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RESEARCH ARTICLE

EVALUATION OF SERUM HEPCIDIN LEVEL IN SUDANESE PATIENTS WITH ANEMIA OF CHRONIC RENAL FAILURE

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ABSTRACT

Background: Anemia of chronic renal disease related to the failure of renal excretory function, and to the renal endocrine function, failure of the excretory function leads to an increased demand for red blood cells because of shortening of the red blood cells life span, failure of renal endocrine function leads to decreased erythropoietic response because of impaired production of erythropoietin. (Krysiak *et al.*, 2015a, Krysiak *et al.*, 2015b) Hepcidinis a major hormonal regulator of iron homeostasis; (Carvalho *et al.*, 2011, Atkinson *et al.*, 2015) Made in the liver, it inhibits iron release from macrophages. (Tsfay *et al.*, 2015) and could be serve as an indicator of functional iron deficiency in portion with renal failure (Lemos Ados *et al.*, 2010)

Objective: The purpose of this study was to evaluate the serum hepcidin level in Sudanese patients with anemia of chronic renal failue.

Materials and methods: A total 42 patinets diagnosed with anemia of chronic renal failue enrolled in this study, serum was separated from participants for ELISA, to estimate hepcidin level.

Results: A total 42 patients diagnosed with ACRF in Sudan, their ages ranged between (13-79) years (mean SD 45 20, the mean value of hepcidin level (13.6) both male 24 (12.7%) and female 18 (14.6%) from different age groups, The hepcidin level showed correlate with duration of disease and with gender (p.value<0.05) the relation of hepcidin level and age the p.value showed that more than 0.05 insignificant, no association with age.

Conclusion: In summary we conclude that it has significant correlation of serum hepcidin level with gender and duration of disease, but no association with RBcs parameters and age.

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INTRODUCTION

Renal failure is a medical condition in which the kidneys fail to adequate filter waste production, from the blood. The two main forms is acute kidney injury, which is often not reversible with adequate treatment, and chronic kidneys disease, which is often not reversible. In both cases, there is usually an underlying cause the kidneys lose its normal function. Anemia of chronic renal disease related to decreased release of iron from macrophages to plasma, reduced red cell life span and an inadequate erythropoietin response to anemia caused by the effects of cytokines such as IL-1 and tumour necrosis factor (TNF) on erythropoiesis. (Sheikh *et al.*, 2006, Xiong *et al.*, 2015) Hepcidin is a protein and the major hormonal rgulater of iron homeostasis, made in the liver (Tsfay *et al.*, 2015), it inhibits iron release from macrophage, intestinal epithelial cells and from placental syncytiotrophoblasts by its interaction with the trans membrane iron exporter ferroportin.

Accelerating degradation of ferroportion mRNA increased production of hepcid in is induced by inflammation, via interleukin 6(IL- 6) hepcid in synthesis and secretion are controlled by proteins, HFE hemojuvelin and transferrin receptor 2, decreased production of hepcidinoccurs in response to iron deficiency, hypoxia and ineffective erythropoiesis. (Casanovas *et al.*, 2009, McCranor *et al.*, 2013) Renal failure is apublic health problem is the major complications in renal failue patient have scueral abnormalities in systemic homeostasis of iron an essential component of the production of red blood cell, hepcidin is one of the main causes of the disturbances in iron metabolism in renal failure and anemia, the patient with renal failure are usually anemic because of defect in erythropoiesis (Rubab *et al.*, 2015), hepcidin that regulates iron homeostasis and could be serve as an indicator of functional iron deficiency in portion with renal disease. (Rubab *et al.*, 2015)

Objective

The purpose of this study was to evaluate serum hepcidin level in Sudanese patients with anemia of chronic renal failure.

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MATERIALS AND METHODS

Patients and samples

Study population

A total 42 Sudanese patients with anemia of CRF admitted to renal hemodialysis center in Khartoum Bahri, during the period from April to May 2015 were enrolled in this study.

Sample collection and serum preparation

Blood sample were collected from patients in plain containers and serum was prepared by centerfugation.

Hcpidin (hepc) level analysis

Serum hepcidin (hepc) was estimated using the commercial ELISA test CDRG stat fax 4200, Germany, the measure range of the assay is 7.5 -150ug/l, the analytical low level of sensitivity of the DRG ELISA was calculated by subtracting 2 standard deviations from the mean of 20 replicate analyses of the zero standard (50) and was found to be 7.5ug/l.

Statistical analysis

Data of this study was analyzed by statistical package for social sciences (SPSS), correlation between serum hepcidin level variants and qualitative variables were tested by crosstablietien and chi-square test, means of age and duration were compared by anova test.

Ethical consideration

This study was approved by the faculty of medical laboratory sciences, Alneelain University, and informed consent and obtained from each participant before sample collection.

RESULTS

A total of 42 patients diagnosed with anemia of chronic renal failure their age ranged between (16-79) years mean \pm SD (45 \pm 20). The mean value of hepcidin level (13-6%) both male 24 (12.7%) and female 18 (14.6%) (Fig. 1) from different age groups showed the mean value in age less than 20, 16 individuals (14.3%) less than 40 years 42 individuals (38.1%), and more than 40 years 42 individuals (47.6%) (Fig. 2) the result was showed the correlation of hepcidin level and duration of disease (fig 4) , the main value 53.890 (p-value less than 0.05). table-4 they have different mean value of hepcidin according to correlation of RBcs parameter pcv (13.8), RBcs count (16.531), MCH (16.57), MCHC (19-393) and MCV (76.6), table.3 the result showed the mean of hepcidin level classified according to gender p.value<0.05) indicate to correlation with gender (Table 1). The relation of hepcidin level and age the p.value showed that more than 0.05 insignificant, no association with age Table 2.

Table 1. The mean value of hepcidin level related to gender

Gender	Hcpidin level			
	frequency	mean	S.D	Dofsig
male	24	12.7	15.8	NS
female	18	14.6	20.9	

S.D –standard deviation, .D of sig -degree of significant

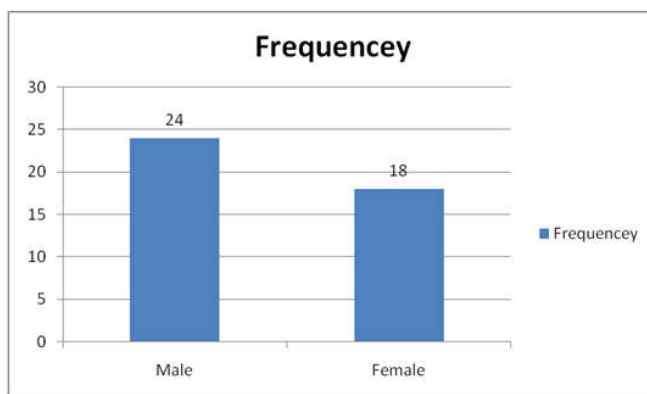


Fig. 1. Showed the mean value of hepcidin level related with gender

Table 2. The mean value of hepcidin level related to age

Age	percentage	frequency	p.value
0-20	14.3%	6	0.781
21>40	38.1%	16	
>40	47.6%	20	

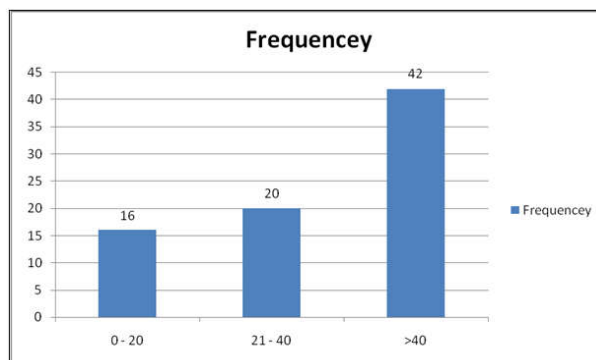


Fig. 2. Showed the frequency of hepcidin level and age

Table 3. The hepcidin level related with RBcs parameters

variable	Hb	Pcv	RBcs	MCH	MCHC	MCV
mean	4.5	13.8	10.531	16.574	19.393	76.6
p.value	0.10	0.11	0.16	0.89	0.31	0.54

PCV – packed cell volume, RBcs – red blood cells, Hb-Hemoglobin, MCH- median concentration of hemoglobin: MCHC- median cell hemoglobin concentration: MCV – median cell volume.

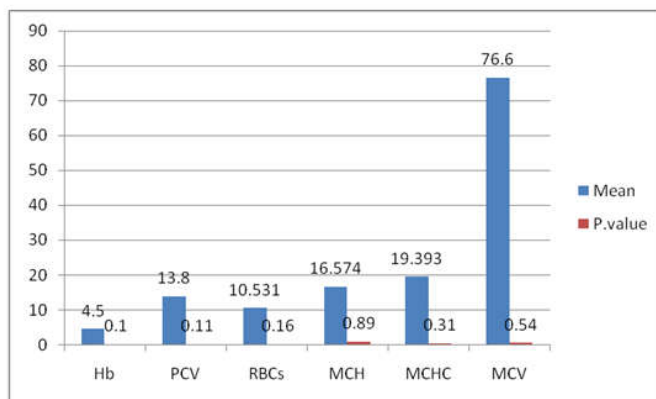
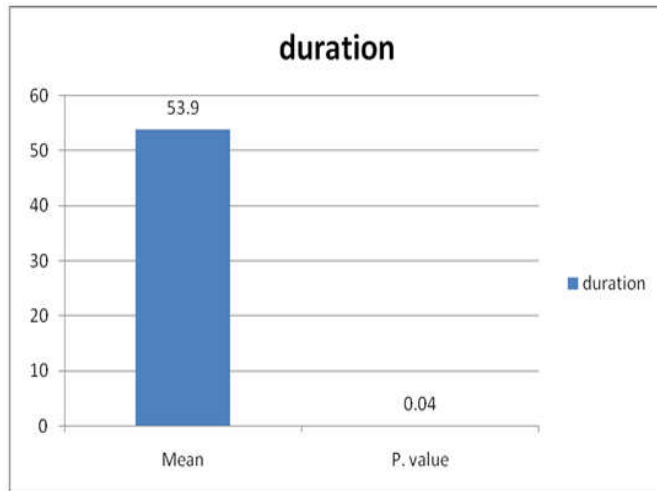


Fig. 3. Showed the hepcidin level related with Rbcs parameters

Table 4. The hepcidin level related with duration

Variable	duration
Mean	53.9
p.value	0.04

**Fig. 4. Showed the hepcidin level related with duration**

DISCUSSION

Hepcidin is one of most important protein that regulate of iron metabolism, and it is regulated by iron status and erythropoietic activity. The present study focused on the level of serum hepcidin in patients with ACRF. In our study we used the enzyme-linked immunosorbent assay (ELISA) method for the detection levels and found that the levels were significantly lower in patients with first stage of hemodialyzed due to anemia, and then increase in end stage of renal anemia due to inflammation, these evaluated levels in hemodialyzed patients could be due to functional iron deficiency anemia and low grade inflammation. the result showed that the level of hepcidin in female (14.6) more than male (12.7%) due to more demand to iron that means significant associated between hepcidin level and gender, $p\text{-value} < 0.05$.

The result optined the level of hepcidin has significant assoited with duration of disease but it has week positive correlation ($p\text{-value}$ less than 0.05) due to increase severity of renal disease lead to abnormalities in systemic homeostasis of iron and affect in the level of hepcidin that is main causes of the disturbances in iron metabolism. The result showed that no correlation between hepcidin level and RBcs parameters (Fig. 4) ($p\text{-value}$ more than 0.05), it has insignificant relation. That RBcs parameters can affect by levels of hepcidin this finding is disagree with study done by institute of transfusiology, Serbia (2013) which showed A significant positive correlation between RBcs number and hepcidin level, The present study agree with study done by shahidamohsin (2015), which showed that there was no association between patients hepcidin level and their age.

Conclusion

In summary we conclude that it has significant correlation of serum hepcidin level with gender and duration of disease, but has no association with RBcs parameters and age. This study needs big study using different stages of renal failure.

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By the grace of Almighty Alla and his help I completed this study; all praise to him, my gratitude goes to Dr. Enaam A. Rhman, my supervisor who guides me to complete this work, all appreciation to the staff of Haematology Department (Alneelain University). Finally special thanks to patients who were so cooperative and despite their pain.

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