Pharmacology and Clinical Pharmacy Research
Volume 2 No. 2 August 2017
ISSN:2527-7322 | e-ISSN: 2614-0020
doi: 10.15416/pcpr.2017.2.2.28

Effectiveness of Erythropoietin in Hypertensive Hemodialysis Patients

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Abstract

Chronic renal failure (CRF) is one the most prevalent health problems among the elderly. On the fifth stage of CRF, the patient becomes eligible to hemodialysis. CRF-induced anemia is commonly treated with Erythropoietin (Epo). Information regarding the effectiveness of Epo in hypertensive hemodialysis patients was limited. Therefore, this study was conducted to evaluate the effectiveness of Epo in hypertensive hemodialysis patients. This study used an observational case-control analytic method. Data were retrieved from the medical records of hemodialysis patients during March-May 2014. A total of 54 participants were included. The increase of haemoglobin (Hb) in controlled hypertension was 0.6257 g/dl, while the in uncontrolled hypertension group, there was a decrease in Hb (-0.1590 g/dl). The use of Epo was more effective in hemodialysis patients with controlled hypertension.

Keywords: chronic kidney disease, erythropoietin, hypertension

Introduction

Chronic renal failure (CRF) is one the most prevalence health problems among the the elderly. On the fifth stage of CRF, the patient becomes eligible to start hemodialysis to remove accumulated toxins from the body.[1] In Indonesia, the number of patients with renal failure was approximately 150,000 patients and the number of hemodialysis patients reached 2260.[2,3]

The costs incurred for CRF therapy are enormous. According to United States renal data system report in 2012, the total cost for chronic kidney failure patients was 3.35 billion dollars, of which 13% was accounted for stage 4-5 of CRF.[4]

Kidney is the main source of erythropoietin (EPo), a hematopoietic growth factor that spur the formation of red blood cells. Epo

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increases the production of reticulocytes and premature reticulocytes from the bone marrow. In CRF patients, Epo production is inadequate, thus anemia often occurs.[5,6] CRF-induced anemia is commonly treated with Epo drug. Several studies have shown that administration of Epo may reduce hospital admissions and improve the quality of life of patients.[7,8]

One of the factors that aggravates CRF in hemodialysis patient is the presence of other complicating medical condition such as uncontrolled hypertension. Several hypertensive guidelines highlight the importance of lowering blood pressure (BP) to slow the progression of CRF.

Information regarding the effectiveness of Epo in hypertensive hemodialysis patients was limited. Therefore, this study was conducted to evaluate the effectiveness of Epo in hypertensive hemodialysis patients.

Methods

This research was a retrospective observational case control study conducted during March-May 2014 in a hospital in Sumedang, Indonesia. The data were collected from medical records.

The inclusion criteria were subjects with CRF who underwent hemodialysis, received Epo therapy (2000 IU), and had hypertension. Exclusion criteria were patients who received blood transfusion, had bleeding and infection, and had incomplete medical records.

From each subject, the following data were extracted: general characteristics, hemoglobin

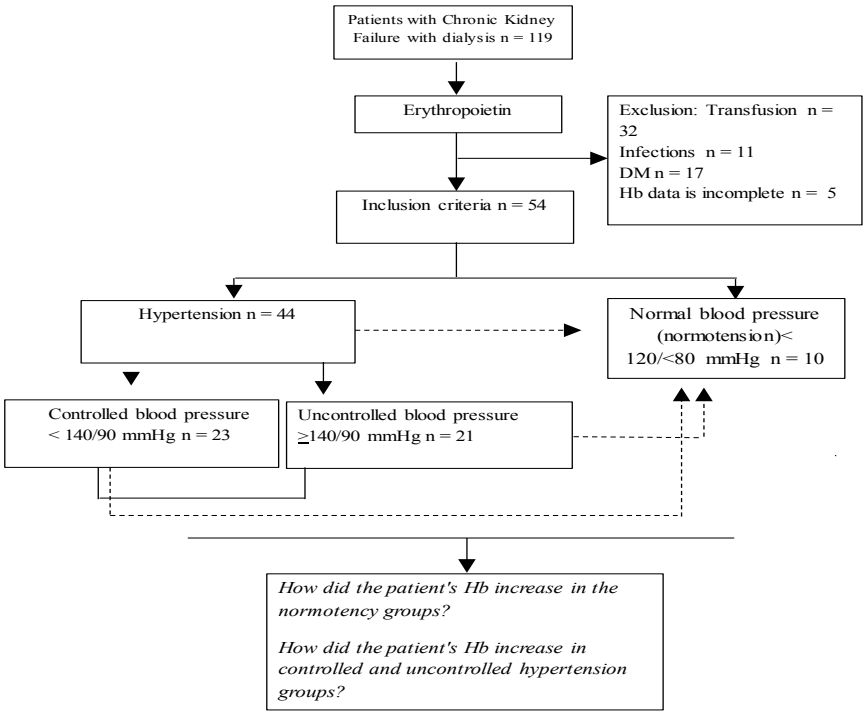

Figure 1. Diagram of subjects selection

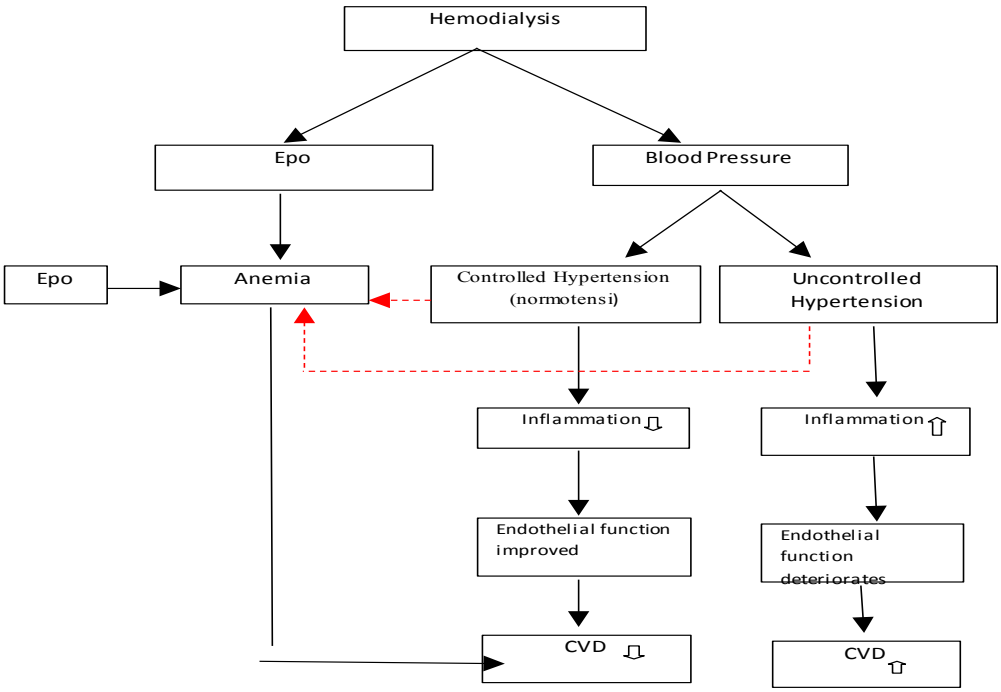

Figure 3. Research framework

(Hb) during study period, duration and frequency of Epo treatment, and BP. Epo was given once a week with the dose of 2.000 IU. Data were analyzed using Cruciate test of Wallis. Significance was set at $P<0.05$.

Results and Discussion

The total population of outpatient hemodialysis was 119 patients. However 65 subjects were excluded due to non-traceable medical records (5), received blood transfusion (32), received antibiotics due to infection (11), and patients with complicated diseases other than hypertension (17). A total of 54 subjects were included. The subjects were classifed into 3 groups, namely controlled hypertension group (BP ≤ 140/90 mmHg), uncontrolled hypertension group (BP>140/90 mmHg) and normal group as standard (BP≤120/80 mmHg).[7]

More than half of the subjects were male (59.09%), aged 51-60 years old (45.45%). Increased risk of CRF was observed for those who aged > 55 (male) and > 65 (female) due to decreased organ functions and regulating hormones.[8,9] More than two-thirds of patients used combinations of antihypertensive drugs. Angiotensin converting enzyme inhibitors (ACEI) or angiotensin receptor blocker (ARB) is the drug of choice for hypertension therapy in renal vascular disorder.[10]

The mean increase of Hb in normal BP group, and controlled hypertension group were 0.62 g/dl and 0.49 g/dl. However, in unctrolled BP

group, there was a decrease in Hb (-0.15 g/dl).

Uncontrolled BP potentially aggravates kidney damage. Continuously developing high BP will increase the glomerular pressure into tenuous, causing endothelial dysfunction, following by necrosis and inflammation of the renal filter layer components, resulting in fibrosis and finally, a decrease in GFR.[11,12]

The more severe of the kidney damage, the higher risk of anemia in hemodialysis patient. Thus, it is necessary to control BP on hemodialysis patients to reduce disease burden.[13]

Conclusion

The use of Epo was more effective in hemodialysis patients with controlled hypertension patients compared to uncontrolled hypertension.

Acknowledgement

None.

Funding

None.

Conflict of Interest

None declared

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