

# Mortality of Hemodialysis Patients with Comorbidities at RSUP Prof Dr R.D Kandou, Manado, North Sulawesi

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## ABSTRACT

**Background:** Hemodialysis is a process in renal replacement function. Comorbid is one of the contributing factors for the high mortality among hemodialysis patients. **Objective:** To determine the correlation between comorbidities and duration of HD treatment and the effect of HD treatment duration on mortality rates in chronic kidney disease mortality patients undergoing hemodialysis. **Methods:** A retrospective cohort study was conducted in this study. This study included Hemodialysis patients with comorbid HD patients (DM, Hypertension and Congestive Heart disease) who died in 2018. The HD population was 560 patients (n=84) using convenience sampling method. The analysis was carried out using the Chi Square test and the Kruskal Wallis and Mann-Whitney test. Certificate of Ethical Eligibility from the Health Research Ethics Committee of RSUP DR R.D Kandou Manado no: 064/EC/KEPK-KANDAU/VII/2020. **Results:** The results of treatment were of 0-24 months (40.5 %), 25-48 months (33.3%) and > 48 months (26.2 %). The analysis showed a significant correlation between the duration of HD treatment and comorbidities in CKD patients undergoing HD, namely comorbid DM after HD (p=0.002), hypertension after HD (p=0.010), congestive heart failure after HD (p=0.003), with 2 comorbidities (p=0.048), and 3 comorbidities (p=0.011). Besides, the effect of the duration of HD treatment on the mortality rate is known that the duration of treatment >48 months gives a lower mortality rate with an average treatment time of 360 days. **Conclusion:** HD patients with the duration of treatment of 0-12 months died the most than the duration of treatment >25- 48 months. There was a significant correlation between Comorbid-3 and the duration of HD treatment in CKD patients (p=0.011).

**Keywords:** Chronic kidney disease, comorbid conditions, Hemodialysis, Mortality

## 1. INTRODUCTION

Hemodialysis is a kidney replacement process<sup>[1]</sup> Based on the results of 2013 Basic Health Research, the prevalence of the Indonesian population diagnosed with chronic kidney disease by health workers was 0.2%, and the highest prevalence was in Central Sulawesi at 0.5%, followed by Aceh, Gorontalo, and North Sulawesi with 0.4% respectively.<sup>[2]</sup>

Diabetes and hypertension are the main causes of hemodialysis<sup>[3][4]</sup>. Recently, not only has the prevalence of hemodialysis increased, and so has the mortality on hemodialysis. One of the factors causing the increase in mortality is comorbidity<sup>[5]</sup>: including Atherosclerosis Cardiovascular Disease (ACVD),

Congestive Heart Failure (CHF), hypertension, diabetes mellitus (DM), and cognitive disorders, where these comorbidities are one of the risk factors for death<sup>[6]</sup>.

Elderly patients ( $\geq 65$  years) suffered from CKD have more comorbidities than younger patients<sup>[7]</sup>. CKD patients older than 65 years have a two-fold greater risk of mortality. The main causes of death are cardiovascular disorders (34.2%) and infections (13.8%), which are more common in the elderly<sup>[8]</sup>.

Cardiovascular disease is one of the contributing factors to the high mortality among hemodialysis patients<sup>[18]</sup>. Besides that, some of those patients died from hepatitis infection<sup>[19]</sup>.

**2. METHODS**

This study used a retrospective study, cohort design. The sample amounted to 84 respondents selected using convenience sampling. The research instrument used were secondary data taken from the medical records of RSUP Prof Kandou, Manado, North Sulawesi, which consisted of:

**Criteria for Inclusion**

- a. Sex
- b. Age >26 years
- c. HD patients who died at RSUP Prof Dr, R. D. Kandou, Manado, North Sulawesi
- d. Patients diagnosed with chronic kidney disease with GFR <15ml/min/1.72m<sup>2</sup>
- e. Duration of hemodialysis treatment (0-24 months, 25-48 months, >48 months)
- f. Comorbidities (DM, Hypertension, Heart, 2 Comorbid, 3 Comorbid)

**Criteria for Exclusion**

- a. Patients with acute kidney disease with GFR value of >30ml/min/1.73m<sup>2</sup>
- b. Incomplete medical records

Data analysis was carried out with Chi Square test and the Kruskal Wallis and Mann-Whitney test. Prior to conducting the research, was obtained ethical clearance from the Health Research Ethics Commission, RSUP PROF DR. R.D. Kandou Manado.

**3. RESULTS AND DISCUSSION**

Based on Table 1. Based on socio-demographic data, based on sex, respondents were by female numbered 50 people (59.5%), based on age, most respondents are at the age of 26-45 years amounting to 34 people (40.5%), and the most high school graduates of 64 people (61.9%). Moreover, based on employment status, most respondents were as civil servants of 30 people (35.7%). Productive people died the most.

Based on Table 2. It is known that there were 84 respondents who underwent hemodialysis treatment for >48 months. For comorbidities DM total before HD 51.2 % and after 34,1% and comorbidities

hypertention total before HD 59.0% and after 45% of whom died.

**Table 1.** Frequency Distribution of Respondents Characteristics

Variables	Frequency	Percentage (%)
Sex		
a. Male	34	40.5
b. Female	50	59.5
Age		
a. 26 – 45 years	34	40.5
b. 46 – 65 years	30	35.7
c. > 65 years	20	23.8
Education		
a. High School	64	61.9
b. Higher Education	20	23.8
Occupation		
a. Unemployed	16	19.0
b. Farmer	10	11.9
c. Civil Servant	30	35.7
d. Private Employee	12	14.3
e. Entrepreneur	14	16.7
f. Trader	2	2.4

**Table 2** Correlation between Treatment Duration (HD) with Comorbidities Diabetes Mellitus, Hypertension, before and After Undergoing HD

Duration of HD Treatment	Frequency	Percentage (%)
a. 0-24 months	34	40.5
b. 25-48 months	28	33.3
c. >48 months	22	26.2

**Table 3** Correlation between Treatment Duration (HD) with Comorbidities (DM), Hypertension, Congestive Heart After Undergoing HD

Comorbidities	HD Treatment Duration (mth)						Total	P value
	0-24		25-48		>48			
	F	%	F	%	F	%		
Diabetes Melitus before HD								0.018
a. Yes	5	29.4	8	30.8	21	51.2	34	
b. No	12	70.6	18	69.2	20	48.8	50	
Diabetes Melitus after HD								
a. Yes	2	11.7	6	23.0	14	34.1	22	0.023
b. No.	15	88.3	20	77.0	27	65.9	62	
Hypertension before HD								
a. Yes	6	42.8	10	38.4	26	59.0	42	
b.No	8	57.2	16	61.6	18	41.0	42	0.048
Hypertension after HD								
a. Yes	2	35.7	7	27.0	20	45.4	29	
b. No.	12	64.3	19	73.0	24	54.6	55	
With 2 comorbidity								0.011
a. Yes	6	42,9	5	35,7	3	21,4	14	
b.No	11	39,3	9	32,1	8	28,6	28	
With 3 comorbidity								0.011
a. Yes	11	55,0	8	40,0	1	5,0	20	
b. No	6	27,3	6	27,3	10	45,5	22	

Based on Table 3 above, it is known that the P-value for comorbid DM, hypertension, and congestive heart value is more than  $<0.05$ , indicating a significant correlation between comorbidities after undergoing HD and the duration of HD treatment. Based on research by (Fitriana et al, 2012)<sup>[9]</sup>, patients with kidney disease who at the same time had CHF who died were 17 patients (34%)<sup>[9]</sup>. Based on data from the Report of Indonesian Renal Registry (2015)[14] the most common cause of death in hemodialysis patients is cardiovascular, as much as 44% [14]. Kidney disease patients with Chronic Heart Failure (CHF) have a 4.636 times higher risk of death than those of with chronic kidney disease with no CHF. This study has conformed the research (Enon et al, 2005) [15],

which states that heart disease is the main cause of morbidity and premature death in chronic kidney disease. Heart disease (cardiovascular) is a disease with the most potential to cause death in patients with chronic kidney disease. Patients with chronic kidney disease are at risk for heart failure, which is preceded by anemia. Until now, heart disease is still a disease that causes death in patients with chronic kidney disease<sup>[10]</sup>.

Based on Table 3. It is known that the P-value for 2 comorbidities is less than  $\alpha = 0,05$ , which is 0.048, and the P-value for 3 comorbidities is less than  $\alpha = 0,05$ , which is 0.011, which indicate a significant correlation between 2 comorbidities and 3 comorbidities with the duration of HD treatment. In a study conducted by (Sathvik, et al 2010)<sup>[16]</sup>, it was found that most hemodialysis patients had 2 comorbidities, including hypertension and DM, as well as hypertension and hepatitis, and hemodialysis patients had 3 comorbidities, such as hepatitis, hypertension, and heart disease. More comorbidities that hemodialysis patients have will affect physical function.

Based on the results of this study, there were patients with 2 types of comorbidities, namely (hypertension and DM), (hypertension and congestive heart failure), (hypertension and ARI), (hypertension and gout) as well as patients with 3 types of comorbidities, namely (hypertension, congestive heart failure, and pneumonia), (hypertension, congestive heart and gout), (hypertension, congestive heart, and DM), (hypertension, gout, and DM).

Based on data from the Report of Indonesian Renal Registry (2015) [14], hypertension is still the most common comorbid disease, which can be explained that whatever the underlying disease, if it is CRF then hypertension generally occurs because in the etiology or basic disease of CRF patients, hypertension with code E4 ranks first as much as 36%, so the results of research conducted show that almost all patients have hypertension[14].

**Table 4.** Effect of Treatment Duration with Mortality Based on HD Treatment Time

HD Treatment Duration (Months)	Mortality Based on HD Treatment Time *		
	Average	±	SD
0-24	51	±	36.27 <sup>a</sup>
25-48	97	±	83.05 <sup>a</sup>
>48	360	±	166.66 <sup>b</sup>

Based on Table 4., using the Kruskal Wallis and Mann-Whitney test, it is known a significant effect of the duration of HD treatment on the death of the respondents in terms of treatment time. This is evidenced by the average value of death based on treatment time that the duration of treatment >48 months gives the respondent's average death is on the 360<sup>th</sup> HD treatment, therefore, indicating that treatment >48 months provides a lower mortality rate than other treatment durations. Based on research conducted by (Fitriana et al, 2012)<sup>[9]</sup>, it was obtained P-value 0.028 <0.05, confirming a correlation between the duration of hemodialysis with the death of patients with chronic kidney disease. Patients who underwent hemodialysis for less than 45 weeks had a 2,455 times risk of death compared to patients who underwent hemodialysis for more than 45 weeks<sup>[9]</sup>. The longer the hemodialysis is undergone, the better the survival. This proves that the longer the patient undergoes hemodialysis, the lower the risk of death. This is because in patients who died, they entered hospital when their condition was already severe and had comorbidities such as heart failure, diabetes mellitus, hypertension and diabetic nephropathy, which were risk factors for death in patients with chronic kidney disease<sup>[17]</sup>.

**4. CONCLUSION**

In HD treatment, patients with socio-demographic data, based on sex, the patients most died were female of 59.5%, age 26-45 years of 40.5%, high school graduates of 61.9%, working as civil servant of 35.7%. Productive people died the most. Duration of HD in patients who died the most was >48 months (more than four years).

Average HD treatment of the death of respondents was at 360 days. There was a correlation between comorbid disease and duration of treatment P-value < 0.05

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