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10-year CVD risk in Han Chinese mainland patients with schizophrenia

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ABSTRACT

People with schizophrenia have a shortened life expectancy, with cardiovascular disease (CVD) being the primary contributor to this excessive mortality. A total of 466 inpatients with schizophrenia and 507 healthy community controls in the Chinese mainland were recruited in this study. Sociodemographic information, medical history, and smoking history were recorded. In addition, total cholesterol (TC), fasting blood glucose (FBG), triglycerides (TG), and high-destiny lipoprotein cholesterol (HDL-C) were analyzed. The 10-year CVD risk was significantly higher in patients with schizophrenia compared with healthy controls. Male schizophrenia patients had significantly higher Framingham risk scores (FRS) than the females. Patients with schizophrenia carried significantly greater risk factors of CVD; body-mass index (BMI), TG and smoking prevalence were significantly higher than in the health community controls, while FBG and HDL-C were on the contrary. Smoking was significantly associated with FRS among schizophrenia inpatients. Collectively, these results suggest that Han Chinese mainland patients with schizophrenia harbor a high 10-year CVD risk when compared with healthy controls, especially in males. CVD in schizophrenia patients requires greater attention by clinicians and researchers.

1. Introduction

Schizophrenia is described as a chronic, debilitating, heterogeneous and multi-faceted disorder (Insel, 2010; Rapoport et al., 2012), with a prevalence of 1% worldwide (Gore et al., 2011; Lee et al., 2012). It causes a primary socio-economic burden, mainly resulting in indirect costs–for example, unemployment, social isolation and hospitalization (Correll et al., 2017). Furthermore, people with schizophrenia have a shortened life expectancy of approximately 10–18 years compared with the general population, with cardiovascular disease (CVD) being the primary contributor to this early excessive mortality (Casey, 2005; Rössler et al., 2005; Laursen et al., 2012; Laursen et al., 2014). More than two-thirds of schizophrenic patients die from CVD, as opposed to the general population. A meta-analysis on mortality of psychiatric disorders has demonstrated that CVD mortality rate is 90% higher in people with schizophrenia than among the general population. Additionally, the results from a recent meta-analysis, which provided comprehensively detailed data on the incidence and prevalence of CVD in patients with severe mental illness (SMI), established that patients with SMI showed a 78% higher risk for developing CVD and a 53% higher risk for harboring factors related to CVD (Correll et al., 2017).

Health care institutions usually focus on the behavioral and psychological problems associated with schizophrenia, while neglecting somatic diseases such as CVD, with the resulting that clinical interventions tend to be ineffective and insufficient (Druss et al., 2000). Apart from the effects of antipsychotic medications (Allison et al., 1999; Subramaniam et al., 2014), unhealthy lifestyle factors (e.g., poor diet, poor physical activity, cigarette smoking and sedentary behaviors) are known to be risk factors that may contribute to poor cardiovascular health in patients with schizophrenia (McCreadie and Scottish Schizophrenia Life Style Group 2003; De Hert et al., 2009; Stubbs et al., 2016a, 2016b). Several studies have highlighted the high risk in patients with schizophrenia to develop metabolism-related issues such as stroke, hypertension, type-2 diabetes and metabolic syndrome (MetS) (Mackin and McAllister-Williams, 2006; De Hert et al., 2011; Foley and Morley, 2011).

MetS is highly prevalent in people with schizophrenia (Meyer and Stahl, 2009), and has been shown to play a key role in developing CVD (Sarafidis and Nilsson 2006). A diagnosis of MetS is of great help in screening individuals who are at a higher CVD risk among patients with schizophrenia, and such a diagnosis may lead to interventions to reduce disease burden and increase longevity. However, because the criteria

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for MetS omit risk factors such as gender, age, and smoking status, MetS fails to reflect a continuous spectrum effect on CVD risk (Tay et al., 2013). Therefore, multivariable risk assessment tools, such as the Framingham risk score (FRS), have been utilized to estimate the CVD risk among people with schizophrenia.

The FRS is a well-known gender-specific multivariate risk factor algorithm which can be conveniently applied to assess general CVD risk and risk of individual CVD events (heart failure, peripheral artery disease, cerebrovascular and coronary disease). It has been widely used to assess CVD risk among people with schizophrenia in many countries, including Canada, Spain, Turkey, Singapore and the United States (Goff et al., 2005; Bobes et al., 2010; Yazıcı et al., 2010; Rekhi et al., 2016). However, there is only one study that employed the FRS to estimate the CVD risk of Chinese schizophrenia patients in Taiwan (Tay et al., 2013). In consideration of the different regions, races and cultural customs, Taiwan may not represent the Chinese mainland schizophrenia inpatients who have special CVD risk factors such as abdominal obesity, long-term hospitalization and high smoking rates (Zhang et al., 2012; Subramaniam et al., 2014; Azad et al., 2016).

Hence, the present study was designed to explore the influencing factors associated with cardiovascular risk factors in inpatients with schizophrenia and to describe the 10-year CVD risk of Chinese Han mainland schizophrenia inpatients. We had the following hypotheses: (1) Han Chinese mainland patients with schizophrenia would harbored a higher 10-year CVD risk; (2) Smoking would be correlated with 10-CVD risk in schizophrenia patients.

2. Methods

2.1. Subjects

The sample comprised 466 inpatients (male/female = 255/211) diagnosed with schizophrenia who met the following recruitment criteria, including: (1) age of 20–70 years old, Han Chinese; (2) ICD-10 diagnosis of schizophrenia; (3) exclusion of physical illness, e.g., viral hepatitis, hypoproteinemia, or endocrine disorders; and (4) maintenance on stable doses of oral antipsychotic drugs for at least 3 months before entry into the study. The healthy control group comprised 507 (male/female = 294/213) individuals recruited among residents living nearby. All participants were in good physical health. Exclusion criteria for healthy controls included: (1) current major medical problems; (2) history of any organic brain diseases; (3) history of substance dependence, or presence of substance abuse within the past 6 months before the study. All subjects signed informed consent forms.

2.2. Data collection

Each subject filled out a detailed questionnaire that recorded general information, sociodemographic characteristics, smoking behavior, medical and psychiatric conditions. The following data were obtained for all the subjects from their medical records: duration of illness, number of hospitalizations, antipsychotic medicines (type and dose) and concomitant medications. The smoking history included years of smoking, number of cigarettes and smoking status. Additional information was collected from available medical records and collateral data (from family and/or treating clinicians).

Subjects and all controls provided fasting venous blood samples. Total cholesterol (TC), fasting blood glucose (FBG), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C) and low-density lipoprotein cholesterol (LDL-C) were measured with analyzer Dimension○RRxl Max (America).

2.3. Body mass index and waist circumference measurement

Body weight and height were assessed to calculate BMI (weight for squared height, kg/m^2). Height was measured with the subjects barefooted and standing upright. Body weight was measured using an electronic scale. All measurements were taken in light indoor clothing. Waist circumference (WC) was assessed while the subjects stood in a comfortable position using a tape placed across the midpoint between the lower margin of the last rib and the top of the iliac crest.

In addition, a digital sphygmomanometer was used to record the blood pressure of all patients and controls.

2.4. 10-year CVD risk assessment

FRS was calculated by the following set of variables: age, sex, SBP treated (medication and lifestyle changes) and untreated, TC, cigarette smoking, BMI, HDL-C levels and self-declared treatment for hypertension status. The calculated Framingham scores were converted into the Framingham absolute risk, which represented the probability of cardiovascular event onset of the individuals in the next 10 years (D'Agostino et al., 2008).

2.5. Statistical analysis

All statistical analysis was performed using SPSS 16.0. Descriptive analyses were performed to describe the sociodemographic and cardiovascular risk factors of the study population. A two-way analysis of variance (ANOVA) was conducted to compare the mean differences of FRS between schizophrenia/healthy and male/female. *T*-tests were used to compare age, smoking rate, BMI, SBP, FBG, TG, TC and HDL-C between patients and controls. Pearson correlation coefficients were calculated to analyze the correlation of demographic and clinical variables. In addition, a stepwise regression analysis was conducted to assess factors that were associated with FRS. A p-value <0.05 was considered as statistically significant.

2. Results

A total of 466 patients and 507 controls were included in this study. Table 1 presents the demographic characteristics and clinical variables. Specifically, the patients had an average age of 43.4 ± 12.7 years old

Table 1
Demographic and cardiovascular risk factors of patients and controls.

	Schizophrenia $N = 466$	Controls $N = 507$	P-value
Age in years, mean(SD)	43.4(12.7)	44.2(7.6)	$P = 0.295$
Gender			$P = 0.561$
Male, n (%)	255(54.7)	294(58.0)	
Female, n (%)	211(45.3)	213(42.0)	
Current smokers, n (%)			$P = 0.00021$*
Male, n (%)	185(39.7)	90(17.7)	
Female, n (%)	4(0.8)	6(1.1)	
Waist circumference, n (%)			
Males with WC, n(%) > 90cm	122(47.8)	103(35.0)	$P = 0.00017$*
Females with WC, n(%) > 80cm	147(69.7)	82(38.4)	$P = 0.00005$*
BMI in kg/m^2, mean (SD)	24.1(3.6)	21.7(4.1)	$P = 0.00033$*
<18.5	54	81	
18.5 to 24.99	206	229	
25–29.99	181	184	
> 30	25	13	
SBP in mmHg, mean (SD)	128.8(14.9)	128.0(15.4)	$P = 0.781$
Fasting glucose in mmol/l, mean (SD)	5.2(1.7)	5.2(0.4)	$P = 0.659$
TG in mmol/l, mean (SD)	1.7(1.1)	1.3(0.9)	$P = 0.00002$*
Total cholesterol in mmol/l, mean (SD)	4.8(0.9)	4.8(0.8)	$P = 0.295$
HDL-C in mmol/l, mean (SD)	1.1(0.3)	1.4(0.2)	$P = 0.00007$*
FRS (%)	6.7(6.9)	4.8(3.1)	$P = 0.00014$*

FRS: Framingham score, represents individuals' probability of cardiovascular event onset in the next 10 years.
* $P < 0.05$.