FARMASAINS: JURNAL FARMASI DAN ILMU KESEHATAN
Volume 4, Number 2, 2019. p-ISSN : 2086-3373 | e-ISSN : 2620-987X
https: ejournal.umm.ac.id/index.php/farmasains

Research Article

Benefit administration of vitamin B1, B6, and B12 on the depression symptom in Hemodialysis Patients

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ARTICLE INFO

Article History
Received July 18, 2019
Revised October 23, 2019
Accepted January 4, 2020

Keywords
Chronic kidney disease
Depression
Vitamin B

Doi
10.22219/farmasains.v4i2.8919

ABSTRACT

Chronic kidney disease (CKD) is a disease that causes a decrease in kidney function, which can be seen from GFR (Glomerulus Filtration Rate) value, which is less than 60 ml/minute/1.73 m2 in minimum three months. Depression is a psychological problem in a patient with chronic kidney disease undergoing hemodialysis. The previous study has shown that giving vitamin B combination can improve depression symptoms. To measure the benefit of vitamin B1, B6, B12 parenterally for depression symptoms in chronic kidney disease patients undergoing hemodialysis. This study used an experimental design (one group pre and post-test) in 117 patient that obtained using a consecutive sampling method. Depression score was measured by the HADS questionnaire before given vitamin B (pre-test) and after given vitamin B (post-test). Data were statistically analyzed using a licensed SPSS program with paired t-test/Non-Parametric Wilcoxon. The relationship between the history of the use of the antihypertensive, antidiabetic, folic acid drug, and depression scores were not showing significant results ($p > 0.05$). The relationship between administration of vitamins B1, B6, and B12 and the patient's depression score showed a decrease but not significant ($p = 0.522$). There was no significant difference after the administration of vitamin B1, B6, and B12 on the depression score of patients with chronic kidney disease undergoing hemodialysis at Bethesda and Panti Rapih Hospital in Yogyakarta.

INTRODUCTION

Chronic Kidney Disease (CKD) is a disease that a big problem in the world. Chronic Kidney Failure is defined as a decrease in kidney function, which can be seen from the value of the GFR (Glomerulus Filtration Rate) Which is below the average value, which is less than 60 ml/min/1,73 m2 in at least three months. People with chronic kidney failure have a lower quality of life than the general population, which increases mortality (Webster, Nagler, Morton & Masson, 2017).

The global average prevalence of chronic kidney disease reaches 13.4% (Hill et al., 2016). Indonesia is a country with a high rate of kidney failure patients. It is estimated that there are around 12.5 % of the population, or as many as 25 million Indonesians have decreased kidney function (Perkumpulan Nefrologi Indonesia, 2014). Yogyakarta is among the top five highest prevalence in Indonesia, with a CKD prevalence of 0.3%. The highest prevalence in Yogyakarta is found in Gunung Kidul and Yogyakarta City, which is 0.5% (Kementerian Kesehatan Republik Indonesia, 2013).

Depression and anxiety are psychological problems in CKD patients undergoing hemodialysis. Research conducted by Caninsti (2013), showed the results of anxiety and depression in chronic renal failure patients undergoing hemodialysis therapy, in which 73.33% of subjects had average anxiety levels, 23.33% of subjects had anxiety in the abnormal borderline category, and 3.33% were classified as normal. Meanwhile, patients who experienced depression in the average level were 76.67%, the abnormal borderline was 23.33%, and none were depressed in the abnormal category.

Vitamins play a major role in health, and vitamin deficiency is associated with symptoms of psychiatric disorders. Vitamin deficiency can affect memory function, cognitive impairment, and dementia. Vitamins B1, B3, B6, B9, and B12 are essential for neuronal function and deficiency associated with depression (Herbison et al., 2012). Mikkelsen, Stojanovska & Apostolopoulos (2016) suggested that vitamins B cannot replace therapy, especially in severe depressive symptoms, but can be used as an additional treatment.

The purpose of this study was to measure the benefits of parenteral administration of vitamins B1, B6, B12 to depressive symptoms, as seen from depressive score scores in chronic renal failure patients undergoing hemodialysis. This research is located at Bethesda Hospital and Yogyakarta Rapih Panti Hospital. This research is expected to provide information on the benefits of parenteral vitamins B1, B6, and B12 on depressive symptoms in chronic kidney failure patients undergoing hemodialysis at Bethesda Hospital and Rapih Nursing Home in Yogyakarta.

RESEARCH METHOD

Subject

This research is a pre-experimental design with pre and post-test design. Subjects were chronic kidney disease sufferers who underwent hemodialysis at Bethesda Hospital and Rapih Orphanage in Yogyakarta. This study was conducted from August to October 2018. The inclusion criteria were male or female patients, aged> 18 years (adults) who were diagnosed with chronic kidney failure, did hemodialysis twice a week, and did not consume vitamin B routinely before. Exclusion criteria were subjects who did not agree to be involved in the study, subjects with hypersensitivity to vitamins B1, B6, B12, and subjects during pregnancy or planned to become pregnant during the study.

The minimum sample size in this study was calculated using a sample size calculator from Open Epi. The mean ± SD depression score before administration of vitamin B was taken from a previous study by Paparrigopoulos, Theleritis, Tzavara & Papadaki (2009) was 7.2 ± 4.7 while the mean ± SD depression score after administration of vitamins B1, B6, B12 was assumed by researchers to be 4.6 ± 5.2. Confidence interval (CI) of 95% and 80% power study were included as input data, so a total sample of 116 was obtained.

Data Analysis

The data taken is secondary data, where respondents who meet the inclusion and exclusion criteria are seen depressed score data from the HADS (Hospital Anxiety and Depression Scale) questionnaire and other essential characteristics such as gender, age, treatment history, and disease history. Descriptive analysis is used to describe the essential characteristics of patients. Data analysis of this study used IBM Statistics 20. Non-Parametric / T-paired Test was used to analyze the effect of drug use and vitamin B administration on depression scores. The normality test uses Shapiro Wilk / Kolmogorov-Smirnoff.

Ethical Feasibility

This research has been through an ethical eligibility examination and approved by the Ethics Committee of the Faculty of Medicine at Duta Wacana Christian University.

RESULTS AND DISCUSSION

Data in the study were obtained from as many as 117 patients. This research was conducted in four weeks consisting of two times the data collection, namely, visit I and visit III. Visit I is the first week of taking depression score data before treatment, which is a parenteral combination of vitamin B in patients with chronic renal failure undergoing hemodialysis. In contrast, visit III is the fourth week of taking

Table 1. Characteristics of sex, age and history of chronic renal failure patients undergoing hemodialysis.

Parameter	Amount (n=117)	Percentage
Gender		
Male	76	65
Female	41	35
Age		
< 40 years old	24	20.51
40-60 years old	62	51.28
> 60 years old	31	28.21
Average ± SD (years)	51,74 ± 12,32	
Disease History		
Hypertension	Yes = 98	83.76
	No= 19	16.24
Diabetes Mellitus	Yes = 40	34.18
	No = 77	65.82

depression score data after giving parenteral combination vitamin B in patients with renal failure chronic undergoing hemodialysis.

Most of the patients are men, as many as 76 people (65%) when compared with women who are 35 people (35%) of the total number of respondents as many as 117 people. The same results were also shown from a study by Fauziah, Wahyono & Budiarti (2015) at Bethesda Hospital Yogyakarta, the number of patients undergoing hemodialysis was 68 men (65.4%) and 36 patients (34.6%). These results are similar to the study by Tjang & Pandelaki (2018) from 82 respondents, 60 (73%) were male, and the remaining 22 (23%) were female. The incidence of chronic kidney failure is higher in men than in women. Based on research by (United States Renal Data System, 2015) shows that 56.3% of patients undergoing hemodialysis are male.

The age of the patients ranged from 19 to 82 years, with an average age of 51.74, with an SD value of 12.32. Of the 117 patients, the highest number of patients was in the age range of 40-60 with 62 patients (51.28%), the age range <40 years, with 24 patients (20.51%) and the age range> 60 years, which was as many as 31 patients (28.21%). The same results were also shown from research by Aisara, Azmi & Yani (2018) that the highest number of patients with chronic kidney disease undergoing hemodialysis was in the 40-60 age range of 65 patients (62.5%).

The more a person ages, the kidney function will decrease. That is because, at the age > 40 years, the number of nephrons will decrease. Estimate decreased kidney function based on age per decade is around 10 ml/minute/ 1.73 m2. If the age enters more than 40 years, it has reached the age of the fourth decade so that it can be estimated there is a decrease in the value of GFR, which is 60-89 ml/ minute/ 1.73 m2 which means that there has been a decline in kidney function by about 10% (Hall, 2011).

This study discusses as many as two diseases that become comorbid in patients with chronic kidney failure, namely hypertension and diabetes mellitus. All patients have then recorded the history of existing diseases. The results obtained are those who have a history of hypertension as many as 98 patients (84.6%) more than patients who are not hypertensive as many as 19 patients (16.24%). Patients with diabetes mellitus were fewer in number, as many as 40 (34.18%) compared with patients without a history of diabetes mellitus in 77 patients (65.82%).

Hypertension can cause chronic kidney failure by two mechanisms. First, hypertension can stimulate glomerular ischemia, which causes damage to the glomerular arteries and arterioles that leads to progressive narrowing of the luminal and decreased glomerular blood flow, so the number of nephrons will progressively decrease. Second, hypertension contributes to the loss of afferent arteriole autoregulation that results in hyperperfusion and hyperfiltration, which leads to damage to glomerular structure (e.g., glomerulosclerosis) and progressive loss of kidney function (Abraham et al., 2017). Hyperglycemia in diabetes mellitus can cause kidney damage by three mechanisms, namely: hyperglycemia can cause renal hemodynamic changes, inflammation, and ischemia, overactive RAAS (Renin-angiotensin-aldosterone-system) (Lin, Chang, Yang, Wu & Chu, 2018).

The Characteristic History of Patient Treatment

A history of antihypertensive and antidiabetic drug use of the patient was recorded, and results were obtained. Antihypertensive drugs prescribed in patients with chronic kidney failure at Bethesda Hospital and Rapih Panti include candesartan, irbesartan, valsartan, furosemide, spironolactone, HCT (hydrochlorothiazide), amlodipine, diltiazem, nifedipine, and clonidine, respectively as many as 5 patients (4.27%), 45 patients (38.46%), 1 patient (0.85%), 47 patients (40.17%), 2 patients (1.70%), 1 patient (0.85%), 60 patients (51.72%), 7 patients (5.98%), 3 patients (2.56%) and 16 patients (13.67%).

Antidiabetic drugs were prescribed to patients consecutively from the most, namely insulin in 10 patients (8.54%), glycuidone in 7 patients (5.98%), acarbose in 5 patients (4.27%), and glimepiride in 3 patients (2.56%). Folic acid is a therapy used to

Table 2. Characteristics of antihypertensive treatment history of patients with chronic renal failure undergoing hemodialysis .

Antihypertensive			Group of dug	Total	Percentage
Drug Name	**Total**	**Percentage**			
Candesartan	5	4,27%	ARB	51	43.58
Irbesartan	45	38,46%			
Valsartan	1	0,85%			
Furosemid	47	40,17%	Diuretic	50	42.72
Spironolactone	2	1,70%			
HCT	1	0,85%			
Amlodipine	60	51,72%	CCB	68	58.11
Diltiazem	7	5,98%			
Nifedipine	3	2,56%			
Clonidine	16	13,67%	α 2-agonist	16	13.67

Table 3. Characteristics of antihypertensive treatment history of patients with chronic renal failure undergoing hemodialysis.

Antidiabetic			Group of Drug	Total	Percentase
Drug Name	**Total**	**Percentage**			
Insulin	10	8.54	Insulin	10	8.54
Acarbose	5	4.27	α -glucosidase inhibitor	5	4.27
Glimepirid	3	2.56	Sulfonylurea	10	8.54
Glikuidon	7	5.98			

Table 3. Characteristics history of treatment folic acid in patients with chronic kidney failure undergoing hemodialysis.

Folic acid	
Total	**Percentage**
102	87,17%

Table 4. The results of the analysis of the effect of the use of antihypertensive, antidiabetic and folic acid on depression scores of chronic renal failure patients undergoing hemodialysis hemodialysis .

Group of Drug	Drug Name	p-Value
Antihypertensive	ARB[a]	0.718
	Diuretic[a]	0.720
	CCB[a]	0.718
	α 2-agonist[a]	0.728
Antidiabetic	Insulin[a]	0.092
	α -glucosidase inhibitor[a]	0.662
	Sulfonylurea[b]	0.830
Folic Acid[a]		0.216

[a] = Non-Parametric Wilcoxon
[b] = Paired t-test

Table 4. Wilcoxon Non-Parametric test results from depression scores for chronic renal failure patients undergoing hemodialysis pre-test and post-test.

	Average ± SD	Range	p-Value
Visite I (Pre-test)	5,13 ± 2,94	0-12	0,522
Visite III (Post-test)	4,96 ± 3,27	0-11	

overcome a folic acid deficiency in kidney failure patients undergoing hemodialysis. The use of folic acid in this study was 87.17% or 102 patients. Statistical analysis was then performed to see the effect of using antihypertensive drugs, antidiabetic, and folic acid on depression scores in patients, and the following results were obtained as many as 5 patients (4.27%), 45 patients (38.46%), 1 patient (0.85%), 47 patients (40.17%), 2 patients (1.70%), 1 patient (0 , 85%), 60 patients (51.72%), 7 patients (5.98%), 3 patients (2.56%) and 16 patients (13.67%).

Statistical analysis test was conducted to see the effect of the use of antihypertensive drugs, antidiabetic, and folic acid on the improvement of depression scores. The results obtained are for the use of antihypertensive drugs group ARB (Angiotensin Receptor Blocker) p-value obtained is 0.780 ($p > 0.05$); diuretic group obtained p-value of 0.925 ($p > 0.05$); CCB (Calcium Channel Blocker) group obtained p-value of 0.893 ($p > 0.05$) and α 2-agonist group obtained p-value of 0728 ($p > 0.05$). The results obtained from the use of antidiabetic drugs in patients, namely for insulin p-value of 0.092 ($p > 0.05$); α-glucosidase inhibitors obtained p-value of 0.662 ($p > 0.05$) and sulfonylurea obtained p-value of 0.830 ($p > 0.05$). The results of the analysis of the influence of the use of folic acid on depression scores in patients obtained a p-value of 0.216 ($p > 0.05$).

In table V above, it can be concluded that there is no effect of the use of antihypertensive drugs for the improvement of depression in patients with chronic renal failure undergoing hemodialysis because of the p value > 0.05 (not significant). Similar results were also obtained from the three classes of antidiabetic drugs, that there was no effect of the use of the three antidiabetic drugs on the improvement of depression in patients with chronic renal failure undergoing hemodialysis because of p value> 0.05 (not significant). The results obtained from the analysis of the effect of the use of folic acid on the patient's depression score were also not significant

with p-value > 0.05.

Test for Normality of Depression Score Data

This study uses the Kolmogorov-Smirnov normality test method because the samples obtained in this study were large in number, namely 117 (> 50). The normality test results obtained were at a visit I, the data were not normally distributed with a p-value of 0.003 (p < 0.05), and at visit III, the data were also not normally distributed with a p-value of 0,000 (p < 0.05).

Wilcoxon Non-Parametric Test Depression Score Data

After the normality of the patient's depression score data was conducted at a visit I and visit III, then a statistical data analysis test was performed to analyze the effect of vitamin B1, B6, B12 on the patient's depression score. The statistical analysis test used is the Wilcoxon Non-Parametric test because depression score data obtained at a visit I and visit III were not normally distributed.

From table 5, at a visit I or before the patient received an injection of vitamins B1, B6, B12 (pre-test), the mean depression score obtained was 5.13 ± 2.94 with a range of 0-12. After the patients were given vitamins B1, B6, B12, the average score of depression (post-test) was 4.96 ± 3.27 with a range of 0-11. When viewed from the Wilcoxon Non-Parametric test results, a p-value of 0.522 (p > 0.05) was obtained. It can be concluded in this study that parenteral administration of B vitamins did not provide benefits for depressive symptoms of chronic kidney failure patients undergoing hemodialysis at Bethesda Hospital and Rapih Orphanage in Yogyakarta.

Effects of Giving Vitamin B on Depression Symptoms

Depression is the most common psychological complication that has a severe impact on the quality of life hemodialysis patients and harms their social, economic, and psychological factors (Anees, Hameed, Mumtaz, Ibrahim & Saeed, 2011). Depression can be caused by things like genetics, long-term illness, and brain aging. Research conducted on twins shows if depression can be caused by genetic factors that are 50% (Levinson & Nichols, 2015). Pre-existing long-term illness or chronic pain and discomfort, coupled with decreased physical abilities, can contribute to depression (Ritter, 2014). Aging of the brain causes depression due to inflammation (Sibille, 2013).

Depression can now be called a brain disorder. Noradrenaline and serotonin (5-hydroxytryptamine / 5-HT) are types of transmitters in the brain (Albert, Benkelfat, Descarries, 2012). Depression is associated with decreased monoamine function and decreased serotonin transmission, which is the cause of all types of depression. Therefore, therapies that are usually used to treat depression are selective 5-HT reuptake inhibitors (SSRIs), which have a mechanism of action to inhibit serotonin and norepinephrine transporters from improving monoamine function and serotonin transmission (Mikkelsen et al., 2016).

The results obtained in this study, the provision of vitamins B1, B6, and B12 for four weeks parenterally, can reduce the average depression score but do not provide significant benefits, which can also be influenced by several other factors, such as individual income/financial difficulties, marital status, and education level in patients associated with depression experienced.

In the study conducted by Cruz et al. (2011), the results obtained are individual income factors that influence the MSC (Mental Scores Component). Subjects without monthly income received lower scores (40.3 ± 12.7) compared to subjects with income sources > 5 (50.4 ± 11.1). It can be concluded from these results if the mental status of subjects with income is better than subjects without income. Similar results were also obtained from studies by Ikonomou et al. (2015), subjects with financial difficulties can also affect the mental status of patients with chronic kidney failure.

Regarding marital status, patients with divorce/ widower status, compared to single and married, have poor mental health, and have higher levels of depression with suicidal thoughts (Theofilou, 2011). The results obtained in a study using the General Health Questionnaire (GHQ-28) in the severe depression subscale, patients with a single status value obtained was 1.32 ± 0.32, compared with those who were married at 1.41 ± 0.66 and divorced at 2.19 ± 1.14 (Theofilou, 2011). It can be concluded if marital status factors are associated with depression in patients with chronic kidney failure.

When viewed from an educational factor, the results obtained in research by Theofilou (2011), the length of time to study affected the depression of chronic kidney failure patients. The results of this study were patients who were educated < 9 years, had a higher score (1.57 ± 0.79) when compared with those who were educated for > 9 years (1.29 ± 0.50) on the

severe depression subscale in GHQ-28. It can be concluded that the level of education affects depression in patients with chronic kidney failure. The same result was also shown by a study conducted by Alshogran (2018), that the level of patient education associated with depression scores (HADS-D) was shown with a p-value of < 0.001. Depression scores in patients decrease with higher levels of education.

Vitamins play a significant role in health, and vitamin deficiency is associated with symptoms of psychiatric disorders. Vitamin deficiency can affect memory function, cognitive impairment, and dementia. Vitamin B plays an essential role in the neurochemical pathways associated with depression, such as glutamate and the neurotransmitter GABA (serotonergic, noradrenergic, dopaminergic, and cholinergic). Specifically, vitamins B1, B3, B6, B9, and B12 are essential for nerve function, and vitamin deficiency has been linked to depression (Herbison et al., 2012). Until now, vitamin B cannot be used as the primary therapy in dealing with symptoms of major depression, but rather as additional therapy (Mikkelsen et al., 2016). This study still has limitations, namely not seeing the length of hemodialysis of the patient, the length of time the patient has suffered from chronic kidney failure as well as internal factors that may affect depressive symptoms such as individual income/financial difficulties, marital status, and education level of chronic kidney failure patients undergoing hemodialysis.

CONCLUSION

This study concludes that there is a decrease in the mean depression score from before giving vitamin B (visit I) and after giving vitamin B (visit III), but the analysis is not significantly different. The irrelevant results can be caused by several other factors such as individual income / financial difficulties, marital status, and education level that affect depression in patients.

Parenteral vitamins B1, B6, and B12 cannot be used as primary therapy in dealing with depression but rather as additional therapy. Suggestions for further research can be analyzed the relationship between the duration of hemodialysis, the duration of the patient suffering from chronic kidney failure, and internal factors such as individual opinion, marital status, and education level that can affect the depression of hemodialysis patients.

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