A comparative study of Liver function tests in normal pregnant women and women with Pregnancy induced hypertension at a Tertiary care centre in central Karnataka

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Abstract

Background: Pregnancy induced hypertension (PIH) is one of the common medical disorders during pregnancy. PIH is development of hypertension after 20 weeks of pregnancy and returns to normal post delivery. PIH can affect different body systems including liver and can be fatal to both mother and foetus. Thus this study aims to compare liver function tests between normal pregnant women and hypertensive pregnant women

Materials and Methods: A comparative cross-sectional study was conducted on 40 pregnant women. Two equal groups of 20 were divided, with normal pregnant women being control group and women having pregnancy induced hypertension (PIH) as study group. Liver function tests such as Aspartate aminotransferase (AST/ SGOT), Alanine aminotransferase (ALT/ SGPT), Alkaline phosphatase (ALP), Gamma glutamyl transferase (GGT) and Serum bilirubin were recorded. Data were analysed with independent t-test and p value ≤ 0.05 was taken as statistically significant.

Results: Pregnant women with PIH showed statistically significant higher mean serum AST, ALP and GGT levels compared to normal pregnant women. There was no statistical significant difference in mean serum albumin, ALT and total bilirubin levels between normal and hypertensive pregnant women.

Conclusion: This study shows that PIH is associated with altered liver function tests which may affect both mother and foetus. Regular monitoring of liver function tests and timely management helps in reducing foetal & maternal morbidity and mortality.

Key words: Pregnancy induced hypertension, liver function tests

Introduction:

Hypertension is one of the most common medical disorders seen in Pregnancy. It is a multisystem disorder that can induce damage to cardiovascular system, kidneys, brain and liver[1]. Abnormal liver tests occur in 3-5% of pregnancies but first we need to differentiate between physiological changes and alteration related to the presence of liver disease. The physiological changes in liver function in pregnancy are commonly transient, rarely permanent [2].

Liver damage during pregnancy can be categorized into three major groups: 1.Specific liver diseases of pregnancy, such as intrahepatic cholestasis of pregnancy (ICP), haemolysis, elevated liver enzyme and low platelets (HELLP) syndrome, acute fatty liver of pregnancy (AFLP); 2.Liver and biliary disease occurring during pregnancy such as viral hepatitis, cholelithiasis, etc; 3.pregnancy in patients with pre-existing chronic liver disease such as chronic hepatitis, cirrhosis, Budd Chiari syndrome etc[3].

Normal LFT values don't always mean that liver is functioning normal. The commonly used LFTs primarily assess liver injury rather than hepatic function. Abnormal LFTs are a hallmark of liver disease and they can provide clues to the nature of the problem but this is not always the case [4].

Due to physiological changes and haemodilution during pregnancy, alanine aminotransferase(ALT) and gamma glutamyl transpeptidase (GGT) are about 20% lower in pregnant women when compared with

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laboratory reference ranges while alkaline phosphatase (ALP) increases due to placental contribution[5,6].

Disorders of liver arising in pregnancy can have serious implications on both mother and baby. Many studies are done till today, but results vary from each other. That could be due to change in equipments, environment around study population and their lifestyle. Present study focuses on recording liver function tests during pregnancy and comparing the results between normotensive and hypertensive pregnant women.

Aims and Objectives: To compare liver function tests in normal pregnant women and pregnancy induced hypertension women.

Materials and Methods:

A comparative cross-sectional study was conducted at a tertiary care centre in central Karnataka. At total sample size of 40 was estimated by taking proportion of patients with PIH (p) 10% according to a study done by Kuklina et al[7]. Two equal groups of 20 were divided, with normal pregnant woman being control group and women having pregnancy induced hypertension (PIH) in study group. All the subjects included in the study were admitted in the department of Obstetrics and Gynaecology, at the tertiary care centre during the study period December 2024 to February 2025. Convenience sampling technique was applied to select the study participants. The Institutional Ethics Committee approved the study and written informed consent was taken from all participants.

Inclusion criteria: Control group, all pregnant women aged 18 yrs and above reporting normal blood pressure and i**n** study group all antenatal women aged 18 yrs and above with hypertension and with or without proteinuria, pre-eclampsia and eclampsia were included in the study.

Exclusion criteria: Pregnant women with known pre-pregnancy cardiovascular, renal, hepatic complications, history of bleeding disorders, those currently taking medications that significantly affect liver functions and pregnant women who were already in active labour at the time of recruitment were excluded from the study.

Data collection

Liver function tests such as Aspartate aminotransferase (AST/ SGOT), Alanine aminotransferase (ALT/ SGPT), Alkaline phosphatase (ALP), Gamma glutamyl transferase (GGT) and Serum bilirubin were documented from both the study population and the control group for comparison.

Statistical analysis

Data entry was done in an excel spreadsheet for a descriptive analysis. Means and standard deviations were used to summarise quantitative data. An independent sample t-test was used to check for differences in mean parameter values like AST, ALT, ALP, GGT and serum bilirubin between study and control groups. P-value 0.05 was set for statistical significance. Statistical analyses were performed using GraphPad-Quickcals.

Results:

A total of 40 subjects (20 in study group & 20 in control group) were included in the study. There was no significant difference in mean age of pregnant women between study group (28.98 ± 4.8) and control group (27.32 ± 3.8)

Table 1: Blood pressure of both study and control groups (n=40)

Parameters	Cases (Mean ± SD)	Controls (Mean ± SD)	'p' Value
SBP (mmHg)	142.9 ± 13.7	114.1 ± 6.08	<0.0001
DBP (mmHg)	91.9 ± 6.51	72.2 ± 4.26	< 0.0001

Table no.1 shows the blood pressure levels between the study and control groups. The systolic blood pressure (SBP) and diastolic blood pressure (DBP) were significantly higher in the study group (SBP: 142.9 ± 13.7; DBP: 91.9 ± 6.51) compared to the control group (SBP: 114.1 ± 6.08; DBP: 72.2 ± 4.26), with p-values of <0.0001 for both systolic and diastolic BP measurements.

Table 2: Comparison of Liver function tests of both study and control groups (n=40)

Parameters	Cases (Mean ± SD)	Controls (Mean ± SD)	'p' Value
Albumin (g/dl)	3.74 ± 0.05	3.6 ± 0.20	0.767
Total bilirubin (mg/dl)	0.95 ± 0.45	0.8 ± 0.27	0.135
Aspartate aminotransferase (AST) (U/L)	32 ± 17	22 ± 12	< 0.001
Alanine aminotransferase (ALT) (U/L)	16 ± 13	13 ± 8	0.16
Alkaline phosphatase (ALP) (U/L)	281 ± 152	171 ± 90	< 0.001
Gamma glutamyl transferase (GGT) (U/L)	18 ± 13	12 ± 8	< 0.01

Table 2 compares liver function test results between hypertensive and normotensive pregnant women. Serum levels of total bilirubin, albumin and ALT were higher in study group compared to normal pregnant women but the difference was not statistically significant. There was a statistically significant difference in the mean serum AST ($p < 0.001$) and mean serum ALP levels ($p < 0.001$) between hypertensive and normotensive pregnant women. Serum GGT values also showed significant difference between both the groups ($p < 0.01$)

Discussion:

In our study, pregnant women with PIH had a significantly higher serum AST levels compared to normal pregnant women. This is in accord with study conducted by Hassen FS et al which showed significant increase in mean serum AST and ALT levels[8]. Study conducted by Sumangali PK et al also showed that majority of hypertensive women had higher AST levels[9]. This elevation may be due to placental ischemia followed by a systemic inflammatory response, resulting in endothelial dysfunction causing vasoconstriction and eventual liver dysfunction.

Although ALT was elevated in hypertensive pregnant women compared to normotensive pregnant women, but it was not statistically significant. This finding was consistent with Atoe, k et al[10]. This was in contrast with results showed by Hassen FS et al[8], Sumangali PK et al [9] and Munazza B et al[11]. Elevated levels of AST and ALT enzymes are indicative of hepatocellular stress, potentially driven by vascular and systemic inflammation linked to hypertensive conditions[12].

The mean serum ALP and serum GGT levels were significantly higher in hypertensive pregnant women but there was no significant increase in serum bilirubin levels between normotensive and hypertensive pregnant women. It is in line with the study conducted by Makuyana D et al[13]. The rise in ALP activity could be physiological or due to cholestasis which increases the synthesis of hepatic ALP and its subsequent regurgitation into plasma.

Measurement of GGT activity is a more sensitive marker of hepatic cholestasis and the enzyme is more likely to be elevated when there is liver cell damage accompanied by minor cholestasis[14].

The absence of significant differences in serum albumin levels among groups may be attributed to the physiological haemodilution which is seen normally in pregnancy. This aligns with findings shown by Meah, VL et al[15] and Hassen FS et al[8].

There was no significant difference in mean serum total bilirubin levels between study and control group which aligns with study conducted by Makuyana D et al[13]but in contrast with study conducted by Munazza B et al [11].

PIH is the most common cause of abnormal LFT. Main cause for abnormal LFTs in first trimester is pre-eclampsia. In second trimester, main cause is HELLP syndrome and hepatitis. In third trimester, main causes are pre-eclampsia, eclampsia, and intrahepatic cholestasis of pregnancy[16].

The pathophysiology behind altered liver function tests in PIH is, Initially there is abnormal placentation, deficient trophoblast invasion, and insufficient remodelling of uterine spiral arteries, which leads to decreased placental perfusion. Then there is release of antiangiogenic factors into maternal circulation, which results in endothelial cell disruption and vasoconstriction of hepatic blood vessels. Hepatic hypoxia in turn leads to necrosis and hepatocyte degeneration resulting in elevated liver enzymes[17].

Conclusion:

This study confirms that hypertensive disorders in pregnancy, particularly preeclampsia and PIH, significantly impair liver function leading to elevated AST, ALT, ALP, and GGT levels. Early detection helps in monitoring the patient properly and timely treatment to reduce foetal and maternal complications

Limitations:

In the present study, data were collected from a single institution and had small number of patients, which may affect generalizability to larger population.

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