Characteristics of Hypertension in Children at Dr. Hasan Sadikin General Hospital Bandung in January to December 2014

Meilani,[1] Nanan Sekarwana,[2] Yuni Susanti Pratiwi[3]
[1]Faculty of Medicine Universitas Padjadjaran, [2]Department of Child Health Faculty of Medicine Universitas Padjadjaran/Dr. Hasan Sadikin General Hospital, Bandung, [3]Department of Anatomy, Cell Biology and Physiology Faculty of Medicine Universitas Padjadjaran

Abstract

Background: Hypertension is often found in children. It could cause serious complications and added risk of hypertension in adulthood. Hypertension in children is likely secondary type and some of them might be severe. The aim of this study was to determine the demographic and clinical characteristics of hypertension in children admitted to Dr. Hasan Sadikin General Hospital Bandung in January to December 2014.

Methods: The study design used was a quantitative, descriptive cross-sectional study. Data were obtained from medical records retrospectively of inpatient children from the period January to December 2014. Data were collected from the period September to November 2015 based on age and gender as a demographic characteristics and stage of hypertension, etiology of hypertension, and emerge of hypertensioncomplication as a clinical characteristics.

Results: Ninety(1.9%)children with hypertension were found from 4,681 of total inpatient children consisting of 58 males and 32 females with median of age 8 (0–13) years old.The main stage of hypertension was hypertension stage 2 with 55 cases and nephrotic syndrome as the most common causes with 43 cases. The complications were present in hypertension stage 2 with 3 cases and hypertensive crisis with 2 cases.

Conclusions: Children with hypertension are most commonly males and median of age was 8 years old. Hypertension is characterized by hypertension stage 2 and nephrotic syndrome as the most common etiology. Complications of hypertension appear in severe hypertension.

Keywords: Nephrotic syndrome, pediatric hypertension, secondary hypertension

Introduction

Hypertension is a disease that is more common in adults. The prevalence of hypertension in adults in Indonesia is very high reaching 26.5% of the total population.[1] The high percentage of that prevalence is indirectly caused by the increasing number of hypertension in children.[2] This is due to the tracking of hypertension from childhood to adulthood.[3] Furthermore, hypertension in children might cause serious complications such as Left Ventricular Hypertrophy (LVH) and Chronic Kidney Disease(CKD).[2] Estimated prevalence of hypertension in children is 1%.[4]

The diagnosis of hypertension in children is different from adults because the blood pressure in children is influenced by age, gender, and height.[2] Hypertension in children can be divided into two categories based on its etiology; which are primary hypertension and secondary hypertension. Secondary hypertension is more prevalent in children.[5] The most common causes of secondary hypertension in children are kidney and renovascular diseases.[2] Secondary hypertension in children is likely severe and requires accurate evaluation and treatment.[6]

Dr. Hasan Sadikin General Hospital Bandung is a referral hospital in the Province of West Java but there has not been any reports on the incidence of hypertension in there. Thus, the author was interested in determining characteristics of hypertension in children in Dr. Hasan Sadikin General Hospital Bandung, therefore it might be helpful in evaluating the incidence of hypertension in children.

Correspondence: Meilani, Faculty of Medicine, Universitas Padjadjaran, Jalan Raya Bandung-Sumedang Km.21, Jatinangor, Sumedang, Indonesia, Email: akumeilani@gmail.com

Methods

The study design used was a quantitative, descriptive cross-sectional study which was approved by the Ethical Committee of Dr. Hasan Sadikin General Hospital Bandung, number LB.02.01/C02/X/2015. The population in this study included the entire medical record ofpatients with hypertension who were admitted to the Inpatient Child Health Department at Dr. Hasan Sadikin General Hospital Bandung from the period January to December 2014. Data were collected from the period September to November 2015. Subjects selected fulfilled the inclusion criteria.

In this study, the inclusion criteria were the entire medical records of patients with hypertension who were admitted to the Inpatient Child Health Department at Dr. Hasan Sadikin General Hospital Bandung from the period January to December 2014 with completed and reliable data. Hypertension were diagnosed according to National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescent.[2] Secondary data from medical records were collected based on age and gender as demographic characteristics and astage of hypertension, etiology of hypertension, and emerge of its complications as clinical characteristics. Total sampling method was used during sampling.

Height percentile data according to Center fo Disease Control Growth Charts was included on measurement of hypertension in children. Persentil of Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) were determined by age, gender, and height percentile. Systolic blood pressure and DBP were taken from physical examination data from medical records. The diagnosis of hypertension was made when the average systolic blood pressure or diastolic blood pressure ≥95th percentile, assessed ≥3 times on different occasions. Hypertension was confirmed within the next two visits. Standards for SBP and DBP for infants younger than 1 year are available. In children younger than 1 year, SBP has been used to define hypertension.[2]

In this study, hypertension was divided into three categories, consisting of hypertension stage 1, hypertension stage 2, and hypertensive crisis. The hypertension stage 1 was characterized by blood pressure from the 95th percentile to the 99th percentile plus 5 mmHg. The hypertension stage 2 was characterized by blood pressure more than the 99th percentile plus 5 mmHg. Meanwhile, hypertensive crisis was characterized by systolic blood pressure >180mmHg or diastolic >120mmHg or any stage of hypertension complicated by hypertensive encephalopathy, heart failure,

Table 1 Distribution of Patients with Hypertension based on Age and Gender

Age	Male n = 58	Female n = 32	Total
0	0	1	1
1	0	1	1
2	3	2	5
3	5	1	6
4	3	1	4
5	3	0	3
6	7	4	11
7	8	4	12
8	3	0	3
9	5	5	10
10	6	5	11
11	6	1	7
12	4	2	6
13	5	**5**	10
Median(min-max)	7.5 (2-13)	9 (0-13)	8 (0-13)

Table 2 Distribution of Patients with Hypertension Based on Etiology and Stage of Hypertension

Hypertension Etiology	Hypertension I (n=28)	Hyperten-sion II (n=55)	Hypertensive crisis (n=7)	Total (n=90)
Nephrotic Syndrome				
Nephrotic Syndrome	13	14	0	27
Nephrotic Syndrome with CKD	3	7	1	11
Nephrotic Syndrome with AKI	1	1	0	2
Nephrotic Syndrome with Obesity	0	3	0	3
Total	17	24	1	43
Nephritic Syndrome				
Nephritic Syndrome	4	11	1	16
Nephritic Syndrome with CKD	1	0	0	1
Nephritic Syndrome with AKI	0	2	1	3
Total	5	13	2	20
CKD	2	14	3	19
AKI	0	2	1	3
Others	4	1	0	5

Note: *Chronic Kidney Disease (CKD), Acute Kidney Injury (AKI

or papilledema.[2] In this study, complications of hypertension in children were seen in the emerged of heart disease resulting from hypertension. Cardiorenal type IV were used as an indication for complications of hypertension.

The collected data were then categorized into appropriate categories. Subsequently, the collected data were tabulated to display the frequency of each category using a statistical program.

Result

In the period January to December 2014, there were 4,681 patients admitted to Inpatient Child Health Departmentat Dr. Hasan Sadikin General Hospital Bandung, out of which 90 (1.9%) children were found to be suffering from hypertension consisting of 58 males and 32 females. The median was used as the non-normal distribution of age in this study. The median (min–max) of age in this study was 8 (0–13) years (Table 1).

The hypertension group most commonly found were 55 cases of hypertension stage 2, followed by 28 cases of hypertension stage 1 and 7 cases of hypertensive crisis. This study also summed up the etiology of hypertension, such as 43 cases of nephrotic syndrome, 20 cases of nephritic syndrome, 19 cases of CKD, 3 cases of Acute Kidney Injury (AKI), and 5 cases of other diseases. Other diseases include Acute Lymphoblastic Leukemia (ALL), Coarctation Aorta and primary hypertension of unknown cause.

The result of this study also showed that there were other diseases along with nephrotic syndrome which may have caused hypertension, such as 11 cases of nephrotic syndrome with CKD, 2 cases of nephrotic syndrome with AKI, and 3 cases of nephrotic

Table 3 Distribution of Patients with Hypertension Based on Complications

Complication	Hypertension I	Hypertension II	Hypertensive Crisis
Yes	0	3	2
No	28	52	5

syndrome with obesity. Similarly, there were other diseases along with nephritic syndrome which may have caused hypertension, such as 1 case of nephritic syndrome with CKD and 3 cases of nephritic syndrome with AKI(Table 2). Based on complication of hypertension, there were 5 cases of hypertension complications, 3 of which were from hypertension stage 1 and 2 were from hypertensive crisis (Table 3).

Discussion

Other studies that indicated incidence rate of pediatric hypertension in Indonesia were Zainoel Abidin General District Hospital, Banda Aceh[7] (0.87%) and Dr. Sardjito General Hospital, Yogyakarta[8] (1.3%) with the respective period of research are five years. Meanwhile, in this study, there were 1.9% children suffering from hypertension. This increase may be due to the high incidence of obesity in children.[9] Blood pressure measurement in children are given slight importance by doctors. For instance, in this study, there were medical records that did not register blood pressure measurements of pediatric patients routinely. Some study showed about 71 % of doctors only measure blood pressure in children if the child is at risk to suffer from hypertension.[10] Furthermore, an increase in blood pressure in children is a risk of hypertension.[2] This makes hypertension in children underdiagnosed which in turn increases the occurrence in the future.

Based on gender, male patients (58) have higher incidence rate compared to female patients (32). This pattern is similar to the study done in Zainoel Abidin General District Hospital,Banda Aceh[7] and Dr. Sardjito General Hospital, Yogyakarta.[8] Other studies have also shown that hypertension is more prevalent in males compared to females.[11] The median of age in this study was 8 years old. The study done in Zainoel Abidin General District Hospital, Banda Aceh[7] used modus as a data centralization with age of 10−11 years old.

In this study, hypertension was divided into three categories, consisting of hypertension stage 1, hypertension stage 2 and hypertensive crisis, defined by National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescent.[2] There were more children suffering from hypertension stage 2 compared to hypertension stage 1, where there were 55 and 28 cases respectively. This result is consistent with the study conducted in Zainoel Abidin General District Hospital,Banda Aceh.[7] The emergence of hypertension stage 2 in children is associated with the incidence of secondary hypertension, whereas the hypertension stage 1 is associated with the incidence of primary hypertension.[2] This explains the high prevalence of hypertension stage 2 in children. Meanwhile, there were only 7 cases of hypertensive crisis in this study. This is in contrast to the study conducted in ZainoelAbidin General District Hospital, Banda Aceh[7] that showed hypertensive crisis was the most prevalent. Other studies mention that hypertensive crisis occur more frequently in children aged >6 years, ranging from 1−18 years old.[12] Therefore, hypertensive crisis cases are rarely found in this study because of the limited age range. This study indicated the severity of hypertension in children, as well as the importance of blood pressure measurement and the necessity of immediate treatment.

This study also summed up the common causes of hypertension, consisting of nephrotic syndrome with 42 cases, nephritic syndrome with 20 cases, CKD with 19 cases, AKI with 3 cases, and other diseases with 5 cases. The number of cases is quite different from the results found in Zainoel Abidin General District Hospital, Banda Aceh[7], where acute glomerulonephritis was the most common cause of hypertension. However, in those studies, the number of cases obtained for acute glomerulonephritisand nephrotic syndrome were similar, which were 16 cases and 13 cases respectively.[7] Acute glomerulonephritis is included in nephritic syndrome group in this study as it is considered as most of the acute symptoms of nephritic syndrome.[13] Nephrotic syndrome is a kidney disease that is most often found in the Inpatient Department of Child Health at Dr. Hasan Sadikin General Hospital in January to December 2014. In addition, this study included children treated with cyclophosphamide therapy which is an indicator for the treatment of nephrotic syndrome. This may be explained that the nephrotic syndrome as the most etiology of hypertension in this study. Nephrotic syndrome is also found with other diseases that can also cause hypertension, such as CKD, AKI and obesity. Besides, nephrotic syndrome may occur with AKI since AKI is known to be a common complication of nephrotic syndrome.14In this study, CKD was identified as the third most common cause of hypertension. Other studies mention that hypertension is a symptom that occurs in 70.2 % of cases of CKD.[15]

Drug-induced hypertension must

always be considered. Drugs that can raise BP include oral contraceptive, steroids, non-steroidal anti-inflammatory drugs, cocaine, amphetamines, erythropoietin and cyclosporins. Glucocorticoids were among the first drugs used in the treatment of ALL. Some studies mention that the incidence of hypertension in ALL patients was 14%.[16]

Children with hypertension are most commonly males and median of age was 8 years. Hypertension is characterized by hypertension stage 2 and nephrotic syndrome as the most common etiology. Complications of hypertension appeared in severe hypertension. These information can help doctors to evaluate the incidence of hypertension in children, so complications of hypertension can be avoided. Furthermore, it can enhance doctor's attention to measure blood pressure in children as vital component of the routine pediatric physical examination.

Limitation of this study included the short duration of the study which is of the period of 1 year. Hence, information regarding the incidence of hypertension in children at Dr. Hasan Sadikin General Hospital could not be described in more details. This is due to the lack of time that was allocated to the researcher for data collection. Besides, incompleted and misplaced medical records were one of the causes this study slightly less descriptive.

References

1. Kementerian Kesehatan RI. Riset kesehatan dasar. Jakarta: Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI;2013.
2. National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescent. The Fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescent. Pediatrics; 2004. p. 555–76.
3. Chen X, Wang Y. Tracking of blood pressure from childhood to adulthood: a systematic review and meta–regression analysis. Circulation. 2008;117(25):3171–80.
4. Lo JC, Sinaiko A, Chandra M, Daley MF, Greenspan LC, Parker ED, et al. prehypertension and hypertension in community-based pediatric practice. Pediatrics. 2013;131(2):415–24.
5. Gomes R, Quirino I, Pereira R, Vitor B, Leite A, Oliveira E, et al. Primary versus secondary hypertension in children followed up at an outpatient tertiary unit. Pediatr Nephrol. 2011;26(3):441–7.
6. Bajracharya P, Olivera M, Kapur G. Epidemiology of secondary hypertension in children. Current Cardiovascular Risk Reports. 2014;8(7):1–9.
7. Haris Syafruddin, Dimiati Herlina, Anwar M.Sidqi. Profil hipertensi pada anak di RSUD Dr. Zainoel Abidin Banda Aceh. Sari Pediatri. 2013;15(2):105–10.
8. Pungky AK, Damanik MP. Hipertensi pada anak di RS Dr. Sardjito Yogyakarta. Berita Kedokteran Masyarakat. 2006;22(3):124–7.
9. Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C et al. Global, regional and national prevalence of overweight and obesity in children and adults 1980–2013: a systematic analysis. Lancet. 2014;384(9945):766–81.
10. Bijlsma MW, Blufpand HN, Kaspers GJL, Bökenkamp A. Why pediatricians fail to diagnose hypertension: amulticenter survey. The Journal of pediatrics. 2014;164(1):173–7.e7.
11. Tran CL, Ehrmann BJ, Messer KL, Herreshoff E, Kroeker A, Wickman L, et al. Recent trends in healthcare utilization among children and adolescents with hypertension in the united states. Hypertension. 2012;60(2):296–302.
12. Yang W-C, Wu H-P. Clinical analysis of hypertension in children admitted to the emergency department. Pediatrics & Neonatology. 2010;51(1):44–51.
13. Kanjanabuch T, Kittikowit W, Eiam-Ong S. An update on acute postinfectious glomerulonephritis worldwide. Nat Rev Nephrol. 2009;5(5):259–69.
14. Mong Hiep T, Ismaili K, Collart F, Van Damme-Lombaerts R, Godefroid N, Ghuysen MS, et al. Clinical characteristics and outcomes of children with stage 3–5 chronic kidney disease. Pediatr Nephrol. 2010;25(5):935–40.
15. Wong H, Mylrea K, Feber J, Drukker A, Filler G. Prevalence of complications in children with chronic kidney disease according to KDOQI. Kidney Int. 2006;70(3):585–90.
16. Juliansen Andry, Andriastuti Murti, Pardede Sudung O, Sekartini Rini. Hypertension, high-dose corticosteroids, and renal infiltration in children with acute lymphoblastic leukemia. Paediatr Indones. 2014;54(6):372–6.