Original article

Assessment of Hematological Profile and Liver Enzyme Activity in Patients with Pregnancy Induced Hypertension (PIH)

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Abstract

The aim of this study is to assess Hematology profile (Hb, RBCs, PVC, MCV and MCMC) liver functions (ALT, AST and ALP) of healthy (control) and patient with PIH (eclampsia). Samples were collected from three Teaching Hospitals (Elmogran, Bashair and Maternal hospital). The clinical measurement was carried out in the of Elmogran Hospital at Al-Neelain University during 2016-2017. The results indicated that Hb, RBCs, PCV, MCV and MCHC for normal pregnant women are 70.40, 5.00, 37.47, 81.63 and 29.71mg / dl, respectively. While the Hb, RBCs, PCV, MCV and MCHC for pregnancy induced hypertension women are 64.61, 5.37, 34.02, 79.76 and33.7671 mg / dl, respectively. The ALT, AST and ALP for normal pregnant women are 22.15, 24.46 and 83.20 IU/L, respectively. While the ALT, AST and ALP for pregnancy induced hypertension women are 34.11, 47.20 and 128.49 IU/L, respectively. In both cases, normal and pregnancy induced hypertension women are more susceptible to hematology changes and elevation of liver enzyme due to dietary iron deficiency.

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Introduction

Hypertensive disorders during pregnancy are important health issues that has to be dealt with especially, in developing countries where the incidence and rates of adverse outcomes are higher. Pregnancy induced hypertension (PIH) is the most common hypertensive disorder of pregnancy. It is the 2 nd most common killer disease in pregnancy (Mohapatra and Behera, 2013). It complicates almost 10% of pregnancies (Sajith *et al*., 2014). Hematological profile is considered as vital role in pregnancy. Anemia is hematological problem in pregnancy, followed by thrombocytopenia. Leukocytosis is related to pregnancy. Women with pregnancy induced hypertension may develop a variety of haematological aberrations (Redman and Sargent, 2005). As there is likely derangement in the functions of the liver in pregnancy induced hypertension, and nearly 3% of pregnancies are complicated by liver disorders, a study on the biochemical changes that occur in the parameters associated to these organs may help in the early diagnosis of the disease (Shekhara and Diddib, 2015; Slemons and Bogert, 1917).

Therefore, this study was undertaken to investigate the levels of estimate the overall mean values of five major

hematological parameters and liver enzymes in both normal pregnancy and pregnancy induced by hypertension women.

Materials

This cross sectional study was conducted in Khartoum State, Sudan in 2016, Study duration was extended from 2016-2017. The study was undertaken on 300 pregnant women. One hundred(100) pregnant women with PIH (eclampsia) admitted in three teaching hospitals Elmogran, Bashair and of maternal Hospital were randomly selected as case group. From the same health facilities, two hundred (200) healthy pregnant women without a history of hypertension were randomly selected as control group for comparison. After explaining aims and objectives, informed consent was obtained from each subject for participation in this study. Ethical approval for the study was obtained from the ethical commission of the collage of postgraduate studies in Al Neelain University. Data collection, demographic data and clinical data was collected by using structured questionnaire. The participants were assisted on how to fill the questionnaire. Patient's information like maternal age, parity and gestation age at screening was recorded.

Ethics

The research was approved by the ethics Research committees of Al-Neelain and three teaching Hospitals (Elmogran, Bashair and Maternal).

Sample collection

A blood sample (4.5 mL) was withdrawn from each participant with minimal stasis from the antecubital vein using a dry, sterile disposable syringe and needle. The blood was dispensed into tubes containing the anticoagulant ethylenediaminetetraacetic acid (EDTA). The specimens were labeled with the subject's age, and identification number. The EDTA samples were kept at room temperature until processing, which occurred within 4 hours of collection.

Methods

Laboratory analysis

Full blood count was performed using a KN-21N Hematology Analyzer (Sysmex, Kobe, Japan), a three-part auto analyzer able to test 19 parameters per sample including Hb concentration, PCV, RBC concentration, MCV and MCHC. Measurement of the liver enzymes (ALT, AST and Alkaline) was done. Standardization, calibration of the instrument, and processing of the samples were done according to the manufacturer's instructions.

Hematological parameters

Heamoglobin, PCV, RBCs count were determined by the methods described by Lea and Febiger (1975).

Mean Corpuscular Volume (MCV)

The MCV in cubic micron was calculated from RBC count and PCV values as follows:

MCV (fl) = PCV(%) ×10 / RBC count in million/m,

Mean Corpuscular Heamoglobin (MCH): The MCH was calculated from Hb and RBC values as follows:

MCH (pg) = Hb (g/dl) ×10 / RBC count in million/m

Mean Corpuscular Heamoglobin Concentration

(MCHC): The MCHC was calculated from Hb and PCV as follows:

MCHC (g/dl)= Hb(g/dl) ×100 / PCV(%).

Estimation of enzymes activity ALT

It was measured according to method described by Friedman and Young (1997).

Estimation of enzymes activity of AST

It was determined according to method described by Murray *et al.*, (1984). Working solution was prepared by adding 2 ml from reagent 1 (buffer, lactate dehydrogenase (LDH), malate dehydrogenase (MDH), L - aspartate, pH 7.8) and 500 µl from reagent 2 (substrate α-ketoglutarate). It was mixed and kept in 370C, 1 ml was taken from working solution, and then 100 µl from serum was added, and then was mixed and incubated at 37oC for 1 minute. Initial absorbance was read at 1 minute intervals, the difference between absorbance were calculated. The average absorbance difference per minute: Δ A / minute × 1750 (factor) = U/ L. A calibrated spectrophotometer (Awareness Technology, model No. 1904 plus, serial No. 1904-5252) was set for measurement of AST concentrations.

Estimation of enzymes activity of alkaline phosphatase

An Automatic machine Elecsys 2010 Germany full automatic device was calibrated for measuring serum alkaline phosphatase concentrations for all animal groups by using method described by Friedman and Young (1997).

Statistical analysis

Data were analyzed using SPSS (v 16; IBM, Armonk, NY, USA). The descriptive data are presented herein as means ± standard deviation (SD). Pearson's Chi-square test and one-way analysis of variance (ANOVA) were used for analytic assessment and the differences were considered statistically significant when the P value obtained was <0.05.

Results and Discussion

Hematology profile

Table (1) illustrates that hemoglobin level for normal pregnancy and pregnancy induced by hypertension is 70.40 and 64.61 g/dl, respectively. These results indicated the

Table (1) Blood analysis of healthy (control) and PIH and eclampsia

Item (g/dL)	Control	PIH and eclampsia	T-Test	P-Value
Hb	70.40±29.23	64.61±29.06	0.950	0.346
RBCs	5.00±0.80	5.37±7.44	0.294	0.770
PCV	37.47±5.73	34.02±3.94	3.545	0.001
MCV	81.63±5.74	79.76±15.23	0.699	0.488
MCH	29.71±4.53	33.76±2.58	5.709	0.000

normal pregnancy has high hemoglobin level than the pregnancy induced hypertension. These values for normal pregnancy and pregnancy induced hypertension are higher than those findings obtained by (Akinsegun et al., 2013).The red blood cells for normal pregnancy and pregnancy induced by hypertension is 5.00 and 5.38 g/dl, respectively. These findings indicate there no significant difference between normal pregnancy and pregnancy induced hypertension in red blood cells. Williams and Wheby (1992) said that anemia is common disease rise during the pregnancy period.In addition, Foulkes (1982) illustrated that anemia is develop when red blood cells of pregnancy is less than 110 g/L.The packed cell volume (PCV) for normal pregnancy and pregnancy induced by hypertension is 37.47 and 34.02 g/dl, respectively. These finding are indicated that the value of packed cell volume begin to decline during pregnancy. These results agree with value reported by shen*et al*. (2010). The mean cell volume (MCV) for normal pregnancy and pregnancy induced by hypertension is 81.63 and 79.76 g/dl, respectively. These findings indicate there no significant difference between normal pregnancy and pregnancy induced hypertension in MCV. These results may be reflected of non-iron deficiency anemia in pregnancy induced hypertension in this study. The mean corpuscular hemoglobin concentration (MCHV) for normal pregnancy and pregnancy induced by hypertension is 29.71 and 33.76 g/dl, respectively. These findings are indicated that in pregnancy induced by hyperextension is lower than in normal pregnancy woman. The MCHC was stable in pregnancy induced by hypertension is 83.20 and 128.49 IU/L. Generally, the results of an elevation in liver enzyme

for pregnancy induced hypertension are agreed with those findings reported by American Family Physician (2008).

Table 2: Liver function of healthy (control) and PIH and eclampsia

Item (IU/L)	Control	PIH & eclampsia	T-Test	P-Value
Alt	22.15±11.21	34.11±14.92	4.152	0.000
AST	24.46±8.51	47.20±29.69	4.434	0.000
Alkaline	83.20±28.27	128.49±45.63	5.345	0.000

AIT = Alanine transaminase, AST = Aspartate transaminase.

Table (2) indicated that value of alanine transaminase for normal pregnancy and pregnancy induced by hypertension is 22.15 and 34.11 IU/L, respectively. These results illustrated that alanine in pregnancy induced hypertension is high significant than in normal pregnancy woman. While value of Aspartate transaminase for normal pregnancy and pregnancy induced by hypertension is 24.46 and 47.2o IU/L, respectively. These findings are clearly observed that AST in pregnancy induced hypertension woman is increased significantly compared with normal pregnancy woman. The Alkaline for normal pregnancy and pregnancy induced by hypertension.

Conclusion

The study observed significant differences in the packed cell volume (PCV) and MCHCbetween the two groups (Control and pregnancy-induced hypertension). Yet, the results

indicated that the value of packed cell volume begin to decline during pregnancy with stable levels of MCHC in pregnancy induced by hypertension. Significantly higher values of alanine transaminase, Aspartate transaminase, and Alkalines were also observed among pregnancy induced hypertension group indicatingan elevation in liver enzymes for pregnancy induced hypertension compared with normal pregnancy woman**.**

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