COMPARATIVE EVALUATION OF LIVER FUNCTIONS IN PRE-ECLAMPTIC AND NORMAL PREGNANT FEMALES

Anamika Singh[1], Naresh Pal Singh[2], Santosh Kumar Sant[3], Kirti Jaiswal[4]

[1]Assistant Professor, Department of Physiology, UPUMS, Saifai, Etawah.
[2]Associate Professor, Department of Community Medicine, UPUMS, Saifai, Etawah.
[3]Professor, Department of Physiology, UPUMS, Saifai, Etawah.
[4]Professor, Department of Physiology, UPUMS, Saifai, Etawah.

ABSTRACT

BACKGROUND

Pregnancy is a normal physiological process, which is often associated with various complications and pre-eclampsia is one of them. It is associated with abnormal liver functions with poor maternal and foetal outcome. Parenchymal necrosis of liver causes elevation in hepatic enzymes. This condition can easily be prevented.

MATERIALS AND METHODS

A comparative cross-sectional study was carried out among 70 pre-eclamptic pregnant women and 70 normal pregnant females. Blood examination was done to evaluate the liver function by assessing the haemoglobin, serum bilirubin, serum Alanine Aminotransferase (ALT), Aspartate Aminotransferase (AST) and Alkaline Phosphatase (ALK-P) levels in the two study groups. Data was analysed using mean, standard deviation and Student's unpaired t-test.

RESULTS

The mean age of study subjects in group I and II were 25.6 ± 3.7 years and 25.1 ± 3.9 years, respectively. The mean systolic blood pressure (±SD) of the pre-eclamptic subjects (group I) was 156.5 ± 18.4 mmHg and of the normal pregnant women (group II) was 117.2 ± 8.9 mmHg and this difference between the two groups was statistically significant ($p<0.001$). The mean value of serum Aspartate Aminotransferase (AST) ± SD in the group I (pregnancy with pre-eclampsia) was 48.4 ± 29.5 IU/L, and in the group II (normal pregnancy), it was 20.8 ± 8.5 IU/L ($p <0.001$). The mean values of serum ALT (±SD) in the group I was 39.6 ± 24.0 IU/L, and in group II, it was 23.6 ± 6.9 IU/L ($p <0.001$).

CONCLUSION

Pre-eclampsia during pregnancy is associated with deranged serum liver enzymes, which can be prevented by routine screening of all the pregnant females for presence of hypertension and later on proteinuria.

KEYWORDS

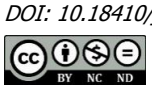
Liver Function, Pre-Eclampsia, Pregnancy.

HOW TO CITE THIS ARTICLE: Singh A, Singh NP, Sant SK, et al. Comparative evaluation of liver functions in pre-eclamptic and normal pregnant females. J. Evid. Based Med. Healthc. 2017; 4(88), 5192-5195. DOI: 10.18410/jebmh/2017/1037

BACKGROUND

Pregnancy is a normal physiological process, which is often associated with various complications and hypertension is the most common medical disorder in pregnancy.[1] Pre-eclampsia is a multisystem disorder usually associated with raised blood pressure and proteinuria after 20 weeks of gestation. Eclampsia is one or more convulsions in association with syndrome of pre-eclampsia.[2,3] Preeclamptic Toxaemia (PET) is diagnosed clinically with presence of hypertension, oedema and proteinuria in absence of pre-existing hypertension and renal disease.[4]

Financial or Other, Competing Interest: None.
Submission 19-10-2017, Peer Review 24-10-2017,
Acceptance 03-11-2017, Published 04-11-2017.
Corresponding Author:
Dr. Naresh Pal Singh,
Associate Professor, Department of Community Medicine,
UPUMS, Saifai, Etawah-206130.
E-mail: nareshpalsingh@gmail.com
DOI: 10.18410/jebmh/2017/1037



It has been observed in numerous studies that abnormal liver functions occur in 20-30% of pregnancies complicated with pre-eclampsia and eclampsia[5,6] and are associated with poor maternal and foetal outcome. Pre-eclampsia and eclampsia are pregnancy-related complications with mortality rate less than 1%.[7]

Liver dysfunction in pre-eclampsia has grave consequences. In pre-eclampsia accompanied by HELLP (haemolysis, elevated liver enzymes, low platelet count) syndrome, an elevation in liver enzymes such as Alanine Aminotransferase (ALT) and Aspartate Aminotransferase (AST) levels are noted and hyperbilirubinaemia may occur, especially in the presence of haemolysis. Parenchymal necrosis of liver causes elevation in hepatic enzymes. There may be subcapsular haematoma formation, eventually liver may rupture to cause sudden hypotension due to haemoperitoneum.[8]

Although, pathophysiology of pre-eclamptic toxaemia and eclampsia is not clearly known endothelial damage due to reduced uterine perfusion seen in hypertension results in

increased production of vasoconstrictor endothelin, which participates in pre-eclampsia.[9] Although, the elevation in plasma levels of endothelin is only two-three folds above normal during pre-eclampsia, this can have significant long-term effects on systemic haemodynamic and arterial pressure regulation.[10] Maternal endothelial dysfunction mediated by excess placenta-derived soluble VEGF receptor 1 is emerging as prominent component in disease pathogenesis.[11] Keeping in mind these facts, this study was planned to evaluate the liver functions in normal pregnant females and those with pre-eclampsia.

Aims and Objectives

To compare the liver functions in females with pre-eclampsia and normal pregnant females.

MATERIALS AND METHODS

A comparative cross-sectional study was carried out among the pregnant women attending the OPD and IPD in Obstetrics and Gynaecology Department of UP University of Medical Sciences, a tertiary care hospital in Saifai, Etawah district of UP during January 2017 to June 2017. The study subjects comprised of 140 pregnant women divided in two study groups. The first group comprised of 70 pregnant women with pre-eclampsia that is having blood pressure more than 140/90 mmHg, proteinuria >300 mg/24 hrs. and with oedema. The second group comprised of 70 normal pregnant women with more than 20 weeks of gestation period. Informed written consent to participate in the study was obtained from the study subjects before the start of collection of the data. The females in each group were adequately matched for age, obstetrical history and period of gestation. Those females having history of hypertension, diabetes mellitus or other chronic diseases before the onset of pregnancy were excluded from the study. Data regarding general demographic profile, obstetrical and family history was recorded on predesigned questionnaire. Blood pressure was recorded by taking two readings in sitting position at an interval of five minutes each by a standard mercury sphygmomanometer. The mean of two readings was calculated. Urine examination was done in all subjects. Blood samples were taken to assess parameters, namely direct and indirect serum bilirubin level and plasma levels of liver enzymes, namely Alanine Aminotransferase (ALT), Aspartate Aminotransferase (AST) and Alkaline Phosphatase (ALK-P) in all the pregnant women of the two study groups. Ethical clearance from the Ethical Clearance Committee of the university was taken before the start of the study. The data was analysed by SPSS software version 21 using statistical tools like mean, standard deviation and Student's unpaired t-test.

RESULTS

The mean age (±SD) of study subjects in Group I and II were 25.6 ± 3.7 years and 25.1 ± 3.9 years, respectively. A 62.9% of pre-eclamptic women were primigravidae. Table 1 reveals that the mean systolic blood pressure (±SD) of the pre-eclamptic subjects (group I) was 156.5 ± 18.4 mmHg and of the normal pregnant women (group II) was 117.2 ± 8.9 mmHg. Similarly, the mean diastolic blood pressure of pre-eclamptic subjects was 102.0 ± 16.3 mmHg and of the normal subjects was 76.7 ± 4.5 mmHg and the difference being statistically significant ($p<0.001$).

Table 2 shows that most of the females in the two groups were anaemic. The mean Haemoglobin (Hb) values (±SD) were 8.20 ± 2.15 g/dL and 8.85 ± 1.88 g/dL in the females of groups I and II. The mean value of serum bilirubin (total) level (±SD) in the pre-eclamptic pregnant females (group I) was 1.01 ± 0.46 mg/dL, and in the normal pregnant females (group II), it was 0.85 ± 0.20 mg/dL and the difference was not statistically significant ($p >0.05$). Total bilirubin was elevated in 28.6% patients. The mean values of serum bilirubin (direct) ±SD in the group I was 0.26 ± 0.14 mg/dL, and in group II, it was 0.21 ± 0.08 mg/dL ($p <0.001$). The mean value of serum Aspartate Aminotransferase (AST) ±SD in the group I (pregnancy with pre-eclampsia) was 48.4 ± 29.5 IU/L, and in the group II (normal pregnancy), it was 20.8 ± 8.5 IU/L ($p<0.001$). The mean values of serum ALT (±SD) in group I was 39.6 ± 24.0 IU/L, and in group II, it was 23.6 ± 6.9 IU/L ($p<0.001$).

Blood Pressure	Groups	Mean ± SD (mmHg)	P value (Student's Unpaired t-Test)
Systolic blood pressure (mmHg)	Group I (pre-eclamptic females)	156.5 ± 18.4	<0.001
	Group II (normal pregnant females)	117.2 ± 8.9	
Diastolic blood pressure (mmHg)	Group I (pre-eclamptic females)	102.0 ± 16.3	<0.001
	Group II (normal pregnant females)	76.7 ± 4.5	

Table 1. Blood Pressure Distribution in the Two Study Groups

Liver Function Tests	Groups	Mean ± SD	P value (Student's Unpaired t-Test)
Haemoglobin g/dL	Group I (pre-eclamptic females)	8.20 ± 2.15	>0.05
	Group II (normal pregnant females)	8.85± 1.88	
Serum bilirubin (total) mg/dL	Group I (pre-eclamptic females)	1.01 ± 0.46	>0.05
	Group II (normal pregnant females)	0.85 ± 0.20	

Serum bilirubin (direct) mg/dL	Group I (pre-eclamptic females)	0.26 ± 0.14	>0.05
	Group II (normal pregnant females)	0.21 ± 0.08	
Aspartate Aminotransferase (AST) IU/L	Group I (pre-eclamptic females)	48.4 ± 29.5	<0.001
	Group II (normal pregnant females)	20.8 ± 8.5	
Alanine Aminotransferase (ALT) IU/L	Group I (pre-eclamptic females)	39.6 ± 24.0	P <0.001
	Group II (normal pregnant females)	23.6 ± 6.9	
Alkaline Phosphatase (ALK-P) IU/L	Group I (pre-eclamptic females)	185.7 ± 63.0	P <0.001
	Group II (normal pregnant females)	94.7 ± 29.4	

Table 2. Assessment of Liver Function in Subjects of Group I and Group II

DISCUSSION

Our study reveals that pre-eclampsia is more prevalent in primigravidae females and this is in accordance with the findings of studies conducted by Joaquin ZM et al,[12] Simeon A et al[13] and Zafar T et al[14] who reported that the pre-eclamptic patients were predominantly primigravidae as compared to control. Robbins and Cotran in their study observed that pre-eclampsia is much more common in women who are pregnant for the first time (primigravidae) and its frequency drops significantly in second pregnancies.[15]

The present study revealed a statistically significant difference ($p<0.001$) in the mean systolic and mean diastolic blood pressure between the pre-eclamptic and the normal pregnant women studied subjects. Similar findings were reported by Malas NO et al,[16] Wilson DJ et al (2003)[17] and Joaquin ZM et al (2005)[12] who concluded that women with pre-eclampsia are at increased risk of hypertension. Simeon A et al (2008)[13] observed that patients with pre-eclampsia had significantly higher SBP ($p<0.05$) and DBP ($p<0.05$) than controls.

The difference in the mean haemoglobin values among the normal pregnant females and those with pre-eclampsia was nonsignificant. The reason for anaemia is that throughout normal pregnancy, blood volume expands by an average of 50% compared with the nonpregnant state.[18] Plasma volume increases more than does red blood cell mass, which produces a declining haemoglobin concentration during pregnancy.

Our observation that the difference in the mean serum bilirubin (total) of the two studied groups was not significant is similar to the findings of DeFlamingh JP et al.[19]

In our study, levels of liver enzymes (serum alanine aminotransferase, serum aspartate aminotransferase and alkaline phosphatase) were significantly higher in hypertensive pregnant women as compared to nonhypertensive females. These findings were similar to findings of DeFlamingh JP et al.[19] Mechanism of raised liver enzymes is hypervascularisation and vasoconstriction of liver leading to cell injury, alteration of membrane permeability and damage to hepatocytes.[20,21]

CONCLUSION

Pre-eclampsia during pregnancy is associated with deranged serum liver enzymes, which are significantly higher in pregnant women with pre-eclampsia in comparison to normal pregnant women. This increases the risk of mortality for the pregnant females. This can be prevented by routine screening of all the pregnant females for presence of hypertension and later on proteinuria.

REFERENCES

[1] Coppage KH, Sibai BM. Treatment of hypertensive complications in pregnancy. Curr Pharm Des 2005;11(6):749-757.

[2] Report of the National High Blood Pressure Education Program. Working Group on High Blood Pressure in Pregnancy. Am J Obstet Gynecol 2000;183(1):S1-S22.

[3] Davey DA, MacGillivray I. The Classification and definition of the hypertensive disorders of pregnancy. Am J Obstet Gynecol 1988;158(4):892-898.

[4] Campbell S, Lees C. Obstetric emergencies. In: Baker PN, Kenny L, eds. Obstetrics by ten teachers. 17th edn. London: Taylor & Francis 2000:3003-3017.

[5] Borglin NE. Serum transaminase activity in uncomplicated and complicated pregnancy and in newborn. J Clin Endocrin Metab 1958;18(8):872-877.

[6] Romero R, Vizoso J, Emamian M. Clinical significance of liver dysfunction in pregnancy-induced hypertension. Am J Perinatol 1988;5(2):146-151.

[7] Knox TA, Olans LB. Liver disease in pregnancy. New Engl J Med 1996;335(8):569-576.

[8] Simith LG, Moise KH, Dildy GA, et al. Spontaneous rupture of liver during pregnancy: current therapy. Obstet Gynecol 1991;77(2):171-175.

[9] Roberts JM, Taylor RN, Musci TJ, et al. Preeclampsia: an endothelial cell disorder. Am J Obstet Gynecol 1989;161(5):1200-1204.

[10] Wilkins FC, Alberola A, Mizelle HL, et al. Systemic hemodynamic and renal function during long term pathophysiological increase in circulating endothelin. Am J Physiol 1995;268(2 pt 2):R375-381.

[11] Magnussen EB, Vatten LJ. Pregnancy cardiovascular risk factor as predictor of preeclampsia. J Med 2007;14:335-339.

[12] Joaquin Z, Armando O, Hugo MZ. Clinical evaluation of hypertension and proteinuria in patients who developed preeclampsia. Internet J Gyne Obst 2005;5(1):5-9.

[13] Simeon A, Isezuo B, Ekele AI. Comparison of metabolic syndrome variables among pregnant women with and without eclampsia. Journal National Medical Association 2008;100(9):1059-1062.

[14] Zafar T, Iqbal Z. Iron status in preeclampsia. Professional Med J 2008;15(1):74-80.
[15] Kumar V, Abbas AK, Fausto N. The liver and biliary tract. Chapter 18. Robbins and Cotran pathological basis of disease. 8th edn. Saunders 2009:920-921.
[16] Malas NO, Shurideh ZM. Does serum calcium in pre-eclampsia and normal pregnancy differ? Saudi Med J 2001;22(10):868-871.
[17] Wilson BJ, Watson MS, Prescott GJ. Hypertensive disorders of pregnancy and risk of hypertension and stroke in later life: results from cohort study. BMJ 2003;326(7394):845.
[18] Pritchard JA. Changes in the blood volume during pregnancy and delivery. Anaesthesiology 1965;26:393-399.
[19] DeFlamingh JP, van der Merwe JV. A serum biochemical profile of normal pregnancy. S Afr Med J 1984;65(14):552-555.
[20] Castro MA, Fassett MJ, Reynolds TB, et al. Reversible peripartum liver failure: a new perspective on diagnosis, treatment and cause of acute fatty liver of pregnancy, based on 28 consecutive cases. Am J Obstet Gyanaecol 1999;181(2):389-395.
[21] Girling JC, Dow E, Smith JH. Liver function test in preeclampsia: importance of comparison with reference range derived from normal pregnancy. British J Obstet and Gynaecol 1997;104(2):246-250.