

Study Kidney Functions, Body Weight, Blood Pressure in Patients with Pregnancy Induced Hypertension (PIH)

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Abstract

An aim of this study is to assess weight, pressure and kidney functions of healthy (control) and patient with PIH (eclampsia). Data was collected by using structured questionnaire. Body weight was measured to an accuracy of 0.1kg using a standard balance scale manufactured by Microlife®, Switzerland, and clinical data was obtained from the subjects' records. The results were revealed that the greater levels of creatinine, blood urea, sodium, and potassium in PIH (eclampsia) patients compared with health group.

Keywords: Kidney; Weight; Pressure; Hypertension

Abbreviations: PIH: Pregnancy Induced Hypertension; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure.

Introduction

Pregnancy induced hypertension (PIH) is a hypertensive a common and dangerous disorder in pregnancy that occurs in the absence of other causes of elevated blood pressure. Pregnancy-induced hypertension is affecting both the child's and mother's morbidity and mortality [1]. PIH includes gestational hypertension as well as preeclampsia and eclampsia. Gestational hypertension is characterized by an abnormal rise in blood pressure that usually develops after the 20th week of pregnancy. In addition to hypertension, symptoms of preeclampsia include

proteinuria and edema. If the condition progresses to eclampsia, life-threatening convulsions and coma can occur. PIH can also result in preterm labor and delivery and low-birth-weight infants [2]. Even in developed countries, prenatal mortality rates in infants of mothers who developed pre-eclampsia were five times more frequent than non-pre-eclamptic mothers [3]. The worldwide prevalence of pre-eclampsia is 5–10% [4]. One study in Tehran reported the local incidence of pre-eclampsia to be 5%. Abdelamarouf, et al. stated that PIH is a common condition in Sudanese pregnant women as observed by practicing doctors, although here is no published data of its prevalence in Sudan [5].

The objectives of this study: to assess the weight, pressure and kidney functions for patient of PIH (eclampsia) comparing with health women.

Material and Method

Material

This cross sectional study was conducted in Khartoum State, Sudan in 2016, Study duration was extended from 2016-2017. The study was undertaken on 100 pregnant women. Thirty five 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, sixty five (65) 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

Methods

Body weight (Kg): It was measured to an accuracy of 0.1kg using a standard balance scale manufactured by Microlife®, Switzerland.

Blood pressure (mm Hg): Blood pressure of the participants were measured at the time of enrolment, by using standard methods.

Blood urea (mg\dl): Urea kits were used to determine urea Nitrogen concentration in blood serum sample according to method of Chaney and Marbach One hundred (μ l) of blood serum were transferred into a test tube [6]. One milliliters reagent 1(Phosphate buffer 120 mmol\l, sodium salicylate 60 mmol\l, sodium nitroproside 5mmol\l, EDTA 1 mmol\l and urease 5KU\L) were added, mixed the solution and left to stand 5 minutes at room temperature, then one ml of reagent 2 (phosphate buffer 120 mmol\l, sodium hydroxide 4000mmol\l and sodium hypochlorite 10 mmol\l) was added and then left to stand 10 minutes before absorbance were read at 600 nm by using spectrophotomer (Model No. 1904 +. Serial number 1904 -5252). Blank and urea standard were read by using spectrophotometer at 600 nm.

Blood creatinine (mg\ dl): Blood serum creatinine was measured according to Fabiny and Etlingshausen [7]. One hundred microliters of blood serum were

transferred into spectrophotometer cuvette. One milliliters creatinine kit reagent (equal volume of reagent 1 (picric acid 8.73 mmol\l) and reagent 2 (sodium hydroxide 312.5 mmol\l and disodium phosphate 12.5 mmol\l) was added and then mixed and left 10 seconds at room temperature. An absorbance was read at 500 nm by using spectrophotomer (Model No. 1904 +, Serial number 1904-5252). A blank used to calibrate spectrophotomer. Creatinine kit was used as reference standard.

Sodium and Potassium (mg\ dl): Extraction of minerals (Na and K) was done according to method described by Pearson [8]. Then concentration of Na and K in blood sample was measured by using atomic absorption.

Statistical Analysis

It was performed by use of SPSS version16 (Statistical Package for the Social Sciences).The differences between the groups were tested for significance by student's t-test, Onaway ANOVA test and chi-square test. Data were expressed as the mean \pm SD. P-values \leq 0.05 are considered statistically significant.

Results and Discussion

History of Health and Patient with PIH & Eclampsia

History of health and patient with PIH & eclampsia was presented in Table 1. The mean scores of age, no of pregnancies, no of living children and no of stillbirths for control group were 27.8 ± 52.71 , 3.86 ± 2.38 , 2.06 ± 1.78 , and 1.66 ± 2.42 compared to 29.69 ± 6.82 , 3.29 ± 2.50 , 1.50 ± 1.75 , and 0.61 ± 1.48 for PIH and eclampsia groups, respectively. Significant differences in mean scores of no of neonatal death and gestational (weeks) between the two groups were observed at 0.76 ± 0.76 and $18, 94 \pm 8.46$ for the control, 0.19 ± 0.40 and 29.51 ± 8.79 for PIH and eclampsia group at p value (0.000) for the two variables, respectively. Significant differences in mean scores of no of neonatal death and gestational (weeks) between the two groups were observed at p value (0.000) for the two variables, which can be attributed to the fact that PIH is rare in early pregnancy. Gestational hypertension or pregnancy-induced hypertension (PIH) is the development of new hypertension in a pregnant woman after 20 weeks gestation without the presence of protein in the urine or other signs of preeclampsia. Earlier studies have also showed that PIH was associated with decreased risks of infant mortality, early neonatal mortality, and late neonatal mortality [9-13].

Item	Control	PIH & eclampsia	T-Test	P-Value
Age (years)	27.8±52.71	29.69±6.82	1.381	0.172
No of pregnancy (Para)	3.86±2.38	3.29±2.50	1.115	0.269
No of living children	2.06±1.78	1.50±1.75	1.433	0.156
No of still birth	1.66±2.42	0.61±1.48	2.023	0.049
No of Neonatal death	0.76±0.76	0.19±0.40	3.972	0
Gestational(Weeks)	18.94±8.46	29.51±8.79	5.815	0

Table 1: History of healthy (control) and PIH & eclampsia groups

Body Weight and Blood Pressure

Body weight and Blood pressure measures were presented in Table 2. Pre-pregnancy weight and current weight for control and PIH (eclampsia) groups were 68.38±10.66 and 72.42±12.33, respectively. Systolic blood pressure and diastolic blood pressure for control group were 115.77±7.81 and 37.47±5.73, while PIH (eclampsia) group recorded 154.91±18.61 and 100.69±13.22, respectively. These results indicate that systolic blood pressure (SBP) and diastolic blood pressure (DBP) in PIH (eclampsia) patients were significantly higher than those values of control subjects. The results showed significantly increased

levels of SBP and DBP ($p=0.000$) in PIH (eclampsia) patients. According to American College of Obstetricians and Gynecologists, preeclampsia is defined as the two categories (1) Systolic blood pressure (SBP) greater than or equal to 140 mm Hg or a diastolic blood pressure (DBP) greater than or equal to 90 mm Hg or higher, on two occasions at least 4 hours apart in a previously normotensive patient, or (2) Systolic blood pressure (SBP) greater than or equal to 160 mm Hg or a DBP greater than or equal to 110 mm Hg or higher (In this case, hypertension can be confirmed within minutes to facilitate timely antihypertensive therapy) [14].

Item	Control	PIH & eclampsia	T-Test	P-Value
Pre pregnancy weight(Kg)	68.38±10.66	72.42±12.33	1.048	0.311
Current weight (Kg)	70.25±12.35	74.11±14.16	1.361	0.178
Systolic blood pressure(mm Hg)	115.77±7,81	154.91±18,61	11.89	0
Diastolic blood pressure (mm Hg)	37.47±5.73	100.69±13.22	10.898	0

Table 2: Weight and pressure of healthy (control) and PIH & eclampsia

Blood Creatinine and Urea

Table 3 indicated that the kidney function of healthy (control) and PIH (eclampsia) groups. PIH & eclampsia group scored significantly higher means (p value < 0.05) compared to control group at mean scores 36.54±10.44 and 19.26±8.17 for blood urea, 1.42±0.25 and 1.08±1.27 for creatinine, 141.66±3.89 and 138.73±3.52 for sodium, 5.37±1.06 and 4.15±0,49 for potassium, respectively.

Conclusion

The results indicated that significant differences in no of neonatal death and gestational (weeks) between

the two groups (Control and pregnancy-induced hypertension). Pregnancy-induced hypertension (PIH) is rare in early pregnancy. Gestational hypertension or pregnancy-induced hypertension (PIH) is the development of new hypertension in a pregnant woman after 20 weeks gestation without the presence of protein in the urine or other signs of preeclampsia. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) in PIH (eclampsia) patients were significantly higher than those values of control subjects. PIH & eclampsia group had significantly higher values compared to control for creatinine, sodium and potassium.

Kidney function	Control	PIH&eclampsia	T-Test	P-Value
Blood urea mg/dL	19.26±8.17	36.54±10.44	8.488	0
Creatinine mg/dL	1.08±1.27	1.42±0.25	2.042	0.045
Sodium mg/dL	138.73±3.52	141.66±3.89	3.718	0
Potassium mg/dL	4.15±0,49	5.37±1.06	6.47	0

Table3: Kidney function of healthy (control) and PIH & eclampsia

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