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ORIGINAL ARTICLE

Synergistic influence of age and serum uric acid on blood pressure among community-dwelling Japanese women

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Serum uric acid (SUA) levels are strongly correlated with aging, gender, renal function, obesity, and metabolic abnormality; however, whether SUA has a causative role in elevated blood pressure (BP) is still a matter of debate. From a single community, we recruited 1177 eligible women (mean age, 61 ± 13 years) during their annual health examination. All subjects were divided into two groups according to their age (participants aged ⩾55 years and those aged <55 years). We investigated whether age and SUA are synergistically associated with BP, independent of confounding factors. Of these subjects, SUA significantly correlated with both systolic BP (SBP; $r=0.236$, $P<0.001$) and diastolic BP (DBP; $r=0.263$, $P<0.001$) in female participants aged <55 years but not in those aged ⩾55 years. The interaction between age and SUA on BP as well as age and body mass index, triglycerides, high-density lipoprotein cholesterol, fasting plasma glucose, prevalence of antidiabetic medication and SUA was a significant and independent determinant of both SBP ($\beta=$ _0.106, $P=0.011$) and DBP ($\beta=-0.070$, $P=0.003$). In participants aged <55 years, the multivariate-adjusted odds ratio (95% confidence interval) for hypertension was 3.03 (1.13–8.11) for the highest tertile (4.8–10.8 mg dl^{-1}) of SUA compared with the lowest tertile (0.7–3.8 mg dl^{-1}) but was not significant in those aged ⩾55 years. These results suggested that age and SUA have a synergistic effect on BP status in community-dwelling women, independent of conventional cardiovascular risk factors.
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Keywords: age; blood pressure; hypertension; interaction; uric acid

INTRODUCTION

Hypertension or high blood pressure (BP) is likely the most common disease worldwide and is one of the risk factors for various cardiovascular diseases (CVDs). Moderate elevation of BP leads to shortened life expectancy, and it has been reported that an increased risk of CVD mortality is present in persons with BP levels as low as 115 mm Hg systolic BP (SBP) and 75 mm Hg diastolic BP (DBP). This risk increases steadily with a rise in BP.[1] In the guideline of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High BP (JNC-7) in 2003, individuals with an SBP between 120 and 139 mm Hg and/or a DBP between 80 and 89 mm Hg were considered as having prehypertension.[2] Prehypertension frequently progresses to clinical hypertension over several years, especially in older adults,[3] and is associated with an increased risk of major CVD events, thus lifestyle changes and/or medical treatment are recommended for individuals with prehypertension.[1]

A number of experimental and epidemiological studies have demonstrated that increased serum uric acid (SUA) in humans is also associated with systemic inflammation,[4] endothelial dysfunction,[5] hypertension[6] and CVD morbidity and mortality,[2,7,8] although the results are not consistent.[9] SUA levels are strongly correlated with aging, gender, renal function, obesity and metabolic abnormality, and whether SUA has a causative role in elevated BP is still a matter of debate. SUA is more strongly associated with metabolic syndrome in women than in men.[10] However, there are few reports on the relationship between elevated BP and the combination of age and UA level in Japanese women.

The aim of this study was to determine whether aging and SUA are synergistically associated with BP by examining cross-sectional data from community-dwelling Japanese women.

MATERIALS AND METHODS

Subjects

Subjects were selected through a community-based annual check-up process in a rural town located in Ehime prefecture, Japan. Information on medical history, present conditions and drugs was obtained by interviewing the subjects. Other characteristics, such as smoking and alcohol habits, and

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