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RISK FACTORS AND COSTS OF HOUSEHOLD PERSPECTIVES IN HEMODIALYSIS PATIENTS ON HOSPITAL OF BHAYANGKARA TK. I. R. SAID SUKANTO

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ABSTRACT

The incidence and prevalence of chronic kidney disease (CKD) patients in Indonesia is increasing every year. In the promotion of health promotion and prevention efforts, data related to risk factors and cost analysis are needed from the perspective of patients and / or families related to CKD treatment that requires replacement therapy for kidney function (Hemodialysis / HD). CKD patients undergo HD therapy generally twice a week, making it a relatively large burden on them. This study aims to determine the risk factors for CKD in hemodialysis patients at Bhayangkara Hospital Tk. I R. Said Sukanto and the impact of the cost of HD therapy from a household perspective. In an observational study with this case control method. Primary data was taken through interviews using a structured questionnaire with 100 HD patients (cases) and 100 patients from other poly (control), cross sectional. Risk factor analysis was carried out by logistic regression ($p < 0.05$) and cost analysis using the accounting method. The results showed that in terms of socio-demography, ages above 40-49 years had a risk of 32.7 times and ≥ 50 years had a risk of 17.9 times having CKD compared to <30 years of age with an education level ≤ Elementary-Senior High School at risk 16.9 times affected by CKD from the academy / university group, and the income of Rp. 2,000,000 - Rp. 4,000,000 has a risk of 8.4 times being affected by CKD from income groups> Rp. 6,000,000. In terms of biophysiology, hypertension, diabetes and anemia had a risk of 516 times, 54 times and 272 times the effect of CKD. The habit of consuming Chinese and Western herbs increases the risk of developing CKD up to 10.9 times. The cost of the household perspective issued by the patient includes a meal cost of Rp360,000, transportation costs Rp.320,000 and drugs and multivitamins Rp250,000. The potential loss of productivity reaches Rp1,241,904 per patient per month.

Keywords: Chronic Kidney Disease (CKD); Hemodialysis (HD); CKD Risk Factors; Case Control; Logistic Regression; Costs From a Household Perspective

INTRODUCTION

Chronic Kidney Disease (CKD) is a multifactorial disease. According to IRR (2018), the most common risk factors are hypertension (36%), diabetic nephropathy (29%), primary glomerulopathy (12%), chronic pyelonephritis (7%), followed by other etiologies (7%) and unknown (1%). Studies also stated that consuming energy drink and soda, patients with hypertension, uric acid, UTI, irregular medicine intake, pain reliever intake, lifestyle (smoking, high meat intake, caffeine intake, salt intake, sugar intake, less sleep, and low physical activity) are also important risk factors[1-5]. Hypertension (25,8%) and diabetes (5,7%)

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are known as the major role contributing to CKD[6].

The disease costs so much. According to IRR (2014), the most common facility that is given by the dialysis facility is hemodialysis, 82%[6]. BPJS release 2,78 trillion in 2015, most of them for hemodialysis[7]. If other cost spent by the patient and family is counted it will be higher. Hemodialysis therapy for CKD is different than other chronic disease treatments. Hemodialysis is done 2 times in a week for 5 hours each time or 3 times in a week for 4 hours each time[8].

Firda and Thabrany's study[9] showed that the average of transportation cost in category B hospital is Rp302.130 per month and Rp204.830 per month in category C hospital. Meanwhile, consumption cost in category B hospital is Rp264.130 per month and Rp129.670 per month in category C hospital. According to Wiguna, *et al*[10], transportation cost to access hemodialysis facility is the highest expense that paid by the patient. Patients still need to pay for other laboratory examination such as Ferritin (Rp190.000), TIBC and Fe (Rp90.000) with health insurance with average cost of Rp2.333.960,78 (IQR = Rp590.000-Rp2.730.000). 17,6 % patients worried because patients be in debt to anticipate the hemodialysis cost, 13,7% patients asked for additional money to family, and 5,9% patients sold their valuables.

National social insurance system stated that Jaminan Kesehatan Nasional (JKN) assured the access of healthcare facility and protection from economical risks for citizens. Social health insurance reduced the burden of health expenses that were paid out of pocket in an unpredictable amount or required a substantial cost[11]. In fact, patients paid charge beyond the insurance membership. This study aimed to identify risk factors that cause CKD and lead to hemodialysis therapy and the amount of expenses related to hemodialysis therapy that needed to be paid from household perspective that could cause economic burden.

MATERIAL AND METHODS

This was an observational study using a case-control approach in CKD patients who undergo hemodialysis therapy in hemodialysis unit Bhayangkara Hospital tk I R. Said Sukanto and non-CKD patients (out-patient care) as control. A total of 200 patients have participated, 100 CKD patients who undergo hemodialysis therapy and 100 non-CKD patients (out-patient care) in Bhayangkara Hospital Tk I R. Said Sukanto. Samples were selected using previous study calculation, with an odds ratio (OR) hypothesis from Lwanga and Lameshow 1981. With significance level 95% (α=5%), power 80% (β=20%), risk factor proportion in control group is 5% referring to 2013 Riskesdas risk factor prevalence and with smallest OR 2,0[13].

Cost estimation and risk factors data collection on CKD patients who undergo hemodialysis therapy in Bhayangkara Hospital Tk I R. Said Sukanto were taken through interview using questionnaire then analyzed statistically. Samples for this study were all the CKD patients who received treatment from hemodialysis unit for 1-3 years. Patients who didn't meet the criteria of CKD grouped as control. The inclusion criteria are patients who diagnosed CKD and went through hemodialysis therapy, willingly

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to join the study proved by signed informed consent, age > 21 years old, undergo hemodialysis therapy for the past 12-36 months, were not participating clinical trials at that moment, and non-CKD patients as control. The exclusion criteria are patients who diagnosed with CKD but did not undertake hemodialysis and patients who indicated with life-threatening disease such as cancer, stroke, and severe heart disease.

RESULTS

Socio-demographic characteristics

Table 1. Sociodemographic and characteristics of risk factors that increase the incidence of CKD

No	Risk Factors	Patient Condition				p-value
		CGK and HD		Non CGK and HD		
		Number	%	Number	%	
1	**Age**					0.000
	< 30 years old	9	9	56	56	
	30 – 39 years old	15	15	28	28	
	40 – 49 years old	21	21	5	5	
	≥ 50 years old	55	55	11	11	
2	**Gender**					0.156
	Male	59	59	49	49	
	Female	41	41	51	51	
3	**Education**					0.000
	≤ Elementary – Senior High School	78	78	97	97	
	Academy/University	22	22	3	3	
4	**Occupation**					0.000
	Unoccupied	19	19	28	28	
	Intellectual occupations	3	3	2	2	
	Physical occupations	37	37	68	68	
	Retiree / stay-at-home mom	23	23	1	1	
	Businessmen	18	18	1	1	
5	Income					0.000
	Unknown	19	19	22	22	
	≤ Rp2.000.000	10	10	1	1	
	Rp2.000.001 - Rp4.000.000	37	37	72	72	
	Rp4.000.001 - Rp6.000.000	26	26	4	4	
	> Rp6.000.000	8	8	1	1	
6	**Hypertension**					0.000
	Yes	79	79	32	32	
	No	21	21	68	68	
7	**Diabetes mellitus**					0.000
	Yes	61	61	24	24	
	No	39	39	76	76	
8	**Anemia**					0.000
	Yes	28	28	4	4	
	No	72	72	96	96	
9	**Kidney stone**					0.000
	Yes	20	20	2	2	

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Case group samples' age ranged from 21-75 years old and 22-56 years for the control group samples. Highest participants on group case and control group were reported on age group ≥ 50 years and < 30 years, respectively. Among all participants on both groups, the education level was mostly ≤ Elementary – Senior High School. The occupation of all participants was mostly on physical activities which were equal on both groups, followed by retirees and stay-at-home mothers, unoccupied, businessmen, and intellectual occupations. The most subjects in terms of income ranged from Rp2.000.001 - Rp4.000.000. According to the bivariate analysis result, only 12 of 16 risk factors were statistically significant for increasing the incident of CKD with p value ≤ 0,05, which were age, education, occupation, income, habit of consuming Chinese/Western herbs, high salt/fat intake, hypertension, diabetes, anemia, kidney stone, herbs using chemical ingredients, and water consumption (Table 1-2

Table 2. Sociodemographic and characteristics of risk factors that increase the incidence of CKD *(continue)*

No	Risk Factors	Patient Condition				p-value
		CKD and HD		Non CKD and HD		
		Number	%	Number	%	
1	NSAID consumption (painkiller and anti-inflammation)					
	Yes	69	69	64	64	0.454
	No	31	31	36	36	
2	Herbal medicine consumption					
	Yes	50	50	57	57	0.321
	No	50	50	43	43	
3	Chinese/Western herbs consumption					
	Yes	33	33	17	17	0.009
	No	67	67	83	83	
4	Herbs with chemical ingredients					
	Yes	15	15	29	29	0.017
	No	85	85	71	71	
5	High dietary fat/salt intake					
	High dietary fat and salt intake	86	86	98	98	0.002
	High dietary salt intake	14	14	2	2	
6	High intake of sugar/mineral in drinks					
	Drinks with sugar and mineral	40	40	38	38	0.772
	Drinks with sugar and caffeine	60	60	62	62	
7	Water intake					
	< 5 glasses per day	20	20	10	10	0.048
	≥ 5 glasses per day	80	80	90	90	

Aside from the 12 risk factors with p value < 0,05, there was 1 risk factor with 0,05 < p value < 0,25 that included to multivariate analysis, which was gender. Whereas 3 other

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factors did not show meaningful correlation statistically to the incidence of CKD (p value > 0,05), which were NSAID intake, habit of consuming beverages with high sugar/mineral, and herbs consumption. Bivariate analysis showed that consuming herbs did not show correlation to the incidence of CKD. As long as special ingredients is not added to the herbs, it wouldn't give any impact on the occurrence of CKD. However, if the herbs contain chemical ingredients, it would show a relation on the incident of CKD. Multivariate analysis was done to 13 variables which were at risk for CKD ($p \leq 0,05$) and 1 variable that potentially increase the occurrence of CKD ($0,05 \leq p \leq 0,25$). The result can be seen at table 3

Table 3. Multivariate analysis data

No	Risk Factors	p-value	OR	95% CI	
				Lower	Upper
	Socio-demographics				
	Age				
	40 – 49 years old	0.002	32.697	3.572	299.339
1	≥ 50 years old	0.004	17.968	2.462	131.141
	Education level				
	≤ Elementary-Senior High School	0.044	0.059	0.004	0.928
	Income				
	Rp2.000.00 - Rp4.000.000	0.031	0.119	0.017	0.827
	Bio-physiology				
	Hypertension				
	Yes	0.000	516.472	39.515	6,750.369
2	Diabetes mellitus				
	Yes	0.000	54.604	7.860	379.354
	Anemia				
	Yes	0.001	272.222	11.509	6,438.584
	Behavior				
3	Consumption of Chinese and Western Herbs				
	Yes	0.009	10.997	1.812	66.725

Chronic Kidney Disease (CKD) patients who were treated by hemodialysis need huge amount of expenses. BPJS Kesehatan covered the cost of hemodialysis so that it could alleviate the patient's burden and therefore increasing the scope of medication. UU No 36 tahun 2009 stated that every citizen has the same right to gain access for health resources and get safe, good, and affordable healthcare services. In the contrary, every citizen also has the obligation to participate in social health insurance program. The government is responsible to make sure the execution of social health insurance program through Jaminan Kesehatan Nasional (JKN) for individual well-being. Hence, the study took place in government hospital and a total of 200 subjects (100 case group patients and 100 control group patients) that used the

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healthcare fee provided by BPJS Kesehatan were selected. Other data related to risk factors and cost analysis from patient or family perspective about CKD medication that needed kidney replacement therapy (hemodialysis) were also required for preventing and promoting health purposes.

DISCUSSION

Cost from household perspective

To measure the cost from household perspective, data were taken from questionnaire and interview with all subjects. There was limitation in this study which not all subjects gave detailed information about monthly or eight times hemodialysis expenses, transportation or consumption cost, medication or multivitamin cost, and caretaker fee spent by the patients or family during therapy. Nevertheless, patients still gave number of total outlay used for therapy.

Monthly expenses and other spending (consumption fee, transport fee, medication fee, and caretaker fee) were used as the base to predict the patient's spending pattern. Patients' data were characteristically similar so can be assumed to have the same spending pattern. The expense pattern from each patient can be estimated based on monthly expenses, hospital-to-home distance, and types of transportations used by the patient/family. Subjects that had similar sociodemographic and socioeconomic characteristics estimated to had the same cost estimation. The median Rp900.000, Mean Rp1.021.250, and Deviation Standard Rp541.296, therefore the fee that needed to be paid for CKD therapy is Rp320.000 minimum and Rp2.780.000 maximum per month (Table 4).

Similar studies showed that patients who had been sick, hospitalized, or had out-patient care were potentially to pay catastrophic health expenses. The social health insurance program is needed to be continue and expanded the coverage for every citizen especially for patients with low income and low social status or patients that wouldn't provide the medication expenses. Moreover, healthcare program aimed for healthy lifestyle need to be increased to protect family from catastrophic expenses[15].

The cost analysis from household perspective data can showed the estimation between monthly income and outcome. The lowest income is <Rp2.000.000 and the highest is > Rp6.000.000 showed that there was economy difficulty. Although CKD therapy and hemodialysis fee is covered by health insurance like BPJS, there were other expenses from household perspective which could effect on the home economy

The negative impact from catastrophic incident is the patient could not continue the therapy and would still be ill. A family who spent more than 40% other than foods and drinks for the importance of health from the total expenses would be categorized as bankrupt because of their healthcare expenses. Household income has correlation with the event of catastrophic health expenditures. The theory explained the result of this study which household with high income tends to experience catastrophic health expenditures[15].

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Table 4. Cost from household perspective in monthly income category

Income	Expenses	N	Mean	Median	SD	Minimum	Maximum
Unknown	Monthly transport	19	362,105.26	320,000.00	239,062.50	80,000.00	800,000.00
	Monthly foods	19	366,315.79	480,000.00	123,117.40	240,000.00	480,000.00
	Medications	19	302,631.58	250,000.00	260,060.72	-	800,000.00
	Caretaker	19	78,947.37	-	236,476.33	-	750,000.00
	Total Cost	19	1,110,000.00	1,100,000.00	681,982.40	320,000.00	2,530,000.00
≤ Rp. 2.000.000	Monthly transport	10	264,000.00	240,000.00	113,450.92	160,000.00	400,000.00
	Monthly foods	10	360,000.00	360,000.00	126,491.11	240,000.00	480,000.00
	Medications	10	382,500.00	300,000.00	192,948.61	175,000.00	750,000.00
	Caretaker	10	-	-	-	-	-
	Total cost	10	1,006,500.00	975,000.00	382,230.66	575,000.00	1,630,000.00
Rp. 2.000.001 – Rp. 4.000.000	Monthly transport	37	339,459.46	320,000.00	226,592.46	80,000.00	800,000.00
	Monthly foods	37	350,270.27	240,000.00	121,254.70	240,000.00	480,000.00
	Medications	37	262,162.16	250,000.00	219,976.45	-	750,000.00
	Caretaker	37	43,243.24	-	148,212.57	-	600,000.00
	Total cost	37	995,135.14	890,000.00	545,367.47	320,000.00	2,580,000.00
Rp. 4.000.001 - Rp. 6.000.000	Monthly transport	26	335,384.62	320,000.00	231,883.26	80,000.00	800,000.00
	Monthly foods	26	369,230.77	480,000.00	122,013.87	240,000.00	480,000.00
	Medications	26	325,000.00	300,000.00	228,582.59	-	750,000.00
	Caretaker	26	30,769.23	-	156,892.91	-	800,000.00
	Total cost	26	1,060,384.62	945,000.00	540,048.00	320,000.00	2,780,000.00
> Rp. 6.000.000	Monthly transport	8	300,000.00	360,000.00	119,043.81	160,000.00	400,000.00
	Monthly foods	8	360,000.00	360,000.00	128,285.40	240,000.00	480,000.00
	Medications	8	162,500.00	150,000.00	174,744.71	-	500,000.00
	Caretaker	8	-	-	-	-	-
	Total cost	8	822,500.00	640,000.00	335,718.84	500,000.00	1,380,000.00

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If patient/family has undergone certain categories stated, that means the health expenses is on the red zone and would effecting the expenses for primary needs, such as education, healthy foods, and ability to pay bills such as electric bills and phone bills. It can be concluded that the family already experienced economy hardship. The data from household perspective taken from 100 case group subjects showed that most patients belong to one of catastrophic categories which means even the expenses is provided by health insurance, it would still affect the patient/family's economy status that can lead to economy difficulty.

Work productivity is a comparison between the result (output) and the resources used (input). Productivity is considered high if the result is more than the resources used. In the contrary, productivity is considered low if the outcome is less than the resources used. Income that was spent is related to the time used in being productive because the patient needs to finish the therapy in hospital. The duration of therapy until fully recovered and able to work is called Lost of Productivity because the patient could not work and lose income throughout the therapy. Patients spent 4-6 hours during hemodialysis and 2 hours for commuting to hospital, therefore patients would not able to work on the day of hemodialysis. Lost of productivity is counted from monthly income divided by work days each month (21 days / month). Patients who undergo hemodialysis therapy would lose their productivity and do the jobs properly which result in decreased income Rp380.952– Rp2.666.666 with an average of Rp1.241.904 (Table 5).

Table 5. Lost of productivity on patients who undergo hemodialysis

No	Income Per Month	Patients	Lost of Productivity	
			Per days	Per month
1	Unknown (UMP Rp4.000.000)	19	Rp190.476	Rp1.523.808
2	≤ Rp2.000.000	10	Rp47.619	Rp380.952
3	Rp2.000.001 - Rp4.000.000	37	Rp142.857	Rp1.142.857
4	Rp4.000.001 - Rp6.000.000	26	Rp238.095	Rp1.904.761
5	> Rp6.000.000	8	Rp333.333	Rp2.666.666

CONCLUSION

1. 8 of 16 risk factors statistically significant. The risk factors are age group 40-49 years old and ≥ 50 years old, income group Rp2.000.001-Rp4.000.000, education level ≤ Elementary-Senior High School, hypertension, diabetes mellitus, anemia, and habit of consuming Western/Chinese herbs.
2. The economy burden from household perspective such as transportation fee, consumption fee, medication fee, and other expense (caretaker) which is not

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provided by BPJS is Rp320.000 minimum and Rp2.780.000 maximum per month

3. The average cost from household perspective are consumption fee Rp360.000, transportation fee Rp320.000, and medication fee Rp250.000, from the highest to lowest respectively.

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