

CARDIAC DYSFUNCTION IN ROUTINE HEMODIALYSIS PATIENT AT SARJITO HOSPITALS

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Abstract

Background : Heart failure (HF) is highly prevalent and associated with high mortality in hemodialysis patients. We studied cardiac dysfunction and related factors in hemodialysis patients at Sarjito Hospital Yogyakarta.

Method : In a cross-sectional study we investigated 45 routine hemodialysis patients at Sarjito Hospitals, from Januari to july 2016. They were male 27 (60%), female 18 (40%), with heart failure in New York Heart Association class I and II. Data analyzed by Pearson Chi Square method.

Result : Mean age $51 \pm 9,3$ years, mean Hb concentrations $9,0 \pm 1,57$, mean ferritin concentrations $1221,7 \pm 1409,67$, Neutrophil to Lymphocyte ratio mean $3,33 \pm 2,67$, mean Length of duration HD $5,36 \pm 3,4$ years and mean of pulse pressure $66,44 \pm 17,58$ mmHg. The pearson chi square, showed that cardiac performance and functions in hemodialisis patients correlates with length of hemodialysis ($p=0,001$), ferritin concentrations ($p=0,001$) Neutrophil-Lymphocyte ratio ($p=0,001$), duration of HD ($p=0,001$), pulse pressure ($p=0,001$) and sex ($p=0,001$).

Conclusion : The study demonstrates that hemodialysis patients have correlated with cardiac dysfunction, and related with factors were sex, length of dialysis time, with feritin level, albumin, hemoglobin and pulse pressure.

Keywords : Hemodialysis, NYHA, cardiac dysfunctions

Introduction

Heart failure (HF) is highly prevalent and associated with high mortality in hemodialysis patients. A Canadian cohort found that heart failure is the most common reason for emergency department visit in hemodialysis patients recently discharged from the hospital [1]. Volume overload, as identified with assessment of inter-dialytic weight gain, has been associated

with all-cause and cardiovascular mortality after multivariate adjustment for demographics, inflammation, and malnutrition [2]. In the haemodialysis (HD) population left ventricular dysfunction (LVDys) is common with a rate 10–30 times greater than that in the general population [3–6]. The clinical diagnosis of congestive heart failure (CHF) in the HD population, which may be due to decreased left ventricular function, correlates strongly with mortality, having a reported 3-year survival of only 17% [7].

In this study, we evaluated the cardiac dysfunction, and related factors, including ferritin concentrations, albumin, hemoglobin, neutrophil-lymphocyte ratio, and pulse pressure in hemodialysis patients. Iron utilization is often defective in patients with CKD, resulting in a functional iron deficiency characterized by increased serum ferritin values. Serum ferritin is both an iron storage protein and an acute phase reactant [8]. Several observational studies have associated higher serum ferritin with higher rates of mortality, including infection-related mortality, in patients undergoing hemodialysis (HD) [9–11]. In contrast, two studies have associated lower serum ferritin with worse outcomes [8, 9].

In previous study NLR has been identified as a marker of systemic inflammation and prognostic marker for mortality in patients with solid organ malignancies, peripheral vascular disease, and in the setting of acute coronary syndrome [14]. Abnormalities of the arterial system are common in dialysis patients and are associated with increased cardiovascular morbidity and mortality [15]. The increased mortality associated with increased arterial stiffness (caused by increasing age, hypertension, uremia, and abnormalities in mineral metabolism) is likely the result of the increased systolic stress, which increases left ventricular afterload, decreases coronary perfusion, and leads to left ventricular hypertrophy. Increased pulse wave velocity and increased pulse pressure are associated with higher mortality in hemodialysis patients [16–18].

Methods

This is a cross-sectional study we investigated 46 routine hemodialysis patients at Sarjito General Hospitals, from Januari to July 2016. They were male 27 (60%), female 18 (40%), with heart failure in New York Heart Association class I (62%) and II (38%). All patients underwent dialysis *via* native arteriovenous fistulas, and all were anuric. Patients were excluded when they had significant symptomatic cardiac failure (NYHA ≥ 3) or experienced an acute coronary syndrome in the preceding 4 mo or had previously received a cardiac transplant. The study protocol was

approved by the Medicine Ethics. The study proceeded in accordance with the Declaration of Helsinki. We evaluated and compared Length of hemodialysis, hemoglobin, albumin, ferritin concentrations, Neutrophil-Lymphocyte ratio, duration of HD, Pulse pressure and Sex with NYHA class function. Results are expressed as mean \pm SD if parametric or as median (interquartile range) if nonparametric, unless otherwise stated. Data analyzed by Pearson Chi Square method, using SPSS program.

Result

Tabel 1. Characteristic Cata

Parameter	Mean \pm SD
Albumin (g/dL)	3,3239 \pm 0,45
Hb (g/dL)	9,0 \pm 1,57
Ferritin (ng/mL)	1221,7 \pm 1409,67
Pulse pressure (mmHg)	66,44 \pm 17,58
N/L ratio	3,33 \pm 2,67

Mean age in our study is 51,93 years, with 60% male, and 40 % male. The NYHA class I is 62%, and II 38 %. The mean albumin is 3,3239 g/dl; Hb 9g/dl; ferritin 1221,7ng/ml; pulse pressure 66,44 mmHg and N/L ratio 3,33. From this data we make correlation between related data compared to NYHA class function, and we found that sex, length of dialysis time, feritin level, albumin, hemoglobin, N/L ratio and pulse pressure was significantly corelated with cardiac dysfunction in hemodialysis patients with $p < 0.05$. while age was not corelated with cardiac dysfunction ($p > 0.05$).

Discussion

In this study, ferritin concentration was significantly correlates with the cardiac performance and function ($p < 0.05$). this finding was consistent, with previous study. Kalantar-Zadeh et al. [9] found no significant differences in risk for all-cause and cardiovascular mortality among 58,058 HD patients with serum ferritin levels of 200 to 1,200 ng/mL, whereas those with serum ferritin levels of $\geq 1,200$ ng/mL were significantly associated with increased mortality rates. In another study, Kuragano et al. [10] found in a prospective, observational, multicenter study of 1,086 Japanese HD patients that hyperferritinemia, defined as serum ferritin > 100 ng/mL, is a risk factor for cardiovascular disease, infection, hospitalization and death.

Other than ferritin, hemoglobin also play important role as prognostic factor in hemodialysis patients. anemia is a marker of cardiac

function/dysfunction due to the presence of inflammatory cytokines; anemia is a reflection of the metabolic milieu and occurs in the presence of other traditional and nontraditional risk factors for cardiac disease; anemia reduces oxygen carrying capacity and results in myocardial ischemia; and anemia contributes to maladaptive cardiac remodelling[19]. Our study consistent with others previous study, where hemoglobin significantly correlated with cardiac dysfunction in hemodialysis patients ($p < 0.05$). the prevalence of anemia increases with severity of New York Heart Association functional classification (20, 21). In reviewing a series of recently published major HF trials, anemia occurred in 9% to 25% of patients (22-25). The presence of anemia in this patient population is associated with recurrent hospitalization and reduced survival (26). Absolute Hb levels correlate with one-year survival (23) and an increase in mortality is observed when Hb levels fall below 120 g/L.

The prognostic value of NLR in patients with cardiovascular disease has been well documented in the general population. NLR has been shown to predict short and long-term mortality in patients with both ST and non-ST elevation myocardial infarction and in patients undergoing percutaneous coronary interventions, NLR has also been shown to be predict severity of coronary artery disease [27-29]. In CKD, NLR is associated with other inflammatory markers such as TNF-alpha and CRP along with lower hemoglobin, albumin and total cholesterol. Inflammation also plays a key role in the initiation and progression of atherosclerosis, where atherosclerotic related cardiovascular events remains one of the most common causes of mortality in dialysis patients. In our study, NRL is significantly correlated with cardiac performance and function ($p < 0.05$). This study consistent with previous studt related to NRL, NLR > 3.5 was associated with an increase in the risk of cardiovascular and all-cause mortality in peritoneal dialysis patents [30]. In another study, NLR > 3.76 and 3.72 to be significant and independent (of CRP) predictors of cardiovascular events in pre-dialysis and dialysis-dependent patients [31,32].

From prior study, In an investigation of 37,069 prevalent hemodialysis patients, every 10-mm Hg increase in post-dialysis pulse pressure was associated with a 12% increased hazard of death at 1 year[33]. In another study, every 10-mm Hg increase in post-dialysis pulse pressure (when adjusted for pre-dialysis pulse pressure) to be associated with a 22% increased hazard of death or hospitalization[34]. In consistent with previous study, our study showed that increased in blood pressure, significantly correlated with cardiac performance, and function.

For albumin correlation, in this study we found that albumin correlated with cardiac dysfunction in hemodialysis patients. This study was consistent with previous study, Iseki et al [35] where serum albumin became strong predictor of death in hemodialysis patients.

Conclusion

This study demonstrates that hemodialysis patients with cardiac dysfunction, had significantly correlated with sex, length of dialysis time, ferritin concentration level, albumin, hemoglobin, N/L ratio and pulse pressure.

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