

Comparative Study of Hemoglobin Level in Patients with Control Group Suffered from Chronic kidney Disease

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ABSTRACT

Introduction: Hemoglobin is associated with quality of life and outcome in patients with chronic diseases including chronic kidney diseases (CKD) and end stage renal disease (ESRD), keeping hemoglobin optimal will decrease risk of complications in these patients. **Objective:** To monitor Hemoglobin levels monthly in sixty patients of Hemodialysis and of peritoneal dialysis and to compare quality of life between two groups of patients. **Methods:** This study was conducted in patients who were having chronic kidney disease on dialysis but doing follow up. Half of patients were on Hemodialysis (HD) and remaining half were receiving Peritoneal Dialysis (PD). All patients' blood samples were done monthly for Hemoglobin level. At the same time their quality of life was assessed by three factors including their physical activity, functional activity and symptoms of the renal failure. Hemoglobin and activity standards were checked monthly. Patients hemoglobin level was compared, frequencies were calculated. Regression analysis was used for the correlation. **Results:** Sixty (60) patients were studied including 98(78%) and female 27(23%). Mean Age in years was

41 to 68. Out of them 43(34%) of CKD, 41(32%) on HD and other 41(32%) were on PD. Monthly mean hemoglobin levels were calculated. Relationship value of low hemoglobin with quality of life was determined. Result of effect of low hemoglobin on functional activity was significant P Value 0.000142. **Conclusion:** Low hemoglobin effect the functional activity while other parameters physical health and symptoms were not being affected.

Key words: Hemoglobin, Chronic kidney disease, End stage renal disease, Control groups.

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INTRODUCTION

Chronic diseases are major cause of death all over the World. The list mainly consists of high blood pressure, stroke, diabetes and cancer. In the developing countries including Pakistan these diseases are responsible for deaths.¹ According to WHO survey done in 2005, Pakistan is at sixth number in "Harboring Diabetic" patients.² National Health Survey showed that above the age of 45, our population consisting 3380% cause of mortality and morbidity. In comparing with the developed nations these diseases cause 60% % of Hypertensive and 25% of Diabetic individuals.³ Data revealed that mainly these two chronic conditions are associated with chronic kidney disease leading to end stage renal disease and dialysis.⁴

Anemia that comes on quickly often has greater symptoms which may include: confusion, feeling like one is going to pass out, and an increased desire to drink fluids. There may be additional symptoms depending on the underlying cause.⁵ Studies reveal that anemia causes fatigue, reduced exercise tolerance and cardiac complication such as Left Ventricular Hypertrophy. Patients with hemoglobin level less than 10 g/dl are considered as anemic and in patients of chronic kidney disease and dialysis as compared to normal hemoglobin level up to 12 g/dl are considered anemic.⁶ Hemoglobin levels are related with Quality Outcome in Dialysis patients.⁷ Anemia and malnutrition is quite common in our country and other developing countries, so this study was conducted to determine the changes in quality of life during hemodialysis and peritoneal dialysis treatment.⁸ Anemia is a most common complication of chronic kidney disease (CKD), including those undergoing maintenance hemodialysis treatment.⁹ There is a triangular relationship and a vicious circle between congestive heart failure, chronic kidney disease (CKD), and anemia, called cardio renal anemia syndrome.¹⁰ The anemia of chronic kidney disease is usually normochromic and normocytic and its cause is the decrease in erythropoietin production, reduced erythrocyte survival, inhibition of bone marrow by uremic toxins and deficiency of folic acid,

iron, and vitamin B12.¹¹ End-stage renal disease (ESRD) is characterized by nutritional impairment, anemia, hypertension, renal bone disease, neuropathy, nutritional impairment, and reduced life expectancy. Anemia of end stage renal disease can be managed relatively successfully by recombinant erythropoietin.¹² Before the erythropoietin injections, assessment of iron status (serum iron, total iron binding saturation) of these patients should be done and iron deficiency should be corrected accordingly. Anemia develops in most people with progressive chronic kidney disease. When it becomes severe, the administration of erythropoiesis-stimulating agents (ESAs) is generally required, along with the repletion of iron stores and the correction of other causes of anemia.¹³ The introduction of ESAs 30 years ago markedly improved the lives of many patients with chronic kidney disease, who until then had severe, often transfusion-dependent anemia.¹⁴ Objective of current study is to monitor hemoglobin levels and compare the quality of life between patients on hemodialysis and patients on peritoneal dialysis for six months.

MATERIALS AND METHODS

This study was conducted at the dialysis unit of Combined Military Hospital (CMH), Quetta. Total one hundred patients of end stage Renal Disease (ESRD) were enrolled. All the patients were informed of the study protocol and consented to be enrolled in the study. Out of 100 patients 40 patients were rejected not meeting inclusion criteria of study. Adult patients who consented themselves understanding, the aim of the research project, patients of end stage renal disease on hemodialysis and patients of end stage renal disease on peritoneal dialysis were included in the study and the patients of chronic kidney disease not on dialysis and renal transplant patients will be excluded.

Inclusion criteria were adult patients who can give consent, duration of dialysis more than 3 months and patients on three times HD in a week

(4 h in each session). At first step initially one hundred patients were screened who were suffering from renal disease at CMH (Combined Military Hospital) Quetta. However, hospitalized patients for an acute illness and vascular access failure and those who refused to participate later were excluded. Finally, HRQOL data were obtained from 60 (60%) patients and assessed retrospectively. All patients were assigned their own separate number. These patients were of different ages starting from age 30 to 90 divided into six categories. A majority of patients were male. Out of total number male were 48 consisting of 80 percent and female total number was 12 counting 20% of total number of patients.

These patients were divided in two groups. One group includes thirty patients on Hemodialysis (HD) and second group contain another thirty patients of ESRD on Peritoneal Dialysis (PD). For both groups Hemoglobin was checked monthly and monitored for three months. Both groups of patients were assessed for their quality of well-being and compared. Blood sample of each patient was drawn for hematological {(hemoglobin and total leucocyte count (TLC)}, biochemical (urea, creatinine, serum potassium and serum albumin) and viral markers (anti-HCV and HbsAg). Amongst all these parameters only hemoglobin was used for the determination of quality of life (QOL). Quality of life of dialysis patients whether hemodialysis or peritoneal dialysis was assessed and expressed in terms of descriptive statistics. A formal written permission was obtained from Medical superintendent and department of Nephrology of Combined Military hospital (CMH) Quetta. An informed consent was taken from all the subjects individually after explaining the objectives and purpose of the study. All clinical blood tests were done for 6 months for each patient and all patients' medication charts were reviewed for ESAs (Erythropoietin/ darbepoetin).

Statistical Analysis

To analyze the result of the study SPSS 19 programmed was used. For mean descriptive values frequencies were calculated. Percentage of different involved subjects was established. Ordinal numbers of the groups were assessed by using Regression Analysis ANOVA test which fortified the results to establish the relationship between hemoglobin and QOL. A P-value of 0.05 or less was considered as statistically significant differences.¹⁵

RESULTS

Age of the patients included was between thirty years to ninety years and divided into six groups as given in Table 1 and basic characteristics of patients of different age as shown in chart (Figure 1). A majority of the patients were male (twelve patients [20%] were female and forty-eight [80%] were male. There were forty patients with Hemoglobin 11 to 12 g/dl. There were five patients having hemoglobin less than 9g/dl, fifteen patients had hemoglobin in the range of 9-10g/dl, twenty-six patients had hemoglobin in the range of 10-12g/dl, and there were fourteen patients having hemoglobin above 12. The majority of patients (48.3%) were on erythropoietin therapy. Forty five percent were on darbepoetin therapy.

Table 1: Percentage of age.

Groups	Age	Percentage %
G.1	30-40	18.3
G.2	41-50	30
G.3	51-60	21.3
G.4	61-70	20
G.5	71-80	8.3
G.6	81-90	1.6

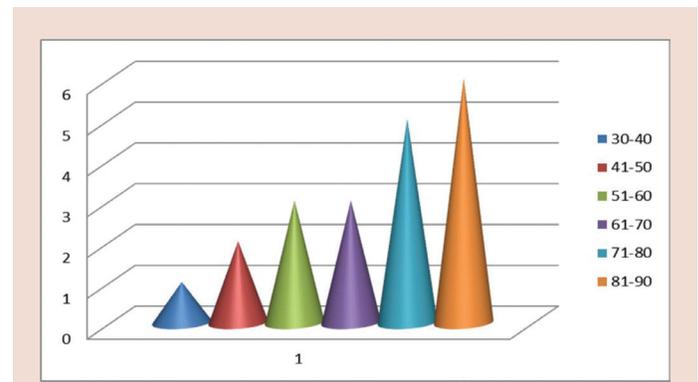


Figure 1: Age distribution of study patients in bar chart.

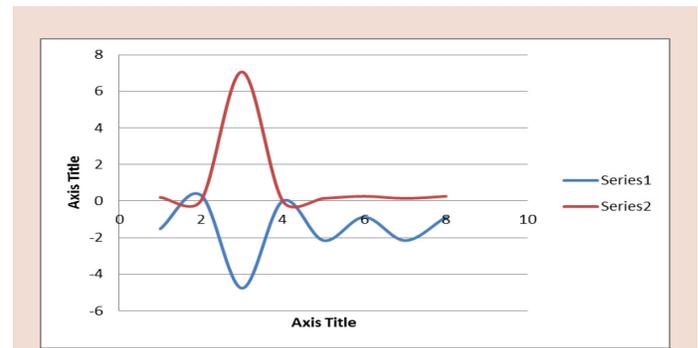


Figure 2: Hemoglobin did not affect the physical activity of patients.

Physical health, social function, and symptoms of renal disease *i.e.*, renal failure which were dyspnea, shortness of breath, tiredness etc. were analyzed. Physical health of Forty three patients (71.66%) were active, thirty five patients (58.33%) were socially active, and symptoms of renal disease found in 29 patients(48.33%), there were no symptoms of renal disease in thirty one patients (51.66%).

This is regression analysis between levels of hemoglobin and physical health and activity of these patients who were belonging to dialysis type whether they were getting hemodialysis or peritoneal dialysis (Figure 2). It showed that these patients activity was not affected by different levels of hemoglobin although difference in hemoglobin was small. The residual chart which is depicting ranges of values widely distributed not mainly with 0 levels (Figure 3).

This regression analysis showing significant effect of hemoglobin on functional effect of these patients means that patients with low hemoglobin were less active then comparing with more hemoglobin, and p value is less than 0.05 so it is very significant in two groups of patients on two types of dialysis *i.e.*, hemodialysis and peritoneal dialysis (Figure 4).

The regression analysis of third factor which was symptoms of renal disease *i.e.*, renal failure which were dyspnea (shortness of breath), anorexia, weight loss and tiredness (Figure 5).

DISCUSSION

In this study, most of the patients (66.60 %) were not anemic (hemoglobin < 11 g/dl). Low level of hemoglobin has been observed in another local study, 10 in which 44 patients (86.4%) were having low hemoglobin levels and the mean hemoglobin level was 7.97 ± 1.4 g/dl. The reasons for

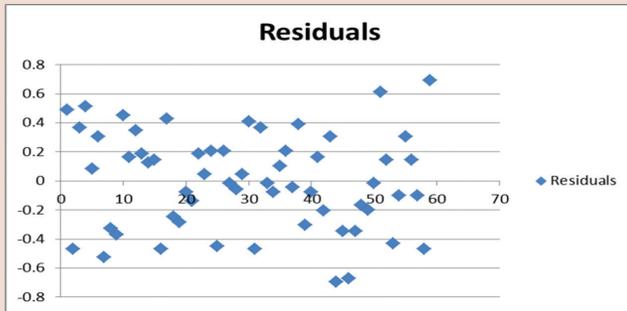


Figure 3: The residual chart depicting ranges of values widely distributed not mainly with 0 levels.

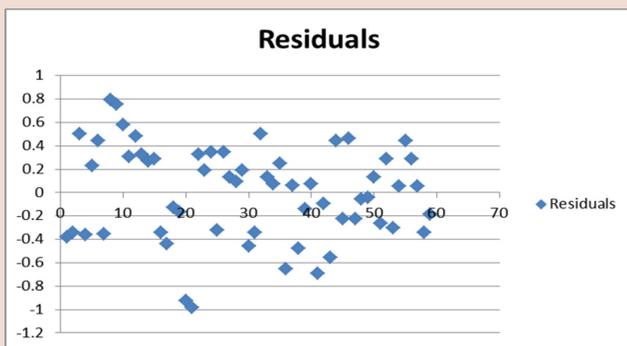


Figure 4: The residual chart which is showing ranges of values widely distributed mainly with 0 levels proving that low Hb affect the functional activity.

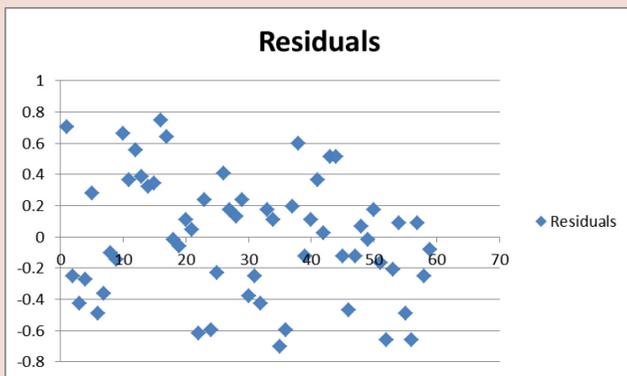


Figure 5: Symptoms of disease not associated in these patients and value was not significant.

anemia in these patients are that uremic toxins inhibit the erythropoiesis in kidney failure through bone marrow suppression and reduced life span of erythrocytes. For the correction of anemia, erythropoietin use is recommended in these patients. However, anemia remains in patients who cannot afford erythropoietin treatment due to financial burden of this chronic disease. Dialysis cost is US \$ 350 to US \$ 400 per month for a three time per week dialysis program, while the per capita income is low. Due to financial gap in income and expenditure, patients cannot

afford expensive injections of erythropoietin, because it increases financial stress on monthly income. Even the dose of erythropoietin used by these patients on maintenance hemodialysis is less as compared to the international guidelines (10 000 U/week 20 000 U/week). In this study, 48.33% of the patients were getting erythropoietin and 45% were getting darbepoetin. Erythropoietin is short acting so small doses are required (three times a week). Darbepoetin is intermediate acting approved for dosing every 2 weeks worldwide. Anemia is an important predictor of QOL in patients on dialysis. In our patients, functional activity was affected with a low hemoglobin levels. Deaths occurred in the patients with hemoglobin lower than 10 g/dl. Similar results were observed by Portales and coworkers. Iron is an essential ingredient for erythropoiesis, and its adequate amount is required for new erythrocytes synthesis. Measurement of serum ferritin, serum iron, and transferrin saturation is the primary tool for assessing iron status in patients with Chronic Kidney diseases. Reduced serum iron level is due to poor dietary intake, poor appetite, and increased iron losses (up to 5 mg/d to 6 mg/d) in patients on hemodialysis. Intravenous iron preparations are affordable for our patients, and we can eliminate iron deficiency according to the international guidelines. This study, however, showed that although iron level and stores were adequate in most of the patients, the majority of the patients were still anemic. Third factor which includes symptoms of renal disease also have no significant effect with low hemoglobin. Symptoms of renal disease usually appears if hemoglobin (Hb) level is less than 9 g/dl. In our study hemoglobin was comparatively better so no symptoms of renal disease appeared. The normal range of hemoglobin in end stage Renal Disease (ESRD) patients is 10-12 g/dl. If hemoglobin (Hb) level goes above 13 g/dl, death rate will increase as blood viscosity increase and this clotting is an important predictor of mortality in patients on dialysis. In our study there were fourteen patients having Hb above 12 g/dl. Despite the deterioration of the physical health status, the mental health of dialysis individuals is relatively preserved. This was explained by superior adjustment of older patients to their chronic illness. Furthermore, lower QOL scores in women was described in other study and this sex-related difference was also found in the general population. Probable reasons for the poorer HR QOL in female gender appear to be more linked to the higher prevalence of depressed mood and anxiety disorder and greater dependency upon their family members and lower adaptability.

This study provides a comprehensive description of the quality of life of patients who started HD and PD and their progress. The findings have important implications for physicians who evaluate and treat patients of chronic kidney disease. After starting dialysis, patients with low hemoglobin both HD and PD reported changes in quality of life especially functional activity was affected. We had less number of patients with dose affordability issues.

CONCLUSION

The study showing that functional activity was affected for hemodialysis and peritoneal dialysis patients with low hemoglobin level. Other factors including physical health and symptoms of renal disease were not affected with hemoglobin changes in patients of end stage Renal Disease on dialysis.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS USED

Hb: Hemoglobin; **CKD:** Chronic kidney disease; **ESRD:** End stage renal disease; **HD:** Hemodialysis; **PD:** Peritoneal dialysis; **WHO:** World Health organization; **CMH:** Combined Military Hospital; **TLC:** Total Leukocytes count; **QOL:** Quality of Life.

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SUMMARY

Hemoglobin is associated with quality of life and outcome in patients with chronic diseases. This study was conducted in patients who were having chronic kidney disease on dialysis but doing follow up. Half of patients were on Hemodialysis and remaining half were receiving Peritoneal Dialysis. Patients hemoglobin level was compared, frequencies were calculated. Low hemoglobin effects the functional activity while other parameters physical health and symptoms were not being affected.