, Chow EP, Jing J, Zhuang X, Li X, He M, ... Wilson DP. HIV prevalence in China: integration of surveillance data and a systematic review. *Lancet Infect Dis*. 2013; 13(11):955–963. DOI: 10.1016/S1473-3099(13)70245-7 [PubMed: 24107261]

Figure 1.
Changes in cigarette smoking behavior after receiving HIV positive test results among those who ever smoked cigarettes.

Table 1

Changes in smoking behavior after receiving HIV positive test results and their associations with demographic factors and participation in ART.

Characteristic	Relapse/Increased n= 1529 (%)	Reduced n=1529 (%)	Quit n= 1529 (%)	Abstinent n=286 (%)
Age in years				
<35	50 (10.5) **	136 (28.6)	66 (13.9) **	46 (69.7)
35–44	50 (8.8)	180 (31.8)	76 (13.4)	62 (81.6)
45	24 (5.2)	120 (25.9)	144 (31.0)	102 (71.8)
Gender				
Male	115 (8.0)	415 (29.0)	263 (18.4) **	192 (73.6)
Female	9 (11.8)	21 (27.6)	23 (30.3)	18 (78.3)
Ethnicity				
Han	81 (7.3) *	304 (27.2)	209 (18.7)	169 (77.5) *
Zhuang	37 (10.5)	119 (33.7)	71 (20.1)	45 (65.2)
Other	6 (18.2)	11 (33.3)	6 (18.2)	3 (50.0)
Years of education				
0–6	61 (8.9)	190 (27.7)	114 (16.6) **	79 (70.5)
7–9	47 (7.5)	193 (30.6)	110 (17.4)	86 (78.2)
10–12	10 (6.8)	43 (29.3)	47 (32.0)	33 (70.2)
>12	6 (15.4)	9 (23.1)	14 (35.9)	11 (78.6)
Marital status				
Unmarried	41 (13.4) **	76 (24.8)	35 (11.4) **	18 (51.4) **
Married	58 (6.4)	280 (30.6)	191 (20.9)	140 (74.1)
Divorced/Separated/Widowed	21 (8.4)	71 (28.5)	55 (22.1)	47 (85.5)
If employed				
Yes	74 (6.9) **	319 (29.9)	193 (18.1)	143 (74.9)
No	49 (11.3)	113 (26.1)	93 (21.5)	67 (72.0)
If LGBT (n=784)				
No	54 (8.0)	191 (28.4)	121 (18.0)	87 (71.9)
Yes	6 (8.0)	18 (24.0)	12 (16.0)	9 (75.0)
If on ART				
Yes	86 (8.3)	326 (31.5) **	215 (20.8) **	163 (76.5)
No	38 (8.2)	109 (23.4)	67 (14.4)	45 (67.2)
Duration of known HIV+ status				
Less than 1 year	19 (6.1) **	91 (29.0)	94 (29.9) **	64 (68.1)
1–2 years	11 (4.1)	81 (29.9)	57 (21.0)	49 (87.5)
2 – 4 years	33 (8.1)	111 (27.4)	65 (16.0)	47 (72.3)
More than 4 years	61 (12.2)	148 (29.5)	68 (13.5)	50 (74.6)

Note.

*
P < 0.05;

**
P < 0.01

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript