

## Anaemia in Chronic Renal Failure Patients Undergoing Haemodialysis: A across sectional study

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### ABSTRACT

Chronic renal failure disease is frequently associated with anaemia and the level of anaemia correlates with the stage of chronic kidney disease (CKD). A cross-sectional study was conducted in 44 chronic kidney disease patients in the department of medicine, M.L.B. Medical College, Jhansi during the period January to June, 2018. The study was evaluating the profile of anaemia and to find the association between the severity of anaemia and ckd-5 patients time period of taking on haemodialysis. Haemoglobin, blood urea, serum albumin, serum creatinine levels were examined using standard techniques. There was a significant difference in the haemoglobin of CKD patients taking 30 days regular interval 3 times values ( $P < 0.05$ ). All 44 patients (100%) were anaemic there was no significant correlation between the severity of anaemia and serum creatinine levels ( $P > 0.82$ ) the most frequent anaemia in chronic kidney disease patients was a malnourished type of a moderate degree anaemic (7 - 10mg/dl). A significant correlation was not found between the severity of anemia and serum creatinine levels 30 day interval of CKD of patients on haemodialysis.

**Keywords:** - haemodialysis, anemia, serum creatinine, haemoglobin, malnutrition.

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### INTRODUCTION

Anaemia is a condition in which the body has fewer red blood cells than normal. Red blood cells transports oxygen to tissues and organs throughout the body and enable them to use energy from food [3]. Anaemia commonly occurs in people with chronic kidney disease (CKD)—the permanent, partial loss of kidney functions. Anaemia might begin to develop in the early stages of CKD when someone has 20 to 50 per cent of normal kidney function. Anaemia tends to worsen as CKD progresses [9, 5]. Most people who have total loss of kidney function, or kidney failure, have anemia. A person has kidney failure when he or she needs a kidney transplant or dialysis in order to live. The two forms of dialysis include haemodialysis and peritoneal dialysis. Haemodialysis uses a machine to circulate a person's blood through a filter outside the body [22, 24]. Peritoneal dialysis uses the lining of the abdomen to filter blood inside the body. This reduction in Hb occurs for a variety of reasons. Approximately 90% of the hormone erythropoietin (EPO) is produced by the kidneys [6, 19].

Studies have shown the use of EPO increases the chance of anemic events. Many people with kidney disease need iron supplements and EPO to raise their red blood cell count to a level that will reduce the need for red blood cell transfusions [19]. Transfusing red blood cells into the patient's vein raises the percentage of the patient's blood that consists of red blood cells, increasing the amount of oxygen available to the body [8, 13]. A health care

provider may suggest vitamin B12 and folic acid supplements for some people with CKD and anaemia. Using vitamin supplements can treat low levels of vitamin B12 or folic acid and help treat anaemia [12, 17]. To help ensure coordinated and safe care, people should discuss their use of complementary and alternative medical practices, including their use of dietary supplements, with their health care provider. A health care provider may advise people with kidney disease who have anaemia caused by iron, vitamin B12, or folic acid deficiencies to include sources of these nutrients in their diets [4, 18]. Some of these foods are high in sodium or phosphorus, which people with CKD should limit in their diet [16]. Before making any dietary changes, people with CKD should talk with their health care provider or with a dietician who specializes in helping people with kidney disease. A dietician can help a person plan healthy meals. The aim of this study was to determine the profile of anaemia affect with haemodialysis [15].

## **MATERIAL AND METHODS**

The study was carried out at Department of Medicine, M.L.B Medical College, and Jhansi (U.P.) over a period of 6 months (January to June, 2018). The study consisted of 44 dialysis CKD patients; data has taken 3 times 30 days intervals.

### **Inclusion criteria:**

Patients have suffered CKD-5 stages minimum of 6 months and on dialysis. Patients providing informed consent. The Human Ethical Committee approval number is NO-838/SURGERY/15.

### **Exclusion criteria:**

Acute or chronic inflammatory disease. Malignancy or known haematological disorder. Recent severe hemorrhagic episode.

Data including demographic and socioeconomic, diet habits and CKD causes were collected in a questionnaire. Venous blood samples were obtained from patients before dialysis and after an overnight fast [2]. Biochemical test were measured calorimetrically using commercially available kits on fully auto analyzer of Clinical Biochemistry Laboratory. The 2006 National Kidney Foundation [Kidney Dialysis Outcomes Quality Initiative (KDOQI)] Guidelines for CKD anaemia (Hb level < 13.5 g/dl in males and < 12 g/dl in females) were used. 8 In our study, the severity of anaemia was graded as mild (Hb > 10 g/dL), moderate (Hb = 7-10 g/ dL) and severe (Hb < 7 g/dL) [1, 16].

The statistical data was recorded on Microsoft Excel programme. The comparison between two groups was done by anova test in Graph Pad Prism 8 software, anova and correlation analysis were used to do statistical analyses. P-value < 0.05 was considered as statistically significant. The degree of anaemia increases as the progressive destruction of kidney tissue occurs [14].

## **RESULTS**

Out of the 44 CKD patients, 35(79%) were male and 9 (20 %) were female. The age of the patients ranged from 18-70 years with the mean age being 45±14.1 years. The health status test different components are using nutritional status, biochemical result affect haemodialysis duration we take haemoglobin and other nutrients, biochemical parameters [7, 11]. (table-1) is presented nutrients in nutrients value 90 days is, energy mean value of 1495.9 ±38.4 kcal, protein mean value is 58.8 ± 3.9 gm., fat men value is 48.1± 5.5 gm. Carbohydrate intake mean value is 213.8±15.2gm. In table-2 the result were showed that evaluation of nutritional status by biochemical tests is an accurate and precise approach that showed chronic renal failure patients physiological and health status. We measure Hb, Rbs, and Serum creatinine serum albumin level regular interval. Mean value of haemoglobin is 8.5±1.5mg/dl. Random blood sugar level mean value is 90.5±11.4 mg/dl. Serum creatine value is 10.7 ± 3.7 mg/dl. Serum albumin mean value is 3.3 ±0.5 mg/dl. Blood serum urea means the value is 123.6± 38.4 mg/dl.

**Table 1:- Nutritional assessments of CKD patients on haemodialysis.**

Nutrients	First month	Second month	Third month	ANOVAs test( significant difference at 0.05 )
Energy (Kcal)	1635	1465.8	1387	<0.0001 ( yes)
Protein	61.6	59.9	52.6	<0.0001 ( yes)
Fat	50.7	48.2	45.3	<0.0001 ( yes)
Carbohydrates	219.7	221.2	200.4	<0.0001 ( yes)

**Table 2- The biochemical value of haemodialysis patients.**

Biochemical parameter	First month	Second month	Third month	ANOVAs test (significant difference at 0.05 )
Haemoglobin	8.6	8.7	8.3	0.43 (No)
Random blood sugar	83.9	95.5	91	<0.0001 ( yes)
creatinine	10.6	11.3	10.3	0.49 (NO)
Serum Albumin	3.52	3.59	2.9	<0.0001 ( yes)
Urea	131.3	119.7	86.9	<0.0001 ( yes)

In table table-3, patients with anaemia have a low haemoglobin level. Most people on dialysis have anaemia [11]. The first month 5 HD patients are mild, 33 HD patients suffered moderate and 6 patients have in severe anaemic condition. The second month 6 patients are mildly anaemic, 34 patients are in moderate anaemic and 4 HD patients were in severe anaemic condition. Third month after 90 of study HD patients almost 32 in moderate anaemic, 4 patients were in mild anaemic while 8 HD patients were in severe anaemic condition. During the dialysis procedure, those patients Hb was below 7.0 mg/dl given blood transfusions treatments.

**Table 3; - Haemodialysis patient’s anaemia status**

Severity of anaemia	First month	Second month	Third month
Mild	5	6	4
moderate	33	34	32
Severe	6	4	8

Table 4:- Dietary habits

Types of Diet	Frequency	%
Vegetarians	28	63
Non-vegetarians	16	37
Total	44	

**correlations**

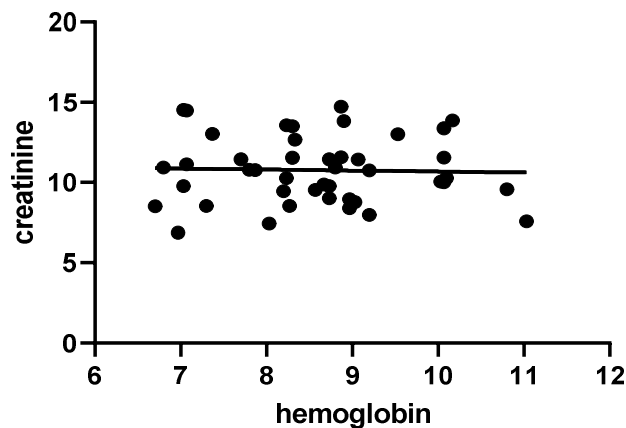


Fig 1: correlation between serum creatine and haemoglobin

63 % HD patient's food habit was vegetarian and 37 % of patients were not vegetarian. Vegetarian patients almost all take one egg per day and non-vegetarian patient's day's egg along with fish, chicken in their diet. The correlation between serum blood creatinine and Hb no significant association.

## DISCUSSION

The majority nephrologists use the World Health Organization (WHO) criteria to define anaemia. Anaemia is defined by WHO as a haemoglobin (Hb) concentration <13 g/dL for adult males and postmenopausal women and an Hb concentration <12 g/dL for premenopausal women [2]. During dialysis condition kidneys are not making enough of a hormone called erythropoietin to help body make red blood cells. CKD patients often lose some blood during haemodialysis treatments and blood testing [5, 23]. As patients progress through the stages of CKD, nutritional requirements are altered and metabolism of protein, fat, water, salt, potassium, and phosphorus are affected [16, 1]. These changes lead to ineffective energy generation despite adequate intake of protein and carbohydrate substrates. In more extreme manifestations, these alterations in nutrient utilization cause "uremic malnutrition," a syndrome that is distinct from malnutrition caused by inadequate nutrient intake. Both inadequate nutrient intake and ineffective nutrient utilization can contribute to nutritional disorders in CKD patients [23]. Anaemia in CKD is evident when a patient's creatinine clearance (CC) is less than 30 ml/min/1.73m<sup>2</sup>, GFR is below 50-40 ml/min, or SC is more than 3 mg/dl. If the GFR is less than 20 ml/min or the SC is more than 5, anaemia is always present and the Hb level is below 10 g/dl. The lower GFR or EPO production, greater loss of hematopoietic nutrient elements and inflammation due to dialytic membrane can lead to lower mean haemoglobin and hematocrit levels in haemodialysis patients [1, 24].

Haemoglobin levels in individuals with chronic kidney disease fluctuate frequently above or below the recommended target levels within short periods of time even though the calculated mean haemoglobin remains within the target range of 11 to 12 g/dl [3].

## CONCLUSION

This study showed a significant difference in dietary intake of macronutrients (protein, carbohydrate,). Dialysis necessary for chronic renal failure patients in CKD-5 stage have an only kidney transplant or dialysis option for surviving CKD patients. Anaemia commonly occurs in people with chronic kidney disease (CKD) the permanent, partial loss of kidney function. Anaemia occurs in early stages of CKD when patient has 20- 50% of normal kidney function. Anaemia tends to worsen as CKD progresses. Most people, who have total loss of kidney function, or kidney failure, have anaemia. Low blood pressure (hypotension) is one of the most common side effects of haemodialysis. It can be caused by the drop in fluid levels during dialysis. Low blood pressure can cause nausea and dizziness, loss of appetite, restricted iron-rich foods. Dietitian and nephrologists' prescription approach should be very logical and balance according to individuals CKD patients not fully ignored sodium, potassium, phosphorus, rich foods they have good sources of iron, copper, pyridoxine, vitamin- c, riboflavin, cyanocobalamin, etc. These all are essential nutrients for biosynthesis haemoglobin. Food technologist and scientist should develop food cooking and processing method which could provide diet which are high in other all nutrients rather than sodium, potassium and phosphorus.

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