

Evaluation of changes in liver functions of normal pregnant women in Shendi locality, Sudan

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ABSTRACT

Background: *Changes in value of certain serum liver function tests occur during normal pregnancy and an understanding of these physiological changes is necessary for the management of liver diseases.*

Material & Methods: *This cross-sectional study was conducted at Shendi locality. The patients underwent a clinical assessment, which included history (a questionnaire) and clinical examination. 160 women were divided into four group's non pregnant as control group, 1st, 2nd and 3rd trimester of pregnancy respectively. The age limits was 12 to 40 years. Serum sample was taken and assessed for routine liver function tests.*

Results: *All values were within normal limits. Serum ALT and AST activity was slightly decreased (not significant) in first, second and third trimester than control pregnant women. The mean value of serum total, direct and in direct bilirubin concentrations were also slightly decreased (not significant) in first and second trimester than control but increased third trimester pregnant women.*

Conclusion:

It concluded that the serum ALT, AST and total bilirubin are affected by pregnancy in the 3rd trimester more than the 1st trimester.

Key words: *Pregnancy, liver function tests, Trimester..*

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INTRODUCTION

The pregnant woman experiences physiological changes to support fetal growth and development (1). The levels of estrogens (estradiol) and progesterone increase progressively during pregnancy. These sex hormones have effects on hepatic metabolic, synthesis, and excretory functions (2). As outside pregnancy, serum liver function tests are essential in the management of liver diseases during pregnancy. Routine liver function tests usually include total and conjugated bilirubin, aminotransferases, alkaline phosphatase, and prothrombin time. In addition, gamma-glutamyltransferase (GGT) or 5'nucleotidase may be used to confirm the hepatobiliary origin of increased levels of alkaline phosphatase (3). Total bilirubin concentrations are decreased during all three trimesters of pregnancy (4)(5)(6). Free bilirubin concentrations have also been found to be lower in pregnant women than in nonpregnant controls during all three trimesters, as are concentrations of conjugated bilirubin during the second and third trimesters(4). Hemodilution could at least be partly responsible for the decrease in bilirubin concentration because albumin is the protein that transports bilirubin. Measurement of serum alanine aminotransferase (ALT) and aspartate aminotransferase (AST) activity levels is the most useful test for the routine diagnosis of liver diseases. The effects of pregnancy in serum ALT and AST activity levels are somewhat controversial. In a few studies, a slight increase in ALT and/or AST activity has been found during the third trimester (7),(5),(8)-(11). However, in the majority of published studies, serum ALT and AST activity levels do not change during pregnancy or remain within the normal limits established in non-pregnant women (7). In one study, we found a slight increase in ALT during the second trimester of pregnancy compared to non-pregnant women, but all the values remained below the upper normal limit (4). There is no sound explanation for this slight increase in ALT and only during the second trimester in pregnant women compared to non-pregnant controls (4). An increase in ALT or AST levels during labor might be due to contractions of the uterine muscle (12)(13). Thus, it should be emphasized that serum AST or ALT

activity values above the upper normal limit before labor should be considered pathologic and should lead to further investigations (14). Serum alkaline phosphatase activity levels increase in late pregnancy, mainly during the third trimester (4). By contrast, serum alkaline phosphatase levels have been found to be lower in oral contraceptive users. This increase during pregnancy is not due to an increase in the hepatic iso-enzyme but rather largely due to the production of the placental iso-enzyme (15). During the third trimester, there is also an increase in the production of the bone iso-enzyme as documented by an increase in its serum level up to six weeks post-delivery (16). These findings document that the measurement of serum alkaline phosphatase activity is not a suitable test for the diagnosis of cholestasis during late pregnancy and post-partum.

The aim of this study was to evaluate the changes in serum levels of routine liver function tests, i.e., Total, indirect and direct bilirubin, alanine transaminase (ALT) and aspartate transaminase (AST), during normal pregnancy in first, second and third trimester pregnant women compared with a control group of non-pregnant women.

MATERIALS AND METHODS

This study was conducted at Shendi locality to determination of serum total, direct, in direct bilirubin, serum ALT and AST in normal pregnant women. The study included (160) normal pregnancy women attending to AL Noor Modern Medical Center. Their ages range from (12-40 years). Blood samples were taken from antecubital vein by plastic disposable syringes. The blood was then transferred into a plane glass tubes. After one hour at room temperature (after clot retraction) centrifugation of the blood was done at a relative centrifugal force of 1000 g for 5 minutes. Afterward, sera were removed by disposable pasture pipettes and transferred into glass containers. Sera were analyzed in patches. Estimation of serum levels of liver function tests, i.e., Total, indirect and direct bilirubin, alanine transaminase (ALT) and aspartate transaminase (AST), during normal pregnancy in first, second and third trimester pregnant women

compared with a control group of non-pregnant women. was done by kit method. Blood pressures were done for all participants in this study. Clinical data were collected through a questionnaire the (SPSS) version (11.5) program was used for data analysis. All the data were presented as the mean \pm SD.

Inclusion criteria: pregnant women, the age between 12 - 40 years.

Exclusion Criteria: pregnant women with gestational diabetes mellitus, hypertension, and women with other chronic diseases.

RESULTS

Table 1: Comparison of study parameters between non-pregnant and pregnant women (first, second and third trimester).

Parameter		1 st Trimester (n=40)		2 nd trimester (n=40)		3 rd trimester (n=40)	
		Mean \pm SD	P value	Mean \pm SD	P value	Mean \pm SD	P value
Pair 1	ALT u/l (Control)	18.45 \pm 10.9	.318	18.45 \pm 10.9	.429	18.45 \pm 10.9	.631
	ALT u/l	16 \pm 11		15.12 \pm 9.3		13 \pm 8.9	
Pair 2	AST u/l (Control)	25.17 \pm 6.15	.443	25.17 \pm 6.15	.947	25.17 \pm 6.15	.184
	AST u/l	21.22 \pm 9		20.85 \pm 6.5		20.45 \pm 7.2	
Pair 3	Total bilirubin mg/dl (Control)	.80 \pm .27	.323	.80 \pm .27	.111	.80 \pm .27	.409
	Total bilirubin mg/dl	.61 \pm .26		.73 \pm .41		.96 \pm .87	
Pair 4	Direct bilirubin mg/dl (Control)	.16 \pm .11	.397	.16 \pm .11	.513	.16 \pm .11	.493
	Direct bilirubin mg/dl	.12 \pm .07		.15 \pm .10		.25 \pm .44	
Pair 5	In Direct bilirubin mg/dl (Control)	.62 \pm .29	.330	.62 \pm .29	.074	.62 \pm .29	.240
	In Direct bilirubin mg/dl	.47 \pm .26		.56 \pm .40		.71 \pm .52	

*t- test $P < 0.05$ is significant

Table 2: Comparison of study parameters between liver function tests in pregnant women (first and third trimester).

Parameter	1 st Trimester (n=40)	3 rd Trimester (n=40)	P value
	Mean \pm SD	Mean \pm SD	
ALT u/l	16 \pm 11	13 \pm 8.9	.153
AST u/l	21.22 \pm 9	20.45 \pm 7.2	.577
Total bilirubin mg/dl	.61 \pm .26	.96 \pm .87	.022 *

Direct bilirubin mg/dl	.12±.07	.25±.44	.097
In Direct bilirubin mg/dl	.47±.26	.71±.52	.067

*t- test $P < 0.05$ is significant

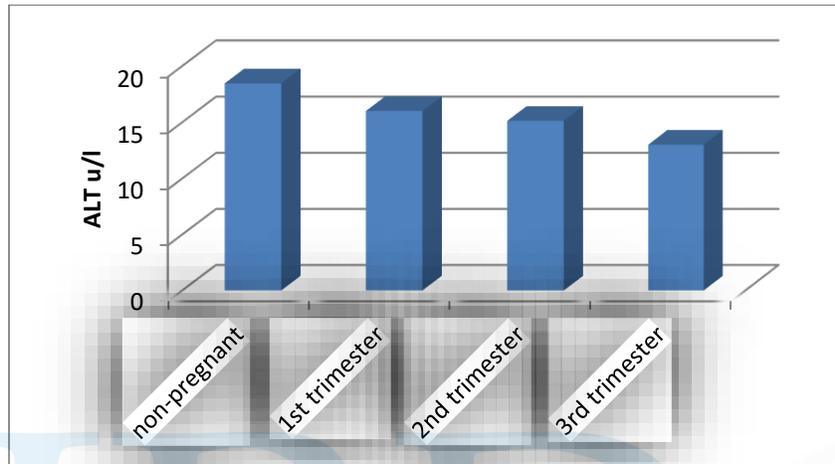


Figure 1: comparison between the mean of ALT concentration in non-pregnant, 1st, 2nd and 3rd trimester of pregnancy

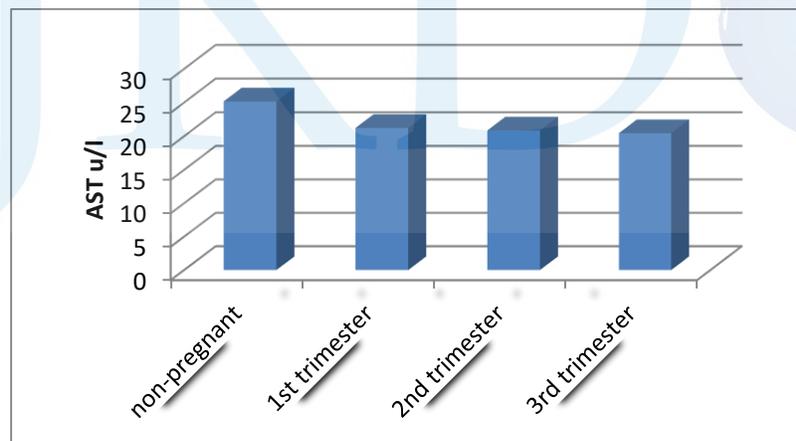


Figure 2: comparison between the mean of AST concentration in non-pregnant, 1st, 2nd and 3rd trimester of pregnancy

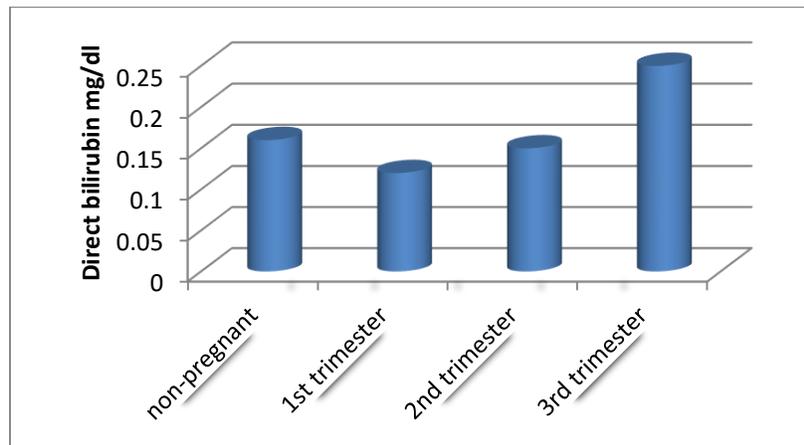


Figure 3: comparison between the mean of direct bilirubin concentration in non-pregnant, 1st, 2nd and 3rd trimester of pregnancy

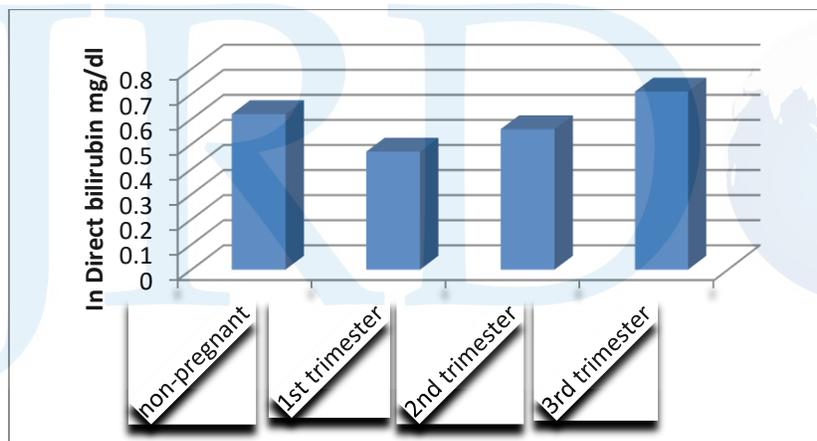


Figure 3: comparison between the mean of in direct bilirubin concentration in non-pregnant, 1st, 2nd and 3rd trimester of pregnancy

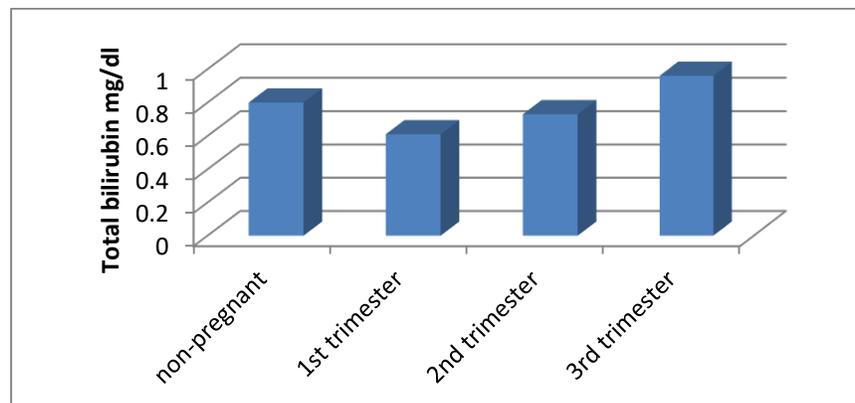


Figure 3: comparison between the mean of total bilirubin concentration in non-pregnant, 1st, 2nd and 3rd trimester of pregnancy

DISCUSSION

Serum liver function tests are essential in the management of liver diseases during pregnancy. Routine liver function tests usually include total and conjugated bilirubin, aminotransferases, alkaline phosphatase, and pro-thrombin time. In addition, gamma-glutamyltransferase (GGT) or 5'nucleotidase may be used to confirm the hepatobiliary origin of increased levels of alkaline phosphatase (17). Total, direct and in direct bilirubin concentration in our study was decreased in first and second trimesters than control non-pregnant women. A decrease in serum total bilirubin concentration has already been observed during pregnancy in various studies (18) (19). Hemodilution could at least partly be responsible for the decrease in bilirubin concentration because albumin is the protein that transports bilirubin. In our study we found decreased in serum ALT and AST activity in 1st, 2nd and third trimester compared to non-pregnant women. . The effects of pregnancy in serum ALT and AST activity levels are somewhat controversial. In a few studies, a slight increase in ALT and/or AST activity has been found during the third trimester (20) (21). However, in the majority of published studies, serum ALT and AST activity levels do not change during pregnancy or remain within the normal limits established in non-pregnant women (20) (22). We did not have any explanation for this slight decrease in serum ALT and AST during the all trimesters in pregnant women compared to non-pregnant controls.

CONCLUSION

In summary, as shown in this study, serum ALT, AST and total bilirubin are affected by pregnancy in the 3rd trimester more than the 1st trimester.

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