

Influence of combination hemodialysis/hemoperfusion against score of depression in regular hemodialysis patients

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Abstract. Patients with chronic kidney disease, have a higher risk for psychological distress such as anxiety, depression and cognitive decline. Combination of Hemodialysis (HD)/hemoperfusion (HP) regularly able to eliminate uremic toxin with mild-to-large molecular weight better. HD/HP can remove metabolites, toxin, and pathogenic factors and regulate the water, electrolyte and acid-base balance to improve the quality of patient's sleep and appetite also reduces itching of the skin, which in turn improve the quality and life expectancy. This research was a cross sectional research with a pre-experimental design conducted from July to September 2015 with 17 regular hemodialysis patients as samples. Inclusion criteria were regular hemodialysis patients and willingly participated in the research. The assessment was conducted using BDI to assess depression. To obtain the results, data were analyzed using T-Test and showed that the average BDI score before the combination of HD/HP 18.59 ± 9 to 8.18 ± 2.83 after the combination ($p < 0.001$). In conclusion, combination HD/HP can lower depression scores in patients with regular HD.

1. Introduction

Kidney disease can be found all over the world. In the United States nearly 100,000 in 2001, underwent renal replacement therapy for the end-stage renal disease.[1] Patients with chronic disease, such as chronic kidney disease, have a higher risk of psychological distress. Psychological symptoms do not only have a negative impact on quality of life, but also prognosis of the disease, including mortality, morbidity, and utilization of services. Mental distress also affects non-adherence to the recommended treatment.[2]

The incidence of psychiatric symptoms such as anxiety, depression and cognitive decline is common among patients with chronic kidney disease. Some studies have indicated the influence of these symptoms on the quality of life of patients who have hemodialysis.[3] Research conducted by Sagduyu and friends (2006), Found 41.2% of patients on hemodialysis therapy had symptoms of depression.[4]

Previous studies have indicated the occurrence of medium- and long-term complications of uremic toxins associated with small molecular clearance rates, medium and large molecules of uremic toxins during hemodialysis process. Relationships components of uremic toxins and biological effects are already clearly known, hemodialysis therapy that aims to dispose of uremic toxins has developed to



improve the quality of life and reduce mortality of hemodialysis patients. The clinical application of the various models of technology hemodialysis extracorporeal demonstrate the effectiveness of the cleaning molecule uremic toxins medium and large, as follows: Hemodialysis (HD)/hemoperfusion (HP) > HP > bio-artificial kidney > hemodiafiltration (HDF) > hemofiltration (HF) > HD.[5]

Chen and colleagues conducted a study of 100 hemodialysis maintenance patients, divided into two subgroups in which the first of patients only with hemodialysis and second with HD/HP. This research obtains HD/HP more superior than their hemodialysis in which the combination is regularly able to eliminate uremic toxins with medium molecular weight (middle molecules) and a high molecular weight (large molecule).[6]

One of the studies showed the effectiveness of hemodialysis (HD) + hemoperfusion (HP) on the clearance of beta-2 -microglobulin (β_2M) and its relationship with quality of life as assessed by scores of SF-36, life expectancy assessed by the phase angle (Bio Impedance Analysis / BIA) in regular hemodialysis patients in Medan, North Sumatra.[7] Based on this study to see the effect of HD/HP combination on depression score reduction in regular hemodialysis patients.

2. Methods

2.1. Patient Selection

The study was a pre-experimental research with one group pre-test- post-test design on seventeen consecutive regular hemodialysis patients admitted to hemodialysis unit of Adam Malik Hospital and Kidney Clinic and Hypertension Rasyida in Medan, Indonesia from July until September 2015. Inclusion criteria are male or female Regular hemodialysis patients (≥ 3 months), age ≥ 17 years, willing to take part in the study and signed the patient consent forms. Exclusion criteria were patients with psychotic disorders and using an anti-depressant. All patients gave informed consent, and the study was by the Research Committee of Medical Field Faculty of Medicine, University of North Sumatra.

2.2. Data Collection

All patients were questioned to collect various baseline data (age, sex, duration of hemodialysis and the etiology of the disease), and filling out the Beck Depression Inventory (BDI) questionnaire before HD/HP. After three months, we conducted a follow up using the BDI to assess the patients. BDI was used to assist the depression scores of the subjects.

2.3. Statistical Methods

SPSS version 22 (SPSS Inc., Chicago) was for the analysis. The data were analyzed using Bivariate analysis is used to express the relationship between dependent variable (depression score) and independent variable (HD/HP combination). Before the data analysis, the normality test was with Kolmogorov Smirnov. For data that were not a normal distribution, Wilcoxon test was used to analyze the data. The confidence interval was 95% and $P < 0.05$ was considered statistically significant.

3. Results

This study followed by as many as 17 patients suffered from Chronic Kidney Disease (CKD) who have met the inclusion and exclusion criteria. More than half (58.8%) of the subjects were male. The mean age was 48 years. The common cause of CKD was non-DM with 15 subjects (88.2%), and the average duration of HD was three years (Table 1).

The results showed almost half of subjects had depression at a moderate level of 8 people (47.1%). Severe depression occurred in as many as three subjects (17.6%). However, after HD/HP, more than half of subjects (52.9%) did not experience depression. And, there were no subjects with moderate and severe depression levels (Table 2).

Table 1. Basic characteristics of the subjects.

Demographic Characteristic	n = 17
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Gender	
Man	10 (58.8)
Woman	7 (41.2)
Age, Mean, year	48 (12.23)
Etiology, n (%)	
DM	2 (11.8)
Non DM	15 (88.2)
Duration of HD, Mean (SB), year	3 (2.37)

There were significant associations between overweight, the degree of lymphocyte infiltration, neutrophil activity, atrophy, intestinal metaplasia with MDA levels ($p < 0.05$). There were no associations between gender and age with MDA levels ($p > 0.05$) (table 2).

Table 2. Depression rate examination results.

Degree of Depression	n = 17
Before HD/HP	
None	3 (17.6)
Low	3 (17.6)
Moderate	8 (47.1)
Severe	3 (17.6)
After HD/HP	
None	9 (52.9)
Low	8 (47.1)

The result of normality of data indicates that the data is normally distributed ($p > 0.05$). Thus, to assess the average decrease in BDI score, data analysis was performed with paired T-test. The results showed the average BDI score before HD/HP was 18.59 with SD 9. The lowest BDI score was 6, and the highest was 36. Meanwhile, after HD/HP showed the average BDI score to 8.18 with SD 2.83. The lowest and highest BDI scores respectively after HD / HP are 2 and 13 (Table 3).

Table 3. Normality test of research variables.

BDI Score	Mean	SD(Standard Deviation)	Min - Max	95% CI	p(Kolmogorov Smirnov)
Before HD/HP	18,59	9	6 - 36	13.96–23.22	0.179
After HD/HP	8,18	2,83	2 - 13	6.72 – 9.63	0.790

Using paired T-test found a significant difference of BDI score between before and after HD/HP ($p < 0.001$). The results showed that the average BDI score decreased significantly after HD/HP (Table 4).

Table 4. BDI score average differences before and after HD/HP.

	Before HD/HP	After HD/HP	p
BDI Score, mean (SD)	18.59 (9)	8,18 (2.83)	<0.001

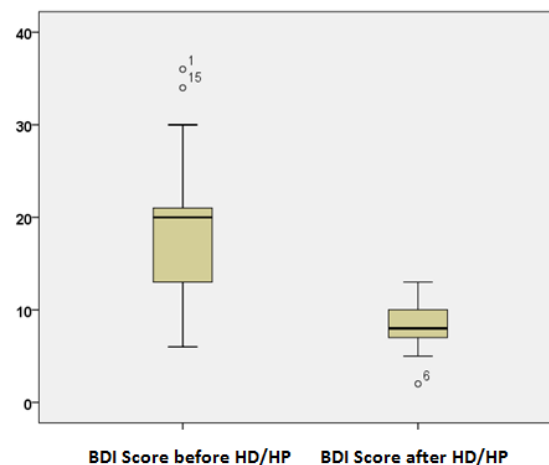


Figure 1. Boxplot graph difference of BDI score before and after HD/HP.

4. Discussion

Depression usually occurs in patients with chronic kidney disease. It associated with several conditions such as malnutrition, disruption of body fluid status, insulin resistance, pathological changes in the peripheral nervous system, bone mineral disorders, left ventricular hypertrophy, refractory hypertension, chronic systemic inflammation, and rapid decline in renal function in patients with regular hemodialysis that incident is still quite high.

Factors that influence the buildup of uremic toxin in patients with chronic kidney disease undergoing dialysis therapy based on the ability to clean uremic toxin and uremic toxin characteristics. Uremic toxins with small molecular weights such as urea and creatinine are cleared by conventional hemodialysis. Moderate/large molecular weight uremic toxins require a dialyzer with larger pores.

In the last decade, several questionnaires have been as screening for depression and anxiety in patients with CKD. The Beck Depression Inventory has been studied extensively, and its use has been validated as screening for depression in patients with CKD.

In this study of 17 subjects observed seen that more than half (58.8%) subjects of male sex. 48 years was the mean age of the subjects the cause of occurrence of PGK is Non-DM as many as 15 subjects (88.2%), with the average duration of HD for three years. Anees et al.'s study in Pakistan obtained a median age of 49 years with the causes of CKD are diabetic nephropathy (46.1%) and hypertension nephropathy (22.5%) followed by chronic glomerulonephritis, nephrolithiasis, and other causes. It occurs because more patients suffer from non-DM in Adam Malik and Kidney Rasyida Clinic and fewer studied samples than Anees research in Pakistan.[9]

The results showed almost half of subjects had depression at a moderate level of 8 people (47.1%). Severe depression occurred in as many as three subjects (17.6%). Similar results were conducted by Andrade et al in which hemodialysis group had an average score of BDI tends to be higher than the cut-off point (14) for moderate and severe depression. However, after HD/HP, more than half of subjects (52.9%) did not experience depression. And, there were no subjects with moderate and severe depression. Similar results were also conducted by Chen et al. (2011) in which HD+HP combinations had a higher quality of life and depression scores than the treatment of hemodialysis alone.

The results showed the average BDI score before HD / HP was 18.59 with SB 9. The lowest BDI score was 6 and the highest 36. The lowest and highest BDI scores respectively after HD/HP were 2 and 13. The same results were also conducted by Fredric (2000) using a BDI questionnaire obtained almost half of the patients studied showed scores above 11.[10]

The weakness of this study is the number of samples that are not too large and not made adjustments to the characteristics of research subjects so that further research is needed on a larger scale to assess the effectiveness of HD/HP combination.

5. Conclusion

The combination of hemodialysis/hemoperfusion affects the depression score of patients undergoing regular hemodialysis, it can be from the Beck Depression Inventory score that decreased at the end of the study. In some subjects experienced moderate depression and severe depression. However, after HD / HP, more than a few subjects did not have depression.

References

- [1] Ibrahim K, Tapoonpong S and Nilmanat K 2009 Coping and quality of life among Indonesians undergoing hemodialysis *Thai. J. Nurs. Res.* **13**(2) 109-16
- [2] Bayat N, Alishiri G H, Salimzadeh A, *et al.* 2011 Symptoms of anxiety and depression: A comparison among patients with different chronic conditions *J. Res. Med. Sci.* **16**(11) 1441-7
- [3] Theofilou P 2011 Comparison of anxiety, depression, and stress among hemodialysis and kidney transplantation patients *J. Depress. Anxiety* **1**(1) 101-2
- [4] Sagduyu A, Senturk V, Sezer S, *et al* 2006 Psychiatric problems, quality of life and compliance in patients treated with haemodialysis and renal transplantation *Turk. J. Psych.* **17**(1) 1-7
- [5] Feroze U, Martin D and Patton A R 2010 Mental health, depression, and anxiety in patients on maintenance dialysis *Iran. J. Kidney Dis.* **4**(3) 173-80
- [6] Chen S J, Jiang G R, Shan J P, *et al.* 2011 Combination of maintenance hemodialysis with hemoperfusion: A safe and effective model of artificial kidney *Int. J. Artif. Organs* **34**(4) 339-47
- [7] Nasution A T 2014 Efektifitas hemodialisis (HD) + hemoperfusion (HP) terhadap clearance beta-2 microglobulin (β 2M) dan hubungannya dengan kualitas hidup yang dinilai dengan skor SF-36, angka harapan hidup yang dinilai dengan phase angle (Bio Impedance Analysis/BIA) pada pasien-pasien hemodialisis regular di Medan Sumatera Utara [Tesis] (Universitas Sumatera Utara)
- [8] Andrade C P and Sesso R C 2012 Depression in chronic kidney disease and hemodialysis patients *Psychol.* **3**(11) 974-8
- [9] Anees M, Barki H and Masood M 2008 Depression in hemodialysis patients *Pak. J. Med. Sci.* **24**(4) 560-5
- [10] Finkelstein F O and Finkelstein S H 2000 Depression in chronic dialysis patients: Assessment and treatment *Nephrol. Dial. Transplant.* **15** 1911-3