

**UNIVERSITI TEKNOLOGI MARA**

**ASSOCIATION OF SERUM URIC  
ACID LEVEL AND CAROTID  
INTIMA MEDIA THICKNESSS  
AMONG HYPERTENSIVE  
POPULATION IN PRIMARY CARE  
CLINIC**

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## ABSTRACT

### Abstract

**Introduction:** Early atherosclerosis can be measured through carotid intima-media thickness (CIMT). Elevated CIMT confirms the presence of subclinical atherosclerosis and is directly associated with an increased risk of cardiovascular disease. Serum uric acids (SUA) is commonly associated with hypertension and may compound the risk for atherosclerosis. The association of SUA on CIMT among the hypertensive population remains unclear and need to be investigated further.

**Objectives:** This study sought to investigate the association of SUA on CIMT in uncomplicated essential hypertensive population attending primary care clinic.

**Method:** A cross-sectional study was conducted between September 2018 to September 2019 in three primary care clinics in Gombak, Selangor. Using convenient sampling, 140 patients who were  $\geq 30$  years old and was diagnosed with hypertension were recruited. Information on socio-demographic characteristics, anthropometry measurements, clinical, biochemical investigations, and electrocardiogram (ECG) were recorded in a proforma. Two trained radiologists performed the ultrasonography to assess the left and right CIMT on a different date. Elevated CIMT was defined by CIMT of  $\geq 75^{\text{th}}$  percentile. The trend of mean CIMT (right and left) across the SUA was analysed using Analysis of Variance (ANOVA) for trends. The odds of an elevated CIMT according to the SUA quartiles was analysed using unadjusted (Model 1) and adjusted logistic regression (hierarchical model). The adjusted variable included Model 2 (age and smoking status based on Model 1). Model 3 (menopause, hypertension medication, antilipidemic medication based on Model 2) and Model 4 (waist circumference, systolic blood pressure, high density lipoprotein, low density lipoprotein, triglyceride, fasting blood sugar based on Model 3).

**Results:** Participants' mean age was  $53.4 \pm \text{SD } 9.99$  years. The mean systolic blood pressure was  $137.09 \pm \text{SD } 13.22$  mmHg for systolic and  $81.89 \pm \text{SD } 8.95$  mmHg for diastolic. Left ventricular hypertrophy and microalbuminuria was present in 1.7% and 6.4% of the participants. The prevalence of hyperuricaemia and metabolic syndrome was 25.7% and 54.3% respectively. With elevated CIMT defined by  $\geq 75^{\text{th}}$  percentile, the cut-off definition value for elevated CIMT was 0.633 mm for the right and 0.666

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Overview

Hypertension (HTN) is an increasingly important medical and public health issue and worldwide prevalence of hypertension is increasing. It is a leading risk factor for cardiovascular disease. In 2000, 26% of the world's adult population (over 1 billion) were considered to have HTN and in 2009, WHO reported that HTN had a causative role in the deaths of over 7.5 million people (Kearney, Whelton, Reynolds, Muntner, & He, 2005)(WHO, 2009). The National Health and Morbidity Survey (NHMS) 2015 has shown that the prevalence of hypertension in Malaysia for adults > 18 years is 30.3% in 2015 which estimated about 6.1 million people affected. For those > 30 years old, the prevalence is 39.8% (NHMS Ministry of Health Malaysia, 2015). This is worrying, as HTN is an independent risk factor for cardiovascular (CV) events (Abdul Rashid Abdul Rahman, Azhari Rosman, 2018). Thus, among the priorities for CVD prevention is to detect and correct the reversible causes related to HTN.

Uric acid is the end product of purine metabolism in humans (Maiuolo, Oppedisano, Gratteri, Muscoli, & Mollace, 2016). There is no universally accepted definition of hyperuricemia. For purposes relating to urate crystal deposition, Malaysian clinical practice guideline (CPG) of gout management defined hyperuricaemia when the serum uric acid is > 360 $\mu$ mol/L in pre-menopausal women and > 420  $\mu$ mol/L in male and post-menopausal women (Chow Sook Khuan, Shahdan Shahid, 2008). However, a cut off point for uric acid level that associated with non-crystal deposition condition is remain unsure as the effects of serum uric acid on cardiovascular and other conditions are found to occur at concentrations that are clearly below the saturation level (Muiesan, Agabiti-Rosei, Pains, & Salvetti, 2016). In the recent decade, the prevalence of hyperuricaemia worldwide, has increased markedly and this may be associated with the increasing prevalence of overweight and obesity, as well as increase intake of sugar-sweetened drinks, purine rich foods, and alcohol (Desideri, Puig, & Richette, 2015). In the other hand, prevalence of hyperuricaemia in Asia varied but has been reported to be between 5-52% (Smith E & March L, 2015). However, currently no data regarding the prevalence of hyperuricaemia in Malaysia is available.