

# Nicotine dependence in community-dwelling Chinese patients with schizophrenia

Yan Li,<sup>1</sup> Cai-Lan Hou,<sup>2</sup> Xin-Rong Ma,<sup>3</sup> Yu Zang,<sup>4</sup> Fu-Jun Jia,<sup>2</sup> Kelly Y C Lai,<sup>5</sup> Gabor S Ungvari,<sup>6</sup> Chee H Ng,<sup>7</sup> Mei-Ying Cai,<sup>8</sup> Yu-Tao Xiang<sup>9</sup>

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YL, C-LH, X-RM and YZ contributed equally.

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## ABSTRACT

**Background** Smoking is a serious public health problem. Patients with schizophrenia usually have a higher prevalence of smoking than the general population, but the level of nicotine dependence is seldom studied, especially for patients living in the communities.

**Aims** This study aimed to examine the level of nicotine dependence in Chinese community-dwelling patients with schizophrenia and explored its associated sociodemographic and clinical factors.

**Methods** A total of 621 patients with schizophrenia treated in the primary care centres of Guangzhou were consecutively recruited. The level of nicotine dependence was assessed with the Chinese version of the Fagerström Test for Nicotine Dependence (FTND).

**Results** 148 patients with schizophrenia were current smokers, and the mean (SD) score of FTND was 5.06 (2.55) for all the current smokers. The prevalence of nicotine addiction was 48.0% (95% CI: 40.0%-56.0%) in patients with current smoking. The patients with schizophrenia had a significantly higher level of nicotine dependence than the Chinese general population. Multiple linear regression analysis revealed that male gender, being unemployed, having a family history of psychiatric disorders, having major medical conditions, first illness episode and less severe positive symptoms were significantly associated with a higher level of nicotine dependence.

**Conclusion** Community-dwelling patients with schizophrenia in China, especially male patients, had a higher level of nicotine dependence than the general population.

## BACKGROUND

Smoking is a major public health challenge which leads to negative health outcomes and heavy disease burden.<sup>1</sup> For example, in China approximately 1 million deaths were associated with smoking in 2010.<sup>2</sup> Compared to the general population, patients with psychiatric disorders are more likely to smoke.<sup>3,4</sup> It has been stated that the current ratio of smoking prevalence is 5.3 times higher in schizophrenia patient compared with the general population.<sup>5</sup>

Patients with schizophrenia have a high level of nicotine dependence.<sup>6</sup> The prevalence of heavy smoking was found to be significantly higher (16.1%) in patient with multiple psychiatric diagnoses than in healthy controls (3.7%).<sup>4</sup> It was also found that the smoking rate in patients with schizophrenia is higher than other psychiatric disorders.<sup>7</sup>

Almost all the studies have focused on the prevalence of smoking in patients with schizophrenia<sup>8-10</sup> rather than nicotine dependence. Nicotine dependence is an important issue associated with cardiovascular and respiratory diseases.<sup>1</sup> Thus, understanding the pattern of nicotine dependence and its associated clinical factors are important to help develop appropriate policy and intervention developments for controlling the risks associated with smoking. The aims of the current analysis were to study nicotine dependence level in community-dwelling patients with schizophrenia in China and to explore its independent sociodemographic and clinical correlates.

## METHODS

### Patients and study site

This study was a secondary analysis of the data based on a survey conducted between June 2013 and October 2014 to investigate the prevalence of smoking in community-dwelling patients with schizophrenia in Guangzhou, China.<sup>11</sup> Inclusion criteria were: (1) diagnosed with schizophrenia according to the International Classification of Diseases, version 10 by a review of medical records and confirmed in a clinical interview using the Chinese version of the Mini International Neuropsychiatric Interview (M.I.N.I.), V.5.0;<sup>12</sup> (2) aged 18 years or older; (3) in a stable condition; (4) receiving treatment in primary care centres and (5) having the ability to comprehend the content of the interview.



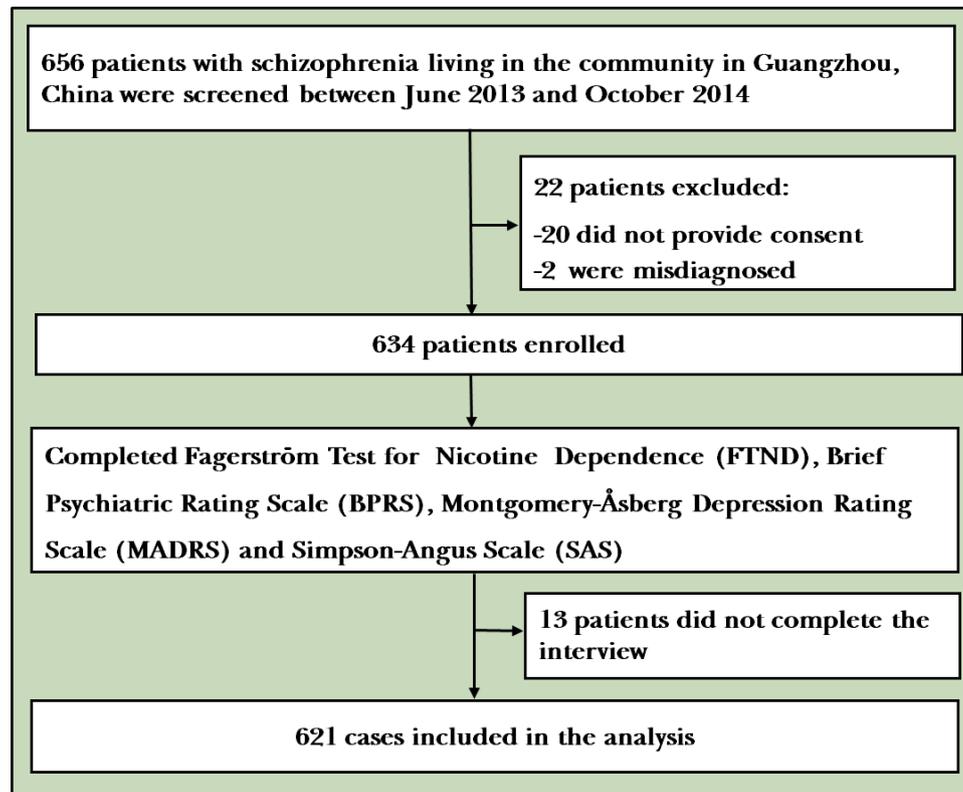
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For numbered affiliations see end of article.

### Correspondence to

Dr Yu-Tao Xiang;  
xyutly@gmail.com

Dr Fu-Jun Jia;  
jiafujun@126.com



**Figure 1** Recruitment of patients.

The recruitment was as follows: of the 92 primary care centres in Guangzhou, 22 were randomly selected; the patients with schizophrenia in the selected centres were consecutively screened. In the 656 patients that were screened, 22 did not meet the study criteria and were excluded, and 13 failed to complete the interview. In the end, 621 were included in the analysis (see [figure 1](#)). The study protocol was approved by the Joint Research and Ethics Committee of the Chinese University of Hong Kong-New Territories East Cluster. Written informed consent was obtained from each patient.

### Assessments and instruments

The basic demographic and clinical characteristics were collected by a review of medical records and confirmed during a clinical interview. An alcohol user was a person who had consumed at least one alcoholic beverage each month in the last year.<sup>13</sup> Doses of antipsychotic drugs were converted into chlorpromazine equivalent milligrams per day.<sup>14</sup>

Current smoking was defined as smoking at least one cigarette per day for at least 5 days per week. The severity of nicotine dependence was assessed using the Chinese version of the Fagerström Test for Nicotine Dependence (FTND) which showed satisfactory validity and reliability in Chinese population.<sup>15</sup> The FTND consists of 6 items and the total score is 10 with a higher score indicating a higher level of nicotine dependence. The FTND total score  $\geq 6$  was defined as ‘nicotine addiction’.<sup>16</sup>

Psychotic symptoms were assessed with the Chinese version of the Brief Psychiatric Rating Scale (BPRS).<sup>17</sup>

The three factors of the BPRS were used: positive (conceptual disorganisation, suspiciousness, hallucinatory behaviour and unusual thought content); negative (emotional withdrawal, motor retardation, blunted affects and disorientation)<sup>18</sup>; and anxiety and tension.<sup>19</sup> Depressive symptoms were assessed using the Chinese version of the Montgomery-Åsberg Depression Rating Scale.<sup>20,21</sup> Extrapyramidal side effects were assessed using the Simpson-Angus Scale.<sup>22</sup> Following other studies,<sup>23</sup> three types of insomnia were measured in this study, including difficulties initiating sleep, difficulties maintaining sleep and early morning awakening. In this study, patients reporting any type of insomnia were defined as ‘having insomnia’.

Three psychiatrists with more than 5 years of clinical or research experience interviewed the patients. Prior to the main study, an intrarater reliability exercise on the use of the questionnaires mentioned above was conducted in 10 patients with schizophrenia and a satisfactory agreement was achieved ( $>0.90$ ).

### Statistical analysis

Data analyses were performed using SPSS V.20.0. The comparisons of nicotine dependence between the patients with schizophrenia and Chinese general population were conducted using the one sample t-test or  $\chi^2$  test, as appropriate. Multiple linear regression analysis was used to examine the independent demographic and clinical correlates of nicotine dependence. The level of significance was set at 0.05 (two-tailed).

**Table 1** Basic demographic and clinical characteristics of current smoking patients with schizophrenia

	Current smoking patients (n=148)	
	N	%
Male	141	95.27
Married	71	47.97
Employed	102	68.91
Low monthly income (< RMB 3000)	143	96.62
No health insurance	34	22.97
Current alcohol use	33	22.29
Major medical condition(s)	56	37.83
Family history of psychiatric disorders	36	24.32
First episode	38	25.67
On FGAs	60	40.54
On SGAs	88	59.45
Any type of insomnia	52	35.13
	<b>Mean</b>	<b>SD</b>
Age (years)	50.01	8.24
Education (years)	9.86	2.56
Age of onset (years)	27.82	9.54
Duration of illness (years)	22.19	10.85
Number of hospitalisations	2.79	3.25
BPRS total	26.64	8.70
BPRS positive	6.06	2.94
BPRS negative	6.37	3.63
BPRS anxiety	3.16	1.77
MADRS total	10.71	9.76
SAS total	12.94	5.15
CPZeq (mg/day)	452.61	524.45

BPRS, Brief Psychiatric Rating Scale; CPZeq, chlorpromazine equivalent milligrams; FGAs, first-generation antipsychotics; MADRS, Montgomery-Åsberg Depression Rating Scale; SAS, Simpson-Angus Scale; SGAs, second-generation antipsychotics.

## RESULTS

A total of 656 community-dwelling patients with schizophrenia were screened and 621 patients were included, giving a participation rate of 94.7%. Of the whole sample, 148 were current smokers, all of whom were included in this study. Table 1 shows the basic demographic and clinical characteristics of the current smokers.

The mean (SD) of FTND score was 5.06 (2.55) for the current smokers (male: 5.14 (2.53) vs female: 3.57 (2.63)). Compared with the Chinese general population,<sup>16</sup> patients with schizophrenia, more specifically in males, had a significantly higher level of nicotine dependence (table 2).

The prevalence of nicotine addiction (FTND total score  $\geq 6$ ) was 48.0% (71/148, 95% CI 40.0% to 56.0%) among all patients with current smoking, with 48.9% (95% CI 40.7% to 57.1%) in male patients. Only two female

**Table 2** Comparison of FTND total score between patients with schizophrenia and the general population with current smoking

	Patients with schizophrenia (n=148)		Chinese general population (n=1196)		Statistics	
	Mean	SD	Mean		t	P values
Total	5.06	2.55	3.30		8.42	<0.001
	Patients with schizophrenia (n=141)		Chinese general population (n=1089)			
Male	5.14	2.53	3.33		8.48	<0.001
	Patients with schizophrenia (n=7)		Chinese general population (n=107)			
Female	3.57	2.63	3.04		0.53	0.613

FTND, Fagerström Test for Nicotine Dependence.

patients were rated as having nicotine addiction. The prevalence estimates of nicotine addiction in the whole sample and in the male patients were significantly higher than the corresponding figures in the Chinese general population (table 3).<sup>16</sup>

Multiple linear regression analysis revealed that male gender, unemployed status, having a family history of psychiatric disorders, having major medical conditions, first illness episode and less severe positive symptoms were significantly associated with a higher level of nicotine dependence (table 4).

## DISCUSSION

### Main findings

To the best of our knowledge, this is the first study that examined the level of nicotine dependence in community-dwelling patients with schizophrenia in China. Both the mean levels of nicotine dependence and the percentage of nicotine addiction in patients were significantly higher than that in the Chinese general population, which is consistent with previous findings.<sup>6</sup> There are several possible reasons for a higher nicotine addiction rate in patients with schizophrenia. First, it was hypothesised that nicotine is used by patients with schizophrenia for self-medication;<sup>24</sup> that is, nicotine could improve certain cognitive deficits by normalising P50 auditory gating and enhancing prepulse inhibition. In addition, nicotine could affect  $\alpha 7$  nicotinic receptors, which could subsequently trigger dopamine release.<sup>24 25</sup>

Male patients with schizophrenia were more likely to have a high level of nicotine dependence, which is consistent with previous findings.<sup>5 26 27</sup> In East Asia, including China, strong cultural and social pressure together with traditional factors may contribute to a considerably lower smoking rate among the female population. Unemployed

**Table 3** Prevalence of nicotine addiction in patients with schizophrenia and Chinese general population with current smoking

	Patients with schizophrenia (n=148)		Chinese general population (n=1196)		Statistics		
	N	%	N	%	x	df	P values
Total	71	47.97	268	22.40	45.63	1	<0.001
	Patients with schizophrenia (n=141)		Chinese general population (n=1089)				
Male	69	48.93	247	22.68	45.07	1	<0.001
	Patients with schizophrenia (n=7)		Chinese general population (n=107)				
Female	2	28.57	21	19.62	–	1	0.627*

\*Fisher's exact test.

patients were more likely to have high level of nicotine dependence, which could be explained by their tendency to be inactive and thus use heavy smoking as a behavioural filler. We found that patients with schizophrenia with a high level of nicotine dependence were more likely to have a family history of psychiatric disorders, suggesting that

genetic factors associated with psychiatric disorders may play a role in nicotine dependence. For instance, it has been reported that DA receptor and transporter genes related to nicotine metabolism were also associated with the pathogenesis of schizophrenia.<sup>28</sup> Smoking could induce various smoking-related diseases, such as cardiovascular diseases, respiratory diseases, cancers, and so forth. These finding may contribute to the association of high level of nicotine dependence with major medical conditions.

First-episode illness was significantly associated with a high level of nicotine dependence, which has not been described previously. It is postulated that first-episode patients with schizophrenia may be lacking coping skills and may be more vulnerable to anxiety and smoking habit, leading to high level of nicotine dependence. Indeed, it has been reported that smoking could alleviate the severity of depressive and anxiety symptoms.<sup>29, 30</sup> We also found that patients with less severe positive symptoms were more likely to have a higher level of nicotine dependence in contrast to some previous studies.<sup>24</sup> Higher level of nicotine might reduce negative symptoms but not positive symptoms; however, the results were inconsistent. The correlation between nicotine and psychotic symptoms is recommended to be further studied.

**Table 4** Independent sociodemographic and clinical correlates of nicotine dependence in patients with schizophrenia with current smoking (by multiple linear regression analysis)

	B	t	P values
Male	2.65	2.55	<b>0.012</b>
Married	-0.32	-0.72	0.469
Employed	-1.21	-2.38	<b>0.018</b>
Low monthly income (<RMB 3000)	1.51	1.20	0.231
No health insurance	-0.69	-1.29	0.198
Current alcohol use	-0.12	-0.23	0.815
Major medical condition(s)	1.00	2.09	<b>0.038</b>
Family history of psychiatric disorders	1.19	2.24	<b>0.026</b>
First episode	1.12	1.99	<b>0.049</b>
On FGAs	0.13	0.23	0.812
On SGAs	0.57	1.16	0.245
Any type of insomnia	0.18	0.83	0.407
Age (years)	0.01	0.32	0.749
Education (years)	-0.08	-0.99	0.323
Age of onset (years)	-0.01	-0.38	0.704
Number of hospitalisations	-0.08	-1.26	0.209
BPRS positive	-0.21	-2.32	<b>0.022</b>
BPRS negative	0.14	1.67	0.097
BPRS anxiety	-0.03	-0.23	0.813
MADRS	0.03	1.05	0.294
SAS	-0.04	-0.94	0.349
CPZeq	0.00	0.24	0.810

Bold values are  $p < 0.05$ .

BPRS, Brief Psychiatric Rating Scale; CPZeq, chlorpromazine equivalent milligrams; FGA, first-generation antipsychotics; MADRS, Montgomery-Åsberg Depression Rating Scale; SAS, Simpson-Angus Scale; SGAs, second-generation antipsychotics.

**Limitations**

There are several limitations in this study. This is a cross-sectional study, thus the causality between nicotine dependence and other variables could not be ascertained. Nicotine dependence was assessed using a subjective scale, rather than any objective index. The patients were recruited in just one large city and only urban patients were included, therefore the findings cannot be generalised to other areas in China. Finally, the sample size was not large enough, especially for the female patients.

**Implications**

In conclusion, the community-dwelling patients with schizophrenia in China had a higher level of nicotine dependence than the general population. Appropriate interventions on smoking control should be developed for the community-dwelling patients with schizophrenia, especially for those who are male, unemployed, having a family

history of psychiatric disorders, having major medical conditions, the first episode and experiencing less severe positive symptoms.

#### Author affiliations

<sup>1</sup>The National Clinical Research Center for Mental Disorders & Beijing Key Laboratory of Mental Disorders, Beijing Anding Hospital & the Advanced Innovation Center for Human Brain Protection, Capital Medical University, School of Mental Health, Beijing, China

<sup>2</sup>Guangdong Mental Health Center, Guangdong General Hospital and Guangdong Academy of Medical Sciences, Guangzhou, China

<sup>3</sup>Ningxia Mental Health Center, Ningxia Ning-An Hospital, Ningxia, China

<sup>4</sup>Shenzhen Key Laboratory for Psychological Healthcare, Shenzhen Institute of Mental Health, Shenzhen Kangning Hospital & Shenzhen Mental Health Center, Shenzhen, China

<sup>5</sup>Department of Psychiatry, The Chinese University of Hong Kong, Hong Kong, China

<sup>6</sup>The University of Notre Dame Australia/Marian Centre, Perth, Australia

<sup>7</sup>Department of Psychiatry, University of Melbourne, Melbourne, Victoria, Australia

<sup>8</sup>Guangzhou Yuexiu Center for Disease Control and Prevention, Guangdong, China

<sup>9</sup>Unit of Psychiatry, Institute of Translational Medicine, Faculty of Health Sciences, University of Macau, Macao SAR, China

**Contributors** Study design: YL, Y-TX. Data collection and analyses: YL, C-LH, X-RM, YZ, M-YC. Drafting the manuscript: YL, F-JJ, KYCL, Y-TX. Critical revision: GSU, CHN. Approval of the manuscript: all authors.

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*Yan Li obtained her bachelor's degree from Chengde Medical College in 2008, master's degree from the Capital Medical University in 2011, and PhD degree from the Chinese University of Hong Kong in 2016. She has started to work at the Beijing Anding Hospital, Capital Medical University since 2016. She is currently working as a resident doctor in ward 11 at the Depression Treatment Center. Her research interests include meta-analysis of psychiatry research and clinical studies of mood disorder.*