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Magnitude of and gender differences in cardiovascular risk profiles among community residents in Shenzhen, China

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ABSTRACT

Objectives: Understanding the prevalence of cardiovascular disease (CVD) risk factors has an impact on the public policy for initiating CVD prevention. This study aimed to examine the prevalence of current smoking, overweight/obesity, hypertension, diabetes mellitus (DM), and dyslipidemia among Shenzhen residents and to investigate gender differences in CVD risk profiles to identify the subgroups at higher risk.

Study design: A large cross-sectional study was conducted between April and May 2015.

Methods: Using multistage cluster random sampling methods, a total of 1784 residents finished the face-toface interview survey. Physical examinations and blood tests were performed by qualified professionals.

Results: The prevalence of current smoking, overweight/obesity, hypertension, DM, and dyslipidemia were 21.8%, 40.6%, 17.6%, 4.8%, and 35.7%, respectively. Clustering of two or more or three or more of CVD risk factors was noted in 35.7% and 14.1% of participants. The prevalence of current smoking (45.0% vs 1.1%, $P < 0.001$), overweight/obesity (48.5% vs 33.4%, $P < 0.001$), hypertension (19.7% vs 15.7%, $P < 0.05$), and dyslipidemia (46.5% vs 20.5%, $P < 0.001$) was found higher among male than among female participants.

Conclusions: This study adds to the evidence suggesting high prevalence rates of CVD risk factors and composite measures among Shenzhen residents. The higher level of CVD risk factors in male than in female residents is suggested. Effective population-based intervention programs such as smoking cessation, early detection, management, and treatment of hypertension, DM, and dyslipidemia should be initiated and enhanced especially among the males.

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Introduction

Cardiovascular disease (CVD) is a major cause of mortality and morbidity in the world as well as in China. Statistics showed that CVDs caused about 17 million deaths (31.5%) in 2013 globally, whereas more than 80% occurred in low- and middle-income countries.[1] In China, CVD is estimated to account for approximately 38% of total mortality.[2] CVD events are predicted to increase by 23% by 2030.[3] Widely recognized CVD risk factors include hypertension, overweight/obesity, smoking, diabetes mellitus (DM), dyslipidemia, etc.[4] The prevalence of these CVD risk factors is on the increase in the developing nations of the world including China.[5–7] Studies have been performed both nationally and internationally regarding the prevalence of CVD risk factors.[8–10] These studies showed that the prevalence rates of CVD risk factors are dependent on economy, culture, and living regions etc. The information is scarce regarding the prevalence of comprehensive CVD risk factors among Shenzhen residents.

Substantial efforts have been made to improve the understanding of gender differences in CVDs. Significant gender differences, which are social differences, have been identified. In the USA, the absolute numbers of women living with and dying of CVD exceed those of men.[11] Gender differences in the burden of CVD provide evidence for the importance of gender-based CVD prevention. However, the prevalence of CVD risk factors may be different from that of the burden of CVD between male and female individuals.

This study aimed to investigate the prevalence of five major CVD risk factors including current smoking, overweight/obesity, hypertension, DM, and dyslipidemia among Shenzhen residents. It also examined gender differences in CVD risk profiles in the population under study to identify the subgroups at higher risk. This study was expected to have an impact on public policy for initiating CVD prevention, and provide implications to policy makers worldwide with similar social and cultural context of Shenzhen, China.

Methods

Study setting

Shenzhen, China's first Special Economic Zone holding sub-provincial administrative status, is situated in the Pearl River Delta region of southern China. The municipality is divided into 10 district-level jurisdictions. According to the 2014 statistics, Shenzhen's population was around 10.78 million with about 70% being migrants, within a total area of 1996.8 square kilometers.[12] Shenzhen is an important economic powerhouse in China, attracting enormous investment from both Chinese and foreign nationals. The average annual disposable income of Shenzhen residents was RMB 32380/4679US$ in 2010.[12]

Study population and procedures

This was a large cross-sectional study which was conducted between April and May 2015 in Shenzhen, China. The study population comprised all community residents who 1) had been living in Shenzhen for more than 6 months, 2) were aged between 18 and 70 years, and 3) were able to give informed consent. The residents who lived in military post, students' dormitory, nursing home, and bunkhouse were excluded. The sample size was calculated by using the standard sample size calculation formula $n = deff^{*}u^{2*}p\,(1-p)/d^{2}$, where deff was 1.5. With an estimated prevalence rate of DM, 5%,[13] we calculated the sample size of 1752 to generate a 95% confidence level (CI) and 2.5% CI. Considering a 10% of non-response rate, the final sample size was 2000.

Multistage cluster random sampling method was adopted to select the participants. First, with districts as primary sampling units, two of 10 were randomly selected, i.e. district A and B. Second, 10 neighborhoods which were secondary sampling units were randomly selected from each randomly drawn district. Third, on the basis of household roster, households as the tertiary sampling units were selected within each neighborhood using a systematic random sampling method. The number of households was 600 for district A and 1400 for district B which was relative to the population of each district. Within each district, households were evenly selected from each neighborhood, i.e. 60 per neighborhood in district A and 140 per neighborhood in district B. A Kish method was adopted for participant selection within each household. Face-to-face interview surveys were conducted onsite or at-home by extensively trained interviewers from chronic diseases prevention agencies. Physical examinations and blood tests (including fasting glucose and serum lipids) were performed onsite by qualified professionals. The participants were assured of the anonymity and confidentiality of the survey, and informed consent was obtained before surveys commenced. At last, a total of 1784 residents, with 538 from district A and 1246 from district B, finished the survey, with a response rate of 89.0% and 89.7%, respectively.

Key measures

Sociodemographic characteristics of the participants were collected including gender, age, marital status, household register, education level, occupation, and monthly household income. The participants were categorized into three groups according to marital status, including individuals never in union, individuals married or living with partner, and individuals widowed, divorced, and separated. The participants were grouped into local residents and migrants according to household register. Migrants refer to individuals who move to the new location without changing their official household registration. Education level was classified into four categories, i.e. primary school and below, middle school, high school and equivalent, and 3-year college and above. We allocated the participants into six groups according to occupation, including manual workers, sales and services, clerical, other workers, not working, and the professional, technical, and managerial. The monthly household income was collapsed into three groups according to the monthly household poverty line (RMB 5000/722.5US$) and the mean monthly household income level (RMB10000/1445US$) in Shenzhen in 2011.