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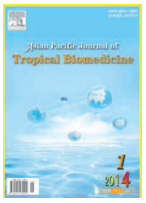

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Serum uric acid level in newly diagnosed essential hypertension in a Nepalese population: A hospital based cross sectional study

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PEER REVIEW

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Comments

Over all the paper is very informative and gives very scientific information, which makes us to rethink about the relationship of uric acid and hypertension. It can be an eye-opener to further conducted research on uric acid levels with other disorders related to hypertension.
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ABSTRACT

Objective: To develop the missing link between hyperuricemia and hypertension.
Methods: The study was conducted in Department of Biochemistry in collaboration with Nephrology Unit of Internal Medicine Department. Hypertension was defined according to blood pressure readings by definitions of the Seventh Report of the Joint National Committee. Totally 205 newly diagnosed and untreated essential hypertensive cases and age-sex matched normotensive controls were enrolled in the study. The potential confounding factors of hyperuricemia and hypertension in both cases and controls were controlled. Uric acid levels in all participants were analyzed.
Results: Renal function between newly diagnosed hypertensive cases and normotensive healthy controls were adjusted. The mean serum uric acid observed in newly diagnosed hypertensive cases and in normotensive healthy controls were (290.05±87.05) μmol/L and (245.24±99.38) μmol/L respectively. A total of 59 (28.8%) participants of cases and 28 (13.7%) participants of controls had hyperuricemia (odds ratio 2.555 (95% *CI*: 1.549-4.213), $P<0.001$).
Conclusions: The mean serum uric acid levels and number of hyperuricemic subjects were found to be significantly higher in cases when compared to controls.

KEYWORDS
Newly diagnosed hypertension, Serum uric acid, Hyperuricemia, Joint National Committee

1. Introduction

Hypertension is the emerging public health problem of adult population across the globe, affecting one in every four individuals[1]. The etiological factors associated with hypertension is difficult to predict because hypertension results from a complex interaction of genes and environmental factors[1]. Different studies advocate the association between serum uric acid level and hypertension. The reasonable mechanism for the development of hypertension in hyperuricemia includes: (a) uric acid induced activation of renin-angiotensin system and action on glomerular apparatus[2,3]; (b) increased insulin resistance and hyperinsulinaemia, causing decreases excretion of uric acid, sodium, potassium from renal tubules[4,5]; and (c) uric acid action in proliferation of vascular smooth muscle[6], endothelial dysfunction with decrease nitric acid production [7,8]. However, there are numerous confounding factors including metabolic syndrome, diabetes mellitus, chronic kidney disease, obesity,

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alcohol consumption, salt intake, fluid volume status *ect.* in the association of hyperuricemia and hypertension. Thus our main objective was to find out the association between hyperuricemia and hypertension by controlling aforementioned potential confounding factors.

2. Materials and methods

2.1. Study design and the participants

This hospital based cross-sectional study was conducted in the Department of Clinical Biochemistry in collaboration with Department of Internal Medicine (Nephrology Unit), Tribhuvan University Teaching Hospital, Institute of Medicine (Tribhuvan University Teaching Hospital, Institute of Medicine). Tribhuvan University Teaching Hospital is a tertiary care hospital in capital city of Nepal and it provides the health services to patients who visit to Tribhuvan University Teaching Hospital from different part of Nepal. Hence this site was chosen for the study.

2.2. Data collection

This study was carried out from 2009 February to 2011 August. The study population included patients visiting medical out patients door (OPD) and nephrology unit of Tribhuvan University Teaching Hospital from different parts of Nepal. A medical history was taken and a physical examination was performed by a physician. Only newly diagnosed hypertensive cases were included in the study. Hypertension was defined by blood pressure ≥140/90 mm Hg[9]. Subjects were resting for at least 20 min before taking the blood pressure. Blood pressure measurement was done using aneroid sphygmomanometer with an adequate cuff size. Systolic blood pressure (SBP) was taken by the first heard sound (Korotkoff Phase I). Diastolic blood pressure (DBP) was recorded at the level when the sound just disappeared (Korotkoff Phase V) or sometimes the K4 point, where the sound is abruptly muffled[10]. Weight was taken using a platform weighing machine. Standing height measurement was done with the participants in bare foot, eyes looking ahead. After having the written consent from the participants, 205 newly diagnosed hypertensive cases, ranging from 16 years to 65 years were eligible for the assessment of biochemical profile. We measured biochemical profile including uric acid, creatinine, total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C) and triglyceride (TG). Furthermore, age-sex matched normotensive healthy controls were also enrolled and all biochemical profile was done similar to cases. Demographic data including age, sex, weight, height, body mass index (BMI), physical activity, smoking status, alcoholic status and family history of hypertension were collected from the participants. Participants with haemophilia and recent cancer chemotherapy were excluded from the venipuncture. Five millilitres of blood was drawn after an overnight fast (12 h) by venous puncture and a routine urine sample were also collected. After clotting of blood, serum was separated within an hou by centrifugation at 5000 *g* for 5 min. Serum was used for analysis of biochemical profile. Laboratory standard operation procedures were maintained for all laboratory analysis. Internal quality control sera, both normal and pathological, were also run for each lot of the test, for the validation of the results.

2.2.1. Inclusion criteria

Age between 16 years to 65 years with newly diagnosed hypertension and normotensive healthy controls were enrolled as a study group.

2.2.2. Exclusion criteria

For study cases: Age <16years and >65 years, gout, chronic alcoholics, leukemias, polycythemia, lymphoma, carcinoma, anti-cancer therapy, psoriasis, pregnancy, diabetes mellitus, chronic diseases causes tissue break down, tuberculosis, chronic obstructive pulmonary disease, chronic renal failure, end stage renal disease, endocrine disorder, patients under medication for diabetes mellitus, hypertension were excluded from the study.

For healthy controls: Age <16 years and >65 years, gout, chronic alcoholics, leukemia, polycythemia, lymphoma, carcinoma, anti-cancer therapy, psoriasis, pregnancy, chronic disease causes tissue break down, tuberculosis, chronic obstructive pulmonary disease, liver disease, endocrine disorder, any medical history of chronic kidney disease , chronic renal failure, end stage renal disease, patients with or without medication for diabetes mellitus, hypertension were excluded.

2.3. Measured variables

Serum level of uric acid (uricase method as described by Fossati *et al.*)[11], creatinine (modified Jaffe reaction)[12], TC (enzymatic method as described by Allain *et al.*)[13], HDL-C (precipitation of LDL-C and VLDL-C with phosphotungstic acid and magnesium chloride and treat as TC), LDL-C (Friedewald formula)[14] and TG (Fossati and Prencipe method associated with Trinder reaction)[15] were also measured.

2.3.1. Defining variables

Hypertension was categorized according to blood pressure readings by Joint National Committee VII definitions: normal (systolic <120 mm Hg and diastolic <80 mm Hg), pre-hypertension (systolic 120 to 139 mm Hg or diastolic 80 to 89 mm Hg), hypertension stage I (systolic 140 to 159 mm Hg or diastolic 90 to 99 mm Hg), and hypertension stage II (systolic≥160 or diastolic≥100 mm Hg)[9]. In this study only hypertensive patient were taken. So, patients having stage I hypertension and stage II