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Assessment of complete blood count in Patients with Chronic Renal failure

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Abstract:

This study was conducted at Military Hospital during the time period from October 2015 to March 2016 in order to measure complete blood count for patients with chronic renal failure after dialysis and to determine the effect of haemodialysis duration on complete blood count, it is designed questionnaire interviews direct were explained the subject of the study are clear to all personnel involved. Were taken 70 blood samples from patients suffering from chronic renal failure and 30 samples taken from healthy as control persons and collecting 2.5 ml of blood from patients and healthy controls, automated hematological analyzer (Sysmex KX-21N) was used to measure complete blood count. Information demographic data of sex, age, duration and other diseases were collected in the questionnaire. The result showed that the hemoglobin mean value of patients with CRF was 1.8 ± 8.6 , mean value of MCV, MCH, MCHC were: 85.4 fl ± 5.9, 27.6 pg ± 2.1, 32.3 g/dl ± 1.1 respectively PCV was 26.7% ± 5.9 , red blood cells was 3.1 ± 0.7×1012/l . Age in this study was divided into three groups: 15-35, 36-55 and more than 55. There no relationship between age group and Hb , RBCs count , PCV level and MCHC induces, but there are relationship in MCV (P. value 0.019) and MCH (P. value 0.014), and that there is no significant difference in Hb , RBCs , PCV , MCV,

MCH, MCHC according to sex. The study concludes that the duration of haemodialysis does not affect those rates.

Key words: Renal failure, Blood count, Inflammatory, Sudanese.

INTRODUCTION:

Renal failure, also known as kidney failure or renal insufficiency, is a medical condition in which the kidneys fail to adequately filter waste products from the blood [1].The two main forms are acute kidney injury, which is often reversible with adequate treatment, and chronic kidney disease, which is often not reversible. In both cases, there is usually an underlying cause. Kidney failure is mainly determined by a decrease in glomerular filtration rate, which is the rate at which blood is filtered in the glomeruli of the kidney. The condition is detected by a decrease in or absence of urine production or determination of waste products (creatinine or urea) in the blood. Depending on the cause, hematuria (blood loss in the urine) and proteinuria (protein loss in the urine) may be noted. In kidney failure, there may be problems with increased fluid in the body (leading to swelling), increased acid levels, raised levels of potassium, decreased levels of calcium, increased levels of phosphate, and in later stages anemia. Bone health may also be affected [2]. Renal failure develops when the GFR is less than 20% of normal. At this point, the kidneys cannot regulate volume and solute composition, and edema, metabolic acidosis, and hyperkalemia develop. These alterations affect other body systems to cause neurologic, gastrointestinal, and cardiovascular manifestations. End-stage renal disease (ESRD) occurs when the GFR is less than 5% of normal. Histologic findings of an end-stage kidney include a reduction in renal capillaries and scarring in the glomeruli. Atrophy and fibrosis are evident in the tubules. The mass of the kidneys usually is reduced. At this final phase of renal failure,

treatment with dialysis or transplantation is necessary for survival [3, 4]. The objective of this study was to assess the hemoglobin, hematocrit, red blood cells count**,** Mean Cell Volume, Mean Cell Hemoglobin and Mean Cell Hemoglobin Concentration in patient with chronic renal failure.

MATERIALS AND METHOD

Study population:

Case control study, in Khartoum state, Military Hospital.
Patients with renal failure already diagnosed as case group and compared to healthy individuals as control group. Controls and patients were matched in age, sex, and blood analysis. From October 2015 to March 2016.This study will be among 100 blood samples. 70 of these samples would be collected from patient with chronic renal failure and 30 samples would be collected from individuals do not have chronic renal failure as control group.

Sampling:

Tow point five ml of venous blood would be collected by using sterile disposable syringes and poured into ethylene diamine tetra acetic acid (EDTA) containers, immediately examined by using of (sysmex, model kx21). This data is would be collected by questionnaire. Complete blood count was done to measure the hematological parameters. Tests used for diagnosis of (Hb, PCV, RBCs, MCV, MCH, MCHC).

Data analysis and presentation:

All result was analysis by statistical package for Social Sciences. The means was obtained and chi-square and other variable odd ratio was calculated for comparison and presented in form of figures and table. P value and odd ratio was obtained to assess the significance of the results by (SPSS).

Ethical consideration:

Ethical clearance was obtained in this study, and the sample was collected after the consent of participants who were informed about the procedure of blood collection and the aim of the study.

Quality control:

Quality control is of great importance for obtaining highly reliable data over a long period of time, as is the constant monitoring of the instrument for preventing troubles or for early detection of problems. Before starting sample analysis, analyze control blood using X control or L-J control program [5].

Result:

The study was done in 100 Sudanese patients 70 patients with Chronic Renal failure which represent case group and 30 healthy people which represent control group. According to age in this study was ranged from 15 years to more than 55 years old.

The CBC result showed that the mean of RBCs , Hb, PCV , MCV , MCH and MCHC in Patients with CRF were 3.1×10^{12}/l , 8.6 g/dl , 26.7% , 85.4 fl , 27.6 pg , 32.3 g/dl respectively, all hematological parameters measured decreased significantly from control Except MCV insignificantly as illustrated in table (1).

The mean of hemoglobin level within males was 8.5 g/dl(SD±1.8), red blood cells count was 3.1×1012/l (SD±0.7), PCV was 26.4% (SD±6.1), the mean of MCV, MCH and MCHC induces was 84.9fl (SD±5.5) , 27.4pg (SD±2.1) , 32.3g/dl (SD±1.2) respectively, also the mean of Hb in females was 8.8g/dl (SD±1.8) , mean of RBCs was 3.1×1012/l (SD±0.6) , mean of PCV was 27.4% (SD±5.6) , the mean of MCV, MCH and MCHC induces was 86.5fl (SD±6.5) , 28.0pg (SD±2.1) , 32.3g/dl (SD±0.9) respectively, according to the p.value which was

insignificant , there was no difference in Hb, PCV, RBCs, MCV, MCH and MCHC induces according to sex as in figure (2).

According to age group the means of hemoglobin , RBCs, PCV, MCV, MCH, MCHC in the age 15-35 were 8.2g/dl ±1.7, 3.0×1012/l ±0.5, 25.4% ±5.5, 84.2fl ±5.9, 27.4pg ±2.0 and 32.5 g/dl ±1.1 respectively, the means in age 36-55 were 8.6 g/dl ±1.6, 3.0×1012/l ± 0.6, 26.8% ±5.5, 87.3fl ±5.1, 28.2pg ±2.0, 32.3g/dl± 1.0 respectively, and the means within age more than 55 were 9.0g/dl ±2.1, 3.4×1012/l ± 0.8, 28.4%± 7.2, 82.7fl ±6.4, 26.4pg ±2.1 and 31.9g/dl ±1.1 respectively, according to the p.value there was no significant difference in hematological parameters except MCV, MCH according to age group as illustrated in figure (3.3). The mean of Hb, RBCs, PCV, MCV, MCH, MCHC according to the duration of haemodialysis in 1-5 year were 8.6g/dl ±1.5, 3.1×1012/l ±0.6, 26.8% ±5.2, 85.9fl ±5.8, 27.8pg ±2.1, 32.4g/dl ±1.1 respectively, the means in group more than 5 years were 8.5g/dl ±2.4, 3.1×1012/l ±0.9, 26.5% ±7.9, 84.1fl ±6.0, 27.0pg ±2.2, 32.0g/dl ±0.9 respectively.

Table (1): Mean of hematological parameters in patients with CRF and control group:

Hematological parameters		Mean	Std. Deviation	P value
HB	control	12.327	1.0362	0.000
	Case	8.634	1.8145	
RBCs	control	4.1900	.29402	0.000
	Case	3.1391	.70963	
PCV	control	36.900	2.9781	0.000
	Case	26.786	5.9718	
MCV	control	87.440	2.4809	0.085
	Case	85.486	5.9210	
MCH	control	29.467	.9132	0.000
	Case	27.656	2.1616	
MCHC	control	33.500	.9910	0.000
	Case	32.333	1.1320	

t-test was used to calculate P value
P value less than 0.05 considered significant

Figure (1): Distribution of study population according to case and control.

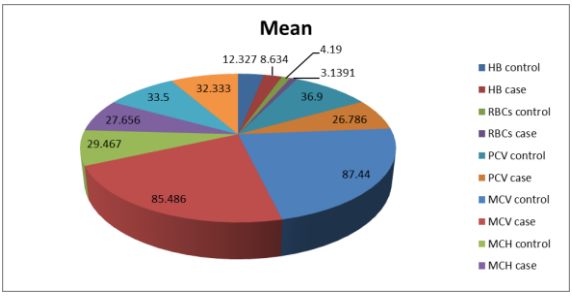


Figure (2): Distribution of study population according to gender:

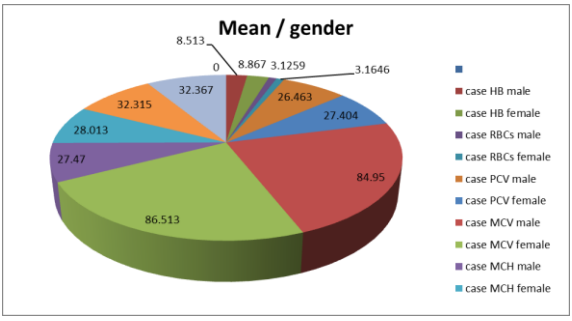


Figure (3): Distribution of study population according to age groups:

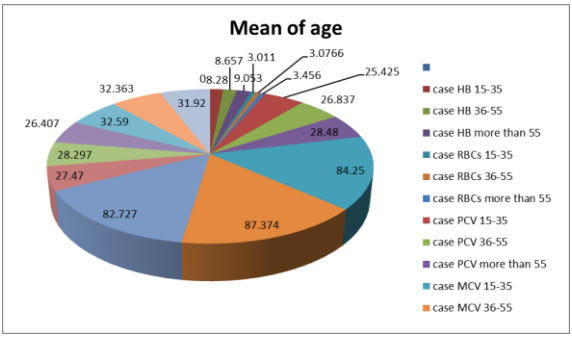
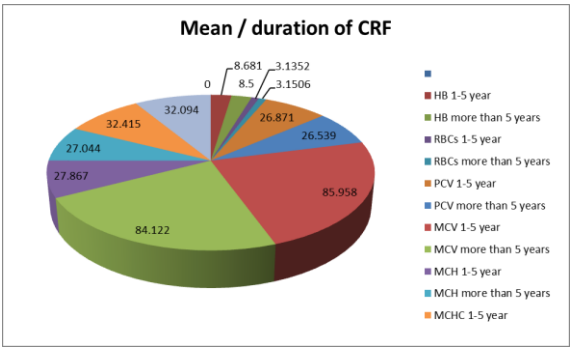


Figure (4): frequency of study population according to duration of haemodialysis:



DISCUSSIONS

70 blood samples were collected from patient with chronic renal failure visiting Military Hospital in Khartoum, also 30 blood samples collected from healthy individual subjects as control group.

The study showed significant decrease in the level of Hemoglobin, Hematocrit, Red Blood Cells count, Mean Cell Hemoglobin and Mean Cell Hemoglobin Concentration (P-value = 0.000) but there was insignificant increase in Mean Cell Volume (P-value = 0.085) in the patient with chronic renal failure when compared to control subject that illustrated in table 1.

In the current study the Hemoglobin, Hematocrit and Red Blood Cells count were reduced in CRF patients and statistical analysis significant difference between the value obtained from patients and control (P-value <0.05) which agrees with result obtain by Mohammed et al(2013)[6], Elhassan et al(2010) [7], Hamed et al(2014) [8], Saad et al(2011) [9].

The study indicated that there is significance decrease on the level of the Mean Cell Hemoglobin and Mean Cell Hemoglobin Concentration (P-value = 0.000) this disagrees with the results of Mohammed et al (2013) [6], Hamed et al (2014) [8], Abd Elsadig et al (2015) [10].

The study indicated that there is effect the level of the Mean Cell Volume (P-value = 0.085) this agrees with Mohammed et al (2013) [6], Elhassan et al (2010) [7], Hamed et al (2014) [8], ALI, HALA (2011) [11] and disagree with Ali, Elyasaa et al (2011) [12].

The study indicated that there is significance decrease on the level of the Hemoglobin, Hematocrit, Red Blood Cells count and Mean Cell Hemoglobin Concentration (P-value = 0.000) this agrees with Ali, Elyasaa et al(2011) [12]. The study indicated that there is significance decrease on the level of the Hemoglobin, Hematocrit, Red Blood Cells count, Mean Cell Hemoglobin and Mean Cell Hemoglobin Concentration (P-value = 0.000), but there was insignificant increase in Mean Cell Volume this agrees with ALI, HALA (2011) [11]. From the present study the followed are recommended, Patients on haemodialysis should be investigated before and after dialysis to control the risk of anemia. More studies should be done on iron status, platelets function and coagulation factors on haemodialysis patients, Increase rates of awareness among renal failure patients how to behave with their disease and how to protect themselves from complications. Genetic studies should be done to detect relationship between renal diseases and family history.

CONCLUSIONS

From this study the following can be concluded, The level of Hemoglobin, Hematocrit, Red Blood Cells count, Mean Cell Volume, Mean Cell Hemoglobin and Mean Cell Hemoglobin Concentration are effected by chronic renal failure due to defect in the kidney. There is no effect of the gender, age and duration of the disease on hemoglobin, red blood cells and hematocrit.

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