Original Research Article

Liver Function Tests (LFT) in pregnant women at a tertiary care center in Ratnagiri district of Maharashtra, India

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Abstract

Introduction: Abnormal liver tests occur in 3–5% of pregnancies and show many different causes. Although alterations of liver enzymes could be a physiological phenomenon, it may also reflect potential severe liver injury, necessitating further assessment and accurate management. The present cross-sectional study was undertaken to study liver function test profile in pregnant women. **Methodology**: All the pregnant patients referred to Pathology section were studied prospectively from January 2018 to April 2019 involving 90 cases. Blood sample was studied for Total protein, Albumin, Globulin, Bilirubin, SGOT, SGPT, Alkaline phosphatase. All the findings filled in MS-Excel sheet and was analysed manually. **Results**: The mean age was found to be 26.61 (±5.42) yrs. Mean total protein level was 11.66 (±53.55) Gm/dl. Mean Albumin was 3.01 (±0.71) Gm/dl. Total patients showed hypalbuminaemia majority of patients in the age group of 24 – 29 yrs [31 (34.4%) cases] and in third Trimester [35 (38.8%) cases]. Mean total Bilirubin is 1.66 (±3.56) Mg/dl, Mean Direct Bilirubin is 0.98 (±2.42) Mg/dl and Mean Indirect Bilirubin is 0.74(±1.40) Mg/dl. Total 57 (63.3%) patient showed increased SGOT, majority of patient in the age group of 24 to 29 yrs [24 (26.6%) cases]. Total 36 (40%) patient showed increased SGPT, majority of patient in the age group of 18 to 23 yrs [11 (12.2%) cases]. Total 62 (68.8%) patient showed increased Alkaline Phosphatase, majority of patient in the age group of 24 to 29 yrs [28 (31.1%) cases]. **Conclusion:** Liver disease in pregnancy is a complex issue that deserves a multidisciplinary approach.

Keywords: LFT, Pregnancy, Liver disease.

Introduction

The liver is the largest organ in the human body, performing many important functions including metabolism, detoxification and formation of important compounds including blood clotting factors and albumin.[1] Pregnancy causes significant changes in the hormonal state, leading to physiological changes to support fetal growth and development as well as biological changes in the body[1,2].The physiological changes in a pregnant woman can confuse the clinician by nonspecific symptoms such as nausea, vomiting and abdominal pain[3]. Maternal cardiac output and heart rate increases however, the hepatic blood flow remains constant.(2) Consequently, certain changes in values of liver function tests occur during normal pregnancy and it does not change liver size but in the third trimester the enlarging uterus displaces the liver superiorly and posteriorly, therefore a palpable liver disease[1].

Liver function test include levels of certain proteins and enzymes that are alanine transaminase, aspartate transaminase, alkaline phosphatase in our blood. AST is found in liver, cardiac muscles, brain, skeletal muscles, erythrocytes and kidney. ALT is found predominantly in liver. Therefore, increases in ALT are more specific than AST for hepatobiliary disease[4]. Uterine muscle contractions during labor may increase AST or ALT activity levels. Thus, serum ALT or AST values above normal ranges before labor are pathological and further investigations are recommended. Hence, measurement of AST and ALT levels is the most informative test in the diagnosis of hepatobiliary diseases[4]. Alkaline phosphatase (ALP) activity level increase in late pregnancy, mainly during the third trimester[2,6].

Liver disease in pregnancy may be divided into three major groups. The liver disorders specific to pregnancy include hyperemesis gravidarum, pre-eclampsia, HELLP syndrome, acute fatty liver of pregnancy and intra hepatic cholestasis of pregnancy. These are mostly trimester specific. The second group include intercurrent liver disease occurring in pregnancy such as viral hepatitis or Gallstone[5].Third group includes pregnancy with preexisting liver disease such as chronic active hepatitis, cirrhosis of liver, Budd Chiari syndrome etc[3].

Liver cell injury or necrosis is measured by determent AST and ALT levels. Liver synthetic function is quantified by determining albumin level and prothrombin time. Biliary obstruction shows elevated alkaline phosphatase. The most commonly used indicators of liver damage (hepatocellular) are the ALT and AST, formerly referred to as SGPT and SGOT. These are enzymes normally found in liver cells that leak out of these cells and make their way to the blood when liver cells are injured[1,6].

The cholestasis represents a clinical picture affecting most of pregnant women. In presence of cholestasis three general concepts are important to consider: 1. Women presenting at any stage of pregnancy cholestatic features should do the same work-up of non-pregnant patient. This includes a familial anamnesis and drugs history, complete physical examination, and serological assessment as indicated by the clinical presentation; 2. The work-up has to consider liver diseases specific of pregnancy and a non-pregnancy related cholestatic diseases (coincidental and pre-existing to pregnancy); 3. Even if the focus is on cholestatic features, the laboratory abnormalities show in almost all cases a contemporary and milder elevation of aminotransferases[7-9].

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Material and Methods

The data was collected from 1st January 2018 to 30th April 2019. It was a cross-sectional observational study.

Inclusion Criteria: All pregnant females referred to Pathology section were included in the study.

Exclusion Criteria: Non-pregnant women, males were excluded from the study.

Analysis of data is based upon:- 1) Age wise distribution. 2) Normal, subnormal and high values of Total protein, Albumin, Globulin, Bilirubin, SGOT, SGPT, Alkaline phosphatase. 3) Causes of abnormal liver function test in pregnant women. 4) First, Second and Third Trimester wise distribution.

The instrument used for study was Erba-EM 200. Estimation of SGOT, SGPT and Alkaline Phosphatase was by kinetic method. Estimation of Protein, Albumin and Bilirubin were done by Biuret, Bromocresol green, Jendrassik and Groff methods, respectively.

Results

Total 90 pregnant female patients were examined for LFT. The majority of patients were found in 24 to 29 years age group. The mean age was found to be 26.61 (±5.42) yrs. (Refer Table No.1)

Table 1: Age group-wise distribution of pregnant women

Age Group	Pregnant Women	Percentage %
18 to 23 Years	28	31.11
24 to 29 Years	38	42.22
30 to 35 Years	18	20
36 to 41 Years	6	6.66

Distribution of Liver Function Test parameters show 74 patients with decreased Albumin, 62 patients with increased Alkaline Phosphatase, 57 patients with increased SGOT, 21 patients with increased Direct Bilirubin, 40 patients with decreased Protein, 36 patients with increased SGPT, 12 patients with increased Indirect Bilirubin, 10 patients with increased Total bilirubin (Refer Table No.2)

Table 2: Distribution of Liver function test status in pregnant women, according to category (Subnormal, Normal, High)

Parameters	Subnormal	Normal	High
Total Protein	40 (44.44%)	49 (54.4%)	1 (1.11%)
Albumin	74 (82.22%)	16 (17.7%)	0 (0%)
Globulin	09 (10%)	72 (80%)	9 (10%)
Total Bilirubin	4 (4.4%)	66 (73.3%)	10 (11.1%)
Direct Bilirubin	0 (0%)	69 (76.6%)	21 (23.3%)
Indirect Bilirubin	6 (6.66%)	72 (80%)	12(13.3%)
SGOT	0 (0%)	33 (36.6%)	57 (63.3%)
SGPT	0 (0%)	54 (60%)	36 (40%)
Alkaline Phosphatase	1 (1.11%)	27 (30%)	62 (68.8%)

There were 74 patients of Hypoalbuminemia, 62 patients of increased Alkaline phosphate, 57 patients of increased SGOT, 40 patients of Hypoproteinaemia, 36 patients of increased SGPT, 10 patients of Hyperbilirubinemia. (Refer Table No.3)

Table 3: Number of pregnant women with abnormal LFT finding

Pathological Finding	Total Cases	Percentage (%)
Hypoproteinemia	40	44.44 %
Hypoalbuminemia	74	82.22 %
Hyperbilirubinemia	10	11.1 %
Increased SGOT	57	63.3 %
Increased SGPT	36	40 %
Increased Alkaline phosphate	62	68.8 %

Highest cases of Abnormal Liver Function Tests were observed more in age group 24 to 29 yrs with 31 patients of Hypoalbuminemia, 28 patients of Increased Alkaline Phosphatase, 24 patients of increased SGOT, 17 patients of Hypoproteinemia, 9 patients of increased SGPT, one patient of Hyperbilirubinemia. Significant number of Abnormal Liver Function Test is also observed in age group of 18 to 23 yrs with 24 patients of Hypoalbuminemia, 17 patients of Increased Alkaline Phosphatase, 17 patients of Increased SGOT, 11 patients of Increased SGPT, 9 Patients of Hypoproteinemia, 4 patients of Hyperbilirubinemia. (Refer Table No.4)

Table 4: Number of pregnant women with abnormal LFT findings in various age groups

Clinical condition	Age Group (Years)			
	18 to 23	24 to 29	30 to 35	36 to 41
Total Cases	28 (31.1%)	38 (42.22%)	18 (20%)	6 (6.66%)
Hypoproteinemia	9 (10%)	17 (18.8%)	9 (10%)	5 (5.5%)
Hypoalbuminemia	24 (26.6%)	31 (34.4%)	13 (14.4%)	6 (6.66%)
Hyperbilirubinemia	4 (4.4%)	1(1.1%)	3(3.3%)	2(2.2%)
Increased SGOT	17 (18.8%)	24 (26.6%)	10 (11.1%)	6 (6.66%)
Increased SGPT	11 (12.2%)	9 (10%)	10 (11.1%)	6 (6.66%)
Increased ALP	17 (18.8%)	28 (31.1%)	11 (12.2%)	6 (6.66%)

Highest cases of abnormal liver function tests were observed more in third trimester with 37 patients of increased Alkaline phosphate, 35 patients of Hypoalbuminemia, 25 patient of increased SGOT, 24 patients of Hypoproteinemia, 17 patients of increased SGPT, 3

patients of Hyperbilirubinemia (Refer Table No.5)

Table 5: Abnormal finding of Liver function test of pregnant women with respect to Trimester

Variable	First Trimester	Second Trimester	Third Trimester
Total Cases	29 (32.2%)	24 (26.6%)	37 (41.1%)
Hypoproteinemia	03 (3.3%)	13 (14.4%)	24 (26.6%)
Hypoalbuminemia	20 (22.2%)	19 (21.1%)	35 (38.8%)
Hyperbilirubinemia	2 (2.2%)	5 (5.5%)	3 (3.3%)
Increased SGOT	11 (12.2%)	21 (23.3%)	25 (27.7%)
Increased SGPT	05 (5.5%)	14 (15.5%)	17 (18.8%)
Increased ALP	01 (1.1%)	24 (26.6%)	37 (41.1%)

There were (highest) 41 patients of Pre–eclampsia, followed by 12 patient of Cholelithiasis and Eclampsia, 5 patients of Viral Hepatitis, 2 patients of Obstructive jaundice, one patient of Hepatocellular jaundice and HBsAg positive and Cholestasis Jaundice. (Refer Table No.6)

Table 6: Causes of Abnormal Liver function tests

Diagnosis	No. of cases	Percentage %
Pre-eclampsia	41	45.55%
Cholelithiasis	12	13.3%
Eclampsia	12	13.3%
Obstructive Jaundice	2	2.2%
Hepatocellular Jaundice	1	1.1%
Cholestasis Jaundice	1	1.1%
HBsAg Positive	1	1.1%
Viral Hepatitis (Hep. A)	5	5.5%

Discussion

Liver diseases in pregnancy is a complicated situation for both mother and fetus[4]. Liver disease during pregnancy is a poorly studied topic and poses a challenge for both the gynecologist and hepatologist. Challenges involve diagnosis and determining the appropriate treatment for the safety of both mother and baby. The factor responsible for the higher maternal and foetal morbidity and mortality appear to be due to lack of facilities, lack of awareness regarding the pregnancy-specific conditions which may lead to worsening of the outcome of pregnancy especially in the presence of abnormal liver function, poor nutrition, prevalence of anemia, delay in seeking medical advice and delay in referral to the tertiary care hospital.

The present study was aimed to determine the status of the liver function test in pregnant women like Total Protein, Albumin, Globulin, Total Bilirubin, Direct Bilirubin, Indirect Bilirubin, SGOT, SGPT, Alkaline Phosphatase. The total 90 pregnant women check-up in Gynecology OPD in B. K. L. Walawalkar Hospital, Dervan were studied. The mean age of all 90 patients was 26.6 (±5.42) yrs.

Majority of cases occurred in the age group of 24 to 29 yrs (42.22%). This was concordant study by *Sumangali PK et al (2017)*, which showed majority of the women were young and aged less than 30 years. Most of them were referred cases from periphery, booked outside their hospital. Majority of the patients were in the age group 21-30 yrs and were primigravida. 93% of the women presented in third trimester (>32 weeks) of pregnancy, like in our study[3].

In present study; out of 90 women, 45.5% cases were of Pre-eclampsia, 13.3% cases of Cholelithiasis and Eclampsia, 3.33% cases of Hepatitis and Viral Hepatitis, 2.22% cases of Hepatitis A and Obstructive Jaundice, 1.1% cases of Hepatocellular and HBsAg Positive. *N Mishra, et al (2016*[10], found incidence of abnormal LFT was 0.9 %. 13/80 (16.75 %) women had liver disorder not specific to pregnancy, whereas 67/80 (83.25 %) women had pregnancy specific liver dysfunction. Of these, 65 (81.25 %) women with liver dysfunction had pre-eclampsia including 11 (13.75 %) with HELLP and six women with eclampsia. 48/65 (60 %) women had pre-eclampsia in the absence of HELLP syndrome or eclampsia. So pre-eclampsia was seen in this study as a common finding with deranged LFT.

U Rathi, et al (2007) [11]found Liver disease in 107 (0.9%) of 12,061 pregnancies. Of these, fifty six (52.3%) had pregnancy-specific liver disorders (pregnancy-induced hypertension [PIH]-associated liver dysfunction [36 cases] – including HELLP syndrome [12] and pre-eclamptic liver dysfunction; intrahepatic cholestasis of pregnancy [10]; hyperemesis gravidarum [7]; acute fatty liver of pregnancy Liver disorders not specific to pregnancy included hepatitis E, hepatitis B, non A-E hepatitis and chronic liver disease [5 each], and others; in 6 patients no cause could be found.

As per *Dang Arbinder, et al (2010),* a total of 79 patients had abnormal liver tests. 22 had viral hepatitis, 10 had HELLP syndrome. Incidence of Hepatitis A 3(0.05%), B 15(0.28%), C 1(0.01%),E 3(0.05%). Reported incidence in literature of Hepatitis A is 1 per 1000 pregnancies, B is 5-15 per 1000 pregnancies. Hepatitis C virus infection does not affect the course of pregnancy unless cirrhosis is present[9].

In study by *N Mishra et al (2016)* 67/80 (83.25 %) women had pregnancy-specific liver dysfunction. Of these, 65 (81.25%) women with liver dysfunction had pre-eclampsia including 11 (13.75%) with HELLP syndrome and six women with eclampsia. 48/65 (60%) women had pre-eclampsia in the absence of HELLP syndrome or eclampsia[10].

The present study showed 74 patients with decreased Albumin, 62 patients with increased Alkaline Phosphatase, 57 patients with increased SGOT, 21 patients with increased Direct Bilirubin, 40 patients with decreased Protein, 36 patients with increased SGPT, 12 patients with increased Indirect Bilirubin, 10 patients with increased Total bilirubin. There were 74 patients of Hypoalbuminemia, 62 patients of increased Alkaline phosphate, 57 patients of increased SGOT, 40 patients of Hypoproteinemia, 36 patients of increased SGPT, 10 patients of Hyperbilirubinemia.

A Khatun, et al (2020) found Total and direct bilirubin concentrations in serum were significantly lower in 2nd and 3rd trimester compared to non-pregnant and first trimester pregnant women. Serum ALT and AST activity was slightly increased in 1st and 2nd trimester but significantly increased in third trimester. No significant increase in serum ALT and AST activity was seen during first and second trimester. Nevertheless, all serum ALT and AST values remained below the upper normal limit. Serum ALP activity was significantly higher in third trimester compared to, first and second trimester pregnant women. Serum ALP activity was also significantly higher in second trimester There is no significant change in serum total proteins concentration. But serum albumin level was significantly lower and serum globulin concentration was significantly higher in all three trimester. Serum A/G ratio was significantly reduced in second and third trimester[12].

As per *N Mishra et al (2016),* in various abnormalities of LFT, the majority (45%) women had AST elevation of less than 100 IU/L and 47.5% had ALT elevated in 100–500 IU/L range. Commonest value of bilirubin level was between 1 and 2.5 mg/dL found in 47.5 % cases[10]. Only 7–10 % women exhibited bilirubin values of 10 mg/dL and/or AST/ALT values >500 IU/L. Alkaline phosphatase between 141 and 564 IU/L was found in 40 % women and more than 1000 IU/L in one woman only.

Conclusion

Liver disease in pregnancy is a complicated situation for both mother and fetus. Liver disease during pregnancy is a poorly studied topic and poses a challenge for both the gynecologist and hepatologist. Challenges involve diagnosis and determining the appropriate treatment for the safety of both mother and baby. The factors responsible for the higher maternal and fetal morbidity and mortality appear to be due to lack of facilities, lack of awareness regarding the pregnancy-specific conditions which may lead to worsening of the outcome of pregnancy especially in the presence of abnormal liver function, poor nutrition, prevalence of anemia, delay in seeking medical advice and delay in referral to the tertiary care hospital.

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