Correlation Lenght of Hemodialysis with Serum Urea and Serum Creatinine Levels On Chronic Renal Disease Patients In Kupang City

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Abstract: Chronic Kidney Disease (CKD) is an irreversible decline in kidney function that can be fatal without hemodialysis, urea and creatinine level was useful biomarker for monitoring kidney damage. Most of CKD patient has to undergo hemodialysis for a lifetime, while hemodialysis has some complication that could affected the patient's adherence to the treatment that may caused escalation on their urea and creatinine levels. The purpose of this study was to determine the correlation between length of hemodialysis with creatinine and urea levels. This research is a non reactive research based on medical record of CKD patients on hospital that has a hemodialysis unit in Kupang City, the study population was all hemodialysis patients total 117 peoples, this study involved 93 patients using purposive sampling technique. Data analysed using Spearman correlation. The results of this study are lenght of hemodialysis and serum urea levels ($p=0.150 > 0.05$) and lenght of hemodialysis and serum creatinine levels ($p=0.0600 >0.05$), findings of this study were length of hemodialysis mean was 22.45 months, most of CKD patient has abnormal urea and creatinine levels (98.9% and 97.8%, respectively). There are other factors could affected urea and creatinine levels besides length of hemodialysis. Conclusion no significant correlation between the length of hemodialysis with serum urea and serum creatinine levels on CKD patients.

Keywords: CKD; Creatinine; Urea; Length of Hemodialysis

Introduction

Chronic kidney disease (CKD) has been one of growing public health problem worldwide (Lv & Zhang, 2019). Global cases of CKD was 697.5 million with prevalence of 9.1% and estimated 1.2 million mortality caused by CKD (Bikbov et al., 2020). Meanwhile, CKD prevalence in indonesia was increased from 0.2% in 2013 to 0.38% in 2018, this data informed there was progression of CKD cases year by year (Badan Penelitian dan Pengembangan Kesehatan, 2018).

KDIGO defined CKD as abnormalities of kidney structure or function, present for ≥3 months, with decreased of Glomelural Filtration Rate (GFR) <60 ml/min per 1.73 m2 and was classified into five stage (Levey et al., 2011). CKD as a progressive and irreversible disease could lead to end stage renal disease even death. Parenchymal cell loss, chronic inflammation, fibrosis and reduce of kidney capacity were factors that contributed to CKD progression (Ruiz-Ortega et al., 2020). In order to improved the life quality of CKD patients, hemodialysis was one of the treatment provided.

Hemodialysis was a treatment that act as "artificial kidney" to removed the wastes and waters from blood when patient blood circulated through dialyzer (NIH, 2018). This methods could cleared wastes product such urea and creatinine that was toxic material. Meanwhile, serum

urea and serum creatinine level were a usefull biomarker to evaluate the progression of kidney damage and also used to estimated GFR (Ul Amin et al., 2014).

Urea was an end product of protein metabolism with molecule weight 60 daltons, the reference range of serum urea was 5 to 20 mg/dl. While, Creatinine derived from the catabolism of muscle creatin, it is interfere by the bod y mass. Creatinine normal range was difference between male and female (female has lower body mass than male), normal range were 0.6 to 1.2 mg/dl and 0.5 to 1.1 mg/dl, respectively (Hosten, 1990).

Usually, CKD patient undergo hemodialysis for two to three times a week with duration two to four hours for each treatment depends on patient's condition (Auda et al., 2014). Unfortunately, most of CKD patient has to undergo hemodialysis for a lifetime after being diagnosed with CKD. As hemodialysis could help CKD patient to prolong lifetime but it also had complication like anemia, chills and rigor, backache, and hypotension (Sharma et al., 2018). Experiencing complication of hemodyalisis could made patient feeling uncomfortable and pain that may affected their adherence become low moreover the patient who undergo hemodialysis in long period of time. This study objective was to determine correlation between length of hemodialysis with creatinine and urea level

Methods

Ethical clearance process : first, author filled the etchical clereance form and submitted to Health Research Ethics Committee Medical Faculty of Nusa Cendana University, then the form was reviewed by the committee board and giving the approval to this research protocol with Register Number UN02190751 and Decree Number 44/UN15.16/KEPK/2019.

This study design was non reactive study based on the medical record data provided by the hospital, population of this study was all patients who undergo hemodialysis with total 117 patients but patient who involved in this study was 93 patients who met the inclusion criteria : diagnosed with CKD and have complete medical record data. Data obtained from patient medical record was recorded using excel format. Data was analysed with Spearman Test using SPSS software.

Result

Subject Characteristic

Data collected from CKD patients medical record was analyzed using descriptive statistic. Total data sampel was taken from 93 patients. Gender of CKD patient was almost equal between male and female, most age of CKD patients were 46-65 years and 56-65 years. 39.8% of CKD patient have length of hemodialysis < 12 months. While, 98.0% has abnormal serum creatinine level also 97.8% has abnormal serum urea level. This distribution aimed to give a description of sampel involved on this study (Table 1).

Tabel 1. Subject Characteristic

Variable	Characteristic	Number	Percentage (%)
Gender	Male	47	50,5
	Female	46	49,5
Age	26-35 years	6	6,5
	36-45 years	18	19,4
	46-55 years	34	36,6
	56-65 years	33	35,5
	>65 years	2	2,2
Length of hemodialysis	≤ 12 Months	37	39,8
	13-24 Months	27	29,0
	> 24 Months	29	31,2
Serum urea level	Normal	2	2.2
	Abnormal	91	97.8
Serum creatinine level	Normal	1	1.1
	Abnormal	92	98.9
Total		**93**	**100**

Source: Patients Medical Record, 2019

Length of hemodialysis on CKD patient the shortest was 1 months and the highest was 137 months with mean 22.45 months, lowest urea level was 17 mg/dl and the highest was 108 mg/dl (Table 2). The normal values of urea was 5 – 20 mg/dl, result of spearman's test p values between length of hemodialysis and urea level was 0.150.

Tabel 2. Correlation Between Length of Hemodialysis and Urea Level

Variable	Min	Max	Mean	Sig (p)
Length Of hemodialisys	1 months	137 months	22.45 months	0.150
Urea Level	17 mg/dl	108 mg/dl	46.55 mg/dl	

Source: Secondary Data, 2019

The lowest level of serum urea was 0.92 mg/dl and the highest was 23.44 mg/dl. Correlation between length of hemodialysis and creatinine level were analysed using spearman's test with p value 0.060 (Tabel 3).

Tabel 3. Correlation Between Length of Hemodialysis and Creatinine Level

Variable	Min	Max	Mean	Sig (p)
Length Of hemodialisys	1 months	137 months	22.45 months	0.060
Creatinine Level	0.92 mg/dl	23.44 mg/dl	8.25 mg/dl	

Source: Secondary Data, 2019

Discussion

Study on CKD patient population found that CKD is more common in male than female (Afriansya et al., 2020; Aljebory et al., 2019; Ul Amin et al., 2014). This parallel with this study findings which male (50.5%) vs female (45.5%) even there only minor difference in number. This study found that most CKD patient age range is 46-55 years and 56-65 years, this are in line with other study were the most CKD patient age range were 40-60 years (Afriansya et al., 2020); and 51-60 years (Ul Amin et al., 2014). Length of hemodialysis most percentage was ≤ 12 months this parallel with study by Auda et al in 2014 who found that higest number of CKD patient has length of hemodialysis between 1 – 12 months (Auda et al., 2014). This study also found most level of urea and creatinine are abnormal this because CKD patients who undergo the dialysis already has a kidney dysfunction as other study also found (Afriansya et al., 2020).

Correlation Between Length of Hemodialysis and Serum Urea and Serum Creatinine Levels

Mean urea levels in CKD patients was 46.55 mg/dl which consider above the normal level of urea even urea level measurement was done post hemodialysis which mean urea level are remain abnormal even the patients undergo hemodialysis, in line with this findings Afransya et al also found mean urea level on CKD patient was 167,09 mg/dl for male and 164,39 mg/dl for female which also higher than normal values (Afriansya et al., 2020), this also in accordance with (Aljebory et al., 2019) that found there is a decreased level of urea after hemodialysis but the level was remain higher than the normal values.

This study also found there was no significant correlation between length of hemodialysis with urea levels ($p = 0.060$), based on collected data from 93 patients only 2 patients who has normal values of urea which means even patient already undergo hemodialysis for long period it has no difference with patient who undergo hemodialysis recenty, this findings was incontrast with study done by (Auda et al., 2014). Other Factors could increased urea level was high-protein diet, gastrointestinal bleeding, fever or infection, and antianabolic drugs (Hosten, 1990).

Creatinine levels from 93 patients was above normal level except 1 patient with mean of creatinine level was 8.25 mg/dl that consider abnormal compared to the reference values, study done by (Afriansya et al., 2020) which mean of creatinine for male was 11,80 mg/dl and female was 9,73 mg/dl. Like urea level, measurement of creatinine level also done post hemodialysis, in accordance with this findings study done by (Ul Amin et al., 2014) found creatinine levels post hemodialysis were decreased compared to pre hemodialysis but still above the normal level.

Result of spearmen test there was no correlation between length of hemodialysis and creatinine levels with p value = 0.150. it may caused by other factors that also affected the creatinine levels such as age, gender, ethnicity, dietary protein intake, and lean mass (Calábria Baxmann et al., 2008).

Determine the hemodialysis time for each patient were depends on various factors, including kidney function, amount of waste in body, level of salts and body weight so hemodialysis could be effective in removed the wastes included urea and creatinine. This study limitation there was no pre hemodialysis measurement of urea and creatinine levels that made this study

could not see is there any changes in both parameter before and after hemodialysis and compared to the length of hemodialysis.

Conclusion

There is no correlation between length of hemodialysis with serum urea and serum creatinine level on CKD patients. This study recommended for furture research to measure the pre and post hemodialysis level of urea and creatinine so there is a clear observation on the effectiveness of hemodialysis on lowering the urea and creatinine.

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