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Changes in liver functions tests during pregnancy.

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ABSTRACT

Pregnancy is a normal physiological phenomenon associated with many physiological changes that assist the nurturing and survival of the fetus, liver function affected by these changes. A prospective study carried out to assess serum level of routine Liver Function Test (LFTs) which included Alb, T.S.B, S.ALT, S.AST, S.ALP and Prothrombin time in ninety pregnant women, thirty women in each trimester of pregnancy and thirty aged matched non pregnant women as a control group who attended to Al-Ramadi General Hospital for Maternity and Children.

The results were as follows: S. Alb and T.S.B levels were significantly lower ($P<0.001$) during all three trimesters as compared to controls.

S.ALP activity was significantly higher in third and second trimester ($P<0.001$) than in controls. SALT activity was significantly higher ($P\leq0.05$) in third trimester than in controls. While serum AST activity and prothrombin time did not give significant differences between pregnant and non-pregnant women.

Introduction:

The pregnant woman experiences physiological changes to support fetal growth and development(1). During pregnancy the serum estrogen and progesterone levels increase progressively and reach a maximum during the third trimester(2), these sex steroid hormones have effects on metabolic, synthetic and excretory hepatic functions(3). The other physiological changes on the liver are the hemodynamic changes caused by the increase in plasma volume that occurs during pregnancy which leads to hemodilution(4).

Pregnancy does not change liver size but in the third trimester the enlarging uterus displaces the liver superiorly and posterioly, therefore a palpable liver suggests significant hepatomegaly and underlying liver disease(5).

Pregnancy may be complicated by sever liver problems including liver failure(6)(7). Telangiectasia and palmar erythema, which are classically associated with chronic liver disease may appear in up to 6% of normal pregnancies and usually disappear after delivery, as the liver cannot metabolize quickly the large quantity of estrogen and progesterone produce during pregnancy(8) (9).

The liver is our body's most important organ after the heart, performing many

important functions including metabolism, detoxification and formation of important compounds including blood clotting factors and albumin(10). No single liver function test is available to quantify liver disease, the designation "Liver Function Tests LFTs" describes a panel of laboratory tests profiling discrete aspects of liver function(11).

Liver cell injury or necrosis is measured by determing Glutamate Oxalacetate Transaminase (AST) and Glutamate Pyruvate Transaminase (ALT) levels(5).

While liver synthetic function is quantified by determining albumin level and prothrombin time(8), biliary obstruction are evaluated by measuring alkaline phosphatase and bilirubin levels(11).

The anatomic and physiological changes that accompany pregnancy alter physical findings and liver biochemistries, the identification of these physiological changes is important for the diagnosis of liver disease during pregnancy(12).

The aim of this study was to evaluate the changes in serum levels of routine LFTs, i.e., ALP, ALT, AST,

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Albumine, Total Serum Bilirubin (T.S.B) and prothrombin time during normal pregnancy compared with a control group of age-matched non pregnant women.

Materials and Methods:

From February 2008 to January 2009 ninety pregnant women aged 29.14±0.062 (thirty women in each trimester of pregnancy) and thirty nonpregnant women aged 28±0.041 as control included in this study. None of the women included had

evidence of liver disease. The samples were collected from pregnant women who attended to Al - Ramadi General Hospital for Maternity and Children and the analysis was done in Beladi laboratory for Medical Analysis. Blood samples were taken from both pregnant and nonpregnant women and the serum was separated by centrifuge at 3000 r.p.m for 15 min and kept frozen till analysis. Labrotary data were obtained by using commercial available kits: Albumin (BCG method), T.S.B (Linear chemicals S.L), S.ALP (Kind and king), S.AST, S.ALT (Randox kit), prothrombin time (Neoplastin cl plus kit)

Statistical analysis: Data were analyzed by using spss and Anova (F-test). Values were expressed as mean±SD. "P" value ≤ 0.05 was considered to indicate statistical significance(13).

Results:

The results of LFTs values for pregnant and nonpregnant women are shown in table 1.

There was no significant difference in prothrombin time and S.AST between pregnant and nonpregnant women.S.ALP was significantly higher ($P<0.001$) during the third trimester 12.20 ± 0.652 compared with the second trimester 8.47 ± 0.628 and the first trimester5.80 ± 0.382 and with control group5.70 ± 0.421.During the second trimester S.ALP was significantly higher($P<0.001$) than in the first trimester and control group.

S.ALT activity was significantly higher($P\leq0.05$) during the third trimester13.20 ± 0.650 compared to first trimester 7.90 ± 0.415 and controls7.13 ± 0.375 .Serum albumin levels were significantly lower($P<0.001$) during the (1st trimester) 3.720 ± 0.083 ,(2nd trimester) 3.673 ± 0.077 and (3rd trimester 3.397± 0.050 when compared to controls4.297 ± 0.069.

T.S.B concentrations were significantly lower($P<0.001$) during first 0.757 ± 0.040 , second0.677 ± 0.041 and third trimester 0.607 ± 0.025 compared to controls1.000 ± 0.050.

Discussion

In this study, LFTs were measured in ninety healthy pregnant women and thirty age-matched controls not receiving oral contraception. None of the women included had evidence of liver disease.

Liver synthetic function is quantified by albumin levels and prothrombin time(8). In this study serum albumin levels decreased from the first trimester and

this decrease became progressively more accentuated as the pregnancy advanced($P<0.001$) . The increase in plasma volume that accurs during pregnancy led to hemodilution and decreased the serum protein concentration(14). Plasma volume increased by approximately 50% from the 6th to 36th week of gestation(5). Red cells volume also increased but in lesser extent and more gradually than plasma volume, the degree of hemodilution was approximated by the decrease of hematocrit(5). Plasma and red cell volume decreased back to the normal range after delivery, aided by the blood loss at delivery because hemodilution, serum albumin levels decreased during all three trimesters(5).

This study showed that the differences in prothrombin time were statistically not significant between pregnant and non pregnant women. Alonso(5) found that the prothrombin time and partial prothrombin time remain unchanged during pregnancy and serum fibrinogen increases in the third trimester of pregnancy.

T.S.B concentrations in this study were significantly lower in pregnant women than non pregnant women during all three trimesters($P<0.001$) . A decrease in T.S.B concentration has already been observed during pregnancy(1) (15). Hemodilution could at least partly be responsible for the decrease in bilirubin concentration because albumin is the protein that transports bilirubin(1) (5).

Liver cell injury or necrosis is measured by determining the activity of ALT and AST(5). In this

study serum ALT activity was significantly higher during the third trimester than in controls($P \leq 0.05$) . This result was similar to two other studies(16) (17), while Bacq etal(1) found that serum ALT activity was significantly higher during the second trimester than in controls but was not different during the third trimester.

In this study serum AST activity was during all three trimesters not significantly higher than in the control group. Bacq et al(1) found the same result. Two other studies found a significant increase in AST levels in the third trimester compared with controls(15) (18).

Other study(19) found a significant increase in AST levels between first and third trimester of pregnancy. An increase in AST and ALT levels was found during labor, which might be caused by contractions of uterine muscle(8) (20). In general practice, it is consider than serum AST and ALT activities remain normal during pregnancy before labor, and any increase in its activities should lead to further investigations(1).

In this study serum ALP activity was significantly higher during the third, second and first trimesters as compared to first trimester and controls($P<0.001$) . This is primarily due to placental isoenzyme production and an increase in the bone isoenzyme rendering it a poor means of diagnosis cholestasis during the third trimester of pregnancy(21-25).

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Table 1:serum LFTs levels in nonpregnant and pregnant women

Variables	Non pregnant n=30	Pregnant			LSD p≤0.05	Probability
		1st trimester 1,2,3 month n=30	2nd trimester 4,5,6 month n=30	3rd trimester 7,8,9 month n=30		
Prothrombin time(sec)	12.73 ± 0.225	13.10 ± 0.330	13.00 ± 0.349	13.03 ± 0.286	N.S.	N.S.
T.S.B(mg/dl)	1.000 ± 0.050	0.757 ± 0.040	0.677 ± 0.041	0.607 ± 0.025	0.0308	<0.001
Albumin(g/dl)	4.297 ± 0.069	3.720 ± 0.083	3.673 ± 0.077	3.397 ± 0.050	0.1986	<0.001
S.ALP (K.A.U/dl)	5.70± 0.421	5.80 ± 0.382	8.47 ± 0.628	12.20 ± 0.652	1.785	<0.001
ALT (U/L)	7.13 ± 0.375	7.90 ± 0.415	10.07 ± 0.502	13.20 ± 0.650	4.078	≤0.05
AST (U/L)	7.47 ± 0.345	7.57 ± 0.524	8.93 ± 0.611	9.77 ± 0.653	N.S.	N.S.

التغيرات في وظائف الكبد خلال مدة الحمل

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الخلاصة:

هدفت الدراسة الحالية الى دراسة بعض اختبارات وظائف الكبد الروتينية التي شملت الالبومين، البيلروبين الكلي للمصل، أنزيمات AST ، ALT ، ALP ، زمن التخثر، في تسعين امرأة حامل ثلاثين امرأة في كل ثلث من الحمل وثلاثين امرأة غير حامل بأعمار مقاربة للنساء الحوامل بوصفها تجربة ضابطة في مستشفى الرمادي العام للنسائية والأطفال، بينت النتائج: حدوث انخفاض معنوي (P<0.001) في مستوى الالبومين والبيلروبين الكلي خلال مراحل الحمل الثلاث مقارنة بمجموعة السيطرة كما بينت النتائج حدوث ارتفاع معنوي (P<0.001) في مستوى انزيم ALP في الثلث الثاني والثالث من الحمل مقارنة بمجموعة السيطرة وحدوث ارتفاع معنوي (P≤0.05) في مستوى انزيم ALT خلال الثلث الثالث من الحمل مقارنة بمجموعة السيطرة في حين لم تظهر النتائج وجود فرق معنوي في مستوى انزيم AST وزمن التخثر بين النساء الحوامل وغير الحوامل.