• pISSN: 2085-1545
• eISSN: 2339-093X

Sains Medika Journal of Medicine and Health

http://jurnal.unissula.ac.id/index.php/sainsmedika

RESEARCH ARTICLE

Death in Patients with Regular Hemodialysis Due to CKD in RSUD Dr. Soedono Madiun Not Correlated to Various Risk Factors

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ABSTRAK

Pendahuluan: Pasien yang menjalani hemodialisa secara regular akibat *Chronic Kidney Disease* (CKD) mengalami peningkatan risiko kematian dalam 2 dekade terakhir. Berbagai faktor risiko yang diangap berpengaruh antara lain umur, jenis kelamin, lama menjalani hemodialisis, durasi hemodialisis, dan komorbid yang menyertai penderita. **Tujuan:** Untuk mengidentifikasi faktor risiko kematian penderita *Chronic Kidney Disease* (CKD) yang menjalani hemodialisa regular.

Metode: Jenis penelitian observasional dengan desain *case-control.* Penelitian di lakukan di RSUD dr.Soedono Madiun, jumlah sampel sebanyak 41 pada kelompok kasus dan 41 kelompok kontrol. Data diambil melalui rekam medis pasien CKD yang menjalani HD regular di bulan Januari-November 2016. Analisis data menggunakan uji *odd ratio* dengan CI 95%, tingkat signifikansi 5% (α=0,05).

Hasil: Tidak terdapat hubungan yang bermakna antara usia (p=0,23; OR=1,78; CI 95% 0,68 – 4,64), jenis kelamin (p=0,623; OR=1,24; CI 95% 0,49-3,18), lama menjalani HD (p=0,12; OR=0,50; CI 95% 0,20 - 1,20), durasi HD (p=0,81, OR=0,89; CI 95% 0,34 – 2,28), hipertensi (p=0,21; OR= 0,44; CI 95% 0,12 – 1,61), diabetes mellitus (p=0,17; OR=1,83; CI 95% 0,75 – 4,47), kadar Hb (p=0,26; OR=1,66; CI 95% 0,68 – 4,05) dan komplikasi intradialitik (p=0,81, OR=1,11; CI 95% 0,44 – 2,80) dengan kematian pada penderita yang menjalani hemodialisi akibat CKD.

Kesimpulan: Tidak terdapat hubungan yang bermakna antara usia, jenis kelamin, lama menjalani hemodialisa, durasi HD, hipertensi, DM, Hb, dan komplikasi intradialitik dengan kematian pada penderita HEMODIALISIS AKIBAT CKD di RSUD dr.Soedono Madiun.

Kata Kunci: risiko, kematian, CKD, hemodialisa, regular

Abstract

Introduction: *Patients undergoing regular hemodialysis due to Chronic Kidney Disease (CKD) have an increased risk of death in the last 2 decades. Various risk factors are considered to be influential such as age, sex, length of hemodialysis, duration of hemodialysis, and comorbid accompanying the patient.* ***Objective:****To identify risk factors for mortality sufferers of Chronic Kidney Disease (CKD) undergoing regular hemodialysis.*

Methods: *observational study with case-control design. The research was conducted in RSUD dr.Soedono Madiun, the number of samples counted 41 in case group and 41 control group. Data retrieved through the medical records of patients with CKD who underwent regular HD from January to November 2016. Data analysis used were odds ratios with 95% CI, 5% significance level (α = 0.05).*

Results: *There were no significant correlations between age (p = 0.23; OR = 1.78, 95% CI 0.68 to 4.64), gender (p = 0.623; OR = 1.24; CI 95% 0.49 to 3.18), long live HD (p = 0.12; OR = 0.50, 95% CI 0.20 to 1.20), duration of HD (p = 0.81, OR = 0, 89, 95% CI 0.34 to 2.28), hypertension (p = 0.21; OR = 0.44, 95% CI 0.12 to 1.61), diabetes mellitus (p = 0.17; OR = 1.83; 95% CI 0.75 - 4.47), Hb levels (p = 0.26; OR = 1.66; 95% CI 0.68 - 4.05) and intradialitic complications (p = 0, 81, OR = 1,11; 95% CI 0.44 - 2.80) with death in patients undergoing hemodialysis due to CKD.*

Conclusion: *There is no significant correlations between age, gender, length of hemodialysis, duration of HD, hypertension, diabetes, hemoglobin, and complications intradialytic with mortality in hemodialysis patients with CKD in RSUD dr.Soedono Madiun.*

Keywords: *risk, mortality, CKD, hemodialysis, regular*

INTRODUCTION

Declining kidney can cause patients with kidney failure to fall in the stage of end-stage renal failure. End stage renal disease is the terminal stage of Chronic Kidney Disease (CKD) indicated by the inability of the kidneys in maintaining homeostasis of the body. This resulted in the patient should undergo lifelong renal replacement therapy (hemodialysis) (Ignatavicius & Workman, 2006). In the last 2 decades patients who undergo regular hemodialysis have a higher risk of death than ever before. Various observations suggest that the survival rate of the patients who received hemodialysis varies, influenced by several factors, including age, sex, and duration of hemodialysis. The low survival rate of patients undergoing hemodialysis due to CKD can be caused by inadequate hemodialysis and other factors such as nutritional status, psychosocial and comorbid status (Widiyatmoko, 2009). Among patients

• pISSN: 2085-1545
• eISSN: 2339-093X
http://jurnal.unissula.ac.id/index.php/sainsmedika

undergoing regular hemodialysis due to CKD, patients with diabetes mellitus had the worst survival when compared with non-diabetics. Patients with a history of DM had a risk of dying 1.898 times higher than non-diabetic patients (Muzasti, 2011). The condition is associated with risk factors for diabetes such as obesity worsens the metabolic disorders that increase the risk of cardiovascular disease (Deger *et al*, 2013).

Cardiovascular disease is one of the causes of morbidity and mortality of CKD patients undergoing hemodialysis. Approximately 60% of patients with hypertensive CKD begins (De Goeji *et al* 2011). The higher the blood pressure and the longer the hypertension, the higher the risk of terminal renal failure (Hidayati, 2008; Tessy, 2009). Data published by the 7 th Indonesian of Renal Registry Report 2014 states that hypertension is the leading cause of CKD undergoing hemodialysis in Indonesia in 2014 (IRR, 2014). The purpose of this study is to identify risk factors of patients mortality with Chronic Kidney Disease (CKD)who undergo regular hemodialysis

METHODS

Observational research using case-control design. Research conducted in RSUD dr. Soedono Madiun on December 2016. The sampling technique used was non-probability sampling is quota sampling. The number of samples were 41 case groups (Deceased CKD patients) and 41 control groups (Alive CKD patients), samples were obtained based on the formula of the minimum sample presented by Budiyanto in 2006 as follows:

$$n = \frac{\left\{Z_{1-\alpha/2}\sqrt{[2P_2^*(1-P_2^*)]} + Z_{1-\beta}\sqrt{[P_1^*(1-P_1^*)+P_2^*(1-P_2^*)]}\right\}^2}{(P_1^*-P_2^*)^2}$$

$$P_1^* = \frac{OR}{(OR+1)} \qquad P_2^* = \frac{P_1^*}{OR(1-P_1^*)+P_1^*}$$

P_1 is the proportion of exposure in the case group while P_2 is the proportion of exposed controls.

Data collection were obtained from medical records that meet inclusion and exclusion criteria. Inclusion criteria include: CKD with regular hemodialysis (2-8 hours/week), age> 18 Year, while exclusion criteria include immidiate hemodialysis, patients with renal transplant, and pregnant women. Analysis of the data using the Odd Ratio 95% CI, 5% significance level (α = 0.05), the variables examined include gender, age, length of undergoing hemodialysis, hemodialysis duration of the week, blood pressure, blood sugar, hemoglobin level, and Intradialitic complications.

Table 1. Characteristics of CKD patients

Variabel	Deceased CKD (Cases)	Alive CKD (Control)
Gender		
Man	29 (70.7%)	27 (65.9%)
Women	12 (29.3%)	14 (34.1%)
Age		
Elderly (> 45 years)	31 (75.6%)	26 (63.4%)
Adult	10 (24.4%)	15 (36.6%)
Duration of Hemodialysis		
≥ 12 months old	17 (41.5%)	24 (58.5%)
Not long <12 months	24 (58.5%)	17 (41.5%)
Frequency of HD In A Week	12 (29.3%)	13 (30.5%)
8-12 hours	29 (70.7%)	28 (69.5%)
<8 hours		
Blood pressure	33(80.5%)	37 (90.2%)
Hypertension	8 (19.5%)	4 (9.8%)
No Hypertension		
Blood sugar	20 (48.8%)	14 (34.1%)
DM	21 (51.2%)	27 (65.9%)
No DM		
Hb level	19 (46.3%)	14 (34.1%)
≤ 8gr / dL	22 (53.7%)	27 (65.9%)
> 8gr / dL		
Intradialitic Complications	14 (34.1%)	13 (31.7%)
Yes	27 (65.9%)	28 (68.3%)
No		

RESULTS

The subjects of this study were 82 hemodialysis patients, consisting of 41 deceased hemodialysis patients, and 41 surviving patients. Based on the result of the research, it was found that based on the deceased CKD patients, there were 29 men (70.7%), with age group> 45 years, 31 patients (75.5%), hemodialysis <12 months 24 Patients (58,5%), duration of hemodialysis <8 hour in a week of 29 patient (70,7%). The comorbid of patients in this group were hypertension of 33 patients (80.5%), DM 20 patients (48.8%), Hb ≤8gr/ dL of 22 patients (53.7%) and 14 of patients (34.1%) who experienced intradialytic complications. Data is illustrated on table 1.

Correlations between variables with death of CKD patients undergoing hemodialysis follows:

In Table 2 it is illustrated that the results of Chi-Square test between sex with the risk of mortality in the CKD were p = 0.63 where p> 0.05 so that we can conclude there is no significant correlations between gender and mortality in the CKD. The OR value is 1.25 with 95% CI 0.49-3.18 which means male CKD patients are 1.25 times more likely to die compared to female patients. The probability of male CKD patients experienced 55.5% mortality.

The age of the respondents were divided into

Table 2. Relationship between variables with death of CKD patient

Variable		Case group		Control group		P value	OR	95% CI
		N	%	N	%			
Gender	Man	29	70.7	27	65.9	0.63	1.25	0.49 - 3.18
	Women	12	29.3	14	34.1			
Age	Elderly ≥46 years old	31	75.6	26	63.4	0.23	1.78	0.68 - 4.64
	Adults 26-45 years old	10	24.4	15	36.6			
Duration of Hemodialysis	Long term (≥ 12 months)	17	41.5	24	58.5	0.12	0.50	0.20 - 1.20
	Short term (<12 months)	24	58.5	17	41.5			
HD duration per week	8-12 hours	12	29.3	13	30.5	0, 81	0.89	0.34 - 2.28
	<8 hours	29	70.7	28	69.5			
Blood pressure	Hypertension	33	80.5	37	90.2	0.21	0.44	0.12 - 1.61
	No Hypertension	8	19.5	4	9.8			
DM	DM	20	48.8	14	34.1	0.17	1.83	0.75 - 4.47
	No DM	21	51.2	27	65.9			
Hb level	≤ 8 gr / dL	19	46.3	14	34.1	0.26	1.66	0.68 - 4.05
	> 8 gr / dL	22	53.7	27	65.9			
Intradialitic Complications	Yes	14	34.1	13	31.7	0.81	1.11	0.44 - 2.80
	No	27	65.9	28	68.3			

adult (26-45 years) and elderly (≥ 46 years). Result of analysis between age with risk of death of CKD patients the probability value of 0,23 with error rate 0,05. It shows that there is no correlations between age with risk of death of CKD in RSUD dr.Soedono Madiun. OR value of 1.78 with 95% CI 0.68 - 4.64, which means CKD patients of elderly age are 1.78 times more likely to die than adults. The probability of CKD patients in the elderly group is 64%.

The duration of hemodialysis is categorized as long term(hemodialysis ≥12 months) and short term (hemodialysis <12 months). The result of the analysis between duration of hemodialysis with risk of death of CKD patient were p = 0,12 where p> 0,05 so it can be concluded there is no significant correlation between duration of hemodialysis with death of CKD patients. OR value of 0,50 with 95% CI 0,20 - 1,20 means CKD patients with long term hemodialysis have 0,50 times greaterpossibility to die compared to short term hemodialysis patients. The probability of CKD patients with long term hemodialysis experienced a mortality of 33.3%.

The duration of hemodialysis within a week were divided into HD ≤8 hours/week and> 8 hours/week. Result of analysis between duration of hemodialysis with risk of death in patients of CKD is p = 0,81 where p> 0,05 so it can be concluded there is no significant correlation between duration of hemodialysis in a week with death of CKD patients. OR value of 0.89 with 95% CI 0.34 - 2.28 which means CKD patients with hemodialysis duration of 8-12 hours in a week have 0.89 times greater a probability of death compared to patients undergoing hemodialysis <8 hours in a week. The probability of CKD patients with hemodialysis duration of 8-12 hours per week experienced 47% mortality.

Blood pressure is classified as hypertension and not hypertension. Results of analysis between blood pressure and mortality risk in patients with CKD obtained result is p = 0.21 where p> 0.05 so it can be concluded there is no significant correlation between blood pressure with mortality of patients with CKD. OR value of 0.44 with 95% CI 0.12 - 1.61 which means CKD patients with hypertension have a probability 0.44 times greater for death compared to non-hypertensive patients. The probability of CKD patients with hypertension experienced 30.5% mortality.

Status of Diabetes Mellitus (DM) is divided into DM and not DM. The result of analysis between Diabetes Mellitus with the risk of death in CKD patient is p = 0,17 where p> 0,05 so it can be concluded there is no significant relationship between DM with mortality of CKD patient. OR value of 1.83 with 95% CI 0.75 - 4.47 which means CKD patients with DM are 1.83 times more likely to die than non-DM patients. The probability of CKD patients with DM experienced deaths of 64.6%.

Levels of hemoglobin divided into Hb ≤8 gr/ dL and Hb> 8 g/dL. The result of analysis between hemoglobin level and mortality risk in CKD patients

was p = 0.26 where p <0,05 so it can be concluded there is no significant correlation between hemoglobin level and mortality of CKD patients. The OR value was 1.66 with 95% CI 0.68 - 4.05, which means CKD patients with Hb ≤ 8g/dL were 1.66 times more likely to die than patients with Hb> 8g/dL. The probability of CKD patients with Hb ≤ 8g/dL experienced 62.4% mortality.

Intradialytic complications were divided into yes and no. The result of analysis between intradialytic complication and mortality risk in CKD patient was p = 0,81 where p> 0,05 so it can be concluded there was no significant correlation between intradialitic complication incident with mortality of CKD patients. OR value of 1.11 with 95% CI 0.44 - 2.80, which means CKD patients with intradialytic complications are 1.11 times more likely to die than patients without intradialytic complications. The probability of CKD patients who experienced intradialytic complications to death were 52.6%.

DISCUSSION

Research conducted in RSUD drSoedono Madiun discusses the risk factors that affect mortality in CKD patients who undergo regular hemodialysis. Factors studied by researchers include gender, age, duration of HD, duration of HD/week, blood pressure, blood sugar, Hb levels and intradialytic complications.

The analysis of the sex variables showed no significant correlations. Nevertheless, CKD patients in this study were more afflicted by males than females, with the probability of male CKD patients experiencing deaths of 70.7%. This is consistent with research conducted by Lorien S *et al* (2010) that theCKD male patients have the higher risk of death, similar research conducted by Kazancioglu (2013) in Japan, cited in the Japanese Society for Dialysis Therapy also indiated that male patients were more than female patients with odds ratios of 1.41 (Morrison *et al.,* 2010; Kazancioglu, 2013).

Unhelathy lifestyle of men can lead to CKD so that when CKD occurred, it will become more serious. Based on the results NKF Clinical Meeting in 2011, one of the behaviors that can increase the risk of kidney disease for more than 300 percent is smoking (Medscap, 2011). Smoking significantly increased the risk of CKD by 61.9% when compared with nonsmokers (OR = 1.63 p = 0.02, 95% CI = 1.08-2.45). The study indicated that heavy smoking increases the risk of overallCKD, and particularly for CKD were classified as hypertensive nephropathy and diabetic nephropathy (Yakoub *et al.,* 2010). In addition to smoking, alcohol consumption ≥30 g/day can increase the risk of albuminuria (OR = 1.59, 95% CI 1.07 to 2.36) (White *et al*, 2009).

In addition to gender, age becomes one of the risk factors of death in patients with CKD. The results of this study indicate that the elderly who suffer from CKD have a probability of experiencing death of 68.6%. The youngest age is 25 years and the oldest is 74 years old in the case group, whereas in the control group the youngest age is 27 years old and the oldest is 74 years old. CKD cases in young age can be caused by unhealthy lifestyle before CKD attack. This can be due to a change in modern lifestyle that can trigger the chronic diseases. Research by Muharni (2009) mentions that 80% of patients before undergoing hemodialysis therapy have a bad lifestyle, as much as 77.50% with physical activity is not good, the use of substances are not good majority (85%), and from the dietary pattern of the majority is not good (87.5%) (Muharni, 2009).

The duration of hemodialysis became one of the risk factors for mortality in CKD patients, although in this study there was no significant result between the duration of hemodialysis and death in CKD patients. In contrast to research conducted by Ekantari (2012) said that there is a relationship between long hemodialysis with death where the value p = 0.028; OR = 2,455; 95% CI = 1.097-5,494). This proves that the longer the patient undergoes hemodialysis, the lesser the risk of death. This is because in patients who die, they come in during when their conditions were already severe, and have comorbidities such as heart failure, type II diabetes mellitus, and nepropathy diabetes, which are the risk factors for the death of chronic renal failure patients (Ekantari, 2012).

In addition, the length of the duration of hemodialysis in a week also affects the death of patients with CKD. The results of this study revealed that there is no significant correlation between duration of HD in a week. Value p = 0.81; OR = 0.89 with 95% CI 0,34 - 2,28 meaning CKD patients with hemodialysis duration of 8-12 hours in a week have a probability 0.89 times higher for death compared to patients undergoing hemodialysis <8 hours a week. The results are different from Septiwi's (2010) study that there is a significant relationship between hemodialysis adequation and quality of life of patients (p = 0,000; OR: 8,98; 95% CI 3.5 - 23.08). The longer the process of dialysis takes place then the blood that is outside the body will be longer so that more anticoagulants are needed. This can increase the side effects that occur (Roesli & Rully, 2006).

Other factors that affect the death of CKD are blood pressure, DM and hemoglobin levels. In this study

there is no correlation between blood pressure, DM, and hemoglobin levels with death of CKD patients. Similar research conducted by Ekantari *et al* (2012) in RSUD dr. Moewardi and the results obtained was there is no correlation between hypertension (p = 0.839, OR = 1.086, CI = 0.489-2.411), anemia (p = 0,523; OR = 0.762; 95% CI = 0.33-1,758) but there is a relationship between diabetes Mellitus (p = 0.046; OR = 2.852; CI = 0.995-8.173) with death in CKD patients (Ekantari, 2012).

The next factor studied is about intradialytic complications. The results of this study obtained values of p = 0.81 so there is no significant correlation between intradialytic complications with the risk of death of patients with CKD. Patients with intradialytic complications were 1.11 times more likely to die than CKD patients with no intradialytic complications. A study conducted by Jin Bo Yu in Shanghai China on 293 patients found that patients with intradialytic hypotension had a 1.6 times higher risk of mortality within 5 years compared with those without intradialytic hypotension (Charnow, 2016). intradialytic hypotension occurs when systole blood pressure drops ≥20 mmHg or a MAP decrease of 10 mmHg whereas intradialytic hypertension occurs when MAP increases ≥15 mmHg, or increases in systole> 10 mmHg blood pressure from before until after hemodialysis (Inrig, 2010; Kotanko & Henrich,2017). Complications of intradialytic especially intradialytic hypotension may increase morbidity and mortality from cardiovascular disease (Stefanson *et al.,* 2014). Further research is needed with larger numbers of samples on other variables such as intradialytic complications of hypertension or intradialytic hypotension with risk of cardiovascular disease.

CONCLUSION

Based on the result of the research, it can be concluded that there is no significant correlations between age, sex, length of hemodialysis, duration of hemodialysis in a week, hypertension, diabetes mellitus, Hb level and intradialytic complication to death of CKD patient.

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