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Original Research

Risk factors affecting intradialytic hypertension in hemodialysis patients

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Abstract

Hemodialysis is a CKD therapy that functions as a kidney replacement. The side effect that often occurs when patients undergoing hemodialysis is intradialytic hypertension (HID), namely an increase in systolic blood pressure >10 mmHg during hemodialysis, due to an increase in cardiac output mediated by volume overload, especially in patients with excess body weight and cardiac dilatation. The objective of this research is to determine the risk factors that influence the occurrence of intradialytic hypertension in CKD patients undergoing hemodialysis at Tugurejo Hospital. Risk factors consist of age, duration of hemodialysis, Quick Blood (blood velocity), ultrafiltration (volume overload), URR. The design used in this research is analytic observational with a cross-sectional approach, the number of respondents is 53 people. The sampling technique used in this research is total sampling. The results showed that age (p-value = < 0.01), duration of hemodialysis (p-value = 0.07), quick blood (p-value = 0.06), ultrafiltration (p-value = 0.04), and URR (p-value = < 0.01) is a protective factor or risk factor for the incidence of intradialytic hypertension. Based on the Spearman rank test, it is known that p-value > means that there is a relationship between age, ultrafiltration and URR with the blood pressure of patients with chronic kidney failure. Age, ultrafiltration, and URR are protective factors or risk factors that influence the incidence of intradialytic hypertension.

INTRODUCTION

Chronic kidney disease (CKD) is progressive and irreversible kidney damage, which has lasted for 3 months or more, in the form of structural abnormalities of the kidney or impaired kidney function, with or without a decrease in the glomerular filtration rate, characterized by pathological abnormalities or signs of kidney damage, including abnormalities in blood or urine composition, or abnormalities in radiological evaluation, or a decrease in the glomerular filtration rate to less than 60 ml per minute/1.73 m2 with or without renal impairment.[1–3]

Hemodialysis is a CKD therapy that functions as a kidney replacement, performed 2-3 times a week with a duration of 4-5 hours. Hemodialysis aims to remove metabolic waste and correct fluid and electrolyte balance disorders. Hemodialysis is proven to be effective in removing fluids, electrolytes, and waste from the body's metabolism, thus indirectly extending the patient's life. Although hemodialysis is safe and beneficial for patients, it is not without

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side effects. The side effect that often occurs when patients undergo hemodialysis is intradialytic hypertension.[4,5]

Intradialytic hypertension (HID) is an increase in systolic blood pressure >10 mmHg during hemodialysis. Intradialytic hypertension occurs as a result of increased cardiac output mediated by volume overload, especially in overweight and dilated patients. In addition, during the hemodialysis process, endothelial dysfunction can occur which can significantly lead to hemodynamic changes. The process of ultrafiltration, mechanical factors, and pathological hypertension during hemodialysis causes a response in the form of synthesis of humoral factors by endothelial cells that affect blood pressure homeostasis.[6–8]

The incidence of chronic kidney disease undergoing hemodialysis is increasing every year. The Indonesian Renal Registry in 2018 recorded that there were 66,433 new patients and 132,142 active hemodialysis patients. Data on hemodialysis complications that are often the subject of discussion is intradialytic hypertension and is still the most complicated at 38%.[9]

The results of the preliminary study in December 2020 at the Hemodialysis Installation of the Tugurejo Hospital 87 patients were undergoing routine hemodialysis. From 15 hemodialysis patients per shift, on average there are 3-4 patients experiencing intradialytic hypertension. One of the efforts to prevent it is to know the risk factors for intradialytic hypertension.

Based on patient characteristics and the underlying pathophysiological mechanism: age, duration of hemodialysis, Quick Blood (QB), ultrafiltration, and urea reduction ratio are associated with the incidence of intradialytic hypertension, but there is still much debate about these factors.

METHODS

The design used in this research is analytic observational with a cross-sectional approach, the method is carried out to find correlations between independent variables and dependent variables by approach, observation, or data collection where the measurement of the variable is only done once a time (point time approaches). The population in this study were CKD patients who underwent hemodialysis from July – to August 2021 at the Tugurejo Hospital, Central Java Province. The sample in this study were 53 respondents using a sampling technique in the form of total sampling. Data were analyzed univariately and bivariately (spearmank rank).

RESULTS

The subjects in this study were 53 patients (table.1). Most of the respondents' gender is male with a total of 30 people (56.60%). There are slightly more male patients than female patients, this proportion is appropriate with the hemodialysis patient profile found in several other countries. The 2018 Indonesian renal registry noted that the number of patients undergoing hemodialysis based on gender was 57% male and 43% female.[9]

Table 1
Frequency Distribution of Respondents Based on Intradialytic Blood Pressure

Characteristics	f	%
Gender		
Male	30	56,60
Female	23	43,40
Total	53	100

Table 2
Relationship between Hemodialysis Duration, QB, Ultrafiltration, URR on Intradialytic Hypertension

Risk Factors	Incidence of Intradialytic hypertension		p	RP (IK 95%)
	Yes (%)	No (%)		
Age				
> 60	3 (5,7)	8 (15,1)	< 0,01	1,57 (-0,011 - 0,296)
≤ 60	18 (34,0)	24 (45,3)		
Duration				
≥ 4.30	18 (34,0)	22 (41,5)	0,07	1,95 (0,795 - 1,300)
< 4.30	3 (5,7)	10 (29,4)		
Qb				
≥ 200	19 (35,8)	31 (58,5)	0,06	0,57 (0,355 - 0,788)
< 200	2 (3,8)	1 (1,9)		
Ultrafiltration				
≥ 2500	13 (24,5)	17 (32,1)	0,04	1,25 (0,406 - 0,832)
< 2500	8 (15,1)	15 (28,3)		
URR				
≥ 65	17 (32,1)	26 (45,3)	< 0,01	0,91 (0,575- 0,949)
< 65	4 (9,4)	6 (11,3)		

DISCUSSION

Based on the data obtained (table.2), intradialytic hypertension was found in 21 (39.6%) of the study subjects. This is appropriate with data from the Indonesian Renal Registry, 2018, which states that intradialytic hypertension is still the most complicated, namely 38%.[9] Furthermore, an analysis was conducted on several factors that may be associated with the incidence of intradialytic hypertension in chronic kidney disease patients undergoing hemodialysis.

Age

The results of the study showed that most of the subjects with intradialytic hypertension were <60 years old. These results differ from those of Inrig et al.[10] Who found that the majority of subjects with intradialytic hypertension were 60 years of age. The results of statistical tests with a 95% confidence level showed that there was a statistically significant relationship between age and the incidence of intradialytic hypertension (p-value: < 0.01). In addition, the Prevalence Ratio (RP) =1.57 with a 95% confidence interval (-0.011 - 0.296) can be concluded that age is one of the factors that has a 1.57 chance of experiencing intradialytic hypertension.

Theoretically, the incidence of hypertension, in general, is more common at a young age because at an advanced age it is associated with comorbid diseases such as heart failure and high drug therapy for hypertension, resulting in many cases of hypotension. If it is associated with the pathophysiological theory of intradialytic hypertension regarding the loss of antihypertensive drugs during the hemodialysis process and the presence of endothelial dysfunction which is common in the elderly, the elderly are more likely to experience intradialytic hypertension.[8,11]

Hemodialysis duration

The results of the research analysis showed that more than half of the patients who were respondents in this study were in the group performing hemodialysis for >4.30 hours, namely 18 people (34%). The results of statistical tests with a 95% confidence level showed no statistically significant relationship between the duration of hemodialysis and the incidence of intradialytic hypertension (p-value:0.07). This shows that the duration of

hemodialysis does not affect the incidence of intradialytic hypertension.

This is in line with Luluk Ulya's research (2020) which concluded that there was no relationship between the duration of hemodialysis and the blood pressure of patients with chronic kidney failure in the Hemodialization Room of RSI Pati (p-value :0.624). This shows that a person does not always experience changes in blood pressure after hemodialysis, because other factors can maintain a person's blood pressure, one of which is blood viscosity (blood viscosity). During hemodialysis and after hemodialysis, if proper monitoring is carried out during the fluid withdrawal process, it can maintain blood pressure.[12]

Quick Blood (QB)

The incidence of intradialytic hypertension mostly had quick blood of more than 200 ml/minute. 19 (35.8) patients, with an average QB of 275 ml/minute. Patients with Chronic Kidney Disease Stage 5 all had a quick dialytic of 500 ml/minute. The results of the 95% CI statistical test showed that there was no significant relationship between blood velocity and the incidence of intradialytic hypertension (p-value: 0.06). This shows that blood velocity (QB) does not affect the incidence of intradialytic hypertension.

Ultrafiltration

Based on fluid withdrawal/ hemodialysis ultrafiltration, 13 (24.5) patients underwent ultrafiltration of more than 2500 ml. The results of statistical tests with a 95% confidence level showed that there was a statistically significant relationship between hemodialysis ultrafiltration and the incidence of intradialytic hypertension (p-value:0.04). In addition, the obtained Prevalence Ratio (RP) = 1.25 with a 95% confidence interval (0.406-0.832) it can be concluded that ultrafiltration is one of the factors that has a 1.25 chance of experiencing intradialytic hypertension.

These results are consistent with the study of Inrig et al. who found that patients with intradialytic hypertension are likely to experience chronic volume overload due to a large and unexpected increase in vascular resistance that causes an increase in blood pressure during dialysis. Body fluids removed during ultrafiltration affect volume. Preload volume preload of the heart that affects blood pressure during hemodialysis. [10,13]

Urea Reduction Rate

Based on the value of renal urea ratio as many as 17 patients with URR >65. The results of statistical tests with a 95% confidence level showed that there was a statistically significant relationship between URR and the incidence of intradialytic hypertension (p-value:>0.01). In addition, the Prevalence Ratio (RP) = 0.91 with a 95% confidence interval (0.575-0.949) can be concluded that URR is one of the factors that has a 0.2 chance of experiencing intradialytic hypertension. Contrary to the results. Based on the results of this study, most of the subjects with intradialytic hypertension had a URR of 65%.[8] The URR was used to evaluate the adequacy of hemodialysis which was known to be associated with cardiovascular complications. The minimum target URR according to the NKF K/DOQI standard for hemodialysis less than 5 hours is 65%. The condition of uremia in CKD patients on hemodialysis is related to volume overload and abnormal calcium and phosphate metabolism.

Based on the hypothesis test with 95% CI, it can be concluded that age, ultrafiltration, and URR are protective factors or risk factors that influence the incidence of intradialytic hypertension. This is due to the fulfillment of statistical test values (p-value) and clinical trials (prevalence ratio and confidence level).

Weaknesses of this research include the methodology used to collect data, namely

analytical observation with a cross-sectional approach. The research will be more optimal if observations are carried out regularly. In addition, researchers have not controlled for other variables that can affect the incidence of intradialytic hypertension such as cardiac dilatation, serum catecholamine levels, serum renin, serum electrolytes, and dry body weight due to limited funds. Research with a larger number of samples and a better research design is expected to complete this research.

CONCLUSION

Based on the results of the study, intradialytic hypertension was found in 21 (39.6%) of the study subjects. Based on the hypothesis test with 95% CI, it was concluded that age, ultrafiltration, and URR are protective factors or risk factors that influence the incidence of intradialytic hypertension. Suggestions for nurses Dialysis settings can be seen from various factors such as age, speed of dialysis, ultrafiltration, duration of hemodialysis, the right URR for each patient can provide comfort and reduce intradialytic complications.

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REFERENCES

1. Suharyanto T MA. Asuhan Keperawatan Pada Klien Dengan Gangguan Sistem Perkemihan. TIM, editor. Jakarta; 2009.
2. Suwitro K. Buku Ajar Ilmu Penyakit Dalam. IV. Setiasi S, Alwi I, Sudoyo AW SM, editor. Jakarta; 2014. 2061–7 p.
3. Levey AS, Coresh J, Bolton K, Culleton B, Harvey KS IT et al. K/DOQI clinical practice guidelines for chronic kidney disease: Evaluation, classification, and stratification. Am J Kidney Dis. 2002;39:S1–266.
4. Hidayati Wahyu. Metode Perawatan Pasien Gangguan Sistem Perkemihan : Aplikasi Konsep Orem " Self - Care Defisit" Dan Studi Kasus. Jakarta: Kencana; 2013.
5. Lazuardi N. Pengaruh intervensi support group terhadap kualitas hidup pasien penyakit ginjal kronis yang menjalani hemodialisa. 2016;1–80.
6. Armiyati Y. Hipotensi dan hipertensi intradialisis pada hemodialisis di yogyakarta. 2010;1–9.
7. Ferdinan D, Suwito J, Padoli. Faktor-Faktor Yang Mempengaruhi Hipertensi Intradialitik Pada Klien Gagal Ginjal Kronik Yang Menjalani Terapi Hemodialisis Di Rsi Jemursari Surabaya. J Keperawatan. 2019;XII:30–9.
8. Naysilla A, Partiningrum D. Faktor Risiko Hipertensi Intradialitik Pasien Penyakit Ginjal Kronik. J Kedokt Diponegoro. 2012;1:115925.
9. Pernefri. 11th Report Of Indonesian Renal Registry 2018. Indones Ren Regist. 2018;1–46.
10. Liani NA. Hubungan Penambahan Berat Badan Interdialisis Dengan Hipertensi Intradialisis Pada Pasien Penyakit Ginjal Kronik yang Menjalani Hemodialisis di RSD Dr. Soebandi. Skripsi Prodi Pendidik Dr Univ Jember. 2016;
11. Tajili R, Ridwan A, Garina L. Faktor-Faktor Risiko Hipertensi Intrahemodialisis pada Pasien Gagal Ginjal Kronis Stadium 5 di RSUD Al-Ihsan Bandung. 2020;510–5.
12. Ulya L, Krisbiantoro P, Hartinah D, Karyati S. Hubungan Durasi Hemodialisa dengan Tekanan Darah Pasien Gagal Ginjal Kronik di Ruang Hemodialisa RSI PATI. Indonesia Jurnal Perawat. 2020.
13. Nuriya Nuriya. Effect Ultrafiltration Rate On Blood Pressure Chronik Kidney Disease Patient During Hemodyalisis: A Literature Review. 2019;1:77–8.