



UNIVERSITI PUTRA MALAYSIA

***PREVALENCE OF HYPERTENSION AND ITS ASSOCIATED FACTORS
AMONG PRIMARY SCHOOL STUDENTS IN FEDERAL TERRITORY***

GHALOO SOBIA SAEED

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By

GHALOO SOBIA SAEED

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfillment of the Requirements for the Degree of Master of Science**

December 2021

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DEDICATION

*I am dedicating my thesis to my Parents,
My husband Saeed Hyder Ghaloo,
My children BibiAbeedah, M.Aayan and M.Faaz,
And my dear brother M.Nasir.*



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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December 2021

Chairman : Navin Kumar Devaraj, PhD
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Hypertension is an important risk factor for cardiovascular disease, and there is an increasing risk of developing hypertension among children. Our study aims to determine the prevalence of hypertension and its associated factors among primary school children (7 to 12 years) in the Federal territory.

A self-administered questionnaire was used that explores the sociodemographic background, past medical history, family history & lifestyle characteristics of the participants. Diagnosis of hypertension was based on standard protocol. Data analysis was done using SPSS v26.0.

This study involved 251 respondents. The prevalence of hypertension among primary school children is 2%. Significant determinants of hypertension were higher body mass index (BMI), marital status, children who lived with a single parent and of Indian ethnicity. In multivariate logistic regression analysis, it was found that Indians had 55 times higher odds of having true hypertension compared to Malays (95%CI =1.47-2061.87, $p = 0.03$). It was also found that children from households with a single parent had 85 times higher odds of having true hypertension compared to households with both parents (95%CI = 2.68-2537.53, $p = 0.01$). Furthermore, those with a higher BMI had 1.4 times higher odds of having true hypertension (95%CI = 1.06-1.43, $p = 0.018$).

The prevalence of hypertension is similar the rates reported around the world. This provides information on where regular monitoring of BP in children should be advocated among healthcare professionals, especially among children with risk factors such as obesity for the development of hypertension.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

PREVALENSI HIPERTENSI DAN FAKTOR-FAKTOR YANG BERKAITAN DI KALANGAN PELAJAR SEKOLAH RENDAH FEDERAL TERRITORY

Oleh

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Hipertensi adalah faktor risiko yang penting untuk penyakit kardiovaskular dan pada masa ini, terdapat risiko peningkatan diagnosa hipertensi di kalangan kanak-kanak. Kajian kami bertujuan untuk menentukan prevalensi hipertensi sebenar dan faktor-faktor yang berkaitan di kalangan kanak-kanak sekolah (umer 7-12) rendah di wilayah Lembah Federal territory.

Soal selidik yang telah dijawab sendiri oleh peserta kajian digunakan yang meneroka latar belakang sosio-demografi, sejarah perubatan masa lalu, sejarah keluarga & ciri-ciri gaya hidup para peserta. Diagnosis hipertensi adalah berdasarkan protokol standard. Analisis data dilakukan dengan menggunakan SPSS v26.0.

Kajian ini melibatkan 251 responden. Prevalensi hipertensi sebenar di kalangan kanak-kanak sekolah rendah adalah 2%. Penentu hipertensi sebenar adalah indeks jisim badan yang lebih tinggi (BMI), anak-anak yang tinggal dengan ibu bapa tunggal dan berasal dari etnik India. Didapati bahawa orang India mempunyai kemungkinan 55 kali lebih tinggi untuk mengalami hipertensi sebenar berbanding orang Melayu (95% CI = 1.47-2061.87, $p = 0.03$). Dalam analisis regresi logistik mutivariate, ia juga didapati bahawa anak-anak dari isi rumah dengan ibu bapa tunggal mempunyai kemungkinan 85 kali lebih tinggi untuk mengalami hipertensi sebenar berbanding rumah tangga dengan kedua-dua ibu bapa (95% CI = 2.68-2537.53, $p = 0.01$). Di samping itu, mereka yang mempunyai indeks jisim badan yang lebih tinggi mempunyai kemungkinan 1.4 kali lebih tinggi untuk mengalami hipertensi sebenar (95% CI = 1.06-1.43, $p = 0.018$).

Kelaziman hipertensi sebenar di kalangan kanakkanak dalam kajian ini adalah sama dengan kadar yang dilaporkan di seluruh dunia. Ini memberikan gambaran bahawa pemantauan BP secara berkala pada kanak-kanak harus disarankan di kalangan

profesional kesehatan, terutama di kalangan kanak-kanak yang mempunyai factor-faktor risiko untuk menghadapi hipertensi.



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This thesis was submitted to the Senate of Universiti Putra Malaysia has been accepted as fulfillment of the requirements for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) were adhered to.

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LIST OF ABBREVIATIONS

HBP	High blood pressure
EH	Essential hypertension
BMI	Body Mass Index
PA	Physical activity
WC	Waist circumference
WHRs	Waist-to-height ratio
SBP	Systolic blood pressure
DBP	Diastolic blood pressure
LMIC	Low middle income countries
NCD	Noncommunicable diseases
DASH	Dietary approaches to stopping hypertension
AHA	American heart association
AAP	American academy of pediatrics
NHNES	National health and nutrition examination survey
MOH	Ministry of health
WHO	World health organization
CPG	Clinical practice guidelines
NHBPEP	National high blood pressure education program
NHMS	Malaysian national health and morbidity survey
SOP	Standard operation procedures
KKM	Kementerian Kasihatan Malaysia

CHAPTER 1

INTRODUCTION

1.1 Background

For several decades, hypertension has been consistently diagnosed among children and adolescents (Kupferman et al., 2021). Hypertension is documented as a common cause of death because long-term high blood pressure causes end-organ damage (Sabri et al., 2019). There are two common types of hypertension, essential or primary hypertension, that can occur (90-95%) without underlying cause or due to genetic, family history, or environmental, while secondary hypertension is only (5%), commonly associated with systemic involvement such as the renal, vascular, and endocrine systems, sleep apnea (Muntner et al., 2018).

Essential or primary hypertension in children is the increase in blood pressure (BP) 95th percentile without any identifiable source, or the blood pressure constantly above 130 and/or 80mm/Hg (Flack & Adekola, 2020). The first incidence report on childhood-onset essential hypertension was published in 1971 (Gruskin et al., 1971). Agarwal et al. (1983) reported that primary hypertension is a silent threat to all age groups worldwide (Agarwal et al., 1983). Commonly essential hypertension among children develops at the age of (Barba et al., 2006). Unfortunately, children often do not show any symptoms early age and the underlying etiologic cause often remains obscured (Riley & Bluhm, 2012). Because of being asymptomatic, 2.5% of children were identified with hypertension, and 75% of the children had been missed from surveillance in health care clinics (Hansen et al., 2007).

Little is known about hypertension and its causative factors among children. One of the most common risk factors is obesity, which may occur in all ages. World Health Organization (WHO) has reported obesity is expanding uncontrolled among children and adolescents, around 4% to 18% was assessed in the last twenty years (Matossian, 2018). The child is thought to be obese or overweight when the weight increases with age and height. Causes of obesity are the same as adults such as lifestyle behavior, genetics, social environment. It also increases the risk of lifelong diseases such as heart problems, vascular diseases, and sleep apnea (WHO, 2014). Obesity is normally established in terms of BMI. While high BMI has come up with catastrophic consequences for community health for several decades (Nuttall, 2015). The NHANES (National Health and Nutrition Examination Survey) has stated that hypertension in children was 3.4%, and 4.4% associated with BMI (Rosner et al., 2013).

In addition to obesity and BMI, some factors such as family system, environment, and society strongly influence health outcomes. Similarly, family health status has revealed a significant association with HPT in children. Having one or more family members suffering from hypertension doubles the possibilities of HPT at a young age. BP also

fluctuates when lifestyle, diet, physical activity, and sleeping patterns are imbalanced (Chaput et al., 2020). Betz et al., 2018, reported that BP is directly proportional to less physical activity (AP) and is inversely proportional to BMI (Betz et al., 2018). Modification of lifestyle with the addition of nutritious food and regular bodily activity is the most convenient way to alleviate BP (Castro et al., 2015). There is evidence that 80% of preventable mortality can be efficiently prevented with a simple and healthy meal plan. Good sleep, in addition to nutrition and exercise, is quite important because disturbed or incomplete sleep always affects blood pressure (Paciência et al., 2013). Therefore, approximately nine hours of sleep is recommended to maintain BP in the normal range. Children with disturbed sleep have been diagnosed with hypertension in several studies (Makarem et al., 2021). Comorbidities such as left ventricular heart, chronic kidney failure, and hyperthyroidism are popular causes associated with hypertension.

Previous studies have proven a range of determinants that causes BP fluctuation in the innocence age therefore, it is vital to seek potential risk factors and associated factors, improve the clinical assessment system and implement children's healthcare strategies to control chronic diseases such as hypertension.

1.2 Definition of hypertension

Hypertension in children can be established when BP is assessed and repeated in different visits up to a maximum of three times, must be higher than 95th percentile or 130/90 mmHg for age, sex, and height (whichever is lower) (Flynn, 2017).

Or

Children under 13 years of age are marked as hypertensive when BP is assessed higher than the 95th percentile based on the three common factors, age, sex, and height, with 3 different assessments (Lande & Batisky, 2019).

Updated Definitions of BP Categories and Stages	
For children aged 1-13 y	For children aged ≥ 13 y
Normal BP: < 90th percentile	Normal BP: < 120/< 80 mm Hg
Elevated BP: ≥ 90th percentile to < 95th percentile or 120/80 mm Hg to < 95th percentile (whichever is lower)	Elevated BP: 120/< 80 to 129/< 80 mm Hg
Stage 1 HTN: ≥ 95th percentile to < 95th percentile + 12 mm Hg, or 130/80 to 139/89 mm Hg (whichever is lower)	Stage 1 HTN: 130/80 to 139/89 mm Hg
Stage 2 HTN: ≥ 95th percentile + 12 mm Hg, or ≥ 140/90 mm Hg (whichever is lower)	Stage 2 HTN: ≥ 140/90 mm Hg
BP = blood pressure; HTN = hypertension.	
<i>Reprinted with permission from Flynn JT, Kaelber DC, Baker-Smith CM, et al. Clinical practice guideline for screening and management of high blood pressure in children and adolescents [published correction appears in Pediatrics. 2017;140(6):e20173035]. Pediatrics. 2017;140(3):e20171904.</i>	

Figure 1.1 : Definition of hypertension (Flynn & Falkner, 2017)

1.3 Problem statement

The most recent survey conducted by National Health and Morbidity (NHMS) with a focus on NCD risk factors in 2019 ascertained the prevalence of raised blood pressure around 30.0% in >18 years (NHLBI, NIH). The increasing number of hypertensive cases and associated factors among children has intensified the overall health burden of the country. The National Heart, Lung, and Blood Institute USA stated that primary hypertension can be expected at childhood age (NHBPEP 2010). The prevalence of hypertension is expected to rise from 26% to 29% by 2025, in developing countries (Sharma, 2008). Approximately 1% to 5% of children were diagnosed with hypertension in 2013 (Thompson et al., 2013), while in 2019 the prevalence of essential hypertension was 3.9 to 14.0% among children (Lian, 2019). Sharma (2013) previously diagnosed hypertensive cases and continuously obtained new cases at an early age mounting the load on the health care system (A. K. Sharma, Metzger and Rodd 2018). Therefore, early identification and adjustment of risk factors minimize the growing prevalence of HBP (NHBPEP,1996-98).

Children remain asymptomatic at an early age, which further causes uncontrolled illness and harms the organ systems of the body. According to the 1996 task force report, regular check-ups are required when the risk expectation is high (NHBPE 1996-98).

The AAP 2017 has introduced updated guidelines with the latest definition, and updated values of BP with classification into stage primary and secondary hypertension for the assessment of BP in youngsters. A huge number of cases of hypertension had been diagnosed following the updated 2017 guidelines by AHA (Muntner et al., 2018).

A study conducted in Sabah, Malaysia, in 2012 reported a prevalence of hypertension of 14% at 8-9 years (Chong, 2012). In 2004, HBP was estimated at 2-4%, while the highest number of cases had been diagnosed in the years 2010 and 2014 (WHO,2020). In comparison with the 2017 research, the prevalence was 4.32% among 6 years 3.28% among 19 years, and 7.89% among aged 14 years (Zhou et al., 2017). Preschool children were at risk of hypertension at a high rate of 9.7% according to a local study in Sarawak (Whye Lian, 2019). The previous results have stressed that assessment of BP is of great importance, the recommendation given by AAP must be followed to achieve accurate and transparent results.

The Malaysian Ministry of Health (MOH) always have given priority to primary prevention to reduce the number of new cases, due to the limited studies conducted in Malaysia, there is still a huge research gap related to the latest update of hypertensive cases among children. The trends are continuously evolving therefore, the presenting cross-sectional study will approximate the prevalence and primary reasons of HBP among children in Malaysia. The investigations will support health care departments and research institutes to conduct subsequent research on hypertension among children in the future to reduce the chances of hypertension. With several challenges now faced by a pediatrician, namely separating primary and secondary, identifying cases with

hypertension and the preponderance of target organ damage, this study will also support the introduction of the latest interventions to control blood pressure and preventive measures for a healthy lifestyle and to support regular measurement of BP in health clinics.

1.4 Study objectives

1.4.1 General objective

To determine the prevalence of hypertension and its associated factors in primary school students.

1.4.2 Specific objectives

1. To determine the sociodemographic characteristics, lifestyle characteristics, and family health status of the participants.
2. To determine the association between sociodemographic characteristics and the presence of hypertension among participants.
3. To determine the association between lifestyle characteristics and the presence of hypertension among the participants.
4. To determine the association between comorbidities and the presence of hypertension among the participants.
5. To determine the association between family health status and the presence of hypertension among the participants

1.5 Null hypothesis

1. There is no hypertension in primary school students.
2. There is no association between sociodemographic characteristics and the presence of hypertension among participants.
3. There is no association between lifestyle characteristics and the presence of hypertension among the participants.
4. There is no association between comorbidities and the presence of hypertension among participants.
5. There is no association between family health status and the presence of hypertension among the participants.

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