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Original Research Article

Study of Liver Function Tests in Normal Pregnancy: A Hospital Based Study

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ABSTRACT

Considering the physiological changes in hepatobiliary system occurring in normal pregnancy reflected by changing level of different Liver Function Tests parameters current study entitled "Study of Liver Function Tests in Normal Pregnancy″ was carried to evaluate different changes in the values of Liver Function Tests parameters in first, second and third trimester of pregnancy.

Methodology: This hospital based case control study was carried out at Jorhat Medical College and Hospital. Study group comprised of 50 pregnant women from each trimester selecting as cases and 50 non pregnant ages matched healthy women selecting as controls. Liver Functions tests such as Total Protein and its fractions, Total Bilirubin and fractions, AST, ALT, ALP and GGT were analyzed in automated chemistry analyzer "VITROUS 250" as per specified method for the instrument

Results: Total serum bilirubin and Direct bilirubin level were found to be progressively lowered from first trimester and significantly lowered in third trimester compared to control group. No significance change of serum ALT and AST activity were observed during first and second trimester of pregnancy. Significant increase of ALT and AST activity observed in the third trimester of pregnancy compared to the controls. Significant rise of serum ALP activity seen in second and third trimester of pregnancy compared to the control. Low GGT activity was observed in third trimester of pregnancy compared to the first, second trimester and controls. Serum albumin level was significantly low in second and third trimester compared to control while significant gradual increased level of serum Globulin observed from first trimester compared to control. Albumin Globulin ratio was significantly reduced in first and second trimester compared to first trimester and control.

Conclusion: The study showed the significant changing pattern of some LFT parameters in pregnant women compared to the non-pregnant healthy age matched controls.

Key words: Pregnancy, enzymes, Physiological change, liver function test.

INTRODUCTION

Liver is one of the most versatile organ and principal site where the metabolism of carbohydrate, lipid and protein takes place. It also plays an important role in excretory and detoxification reactions in the body. These functions are found to be deranged in various metabolic diseases and numerous laboratory investigations have been proposed for assessment of liver disease. Total protein and its fraction, total bilirubin and its fractions, enzymes like AST, ALT, GGT, and ALP are included as liver function tests and can be done almost in all laboratories. Besides these, some more tests, like prothrombin time, 5' Nucleotidase, Lactate Dehydrogenase etc. are found to be beneficial for assessing some specific functions of liver.

Though pregnancy is a physiological process and many metabolic changes occur during the process to support fetal growth and development. [1] During the process hormones like estrogen, progesterone is found to be increased and reach maximum level during the third trimester of pregnancy. These hormones affect metabolic, synthetic and excretory functions of liver. [2] The physiological changes in liver function occurring in pregnancy revert back to normal stat after the birth of the baby. But some disorders arising in pregnancy such as pre eclampsia, eclampsia, acute fatty liver of pregnancy, hemolysis, elevated liver enzymes and low platelet (HELP syndrome), cholestasis, hyperemesis gravidarum and isolated cases of raised liver enzymes can have serious implications. Proper interpretation of liver function tests (LFTs) helps a physician for correct diagnosis and to give correct line of treatment In time which reduces development of complications in both mother and foetus. [3]

Considering the above facts the current study "Study of changes in Liver function tests in normal Pregnancy" was carried out to find out the changing pattern of LFT during normal pregnancy.

MATERIALS AND METHODS

This Hospital based study was carried out at Jorhat Medical College in normal pregnant women visiting outpatient department of Obstetrics and Gynecology for antenatal check up from September'2014 to August'2015 as case control study. 50pregnant women of each trimester of pregnancy were selected as cases and compared with 50 numbers of age matched non pregnant healthy women. The age of study group was selected between 20 yrs to 30 yrs of age. Pregnant women suffering from Diabetes Mellitus, gestational diabetes mellitus, Hypertension, viral hepatitis, renal disorders and past history of jaundice or pruritus; chronic alcoholism; under treatment of antituberculous drugs or anticonvulsants therapy and having sero positivity for VDRL were excluded from the study.

Laboratory Investigations

Liver Functions tests such as Total Protein and its fractions, Total Bilirubin and fractions, AST, ALT, ALP and GGT were performed to assess the hepatic functions and Fasting & Post prandial blood sugar, Blood urea and Serum creatinine were done to exclude Diabetes mellitus and renal disorders. All parameters were analyzed in automated chemistry analyzer "VITROUS 250" as per specified method for the instrument

Pregnant women suffering from Diabetes Mellitus, gestational diabetes mellitus Hypertension, viral hepatitis, renal disorders and past history of jaundice or purities; chronic alcoholism; under treatment of antituberculous drugs or anticonvulsants therapy and having sero positivity for VDRL were excluded from the study.

The reference range of normal values of LFT parameters in our laboratory for non pregnant women ranges from 0.2 to 1.3mg/dl for total serum bilirubin, 0.0 to 0.2mg/dl for direct bilirubin, 13 to 69 U/L at 37^0 C for serum ALT,15 to 46 U/L for serum AST at 37 ^{0}C, 38 to 126 U/L at 37 ^{0} C for serum ALP, 12 U/L to 58 U/L at 37 ^{0}C for GGT, 3.5 to 8.5 gm/dl for total serum protein and 3.5 to 5.0 gm/dl for serum Albumin.

Analysis of data

The data were analyzed by using instant graph pad software .p values were estimated by performing students T test. Values were expressed as mean±SD. The observed values of different LFT parameters of first, second and third trimester pregnant women were compared with the LFT values of non pregnant women by using ANOVA. P value ≤ 0.05 was considered to indicate statistical significant.

RESULTS

The values of different parameters of liver function test for pregnant women of first, second and third trimester and non

pregnant women were compared in the table 1.

In our study the serum bilirubin concentration observed was 0.68±.250 mg/dl in first trimester, 0.64±.249 mg/dl in second trimester and 0.530±.232 mg/dl in third trimester of pregnancy while 0.758±0.208 mg/dl of TSB observed for non pregnant women.

The observed value of direct serum bilirubin concentration was 0.196±.150 mg/ dl in first trimester, 0.187±.085 mg/dl in second trimester and 0.185±0.82 mg/dl in third trimester pregnant women while 2.16 ±.169 mg/dl of direct bilirubin concentration observed in non pregnant women. The value of serum ALT activity observed was 24.87±10.01 U/L in first trimester, 25.21± 7.52 U/L in second trimester and 28.32±8.72 U/L while serum ALT for non pregnant women was 22.85±6.89 U/L. In our study the observed value of serum AST activity was 27.58±10.01 U/L in first trimester, 27.97±10.60 U/L in second trimester and 31.24±12.47

U/L observed in third trimester. Non pregnant women had value of serum AST about 26.56±9.21 U/L.

The observed value of serum ALP was 115.22±52.44 U/L in first trimester, 131.96±64.12 U/L in second trimester and 136.90±47.62 U/L in third trimester. The serum ALP activity on non pregnant women group was 94.58±35.03 U/L. The mean serum GGT value observed in first trimester was 18.76±8.24, 18.11 ±7.97 U/L in second trimester and 16.69±5.21 U/L in third trimester while serum GGT value of 19.56±8.67 U/L was observed in non pregnant group.

The total serum protein value of 7.48±0.50 gm/dl was observed in first trimester, 7.49±0.502 gm/dl was observed in second trimester and 7.51±.503 gm/dl was observed in third trimester. Non pregnant women group had serum total protein concentration of 7.25±0.515 gm/dl. The serum albumin value observed in first trimester was 3.67±.585 gm/dl, 3.50±0.606 in second trimester and 3.39±.796 gm/dl in third trimester while non pregnant women had value of 3.88±.584 gm/dl. The serum globulin concentration in first trimester was about 3.80±0.915 gm/dl,3.94±0.896 gm/dl in second trimester and 4.11±0.907gm/dl in third trimester of pregnancy. Non pregnant women had serum Globulin level of 3.36±0.931 gm/dl.

In our study the serum albumin globulin ratio in first trimester women was 0.957±0.639, 0.887±0.676 in second trimester and 0.824±0.657 in third trimester pregnant women .Non pregnant women had serum albumin globulin ratio was about 1.154±0.627.

Table 1: Serum LFT values in pregnant and non pregnant women

Variables	Controls	Cases Pregnant women			Probability (p value)
	Non pregnant n=50	1st trimester n=50	2nd trimester n=50	3 rd trimester N=50	
Total serum Bilirubin (mg/dl)	.758±.208	0.68±.250 NS	0.64±0.249 p value=.0116	0.53±.235 <.0001	<.0001
Direct Bilirubin (mg/dl)	2.16±.169	196±.150	0.187±.085	185±.082	<.0001
ALT(U/L)	22.85±6.89	24.87±17.21 NS	25.21±7.52 NS	28.32±8.72 p value=.0007	.0007
AST(U/L)	26.56±9.21	27.58±10.01 NS	27.97±10.60 NS	31.24±12.47 p value=.0401	.0401
ALP(U/L)	94.58±35.03	115.22±52.44 p value=.0227	131.96±64.12 p value=.0005	136.90±47.62 p value=<.0001	<.0001
GGT(U/L)	19.56±8.67	18.76±8.24 NS	18.11±7.97 NS	16.69±5.21 p value=0.0476	0.0476
Total protein (gm/dl)	7.25±.515	7.48±0.500 NS	7.49±0.502 NS	7.51±0.503 NS	NS
Albumin (gm/dl)	3.88±.584	3.67±.585 NS	3.50±0.606	3.39±.796	<.0001
Globulin (gm/dl)	3.36±.931	3.80±.915 p value=.0043	3.94±.896 p value=.00057	4.11±.907 p value=.0008	<.0001
Albumin/Globulin ratio	1.15±.627	0.957±639	0.887±.676	0.824±.657	<.0001

Note: All data are expressed as mean ±SD. p value <0.05 considered as statistically significant.

DISCUSSION

In this current study, we analyzed the values of different Liver function test parameters in healthy pregnant women of first, second and third trimester and compared the observed values of different LFT parameters with non pregnant control group.

Total serum bilirubin and direct bilirubin were found to be progressively decreased from the first trimester and became more marked in the third trimester compared to the control group. Decreased level of total serum bilirubin and direct bilirubin were observed in various study. [4] Albumin is the major protein transporting bilirubin in plasma and hemodilution occurring in pregnancy was the main cause of decrease serum total and direct bilirubin in plasma. [1] ALT and AST activity reflects liver cell necrosis and injury to hepatic tissue. In our study serum ALT and AST level were found to be significantly higher in third trimester of pregnancy compared to the first and second trimester and non pregnant women. In previous two published studies the rise of ALT and AST were found to be higher in late pregnancy than in early pregnancy. [5] Values of ALT and AST were within normal reference level in our laboratory during all the three trimesters of pregnancy. Uterine contraction before labour causes increase in ALT and AST activity reflecting increase serum ALT and AST level. [6] In our study serum ALP (Alkaline phosphatase) activity was significantly higher in the third trimester compared to the non pregnant women which was found to be similar to previous published study. [7] Significant increased in the ALP activity was also found in second trimester compared to non pregnant women in our study. Increased ALP activity was observed in second and third trimester in most of studies done earlier. [4,5] Increased serum ALP activity was observed primarily due to increased synthesis of placental alkaline phosphatase isoenzyme and increase in bone isoenzyme production causing difficulty in diagnosing cholestasis during third trimester of pregnancy. [8,12] Serum GGT activity in our study was found to be significantly lowered in third trimester of pregnancy compared to the first, second trimester and non pregnant women which was similar to the previously published study. [7] Most of the previous published studies showed serum GGT activity within normal range during pregnancy. [5,6,13,14] Serum GGT activity decreases in late pregnancy because of inhibition of hepatic GGT synthesis by hormone secretion during pregnancy. High serum GGT activity was observed in women suffering from viral hepatitis in early pregnancy compared to the late pregnancy and high serum GGT activity was also observed in women receiving oral contraceptives. [15] In our study no significant change was observed in serum total protein level which is similar to most of the published study. [7]

Serum albumin value was significantly lowered particularly in second and third trimester in compared to the non-pregnant women. In a previous published study [1] serum albumin value was found to be gradually lowered from first trimester and lowering of serum albumin level became more accentuated as pregnancy advanced. Haemodilution in pregnancy could be partly responsible for decrease in serum albumin level. [16] The mother´s plasma volume increases gradually from the six to the 36 weeks of gestation by 50% and total blood volume increases with hemodilution and plasma and red cell volume are rapidly lowered after delivery. [17,18] Indeed the intravascular mass of albumin has been found to be normal in pregnancy its catabolism and synthesis remained unaltered compared to the control. [19]

Serum globulin concentration was found to be significantly rising from the first trimester in compare to non pregnant women. Serum albumin globulin ratio was found to be significantly reduced in the second and third trimester in compared to first trimester and non pregnant women.

CONCLUSION

From the above study it can be concluded that alteration of different parameters of LFTs occur during normal pregnancy and the complete understanding of physiological changes in hepatobiliary system and proper evaluation of different LFT parameters helps physician for correct interpretation of liver function status during pregnancy and helps in proper diagnosis and treatment of liver disease.

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