Archives of Gerontology and Geriatrics 64 (2016) 162–166

Contents lists available at ScienceDirect

Archives of Gerontology and Geriatrics

journal homepage: www.elsevier.com/locate/archger

Prevalence of hyperuricemia among Beijing post-menopausal women in 10 years

Shaochen Guan[a,b], Zhe Tang[a,b], Xianghua Fang[a,b,*], Xiaoguang Wu[a,b], Hongjun Liu[a,b], Chunxiu Wang[a,b], Chengbei Hou[a,b]

[a] Department of Evidence-Based Medicine, Xuanwu Hospital, Capital Medical University, Beijing, China
[b] Key Laboratory for Neurodegenerative Disease of Ministry of Education, China

ARTICLE INFO

Article history:
Received 29 September 2015
Received in revised form 1 February 2016
Accepted 4 February 2016
Available online 6 February 2016

Keywords:
Prevalence
Hyperuricemia
Risk factors
Post-menopausal
Cross-sectional study

ABSTRACT

Objectives: The objective of this study was to explore the trend and risk factors of the prevalence of hyperuricemia among post-menopausal women in Beijing over a ten years period.
Method: This research was based on two cross-sectional surveys in post-menopausal women in Beijing. A total of 1881 post-menopausal women were included. Subjects answered a questionnaire and underwent a physical examination and blood test. Serum uric acid >357 μmol/L was diagnosed as hyperuricemia, and another diagnosis criterion (serum uric acid >416 μmol/L) was applied in these women.
Results: Serum uric acid levels and hyperuricemia prevalence increased remarkably in the 10-year period. The prevalence of hyperuricemia increased more than 2-fold after being adjusted by age. Multivariate logistic regression models revealed hyperuricemia associated with age, education level, urban residents, alcohol consumption, hypertension, obesity, and dyslipidemia. With the increasing number of traditional cardiovascular risk factors (including hypertension, obesity, diabetes, and dyslipidemia), the risk of hyperuricemia increased significantly, and the accumulative effect of the factors on the risk of hyperuricemia was determined.
Conclusion: The prevalence of hyperuricemia was high and exhibited a remarkable, increasing trend in Beijing community-based, post-menopausal women. Better management of relative factors could help to prevent further increases in the burden of hyperuricemia in post-menopausal women in this region.

1. Introduction

Uric acid (UA) is the end product of purine metabolism in humans. Substantial epidemiologic research has demonstrated that elevations in UA level are independently associated with gout (Rho, Zhu, & Choi, 2011), as well as increased the risks of hypertension, obesity, diabetes, stroke, and premature death (Coutinho Tde et al., 2007; Karagiannis et al., 2007; Li, Hou, Zhang, Hu, & Tang, 2014; Li, Lu, Wu, & Yang, 2014; Puig et al., 2008). In the past few decades, the prevalence of hyperuricemia (HUA) has rapidly increased worldwide (Mertz & Loewer, 1992; Robinson, Taylor, & Merriman, 2012; Trifiro et al., 2013; Zhu, Pandya, & Choi, 2011), and its treatment cost has increased (Brook, Forsythe, Smeeding, & Lawrence Edwards, 2010; Trieste et al., 2012). Research has provided strong evidence for governments to adjust their health system policies. Health policy in mainland China has scarcely developed. The trend of the prevalence of HUA is unknown. No direct data could be provided to answer the question.

Moreover, epidemiologic research showed a steady increase of HUA in women after 50 years of age (Liu et al., 2011; Poletto, Harima, Ferreira, & Gimeno, 2011), at which age most women are in menopause. After menopause, some cardiovascular disease incidents occur more frequently due to estrogen deficiency. Similarly, loss of this protection from estrogen could unmask a population of women prone to HUA (Poletto et al., 2011). It is vital to explore the trend of the prevalence of HUA in menopausal women and its correlative risk factors in China. Our goal is to evaluate the trend on morbidity of HUA from 2000 to 2009, which came from two separate cross-sectional studies of post-menopausal women in Beijing, China. The potential association between HUA and relative risk factors was also explored.

Abbreviations: HUA, hyperuricemia; UA, uric acid; BMI, body mass index; SD, standard deviation; OR, odds ratio; CI, confidence interval.

* Corresponding author at: Department of Evidence-Based Medicine, Xuanwu Hospital, Capital Medical University, 45#Changchun Street, Xicheng District, Beijing, China 100053. Fax: +86 10 63153439.
E-mail address: xhfang163@163.com (X. Fang).

http://dx.doi.org/10.1016/j.archger.2016.02.002
0167-4943/

2. Materials and methods

2.1. Study population

The study populations were derived from the Beijing Longitudinal Study of Aging, conducted by the Social Medical Department of Xuanwu Hospital. Briefly, a stratification-random-clustering procedure was designed to ensure the representativeness of the average age and education and economic level in the Beijing population equal to or older than 55 years of age in 1992 (Jiang et al., 2002; Zimmer, Fang, & Tang, 2014). A similar survey was conducted every 3 or 5 years. All the residents aged 55 years old and over in the selected communities/villages were enrolled in every wave of surveys. All of the individuals answered a uniform questionnaire and underwent physical examinations via face-to-face interviews. Demographic data, including gender, age, residential location, education level, and marriage status, were collected. Lifestyle information, including smoking, alcohol consumption, physical activity, medical history, and the use of medicine, was also recorded. Blood samples, including serum UA, glucose, and lipid profiles, were collected in 2000 and 2009. Finally, 1085 individuals in 2000 and 796 in 2009 were enrolled in the current study, after excluding 30 diuretic users (13 cases in 2000 and 17 in 2009) for diuretic medicine that was likely to alter UA levels.

All procedures and protocols of the study were approved by the Xuanwu Hospital ethics committee. Written informed consent regarding the survey and blood analysis was obtained from all participants.

2.2. Physical examination and laboratory measurements

First, each subject was asked to rest for at least 20 min. Sitting blood pressure was measured from the right arm twice with a 2- to 5-min interval, using a standard mercury sphygmomanometer. The mean of the two measurements was calculated for analysis. Height and body weight were also measured for each subject. Body mass index (BMI) was calculated as weight (kg) per height (m) squared.

Blood samples were taken from the subjects in the morning after an overnight fast, centrifuged for serum collection, stored in a refrigerator at 2–8 °C, and transferred to a central laboratory (IPE Center for Clinical Laboratory, Beijing, China) that performed all analyses within 24 h.

Serum UA was quantified with the enzymatic colorimetric method on an auto-analyzer. The concentrations of cholesterol (TC) and triglycerides (TG) were measured enzymatically. Low-density lipoprotein cholesterol (LDL-C) was calculated using the Friedewald formula (Bairaktari, Seferiadis, & Elisaf, 2005). Blood glucose was measured by a glucose oxidase method.

2.3. Disease diagnosis criteria

Our primary definition of HUA was a serum urate level >357 μmol/L (6.0 mg/dL) in women (Fang & Alderman, 2000), which is a widely accepted therapeutic target. The potential impact of alternative definitions of HUA was examined (Zhang et al., 2006) (i.e., serum urate levels >416 μmol/L), which is above the supersaturation point. Hypertension was defined by a systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg, a previous diagnosis of hypertension by physician, or self-reported treatment of hypertension with antihypertensive medication in the past 2 weeks(Nasir et al., 2007). Diabetes was defined as fasting plasma glucose of ≥7.0 mmol/L, a previous diagnosis of diabetes by physician, or current use of anti-diabetic agents or insulin (Anonymous, 1997, 2003). Overweight and obesity were defined as BMI ≥25 kg/m^2 (Kanazawa et al., 2005). Diagnosis of dyslipidemia should meet at least one of the following criteria (Expert Panel on Detection and Treatment of High Blood Cholesterol in, 2001): decreased high-density lipoprotein cholesterol level (<1.0 mmol/L), elevated LDL-C level (≥3.37 mmol/L), elevated TG level (≥1.7 mmol/L), or current use of anti-lipid agents.

2.4. Statistical analysis

Statistical analysis was performed using SPSS 11.5. Descriptive statistics are expressed as mean ± standard deviation (SD) for continuous variables and percentages for categorical variables. Analysis of variance was used for continuous variables, and the chi-squared test was used for categorical variables. The prevalent rates of HUA in 2000 and 2009 were calculated separately. Prevalence of HUA was also reported as an age-standardized rate, using the standard population of Beijing from the 2000 census. A multivariable logistic regression model was used to examine differences in the distribution of risk factor profiles between HUA and normal UA. Odds ratios (ORs) and 95% confidence intervals (CIs) were estimated. Statistical significance was defined as a p-value < 0.05.

3. Results

3.1. Population characteristics in the two surveys

Compared with the women in 2000, women in 2009 were younger, more rural residents, more educated, and more active in terms of physical exercise ($p < 0.01$). Meanwhile, women in 2009 smoked less and had increased dyslipidemia and diabetes morbidity ($p < 0.01$). However, there was no significant difference in the prevalence of hypertension and obesity between the two surveys ($p > 0.05$) (Table 1).

3.2. Prevalence of HUA and mean serum urate levels in the 2 surveys

As shown in Table 2, the crude prevalence of HUA in 2009 (23.12% [95% CI: 20.19–26.04]) was significantly higher than the prevalence estimate in 2000 (9.77% [95% CI: 8.0–11.54]), with a difference of 13.35(95%CI: 9.92–16.77). After these rates were adjusted by the standard population of the Beijing 2000 census, the difference was 12.46(95%CI: 12.37–12.55). Correspondingly, the mean urate level significantly increased over the same period of time. Serum urate level was 300.17 ± 93.88 μmol/L in 2009 and 246.24 ± 79.25 μmol/L in 2000, with a difference of 53.93(95%CI: 45.87–61.98). The prevalence of HUA increased with age, with the highest prevalence among individuals aged 65 years or older. The crude prevalence of serum urate levels > 416 μmol/L (7 mg/dL) was 3.59% (95%CI: 2.49–4.70) and 10.8% (95%CI: 8.65–12.96) in 2000 and 2009, respectively. After standardization, the prevalence was 3.05% (95%CI: 3.02–3.08) in 2000 and 9.73% (95%CI: 9.68–9.79) in 2009, with a difference of 6.68 (95%CI: 6.62–6.74).

Table 1
Characteristics of study population in 2000 and 2009.

	2000 (n = 1085)	2009 (n = 796)
Age (mean ± SD, years)	70.94 ± 7.69	69.28 ± 8.13[a]
Rural resident (n, %)	539(49.7)	525(66.0)[a]
Literate (n, %)	450(41.5)	476(59.8)[a]
Spouse (n, %)	676(62.3)	540(67.8)
Smoking (n, %)	116(10.7)	56(7.1)[a]
Alcohol consumption (n, %)	129(11.9)	82(10.3)
Physical exercise (n, %)	717(66.2)	641(80.5)[a]
Hypertension (n, %)	734(67.6)	554(70.1)
Diabetes (n, %)	82(7.6)	148(18.6)[a]
Dyslipidemia (n, %)	696(64.1)	629(79.0)[a]
Obesity (n, %)	388(40.5)	301(41.0)

[a] $p < 0.01$.