

Incidence and risk factors of hypertension in children in the emergency department of Ibnu Sina Hospital Makassar

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ABSTRACT

Background: Hypertension is rare in childhood, but it has become a significant concern for the community. This condition can lead to serious complications, including an increased risk of end-organ damage and the potential for early essential hypertension. This study aims to determine the incidence and risk factors for hypertension in children in the emergency department of Ibnu Sina Hospital Makassar. **Methods:** This research is descriptive observational design with a cross-sectional approach, collecting primary data through interviews and measurements of respondents. **Results:** A total of 191 pediatric patients visited the emergency room of Ibnu Sina Hospital. The age distribution was as follows: 13.6% were under 5 years old, 45.5% were between 5 and 11 years old, and 40.8% were 12 to 18 years old. The gender distribution was 46.1% male and 53.9% female. In terms of hypertension, 87.9% of the patients had normal blood pressure, 1.6% had elevated blood pressure, 6.8% were classified with grade 1 hypertension, and 3.7% had grade 2 hypertension. The nutritional status was as follows: 20.4% were obese, 15.2% were overweight, 32.9% were well-nourished, 19.9% were undernourished, and 11.6% were malnourished. In terms of family history of hypertension, 46.6% had a family history, while 53.4% did not. Additionally, 16.8% had a history of low birth weight (LBW), and 83.2% did not. **Conclusion:** Nutritional status varied significantly, with notable rates of obesity and undernourishment. Nearly half of the patients had a family history of hypertension, and a small percentage had a history of low birth weight.

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INTRODUCTION

Hypertension is rare in childhood and adolescence, but it has become a concerning issue for the community, particularly for parents, as it is a serious condition that can increase the risk of end-

organ damage and potentially lead to early essential hypertension and death in the future. Recently, studies conducted in other regions have reported an increase in the prevalence of hypertension among school-aged children. However, the incidence and risk factors of hypertension in children in the emergency department of Ibnu Sina Hospital Makassar have not studied before.

According to the WHO (World Health Organization), Southeast Asia ranks third with a hypertension prevalence of 25%, following Africa (27%) and the Eastern Mediterranean (26%). A study conducted in the United States found a hypertension incidence rate of 2.7% among children aged 10 to 19 years, with 16.3% showing prehypertension. The actual prevalence of clinical hypertension in children and adolescents is approximately 3.5%, with higher rates observed among those who are overweight or obese (Flynn et al., 2017). According to Riskesdas 2018, hypertension prevalence in Indonesia has been increasing in every province. Data from Riskesdas 2018 show that the national prevalence of hypertension among individuals aged ≥ 18 years is 34.11%, with South Sulawesi around 30-32% (Kemenkes RI, 2021).

The incidence of hypertension in children may initially be due to insulin resistance and hyperinsulinemia resulting from visceral fat accumulation in childhood obesity, leading to systolic hypertension with tachycardia. A study of severely obese Japanese children reported that those with low birth weight were more likely to develop pediatric metabolic syndrome with hypertension. The fetus prioritizes the brain for glucose supply, so if the mother is malnourished, other fetal organs such as the liver, muscles, and kidneys will lack sufficient glucose. As a result, low birth weight infants have insulin resistance and fewer nephrons. Different mechanisms contribute to elevated blood pressure at various stages of biological development. With increasing age and persistent early abnormalities, changes such as compromised body composition, adaptive vascular changes, microcirculatory damage, and immune activation gradually lead to new, irreversible arterial injury with increased stiffness, resulting in persistent hypertension. The evolution of these lesions is influenced by genetic susceptibility (Kikuchi, 2022). The rising incidence of hypertension in children and adolescents are influenced by several factors, including increasing rates of obesity/overweight and lifestyle changes such as reduced physical activity, excessive screen time, high-calorie and high-salt diets, consumption of alcohol and caffeine, smoking, mental stress, and insufficient sleep. Children with hypertension four times more likely to develop hypertension in adulthood compared to their normotensive peers. Hypertension in children impacts cardiovascular health in adulthood, as atherosclerosis begins in childhood (Litwin, 2023).

Hypertension in children requires serious attention, as it can persist into adulthood if not effectively treated. Therefore, it is crucial to enhance research and awareness regarding childhood hypertension for detection and prevention of complications. This underscores the importance of conducting research on the incidence and risk factors of hypertension in children, particularly since such studies have not been studied at Ibnu Sina Hospital Makassar.

RESEARCH METHOD

This study is a quantitative research project using a descriptive observational method and a cross-sectional approach. It employs primary data from interviews and measurements of respondents as research samples to determine the incidence and risk factors of hypertension in children in the emergency department of Ibnu Sina Hospital Makassar. The research was conducted from February to April 2024. Data collection procedures included administrative steps taken after obtaining research approval and ethical clearance from the University of Muslim Indonesia Foundation, addressed to the director of Ibnu Sina Hospital Makassar. Technical procedures involved obtaining permission from the hospital medical records staff, explaining the research objectives, identifying patient records that met the inclusion criteria, and collecting, processing, and analyzing the data (Adiputra et al., 2021).

Data Analysis

The data obtained from medical records will be entered into the computer by the researcher. Data analysis will be conducted analytically using the SPSS (Statistical Program for Social Science) software (Sugiyono, 2018).

RESULTS AND DISCUSSIONS

Respondent Description

From February to April 2024, of the 191 pediatric patients who visited the emergency department at Ibnu Sina Hospital Makassar, 26 patients (13.6%) were under 5 years old, 87 patients (45.5%) were 5-11 years old, and 78 patients (40.8%) were 12-18 years old. Gender distribution included 88 patients (46.1%) male and 103 patients (53.9%) female. In terms of hypertension, 168 children (87.9%) had normal blood pressure, 3 children (1.6%) had elevated blood pressure, 13 children (6.8%) had grade 1 hypertension, and 7 children (3.7%) had grade 2 hypertension. For nutritional status, 39 children (20.4%) were obese, 29 children (15.2%) were overweight, 63 children (32.9%) were normal weight, 38 children (19.9%) were underweight, and 22 children (11.6%) were malnutrition. Concerning family history, 89 children (46.6%) had a family history of hypertension, while 102 children (53.4%) did not. Additionally, 39 children (16.8%) had a history of low birth weight, and 159 children (83.2%) did not.

Table 1. Characteristics of respondents

Characteristics	Frequency	Percentage
Gender		
Female	103	53.9
Male	88	46.1
Age		
Toddlers (<5 years)	26	13.6
Children (5-11 years)	87	45.5
Adolescents (12-18 years)	78	40.8
Hypertension		
Normal	168	87.9
Pre-Hypertension	3	1.6
Hypertension Grade 1	13	6.8
Hypertension Grade 2	7	3.7
Nutritional Status		
Obesity	39	20.4
Overweight	29	15.2
Normal	63	32.9
Underweight	38	19.9
Malnutrition	22	11.6
Family history of hypertension		
Yes	89	46.6
No	102	53.4
History of low birth weight		
Yes	32	16.8
No	159	83.2
Total	191	100.0

Based on blood pressure levels, 3 children (1.6%) had elevated blood pressure, 13 children (6.8%) had grade 1 hypertension, and 7 children (3.7%) had grade 2 hypertension. These findings are consistent with the study by (Made et al., 2020), which reported that hypertensive children were dominant in female (53.6%) and aged 6-13 years (46.4%), with a good nutritional status (46.4%). The most common category of hypertension found was grade 2 (57.1%). Similarly, the study by (Bilal et al., 2020) found higher prevalence rates of hypertension and prehypertension in children aged 4 and 7 years, with rates of 25.0% and 10.0%, respectively, although there was no significant variation between genders. Research often suggests that hypertension is more prevalent

in boys compared to girls; for example, a study conducted in the emergency department of a hospital in Taiwan found a hypertension prevalence of 78.8% in boys.

Hypertension is a condition characterized by a sudden increase in blood pressure in the vessels (Ubaidillah et al., 2022). A systematic review on global prevalence of hypertension in children show that adolescents aged 10-19 years are at higher risk of hypertension, often linked to glomerulonephritis, which is more common in this age group (Song et al., 2019). According to research by (Siswanto et al., 2023), the prevalence of hypertension among adolescents in Indonesia was 9% in 2007 and increased to 10.7% in 2013.

Ideally, every child aged 3 years or older should have their blood pressure checked at least once a year, (Masta Melati Hutahaean et al., 2021)(Simatupang et al., 2022)(Syamsiyah, 2022) just like the regular monitoring of weight and height. For neonates and infants (0-1 year), hypertension classification still relies on the curves developed by The Second Task Force Report on Blood Pressure, as several factors affect blood pressure in this age group, making precise hypertension boundaries difficult to determine (Kemenkes RI, 2021).

The nutritional status distribution of pediatric patients visiting the emergency department at Ibnu Sina Hospital Makassar from February to April 2024 shows that the majority had a well-nourished status (32.9%), compared to other nutritional statuses. This contrasts with the study by (Kurnianingsih et al., 2019), which found that obesity significantly affects hypertension in adolescents aged 15-19 years, with obese adolescents having a 2.15-fold higher risk of hypertension compared to non-obese peers. Similarly, research by (Meena & Sinha, 2022) showed that more than half of obese children and a quarter of overweight children suffered from hypertension, which the prevalence of hypertension was <10% and ~5% among children with normal and undernourished nutritional status, respectively. (Zhao et al., 2021) investigated the combined effects of obesity and family history of hypertension on predicting hypertension risk in Chinese adolescents and found that those classified as overweight or obese had a higher prevalence of hypertension compared to those with normal BMI.

Hypertension or increased blood pressure when consuming salty foods is affected by the sodium present in these foods. Sodium is not found only in salt but also in food additives and preservatives like sodium benzoate. Adolescents tend to consume high-energy, high-fat, and high-sodium foods that are low in fiber, often from convenient fast foods. This dietary pattern increases the risk of developing degenerative diseases such as obesity, heart disease, diabetes, and hypertension (Listiawaty & Berliana, 2020).

The distribution of family history of hypertension among pediatric patients visiting the emergency department at Ibnu Sina Hospital Makassar from February to April 2024 shows that the majority did not have a family history of hypertension (53.4%) compared to those with a family history (46.6%). This contrasts with the study by (Jang et al., 2023), which found that the risk of hypertension in children is high if one parent has hypertension and four times higher if both parents have hypertension, compared to a control group with no parental history of hypertension (Vera Hayati et al., 2024). Similarly, (Robinson & Chanchlani, 2022) reported that genetic factors significantly contribute to hypertension, with a stronger relationship between parental blood pressure and child blood pressure compared to that between partners. The heritability of hypertension in twin families is estimated to range from 30% to 50%. (Zhao et al., 2021) found that individuals with a positive family history, whether from one or both parents, have an increased risk of hypertension compared to children and adolescents whose parents have no hypertension history. However, (Önsüz & Demir, 2015) found in a study of 2,166 students in Turkey's that while sex and obesity were associated with hypertension, a positive family history of hypertension was not associated with hypertension in children.

The distribution of birth history with low birth weight (LBW) among pediatric patients visiting the emergency department at Ibnu Sina Hospital Makassar from February to April 2024 shows that the majority did not have a history of LBW (83.2%) compared to those with a history of

LBW (16.8%). This contrasts with the study by (Poplawska et al., 2012), which found that out of 15 studies analyzed, 10 reported significantly higher systolic blood pressure in premature infants compared to controls, regardless of the measurement method. Similarly, (Leyvraz et al., 2019) found that children with low birth weight and small gestational age are more sensitive to salt, with salt sensitivity strongly correlating with kidney length, which is smaller in preterm children. (Sabri et al., 2021) indicated that the primary causes of abnormal blood pressure in children include low birth weight, poor weight management, and metabolic syndrome in childhood.

CONCLUSION

Based on the research conducted at the Emergency Department of Ibnu Sina Hospital Makassar in 2024, the conclusion is the highest incidence of hypertension among children visiting the ER was grade 1 hypertension, accounting for 6.8%. The most common characteristics were children aged 5-11 years (45.5%) and female (53.9%). Risk factors included good nutritional status (32.9%), no family history of hypertension (53.4%), and no history of low birth weight (83.2%).

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