

Relationship between anemia and parathyroid disorders in hemodialysis patients

ABDULRAHMAN ABDULLAHI ISHAG AHAMED

KAMALADIN AHAMED SALIH

Faculty of Medicine and Health Sciences

University of Sennar

YAGOUB ABDALLA ABDERAHAMAN

Ultrasound Department, Sennar Teaching Hospital

NUHA YOUSIF ALI

PhD student, Medical Laboratory

TAWADOD HAMZA ABUBAKER

MSc. Student, Medical Laboratory Science

Abstract:

Introduction: Anemia is common in patients suffering from chronic renal failure , and is one of the leading causes of increased cardiovascular morbidity and mortality in these patients(1,2,3), more than a quarter of a century ago, Brikmannet al. (4) showed that an excess of parathyroid hormone could induce a marrow fibrosis with a concomitant reduction of space for erythropoiesis. Two decades later, this hypothesis was confirmed by Raoet al. (5), who evaluated the response to erythropoietin therapy in a group of 18 uremic patients on regular hemodialysis therapy.

Material and Methods. The study has been done in the period from January 2014- to October 2014 in sennar teaching hospital, The data is collected from 80 cases under regular hemodialysis , All the patients are of adult age and more than 15years old, with erythropoietin and mineral therapy. All the data is collected by using a questionnaire which includes patient's personal data plus

laboratory finding using statistical package for the social sciences program for analysis.

Results: *The results conclude that 71% of all patient showed hyper parathyroidism, with mean 313.49 pg/ml, where 73% showed low hemoglobin, with mean 9.4g/dl, in spite of that weak reverse relationship between hemoglobin and hyper parathyroidism is noticed.*

Conclusion: *Same like most universal studies, our study in the Sudanese patients shows weak reverse relationship between hemoglobin and hyper parathyroidism.*

In spite our patients on erythropoietin and mineral therapy still there's large number of uremic patients suffering low hemoglobin and hyper parathyroidism, so more studies(nutrition, erythropoietin level, transferrin saturation , etc...) in this field to improve patient life quality is recommended.

Key words: anemia and parathyroid disorders, hemodialysis patients

INTRODUCTION:

Whether excessive parathyroid activity *per se* causes anemia and resistance to erythropoietin remains controversial. The potential mechanisms include a direct effect of PTH on endogenous EPO synthesis, on bone marrow erythroid progenitors, and on red blood cell survival (accelerated hemolysis). An indirect effect through the induction of bone marrow fibrosis also has been proposed (3).

An inversely relationship between serum intact parathyroid hormone (iPTH) and serum hemoglobin level among end-stage renal disease patients undergoing maintenance hemodialysis, is an issue of much importance. According to the various studies, an increase in serum level of iPTH leads to a decrease in serum level of hemoglobin among hemodialysis patients (6,7). While, several studies have also suggested a significant relationship between secondary hyperparathyroidism (SHPTH) and anemia in end stage kidney

disease patients (8,9,10,11,12,13), however, the evaluation of other common cause of anemia among end stage kidney disease patients undergoing maintenance hemodialysis including iron deficiency anemia, inflammation, aluminum toxicity and etc., is also needed for better evaluation.

THE PROBLEM:

In spite hemodialysis keep life of end stage kidney disease patients, their life's still poor in quality with increased morbidity and rate of hospital admission, one of major complication making them suffering is anemia, and its effect upon heart and circulation with over load subsequences, some patients not responded although erythropoietin and mineral therapy.

This study tries to find out relation between anemia and parathyroid disorder opening new way in treatment of erythropoietin resistant anemia.

OBJECTIVE:

General Objective:

The general objective is to study relation between anemia and parathyroid disorder in hemodialysis patients

MATERIALS AND METHODS:

The study has been done in the period from January 2014- to October 2014 in sennar teaching hospital, The data is collected from 80 cases under regular hemodialysis , All the patients are of adult age and more than 15years old, with erythropoietin and mineral therapy.5ml of blood were collected from hemodialysis patients (2 ml in EDTA for hemoglobin assay and 3ml in heparin for parathyroid hormone) for hemoglobin

measured we were used automated hematology analyzer Medonic and we were used AIA360 automated Immunoassay Analyzer which Principle is ST AIA-PACK Intact PTH is a two-site immunoenzymatic assay which is performed entirely in the AIA-PACK. Intact PTH present in the test sample is bound with polyclonal antibody immobilized on magnetic beads and enzyme-labeled polyclonal antibody in the AIA- PACK. The magnetic beads are washed to remove unbound enzyme-labeled polyclonal antibody and are then incubated with the fluorogenic substrate 4-methylumbelliferyl phosphate (4MUP). The amount of enzyme-labeled polyclonal antibody that binds to the beads is directly proportional to Intact PTH concentration in the test sample.

RESULTS

Table (1) Age Distribution and Frequency.

Age	15-30	30-45	45-60	60<	total
Frequency	20	36	19	5	80
Percentage	25 %	45 %	24 %	6 %	100%

Table (2) Parathyroid

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hypo	3	4	4	3.8
	Normal	20	25	25	28.8
	Hyper	57	71	71	100.0
	Total	80	100.0	100.0	

Table (3) Hemoglobin

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Normal	22	27	27	27.5
	Anemia	34	43	43	70.0
	Severe Anemia	24	30.0	30.0	100.0
	Total	80	100.0	100.0	

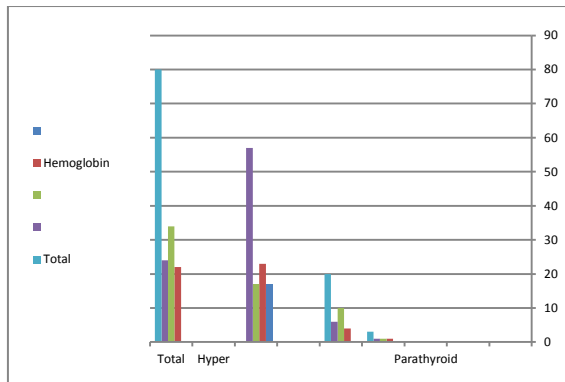


Figure (1) Parathyroid * Hemoglobin Cross tabulation

Table (4) The Correlation between HP and PTH in case HP has Anemia/ PTH has Hyper Parathyroidism

		Hb	PTH
Hb	Pearson Correlation	1	-.119
	Sig. (2-tailed)		.466
	N	40	40
PTH	Pearson Correlation	-.119	1
	Sig. (2-tailed)	.466	
	N	40	40

DISCUSSION

The study showed that 80 cases under hemodialysis, 25% of them their age between 15-30, 45% between 30-45, 24% between 45-60 and 6% above 60(table(1)). On the other hand had 71% of all cases had hyper parathyroidism, 25% showed normal parathyroid function, only 4% suffered hypo parathyroidism(table 2), in respect to hemoglobin concentration 73% of all cases complained low hemoglobin, (30% for blood transfusion, where 43% just low hemoglobin), only 27% have normal hemoglobin concentration(table 3), not only this, the study also clarified 70%of hyper parathyroidism patients suffering mild, or severe anemia(fig 1).

The study shows the hemoglobin mean 9.04, also it shows very weak linear relation was observed between HB and PTH, Pearson correlation = -0.119, p = 0.466 (2-sided), this indicates very weak reverse (Negative) linear relationship between hemoglobin and parathyroid hormone (figure 1), this matched with Baradaran and Nasri (14), evaluated the role of secondary hyperparathyroidism in the severity of anemia in 36 end stage kidney disease patients undergoing maintenance hemodialysis. The result of this study showed, a reverse correlation between primary hyperparathyroidism and hemoglobin, also matched with a cross-sectional study, Chutia and Ruram (15), evaluated the role of secondary hyperparathyroidism as a cause of anemia and correlation of intact parathyroid hormone and hemoglobin level among 63 individuals admitted in hemodialysis unit of North East Indira Gandhi Institute of Health and Medical Science. The result of this study also showed a reverse correlation between intact parathyroid hormone and hemoglobin level. There was no correlation between intact parathyroid hormone and serum ferritin level in the Chutia and Ruram, study which indicate that the anemia is not due to depleted iron stores.

This study also showed that the mean of hemoglobin is 9.04g/dl which also corresponding to Azar Baradaran and Hamid, they found the mean hemoglobin is 9g/dl, but this study differ in the parathyroid hormone mean which is 313.49pg/ml, they found the mean of parathyroid hormone was 439.4 pg/ml (14)..

RECOMMENDATIONS:

After the enumeration of the results that are related to the following thesis, there are some ideas which could help further in the field of the research and are better to be recommended as follow:

- A routine checkup, for hemoglobin and parathyroid hormone levels are mandatory in follow up to help in the treatment of hemodialysis patients suffering erythropoietin resistant anemia
- Study of nutritional status of hemodialysis patient in aim to treat anemia is recommended. .
- We need further research to detect erythropoietin level, and trans ferritin saturation to readjust the dose of iron and erythropoietin therapy.

CONCLUSIONS:

This study has been done in Sennar Teaching Hospital on 80 case of end stage kidney disease patients on hemodialysis. Their ages are above 15 years (26 male, 24 female), all patients is on erythropoietin and mineral therapy.

The goal of this research is to study the relation between anemia and parathyroid disorder in hemodialysis patients

The results conclude that 71% of all patients showed hyper parathyroidism with mean is 313.49 pg/ml, where 73% of all patients showed low hemoglobin, and the mean is 9.04g/dl, in spite of that weak reverse relationship between hemoglobin and hyper parathyroidism is noticed.

A routine hemoglobin, parathyroid hormone, erythropoietin, transferrin is mandatory in management of end stage kidney disease patients, as well as study of nutritional status.

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