

# ELEVATED BLOOD PRESSURE AND ITS PREDICTORS AMONG SECONDARY SCHOOL STUDENTS IN SARAWAK: A CROSS-SECTIONAL STUDY

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## SUMMARY

**Objectives:** Hypertension is a health issue affecting adolescents. Accumulating evidence affirms that elevated blood pressure begins in childhood and tracks into adulthood. This cross-sectional study was conducted to determine the prevalence of elevated blood pressure and its predictors among secondary school students in Sarawak, Malaysia.

**Methods:** A total of 2,461 secondary school students aged 12–17 years from 19 schools in Sarawak participated in the study. Questionnaire was used to obtain socio-demographic data, parental history of hypertension, and self-reported physical activity. Anthropometric and blood pressure measurements were taken. Data was entered and analysed using SPSS version 23.0.

**Results:** The prevalence of adolescents with elevated blood pressure, overweight, central obesity, and overfat were 30.1%, 24.3%, 13.5%, and 6.7%, respectively. Multivariate logistic regression demonstrated the predictors significantly associated with elevated blood pressure among respondents: overweight (adjusted odds ratio = 3.144), being male (adjusted odds ratio = 3.073), being Chinese (adjusted odds ratio = 2.321) or Iban (adjusted odds ratio = 1.578), central obesity (adjusted odds ratio = 2.145), being overfat (adjusted odds ratio = 1.885), and being an older adolescent (adjusted odds ratio = 1.109). Parental history of hypertension, locality, and physical activity showed no significant associations.

**Conclusion:** The obesity epidemic must be tackled at community and school levels by health education and regulation of school canteen foods.

**Key words:** adolescent, elevated blood pressure, hypertension, prevalence, predictors, risk factors, obesity, gender, ethnic, age, parental history of hypertension, locality, urban, rural, physical activity, Sarawak, Malaysia

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## INTRODUCTION

Elevated blood pressure (BP) or hypertension has been frequently implicated as an exceptionally common and weighty risk factor of cardiovascular and renal diseases, including stroke, coronary heart disease, heart failure, left ventricular hypertrophy, and kidney failure (1). This is a major concern as prevalence of hypertension seems to be on an upward trend worldwide. Globally, the overall prevalence of elevated BP in adults aged more than 24 years was around 40% or nearly 1 billion in 2008, an upsurge from 600 million in 1980 (1). By 2025, this number is expected to reach 1.56 billion (2). In Malaysia, the latest statistics by the National Health and Morbidity Survey (NHMS) 2015 displayed that 30.3% or around one-third of adults aged 18 years and above were hypertensive (3). The high global prevalence of elevated BP has led to an estimated 7.5 million deaths, which was about 12.8% of all deaths (1).

Even more worryingly, recent studies have found that hypertension is no longer a health issue exclusive to adults, as it is becoming progressively common among adolescents (2). As a matter of fact, accumulating evidence affirms that elevated BP begins in childhood and tracks into adulthood (4). In 1995, Bao et al. analysed data from the renowned Bogalusa Heart Study

(BHS) and found that elevated BP levels in childhood tend to persist into adulthood independent of body mass index (BMI), with double the expected number of individuals whose levels were in the highest quintile at childhood remaining there in adulthood 15 years later (5).

In light of this phenomenon, there is growing interest in the prevalence of elevated BP among adolescents. The results of present studies have been inconsistent. There was a national study on the prevalence of adolescent hypertension conducted in the United States (6), which was not directly applicable in the Malaysian settings due to the wide range of prevalence reported and differences in the biology of Asians and Americans. Unfortunately, to our knowledge only two studies related to adolescent BP have been done in Malaysia. Both studies used the International Diabetes Federation (IDF) standard to define adolescent hypertension as they focused on metabolic syndrome rather than hypertension alone (7, 8). However, the prevalence of adolescent hypertension is better determined by the BP standards of the National High Blood Pressure Education Program (NHBPEP) (9). Thus, the present study was designed to fill in the gap in knowledge on the prevalence of elevated BP among adolescents in the state of Sarawak, Malaysia, and its predictors so early actions can be taken before adolescent elevated BP becomes adult hypertension.