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## Determination of the Liver Enzymes Level and Kidney Functions in Pregnant Women in the Second Trimester of Pregnancy at Different Age Groups

Suha A. Al-Jowary

Department of Biology, College of Science, University of Baghdad, Baghdad. Iraq.

### Abstract

The level of liver enzymes and kidney functions in pregnant women in the second trimester of pregnancy at different age groups was determined. This study is composed of fifty pregnant women in the second trimester of pregnancy and were classified into two subgroups; first group included twenty-five pregnant with an age between 22-30 years, a second group included twenty-five pregnant with an age 35-42 years. A control group included twenty-five non-pregnant, healthy women was also included. Blood samples were obtained from each group, centrifuged, serum was collected from each group to measure liver enzymes (AST, ALT and ALP) and kidney function tests (urea and creatinine) were measured using enzymatic kits. The results of present study illustrated significant elevation ( $P \leq 0.05$ ) in AST and ALT means in the age group 35- 42 years, while there were no-significant differences in an age group 22- 30 compared with control healthy group. In addition, the ALP mean values are significantly increase ( $P \leq 0.05$ ) in 22- 30 and 35- 42 years compared with non-pregnant women. The findings also demonstrated that the means of blood urea is significantly declined ( $P \leq 0.05$ ) in the age groups 22- 30 and 35- 42 years compared with healthy non-pregnant. This study found significant decline ( $P \leq 0.05$ ) in serum creatinine at an age group 22- 30 and significant increase ( $P \leq 0.05$ ) in the other group (35- 42 years) compared with the control. The conclusion of the present study that hepatic and renal functions are more damaged in an age group 33- 42 years than an age group 22- 30 years through the values of parameters above. Therefore, pregnancy in the age 22- 30 years is more healthy for both mother and fetus than an age 33- 42 years.

**Keywords:** Aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, Urea, Creatinine, Pregnancy.

### تعيين مستوى انزيمات الكبد ووظائف الكلى في النساء الحوامل في الثلث الثاني من الحمل بمجاميع عمرية مختلفة

سهى عبد الخالق الجواري

قسم علوم الحياة، كلية العلوم، جامعة بغداد، بغداد، العراق.

### الخلاصة

تم دراسة مستوى انزيمات الكبد ووظائف الكلى في النساء الحوامل في الثلث الثاني من الحمل بأعمار مختلفة، تضمنت هذه الدراسة خمسين امرأة حامل في الثلث الثاني من الحمل وصنفت الى مجموعتين ثانويتين: المجموعة الاولى تكونت من 25 حامل بعمر من 22- 30 سنة، اما المجموعة الثانية فإنها تكونت

ايضا من 25 حامل بعمر من 35- 42 سنة، ومجموعة السيطرة فقد تكونت من 25 امرأة غير حامل اصحاء، جمع مصل من كل المجاميع لقياس مستوى انزيمات الكبد ووظائف الكلى بالعدد الانزيمية الخاصة. اشارت نتائج الدراسة الحالية ارتفاعا معنويا ( $P \leq 0.05$ ) في معدلات انزيمي الاسبارتيت الناقل للأمين والالنين الناقل للأمين بعمر 35- 42 سنة ولم تظهر فروقات معنوية بعمر 22- 30 سنة مقارنة مع مجموعة السيطرة الاصحاء، بالإضافة لذلك فان معدلات الفوسفاتيز القاعدي قد ارتفعت ( $P \leq 0.05$ ) في مجموعتي 22- 30 و 35- 42 سنة مقارنة مع الاصحاء غير الحوامل، لقد اوضحت النتائج ايضا بان معدلات يوريا الدم قد انخفضت معنويا ( $P \leq 0.05$ ) بعمر 22- 30 وبعمر 35- 42 سنة مقارنة مع النساء غير الحوامل الاصحاء، اظهرت هذه الدراسة اظهرت انخفاضاً معنوياً ( $P \leq 0.05$ ) بعمر 22- 30 سنة وارتفاعاً معنوياً في المجموعة الأخرى (35- 42 سنة) مقارنة مع مجموعة السيطرة.

يستنتج من الدراسة الحالية بان وظائف الكبد والكلى اكثر تضررا بعمر 33- 42 سنة مما بعمر 22- 30 سنة من خلال قيم المتغيرات اعلاه، لذلك فان الحمل بعمر 22- 30 سنة اكثر صحيا للام والجنين من الحمل بعمر 33- 42 سنة.

## Introduction

Pregnancy or gestation in a normal condition occurred in women characterized by many physiological and anatomical alternations in order to prepare appropriate environment for developing the embryo until birth [1, 2]. One of the most physiological changes is the elevation in the level of sex steroid hormones which influence on the hepatic functions [1- 4]. In addition, kidneys are one of the maternal changes that happened during gestation and have impact on fetus [2, 3].

Gestation period is divided into three phases; first second and third trimesters. In the second trimester, the development and movement of embryo should monitor in this period [3].

Alternations in hepatic functions for pregnant women are normal, however, the level of liver enzymes which include aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) must determine in each period of pregnancy [4, 5].

On the other hand, renal function tests must assessed routinely to stand on any problem may occurred to mother and fetus during gestation [6, 7]. One of the more important tests are serum creatinine and urea, which are metabolic product of urinary system and their elevated values means that kidneys are not work normally [4]. Therefore, the aim of the present work is to determine the level of liver enzymes (AST, ALT and ALP) and kidney functions (urea and creatinine) in pregnant women in the second trimester of pregnancy at different age groups.

## Materials and Methods

This study was composed of fifty pregnant women in the second trimester of pregnancy, classified into two subgroups; first group of twenty-five pregnant with an age between 22-30 years, a second group of twenty-five pregnant with an age 35-42 years. A control group of twenty-five non-pregnant, healthy women was also included. Blood samples were obtained from each group, centrifuged, serum collected and stored in deep freezer ( $-20^{\circ}\text{C}$ ). The samples were collected from special laboratories in Al-Harithya Campus / Baghdad.

Liver enzymes (AST, ALT and ALP) were measured using enzymatic kits: ALT (Biolab Reagents, France), AST (Biomaghreb, Tunis), ALP (Biomerieux, France). These kits depended on the colorimetric determination the activity of these enzymes in serum samples [8].

Kidney function tests were determined also by analytical kits. Enzymatic method was depended to measure blood urea (Biolabo, France), while colorimetric method was used to determine serum creatinine (Biomerieux, France) [7].

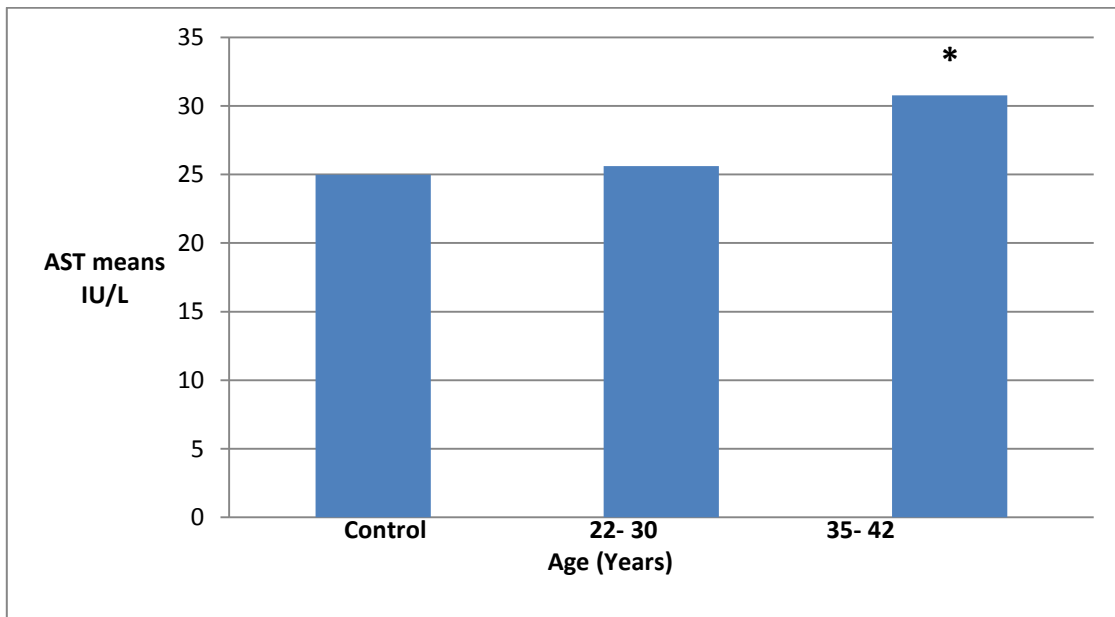
Values were represented as mean  $\pm$  standard deviation and statistical analysis was made using analysis of variance test (ANOVA). The program of SPSS was used to test significance among means at probability level  $\leq 0.05$  [9].

## Results and Discussion

The results of present study illustrated significant elevation ( $P \leq 0.05$ ) in AST and ALT means in the age group 35- 42 years, while there were no-significant differences in an age group 22- 30 compared with control healthy group. The value means of AST were  $24.988 \pm 2.265$ ,  $25.608 \pm 2.052$  and  $30.768 \pm 3.569$  IU/L in the control, 22- 30 and 35- 42 years, respectively (Figure- 1). The ALT

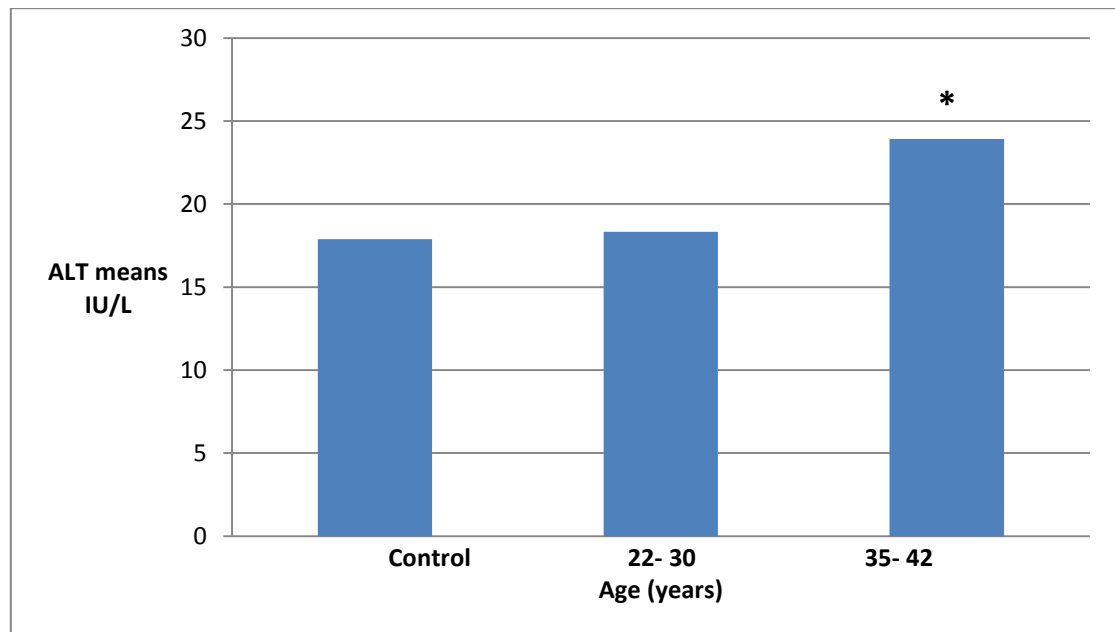
means were  $17.888 \pm 2.533$ ,  $18.336 \pm 2.235$  and  $23.916 \pm 3.339$  IU/L in the control, 22- 30 and 35- 42 years, respectively (Figure- 2). In addition, the ALP means were significantly increase ( $P \leq 0.05$ ) in 22- 30 and 35- 42 years compared with non-pregnant women. The value means of ALP in 22- 30 and 35- 42 years, respectively  $42.356 \pm 4.253$  and  $57.632 \pm 3.858$  IU/L, while it was  $33.792 \pm 3.284$  IU/L in control women (Figure -3). The findings in Figure- 4 demonstrated the means of blood urea were significantly declined ( $P \leq 0.05$ ) in the age groups 22- 30 and 35- 42 years compared with healthy non-pregnant group. Blood urea concentration means were  $17.316 \pm 2.476$ ,  $12.124 \pm 1.873$  and  $9.964 \pm 1.790$  mg/ dl in control and the two groups mentioned above, respectively.

Concerning the level of serum creatinine, this investigation found significant decline ( $P \leq 0.05$ ) in an age group 22- 30 and significant increase ( $P \leq 0.05$ ) in the other group (35- 42 years) compared with the control. The creatinine means were  $0.7288 \pm 0.165$ ,  $0.593 \pm 0.152$  and  $0.824 \pm 0.152$  mg/ dl in the control women and groups at age 22- 30 as well as 35- 42 years, respectively (Figure- 5).



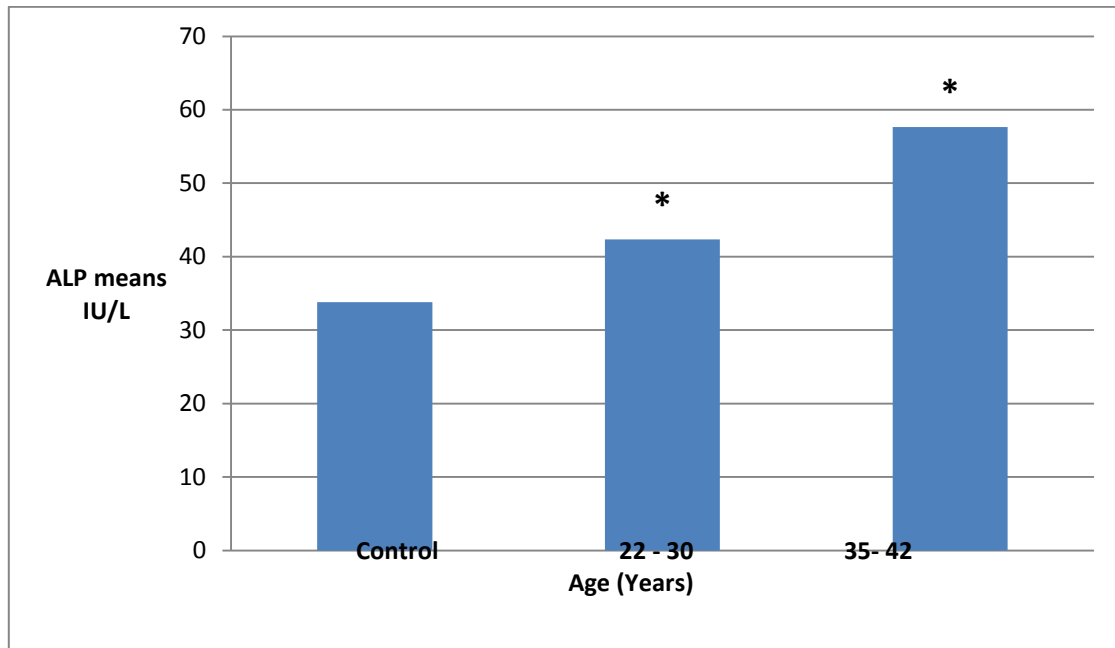
**Figure 1-** Changes in the level of AST enzyme in pregnant women at different age groups.

\*A significant difference at  $P \leq 0.05$  compared with control

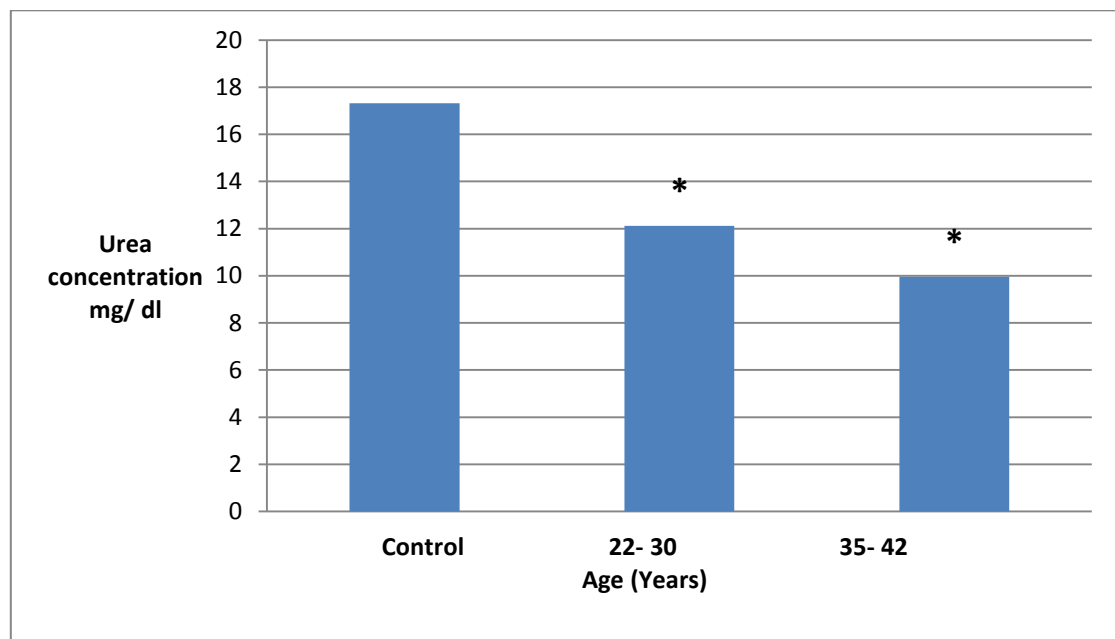


**Figure 2-** Changes in the level of ALT enzyme in pregnant women at different age groups.

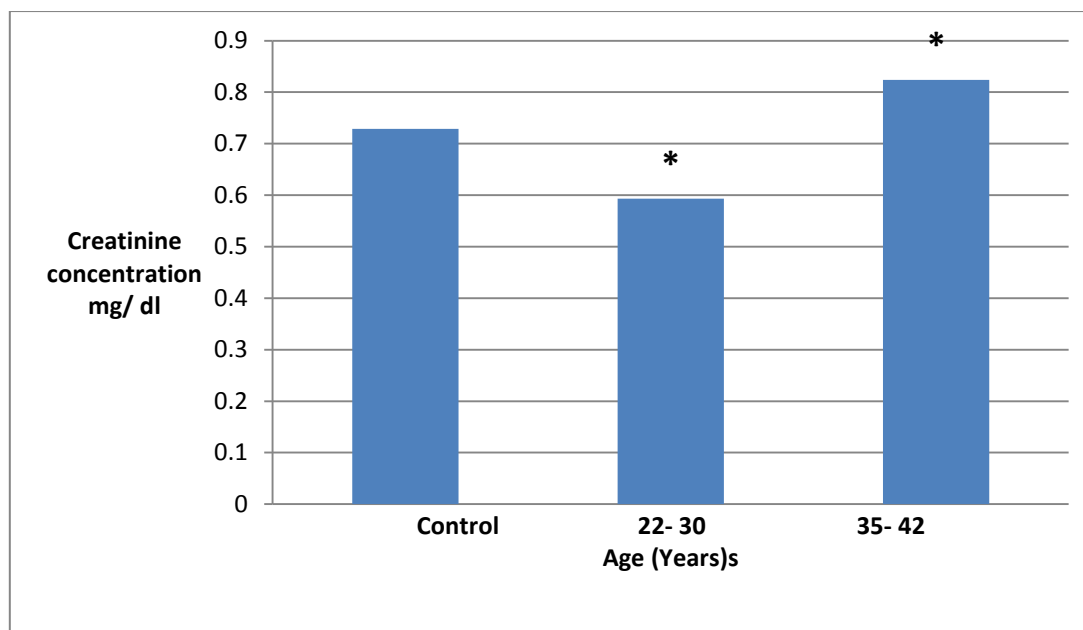
\*A significant difference at  $P \leq 0.05$  compared with control.



**Figure 3-** Changes in the level of ALP enzyme in pregnant women at different age groups.  
\*A significant difference at  $P < 0.05$  compared with control.



**Figure 4-** Changes in the blood urea concentration in pregnant women at different age groups.  
\*A significant difference at  $P < 0.05$  compared with control.



**Figure 5-** Changes in creatinine concentration in pregnant women at different age groups.

\*A significant difference at  $P < 0.05$  compared with control.

### Discussion

In fact, each pregnant women worldwide suffering from multiple hematological, biochemical, hormonal and cardiovascular alternations during the three trimesters of pregnancy [7, 8, 10].

In our study, serum ALT activity was slightly but significantly higher in the age group 35- 42 years than in controls. An increase in ALT and AST levels might be caused by contractions of uterine muscle [1, 8]. Further, an increase in the level AST and ALT enzymes in pregnant at age group 35- 42 years may be due to activators or inhibitors which have effect on the concentration of these enzymes. Thus, heavy pregnancy might cause oxidative stress to pregnant at age 35- 42 which impair liver and release these enzymes to blood stream [4].

The determination of the level of urea and creatinine in pregnant women has important benefits for pregnant and fetus because these parameters are essential for the normal function of kidney and any change within these parameters may indicate renal dysfunction [3].

The lower level of urea and creatinine in pregnancy is considered healthy, but when the level of urea and creatinine above the normal range in pregnant women, this may be led to renal problems [10].

Concerning the decrease in the concentrations of urea in pregnant women in both age groups may be related to elevation in glomerular filtration rate (GFR), hydration, increment metabolism and increment of protein demand during the growth and development of embryo from mother's protein. Thus, the level of amino acids in pregnant women reduce to 15- 25% of their total concentrations [3, 7].

The observed decline in the creatinine levels in the age group 22-30 may be related to the elevation in the glomerular filtration rate (GFR) and to the decrescent value of creatinine clearance in pregnant women, so there is reversible relationship between GFR and creatinine level [3, 10]. On the other hand the level of creatinine was higher in pregnant women in the age group 35- 42 than pregnant women in the age group 22- 30, this difference may be related to the body and muscle mass of women, dietary habitats as well as content and rate of creatinine synthesis[4, 11].

It concluded from the present study that hepatic and renal functions are more damaged in an age group 35- 42 years than an age group 22- 30 years through the values of parameters above. Therefore, pregnancy in the age 22- 30 years is more healthy to mother and fetus than an age 33- 42 years.

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