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Original Research Article

A Retrospective Assessment of the Association of Anemia and Hypoalbuminemia with the Mortality of CKD Patients Undergoing Routine Hemodialysis

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Abstract

Aim: The aim of the present study was to assess the association of anemia and hypoalbuminemia with the mortality of CKD patients undergoing routine hemodialysis.

Methods: A retrospective cohort research was undertaken in the Department of Medicine, Katihar Medical College and Hospital, Katihar, Bihar, India over a one-year period. The inclusion criteria consisted of chronic kidney disease (CKD) patients who were at least 19 years old and had received regular hemodialysis treatment at our institution. A total of 200 patients were included in this investigation.

Results: Out of 200 patients, 56% were men and 44% women. Patients were mostly adults (64%) and elderly (36%). CKD was caused by diabetic (44%), hypertensive (29%), obstructive (17%), and other (10%) nephropathy. At dialysis commencement, 81% used subclavian vein catheters, 8% internal jugular vein catheters, 10% femoral access, and 1% arteriovenous fistula. At dialysis start, 70% had anemia and 70% had hypoalbuminemia. The mean hemoglobin level was 9.145±2.24 g/dl, whereas the mean albumin serum level was 3.27±0.63 g/dl. The dialysis therapy killed 56 people (28%). A majority of individuals exhibited hypoalbuminemia and anemia. In regular HD patients, anemia (p=0.184) and hypoalbuminemia (p=0.332) did not significantly affect death.

Conclusion: Anemia and hypoalbuminemia increased mortality. Although our research found no statistically significant association between anemia and hypoalbuminemia and CKD mortality, they may still be predictive for regular HD patients.

Keywords: Anemia, Hemodialysis, Hypoalbuminemia, Mortality, Chronic kidney disease

Introduction

The global prevalence of chronic hemodialysis (HD) is 298.4 per million people (pmp). [1] Chronic kidney disease (CKD), specifically end-stage renal disease (ESRD), is recognized as a substantial risk factor for mortality. Hemodialysis (HD) is the predominant approach for renal replacement therapy worldwide. Furthermore, extensive prospective study undertaken in the United States reveals that it has the highest mortality rate, with just 40% of patients surviving for five years. Typically, the mortality rate is 10-20 times higher than that of the whole population, with an annual death rate of around 9%. [2,3] Cardiovascular disease (CVD) is the leading cause of death in individuals with end-stage renal disease (ESRD) who are undergoing hemodialysis (HD). More than 50% of patients undergoing dialysis are affected by it, and the likelihood of mortality from cardiovascular disease events in hemodialysis is estimated to be 20 times higher compared to the general population. Ventricular hypertrophy is the most likely reason for this, along with non-traditional risk factors such as chronic volume overload, anemia, inflammation, oxidative stress, and chronic renal disease–mineral bone issue. [4]

In recent years, there has been a rise in the occurrence of chronic kidney disease (CKD) and heart failure (HF), especially among patients with end-stage renal disease (ESRD). The prevalence of these illnesses is around 40%, mostly attributed to the existence of conventional risk factors for cardiovascular disease such as diabetes, hypertension, and obesity, as well as other previously stated non-conventional risk factors. [5] An innovative study done in the United States analyzed over 1900 patients with HD. The research revealed an incidence rate of 71 instances of HF per 1000 person-years, with a mortality rate of 83% at

the end of 3 years. Patients with end-stage renal disease (ESRD) who also have heart failure (HF) provide a greater challenge in assessing their fluid volume status and devising optimal fluid management measures. [6]

Protein-energy deficiency greatly increases the likelihood of mortality and inflammation. Serum albumin serves as the principal marker for assessing both nutritional status and inflammation. Studies have shown that having a serum albumin level below 3.8 g/dL, or a decline in serum albumin levels, increases the likelihood of mortality in patients with end-stage renal disease (ESRD) and other medical conditions. [7] Hypoalbuminemia is not only a reliable indicator of health issues connected to malnutrition and inflammation, but there is also growing evidence linking it to the onset of several cardiovascular disorders, such as heart failure (HF). The prevalence of hypoalbuminemia in chronic heart failure (HF) varies between 20 and 25%, but in older persons with acute HF, it may reach as high as 90%. [8]

The aim of this research was to assess the association between anemia and hypoalbuminemia and the mortality rate of patients with chronic kidney disease (CKD) undergoing regular hemodialysis therapy.

Materials and Methods

A retrospective cohort research was undertaken in the Department of Medicine, Katihar Medical College and Hospital, Katihar, Bihar, India, over a one-year period. The inclusion criteria consisted of patients with chronic kidney disease (CKD) who were at least 19 years old and had received regular hemodialysis treatment at our institution.

A total of 200 patients were included in this investigation. This research excluded patients under the age of 19 who were receiving hemodialysis for the first time, patients diagnosed with acute renal damage, and patients whose initial laboratory values were not included in medical records.

Data collection and statistical analysis

The statistical analysis was made using chi-square tests. All p values were 2-sided, and the significance level was set at 0.05. Analysis was performed using commercially available software (SPSS version 22.0).

Results

Table 1: Characteristics of patients undergoing routine hemodialysis

Characteristics	N (%)
Gender	
Male	112 (56)
Female	88 (44)
Age	
Adult	128 (64)
Elderly (>60-year-old)	72 (36)
Etiology of CKD	
Diabetic nephropathy	88 (44)
Hypertensive renal disease	58 (29)
Obstructive nephropathy	34 (17)
Others	20 (10)
Hemodialysis access	
Femoral	16 (8)
AV shunt	2 (1)
Subclavian vein catheter	162 (81)
Internal jugular vein catheter	20 (10)
Anemia	
Yes (Hemoglobin <10 g/dl)	140 (70)
No (Hemoglobin ≥10 g/dl)	60 (30)
Hypoalbuminemia	
Yes (Albumin <3.5 g/dl)	140 (70)
No (Albumin ≥3.5 g/dl)	60 (30)
Laboratorium value	
Hemoglobin (g/dl)	9.145±2.24
Albumin serum (g/dl)	3.27±0.63
Outcome	
Alive	144 (72)
Dead	56 (28)

Out of 200 patients, 56% were men and 44% women. Patients were mostly adults (64%) and elderly (36%). CKD was caused by diabetic (44%), hypertensive (29%), obstructive (17%), and other (10%) nephropathy. At dialysis commencement, 81% used subclavian vein catheters, 8% internal jugular vein catheters, 10% femoral access, and 1% arteriovenous fistula. At dialysis start, 70% had anemia and 70% had hypoalbuminemia. The mean hemoglobin level was 9.145±2.24 g/dl, whereas the mean albumin serum level was 3.27±0.63 g/dl. The dialysis therapy killed 56 people (28%).

Table 2: Association of anemia and hypoalbuminemia with mortality

Parameters	Outcome		P value
	Alive	Dead	
Anemia			
Yes	94	46	0.184
No	50	10	
Hypoalbuminemia			0.332
Yes	98	46	
No	46	10	

A majority of individuals exhibited hypoalbuminemia and anemia. In regular HD patients, anemia (p=0.184) and hypoalbuminemia (p=0.332) did not significantly affect death.

Discussion

Chronic kidney disease (CKD) is a major contributor to morbidity and mortality associated with non-communicable illnesses on a global scale. Based on the global burden of illness study, the worldwide prevalence of chronic kidney disease (CKD) was recorded as 697.5 million cases. This is a 150% increase compared to the prior year. [9,10] Substandard care leading to chronic kidney disease (CKD) can cause various medical complications including hypertension, cardiovascular disease, anemia, hypoalbuminemia, bone abnormalities, fluid retention, acid-base disorders, electrolyte disorders, and other related conditions. Patients with chronic kidney disease will undergo a deterioration in their quality of life as a result of this burden. [11] Anemia and hypoalbuminemia are significant predictive factors for mortality during the first three months of hemodialysis. [12]

Several variables contribute to the faster progression of chronic kidney disease (CKD) in males compared to females. The characteristics include an increased vulnerability to diabetic nephropathy, hypertension, hyperglycemia, albuminuria, dyslipidemia, raised body mass index, lifestyle choices, kidney morphology, and sex hormones. [13] Out of the 200 patients, 56% were male and 44% were female. The majority of the patients were adults, accounting for 64% of the total, while the remaining 36% were old. The etiologies of chronic kidney disease (CKD) were as follows: diabetic nephropathy (44%), hypertensive kidney disease (29%), obstructive nephropathy (17%), and other causes (10%). Regarding vascular access at the beginning of dialysis, 81% of patients received a catheter in the subclavian vein, 8% had a catheter in the internal jugular vein, 10% had access via the femoral vein, and 1% had an arteriovenous fistula. Several studies have shown that the risk of death and hospitalization more than doubles during the first 90 days of beginning dialysis treatment. The greatest risk is seen within the first fortnight. Typically, the first few weeks of hemodialysis need close observation, since patients receiving dialysis seem to be more vulnerable during this particular period. [14] Chronic kidney disease (CKD) development is associated with several clinical diseases that cause considerable morbidity and mortality, including anemia and hypoalbuminemia. [15]

When dialysis started, 70% of patients had anemia, and an equal number of patients had hypoalbuminemia. The mean hemoglobin concentration was 9.145±2.24 g/dl, whereas the mean serum albumin level was 3.27±0.63 g/dl. Regrettably, 28% of the sample, which amounts to 56 people, did not survive among the total number of patients receiving dialysis treatment. The majority of participants had both anemia and hypoalbuminemia. The bivariate analysis revealed that there was no statistically significant correlation between anemia (p value=0.184), hypoalbuminemia (p value=0.332), and death in individuals undergoing regular hemodialysis. Anemia is an inevitable illness often encountered in individuals with chronic kidney disease (CKD). This illness results in higher mortality and morbidity rates, decreased physical ability and quality of life, as well as elevated healthcare costs and extended hospital admissions. Anemia in people with chronic kidney disease (CKD) may result from several sources, including shortened lifetime of red blood cells, toxic consequences of uremia, reduced production of erythropoietin, and insufficient iron levels. [16-19] Umami et al. discovered that individuals with moderate and severe anemia, characterized by a hemoglobin level below 8 g/dl, were most likely to die within the first three months after undergoing

hemodialysis.[12] The outcomes of our research differed significantly from those of earlier investigations. The results of our research indicate that there is no association between anemia and mortality in individuals with chronic kidney disease (CKD) who undergo regular hemodialysis (HD). Conversely, a study done by Shrestha et al. [20] on patients with chronic kidney disease (CKD) who undergo regular hemodialysis (HD) found a link between anemia and death. Karaboyas et al. [21] discovered that individuals with chronic kidney disease (CKD) who had lower levels of hemoglobin had a greater likelihood of death in the months after starting hemodialysis (HD). Hence, it is crucial to effectively control anemia before to commencing dialysis in order to enhance survival rates after the initiation of hemodialysis. Nevertheless, there are other plausible explanations for these observations.

According to the HEMO study, an increase in blood albumin levels was associated with a reduced risk of mortality over a period of more than 6 months in individuals with albumin.[22] In addition, Bradbury et al. observed that hypoalbuminemia increased the likelihood of mortality within the first 120 days after starting hemodialysis (HD).[23] Our analysis revealed that there is no substantial link between hypoalbuminemia and mortality in individuals undergoing dialysis. This mismatch may occur because we only assessed the initial albumin level at the start of hemodialysis, instead of taking into account the average albumin level during the procedure.

Conclusion

Most hemodialysis patients died within three months. Death risk increased for anemic and hypoalbuminemia patients. Our research demonstrated no statistical relationship between anemia and hypoalbuminemia and CKD mortality; however, these abnormalities may be predictive for conventional HD CKD patients. To study the link between anemia, hypoalbuminemia, and mortality in regular hemodialysis patients, more volunteers are needed.

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