Artikel 11

A. **Judul: Risk Factor of Early Death in Diabetic Terminal Renal Failure Patients Receiving Hemodialysis**
B. **Cover**

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Risk Factor of Early Death in Diabetic Terminal Renal Failure Patients Receiving Hemodialysis

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Abstract

Early death in terminal renal failure disease is mortality from all causes in first 3 months (90 days) after being started dialysis, especially patient with high risk end stage renal disease including history of Diabetes Mellitus (DM). Around 10% from adult people population are diagnosed chronic kidney disease and 12.6%-32% of all mortality rates in first year in dr. Soetomo Hospital has DM history and has risk to suffer from early death. This study aimed to analyze risk factors for early death in diabetic terminal renal failure patients receiving hemodialysis. This study was conducted for 4 months (September to December 2018) in dr. Soetomo Hospital, Surabaya. Affordable population of terminal renak failure patient with DM history who underwent hemodialysis for the first time in Regional Public Hispital of dr. Soetomo Hospital in January 2015 to December 2017. Sampling techniques used was total sampling (211 patients). Data were collected from medical records, then analyzed by using logistic regression test. The determinants of early death in diabetic terminal renal failure patients receiving hemodialysis were poor nutritional status, pleural effusion, sepsis, metabolic acidosis, and intra HD complication.

***Keywords**: Early death, Terminal renal failure, DM history, Hemodialysis*

Introduction

Diagnosis of End Stage Renal Disease (ESRD) or Terminal Renal Failure means patient with kidney disease in end stage and becomes a death penalty[(1)]. Chronic DM becomes dominant etiology in a late stage kidney disease in developed countries and showed similar trend in developing countries[(2)].

Moreover, chronic kidney disease places in 27th rank in list of mortality causes in the world in 1990 even it increases to be 18th rank in 2010[(3),(4)]. In United States, it is noted that 15% of adult people are estimated to suffer from chronic kidney disease. Prevalence of chronic kidney disease to adult people who are 18 years old or more in United Stated shows that it is estimated if this disease is occurred more to female (16%) rather than male (13%)[(5)]. Data of kidney disease in Indonesia is obtained from result of Basic Health Research 2013, which showed that in population of age ≥15 years was diagnosed chronic kidney disease in 0.2%. The prevalence increased as long as the people got older with quite significant increase in group of 35-44 rather than 25-34 years old. Data of chronic kidney disease in Indonesia that was obtained from Indonesian Renal Registry (IRR) 2015 showed that the final stage/ terminal has the largest proportion (89%) and those who experience premature death increased by 39% in 2016 compare to previous year[(1)]. Furthermore, East Java placed in second rank after West Java with total of new patients of renal failure in 4139 patients with prevalence of chronic kidney disease in 0.3 % higher than national prevalence, which was 0.2%[(6)]. Report from Public Health Office of East Java Province in second quarter in 2017 showed that total of chronic kidney disease patient in Surabaya City that was recorded was 2059 patients and it increased from previous year, which in 2016, there were 1984 patients and it was the first rank from District or City in East Java.

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However, mortality cause from terminal/end stage renal disease patient generally was cardiovascular disease and comorbidity cause was infection[7]. The mortality cause to hemodialysis patient included cardiovascular (44%), cerebrovascular (8%), gastrointestinal bleeding (3%), sepsis (16%), other causes (6%) and unknown causes (23%). The mortality cause was different which meant to the length of life for various mortality causes, particularly for cardiovascular disease and cerebrovascular disease[1].

The impact that was faced by terminal renal failure patient could cause anemia, infection, low calcium levels and high phosphorus levels in blood, high potassium levels (hyperkalemia), loss of appetite, extra fluid in the body that caused high blood pressure, swelling in legs, or short breath due to fluid in the lung (pulmonary edema), depression, or lower quality of life[5]. Risk factor of old age, having cardiovascular disease history before, and/ or diabetes, hypertension, disorders of Ca-P metabolism, anemia, high CRP levels with hypoalbuminemia, ventricular hypertrophy, and renal dysfunction influenced against mortality of end stage renal disease patient[7].

The increase of terminal renal failure patient total in Indonesia, including East Java, needed either availability of unit services / hemodialysis installations or peritoneal dialysis therapy and kidney transplants to survive. The availability of hemodialysis service that was added continuously and improved its quality could make easier the access for patients wherever they domiciled. Hemodialysis service with the progress in treatment recently enabled patient to survive longer than before. Nevertheless, the result of treatment was depended on the patient if without being analyzed or kidney transplants and comorbidity which were suffered by chronic kidney disease patient, hence, the mortality would be occurred[8]. Furthermore, this study aimed to analyze risk factors for early death in diabetic terminal renal failure patients receiving hemodialysis.

Method

This study was conducted for 4 months (September to December 2018) in dr. Soetomo Hospital, Surabaya. Affordable population of terminal renak failure patient with DM history who underwent hemodialysis for the first time in Regional Public Hispital of dr. Soetomo Hospital in January 2015 to December 2017. Sampling techniques used was total sampling (211 patients). Data were collected from medical records. The type of data were categorical, so presented in the form of frequency and percentage[9], then analyzed by using logistic regression test.

Findings

Chi Square test was conducted in order to investigate the correlation among age, sex, nutritional status, comorbidity and complication (hypertension, heart disease, uremia, pleural effusion, anemia, sepsis, hyperkalemia, metabolic acidosis), HD regularity, smoking history, intra-HD complications (shock) against early death in diabetic terminal renal failure patients receiving hemodialysis.

Table 1. Correlation between Variables and Early Death in Diabetic Terminal Renal Failure Patients Receiving Hemodialysis

Variable	Category	Early Death in Diabetic Terminal Renal Failure Patients Receiving Hemodialysis				p-value	PR (CI95%)
		Died		Survived			
		n	%	n	%		
Age	< 55 years old	34	33.33	68	66.67	0.365	
	55-64 years old	32	35.96	57	64.04		
	≥ 65 years old	10	50.00	10	50.00		

Cont ... **Table 1. Correlation between Variables and Early Death in Diabetic Terminal Renal Failure Patients Receiving Hemodialysis**

Sex	Male	38	35.85	68	64.15	1.000	0.991 (0.691-1.419)
	Female	38	36.19	67	63.81		
Nutritional Status	Poor	56	55.45	45	44.55	0.000	3.050 (1.977-4.703)
	Good	20	18.18	90	81.82		
Hypertension	Yes	50	39.37	77	60.63	0.271	1.272 (0.808-2.597)
	No	26	30.95	58	69.05		
Heart Disease	Yes	29	63.04	17	36.96	0.000	2.213 (1.595-3.072)
	No	47	28.48	118	71.52		
Uremia	Yes	28	36.36	49	63.64	1.000	1.015 (0.700-1.473)
	No	48	35.82	86	64.18		
Pleural Effusion	Yes	28	47.46	31	52.54	0.046	1.503 (1.053-2.146)
	No	48	31.58	104	68.42		
Anemia	Yes	64	43.24	84	56.76	0.001	2.270 (1.321-3.902)
	No	12	19.05	51	80.95		
Sepsis	Yes	49	61.25	31	38.75	0.000	2.972 (2.035-4.339)
	No	27	20.61	104	79.39		
Hyperkalemia	Yes	47	48.96	49	51.04	0.001	1.941 (1.334-2.825)
	No	29	25.22	86	74.78		
Metabolic Acidosis	Yes	57	50.89	55	49.11	0.000	2.652 (1.702-4.131)
	No	19	19.19	80	80.81		
HD regularity	Poor	43	47.78	47	52.22	0.003	1.752 (1.219-2.517)
	Good	33	27.27	88	72.73		
Smoking history	Yes	28	37.33	47	62.67	0.884	1.058 (0.730-1.553)
	No	48	35.29	88	64.71		
Intra HD Complications (Shock)	Yes	34	77.27	10	22.73	0.000	3.073 (2.261-4.176)
	No	42	25,15	125	74,85		

Table 2. Result of Logistic Regression Test

Variable	Category	B	Sig	PR	(CI-95%)
Nutritional Status	Poor	1.100	0.005	3.050	1.977-4.703
	Good*	-	-	-	-
Heart Disease	Yes	0.744	0.089	-	-
	No*	-			
Pleural Effusion	Yes	0.868	0.035	1.503	1.053-2.146
	No*	-		-	-
Anemia	Yes	0.136	0.787		
	No*	-			

Cont ... **Table 2. Result of Logistic Regression Test**

Sepsis	Yes	1.429	0.000	2.972	2.035-4.339
	No*	-		-	-
Hyperkalemia	Yes	0.462	0.225	-	-
	No*	-			
Metabolic Acidosis	Yes	1.336	0.001	2.652	1.702-4.131
	No*	-		-	-
HD Regularity	Poor	0.342	0.378	-	-
	Good*	-			
Intra HD complication (Shock)	Yes	1.856	0.000	3.073	2.261-4.176
	No*	-		-	-

*=comparer

Based on table 2, the determinants of early death in diabetic terminal renal failure patients receiving hemodialysis were poor nutritional status, pleural effusion, sepsis, metabolic acidosis, and intra HD complication.

Discussion

Influence of Nutritional Status on Early Death in Diabetic Terminal Renal Failure Patients Receiving Hemodialysis

Poor nutritional status was one of risk factors of early death in diabetic terminal renal failure patients receiving hemodialysis. Poor nutritional status to terminal renal failure patient who underwent hemodialysis (HD) could be caused by patient's condition with hypoalbumin in long time. Besides, non optimal therapy really correlated directly with the increase of mortality[1]. Result of this study showed nutritional status became dominant/ main risk factor that influenced early death in diabetic terminal renal failure patients receiving hemodialysis.

This could be caused by restriction impact on protein intake that was conducted in order to reduce urea accumulation that was from protein catabolism. Besides, it was occurred a change of amino acid metabolism that was formed in kidney as an impact from the chronic kidney disease such as arginine, serine, and tyrosine[10]. Furthermore, this research was in accordance with result of conducted research by Lukowcky, et al.[11] who stated that mortality risk of HD patient for first 6 months was mostly occurred in 80%, particularly in first 2 months and its one third was caused by central catheter and hypoalbuminemia <3.5 g/dL which were in one third from all mortalities in first 90 days.

Influence of Pleural Effusion Comorbidity on Early Death in Diabetic Terminal Renal Failure Patients Receiving Hemodialysis

Pleural effusion comorbidity was one of risk factors of early death in diabetic terminal renal failure patients receiving hemodialysis. This was caused by urinary stasis in end stage renal disease patient that could undergo extra Na^+ and water which were caused by loss of the excretion route for salt and water through the kidneys. This study result showed that pleural effusion comorbidity became main/ dominant factor in influencing early death in diabetic terminal renal failure patients receiving hemodialysis.

Moreover, this could be caused by extra fluid that could be accumulated as effusion, such as pleural effusion or ascites and caused a difficulty for breathing. Pulmonary edema could be heard by stethoscope as a fine crack while inspiration[12]. This study was in accordance with conducted research by Bisenbach[13] who stated that most of early death in HD patient was after began dialysis that underwent pleural effusion and fluid hyperhidration in the lungs which caused the severity of myocardial failure.

Influence of Sepsis Comorbidity on Early Death in Diabetic Terminal Renal Failure Patients Receiving Hemodialysis

Infection that caused sepsis was a main cause for the increase of morbidity and mortality to the patient with end stage renal disease through chronic hemodialysis therapy. This study result showed that sepsis comorbidity influenced early death in diabetic terminal renal failure patients receiving hemodialysis. In this study, sepsis comorbidity became main/ dominant risk factor with prevalence of early death in more than 3.07 rather than in respondent who did not have sepsis comorbidity. This was caused by worse multifactor inflammation[7].

Chronic kidney patient with septicamia had risk of mortality twice from any causes and the increase of risk to be five times even nine times of mortality due to septicamia. Moreover, septicamia caused high increase of mortality risk. Besides, it was often occurred to peritoneal dialysis patient and hemodialysis patient[14]. This study was in accordance with conducted research by Powe[14] in Maryland United States who stated that sepsis influenced early death in hemodialysis patient of end stage renal disease.

Influence of Metabolic Acidosis Complication on Early Death in Diabetic Terminal Renal Failure Patients Receiving Hemodialysis

Proportion of early death diabetic terminal renal failure patients receiving hemodialysis increased more to the patient who underwent metabolic acidosis rather than who did not undergo metabolic acidosis. Result of this study showed metabolic acidosis complication became main/ dominant factor to influence early death in diabetic terminal renal failure patients receiving hemodialysis.

This was due to acid entry or loss of chemical base in bicarbonate form. Chronic kidney disease caused phosphate, sulfate and organic anion retention. Firstly, bicarbonate was as a buffer, then, it was followed by bone and intracellular buffer[12].

Influence of Intra HD Complication on Early Death in Diabetic Terminal Renal Failure Patients Receiving Hemodialysis

Proportion of early death diabetic terminal renal failure patients receiving hemodialysis increased more to the patient who underwent shock rather than who did not undergo shock because patient who did hemodialysis could undergo chronic and acute complications. Movement in blood out of circulation into the dialysis circuit could cause hypotension[12]. Result of this study showed intra HD complication (shock) became main/ dominant factor that influenced early death in diabetic terminal renal failure patients receiving hemodialysis.

This could be caused by very aggressive preliminary dialysis that could cause disequilibrium (imbalance) of dialysis. Moreover, it was as an impact of osmotic changes in brain when plasma urea levels reduced. This incidence caused shock which its effects were various from nausea and headache until convulsions and coma, even death[12]. Therefore, it needed to evaluate regularly to the pre HD patient, even during undergoing HD through identifying factors that could influence shock as a preventive action and doing approriate management.

Conclusion

Result that was obtained in this research could be used for health officers for early detection and evaluation for pre HD patient based on classification of risk factors, particularly for patient who had poor nutritional status, comorbidity and complication (pleural effusion, sepsis, metabolic acidosis), and who underwent intra HD complication (shock) as preventive action and appropriate management against the incidence of early death.

Additional Informations

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