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Effects of Pregnanton Some Biochemical Parameters in Healthy Subjects

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Abstract: Biological marker changes during pregnancy and adequate reference values are of importance for correct clinical decisions. There are only few studies on the variations of laboratory tests during normal pregnancies, especially during the first trimesters. The aim of this study was to assess the effects of pregnancy in the first trimester on several biochemical parameters in healthy pregnant women by comparing the values of these parameters with non-pregnant women. Blood samples were taken from 30healthy pregnant women and 30non-pregnant women. Glucose, Total protein (TP), Albumin, Total bilirubin (TB), Alkaline phosphatase (ALP), Aspartate transaminase(AST), Alanine transaminase(ALT), Gamma glutamyl transferase(GGT), Cortisol and Phosphatewere measured. the result shows that a pregnant affected in serum total bilirubin, Aspartate transaminase, Cortisol. It recorded a significance decrease in total bilirubin and Aspartate transaminase in pregnant women compared with non-pregnant women, While the pregnant caused significant increase in Cortisol compared with non-pregnant women.

Keywords: Pregnant, Biochemical Parameters, Aspartate Transaminase(AST), Alanine Transaminase(ALT), Gamma Glutamyltransferase (GGT), Cortisol

1. Introduction

The pregnant woman's body goes through some profound anatomical, physiological, and biochemical changes to adapt to and support the entire pregnancy, which ultimately support the growing fetus. Although these physiological changes are normal [1]. Physiologic changes in pregnancy induce alterations in the alimentary, cardiovascular, pulmonary, endocrinology changes and renal organ systems during pregnancy are designed to increase availability of nutrients and remove wastes from the fetus. These physiological adaptations will impact on toxicokinetics. Absorption, distribution, metabolism,elimination, transfer between maternal and fetal compartments. Pregnant women undergo several adaptations in many organ systems. Some adaptations are secondary to hormonal changes in pregnancy. Some of the changes in maternal physiology during pregnancy include, for example, increased maternal fat and total body water, decreased plasma protein concentrations, especially albumin, increased maternal blood volume, cardiac output, and blood flow to the kidneys, and decreased blood pressure. Other physiologic changes include increased respiratory alkalosis, delayed gastric emptying and gastrointestinal motility, and altered activity of hepatic drug metabolizing enzymes [2-5].

Pregnancy is associated with altered liver function, particularly in serum enzymes. Anabolic steroids are responsible to some degree in mediating the physiological and biochemical changes that occur during an uncomplicated pregnancy [6]. Liver diseases in pregnancy, although rare, but they can seriously affect mother and fetus. It is difficult to identify features of liver disease in pregnant women because of physiological changes. Physiological changes of normal pregnancy can be confounding with that of sign and symptoms of liver diseases. These normal alterations mimic physiological changes in patients with chronic liver disease. Understanding of these physiological changes is necessary for the management of liver diseases [7, 8]. They found that ALT, ALP and AST decreased in late gestation. Larsson et al. (2008) They reported that plasma ALT, albumin, ALP, AST, bilirubin, GGT and phosphate change during normal pregnancy.

Lbdah, (2012) They resulted that albumin level decreases as early as the first trimester. Serum ALT and ASTactivity levels remain within the normal limits established for non-pregnant women. Serum ALP activity increases in late pregnancy. Serum GGT activity levels decrease during the second and third trimesters.

Persson and Hansson (1993) They suggested that there is a very close relationship between maternal and fetal glucose concentrations during early gestation. Maternal hypoglycaemia during pregnancy will therefore not only affect the mother herself, but also the fetal growth. Chiasson et al. (1997) They found that decrease in the plasma glucose level during pregnancy suggests that the use of glucose by the growing fetus is augmented and that this is not totally compensated for by a rise in hepatic glucose production. The glucose requirement by the growing fetus is probably supplied by the increased postprandial plasma glucose level.

Hoffman et al. (2003) demonstrated that feeding meals rich in sugar and starch influenced glucose metabolism in horses to an extent that the natural adaptation of glucose metabolism to pregnancy. Nalla et al. (2014) They found that pregnancy serum significantly increased proliferation of rat beta cells in early pregnancy. The Somatolactogenic hormones stimulate proliferation beta cells.

Pregnancy alters the pattern of maternal cortisol metabolism. (Pepe et al. 1976) Tsubouchi et al. (2011) They reported that salivary cortisol concentrations of the chronic high stress group were significantly lower compared with those of the normal group. Goedhart et al. (2011) demonstrated thathigher maternal cortisol levels were independently related to lower birthweights and a higher gestational age risk. Maternal psychosocial problems were not associated with cortisol levels. Shea et al. (2007) They resulted that cortisol response was not significantly different between women who were depressed during pregnancy compared to healthy control women. The cortisol response may provide important information about the maternal hypothalamic-pituitary-adrenal axis during pregnancy.

There are many studies about the effects of pregnant on phosphate, Dawson and Wray (1985) They conclude that concentrations of phosphorus metabolites depend upon the physiological state of the uterus.

Mbassa and Poulsen [8] found that phosphorus decreased in late gestation. Alterations in the level of plasma electrolytes due to pregnancy and depends on age, influenced also by environment. Wójcicka-Jagodzińska et al [9] conclude that premature uterine contractility in women in the second trimester may be related to the disturbances of calcium-phosphorus-magnesium homeostasis. Yokus and Cakir [10] found that phosphorus varies influenced by seasonal, but not physiological changes, whereas ALP concentrations change in physiological and seasonal conditionsin early pregnancy. See comment in PubMed Commons below Michałeket al [11] demonstrated that the kidneys of pregnant goats regulate the calcium-phosphate balance to a great extent. The aim of this study was to assess the effects of pregnancy in the first trimester on several biochemical parameters in healthy pregnant women by comparing the values of these parameters with non-pregnant women.

2. Materials and Methods

2.1. Biochemical Parameters

Blood samples were taken from 30in early healthy pregnant women and 30non-pregnant women. Cortisol was measured by electrochemiluminscence immunoassay using the Elecsys 2010. Glucose, TP, Albumin, TB, ALP, AST, ALT, GGT and phosphate were measured using Hitachi/Roche 917 chemistry autoanalyzer.

2.2. Statistical Analysis

The data were presented as the mean ± S. E. Statistical differences between the values during and post fasting were determined by Student's t. test.

3. Results and Discussion

Most laboratory parameters change during pregnancy. The concentrations of most components change during pregnancy. From table (1) and figure (1,10) the level of glucose (mmol/L), TP (g/L), Albumin (g/L), ALP (U/L), ALT (U/L), GGT (U/L), Phosphate (mmol/L)in the sera of non-pregnant women have (5.12 ± 0.19), (79.45 ± 1.42), (49.42 ± 1.14), (85.18 ± 3.04), (11.06 ± 0.31), (18.67 ± 1.05), (1.12 ± 0.05).

Table 1. *Mean values of Glucose,Total protein,Albumin, Total bilirubin, Alkaline phosphatase, Aspartate transaminase, Alanine transaminase, Gamma glutamyl transferase,Cortisol,Phosphate,in non-pregnantand pregnant women.*

	Non pregnant Mean ± S. E	**Pregnant Mean ± S. E**
Glucose (mmol/L)	5.12 ± 0.19	5.42 ± 0.21
Total protein(g/L)	79.45 ± 1.42	77.27± 1.04
Albumin(g/L)	49.42± 1.14	47.45 ± 0.62
Total bilirubin(μmol/l)	10.97± 0.54	5. 73 ± 0.29***
Alkaline phosphatase (U/L)	85.18± 3.04	79.85 ± 3.36
Aspartate transaminase(U/L)	19.30 ± 0.69	17.0± 0.86*
Alanine transaminase(U/L)	11.06± 0.31	12.15± 0.63
Gamma glutamyl transferase (U/L)	18.67 ± 1.05	18.03 ± 1.28
Cortisol (nmol/l)	255.39 ± 13.61	388.13 ± 21.96***
Phosphate (mmol/L)	1.12 ± 0.05	1.17 ± 0.04

The mean ± S. E. $P < 0.05$ *, $P < 0.01$**, $P < 0.001$***.

In pregnant women values have (5.42 ± 0.21),(77.27 ± 1.04), (47.45 ± 0.62), (79.85 ± 3.36), (12.15 ± 0.63), (18.03 ± 1.28), (1.17 ± 0.04), Glucose, TP, Albumin, ALP, ALT, GGT, Phosphateshows no significant change in pregnant women compared with non-pregnant women, figure (1, 2, 3, 5, 7, 8, 10).

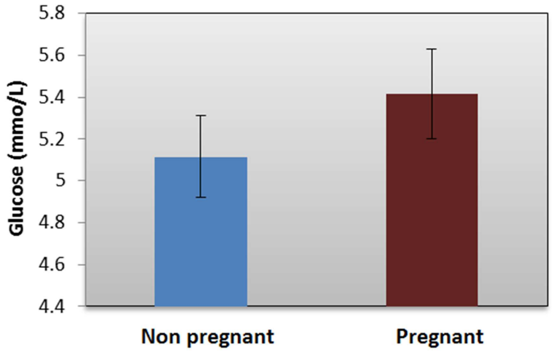

Figure 1. *Glucose (mmo/L) values in non pregnant and pregnant women.*

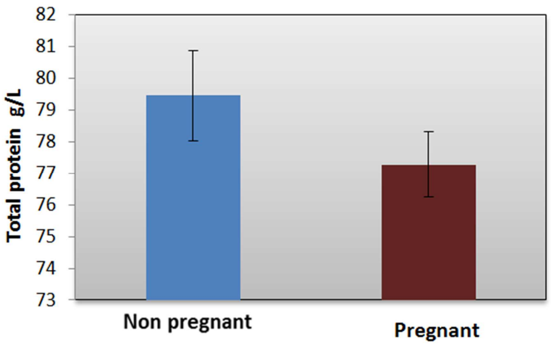

Figure 2. *Total protein (g/L) values in non pregnant and pregnant women.*

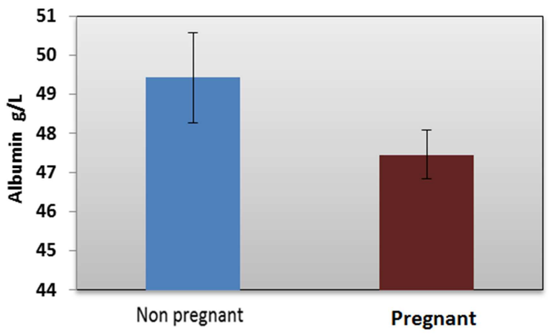

Figure 3. *Albumin (g/L) values in non pregnant and pregnant women*

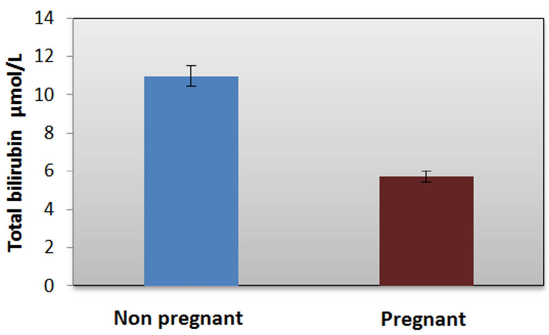

Figure 4. *Total bilirubin (µmol/L) values in non pregnant and pregnant women.*

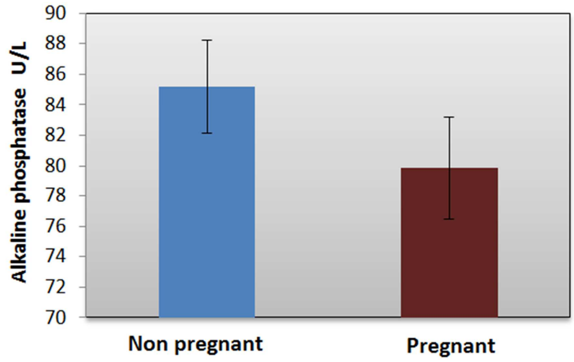

Figure 5. *Alkaline phosphatase (U/L) values in non pregnant and pregnant women.*

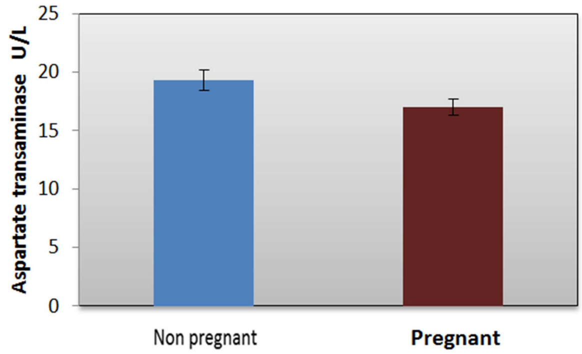

Figure 6. *Aspartate transaminase (U/L) values in non pregnant and pregnant women.*

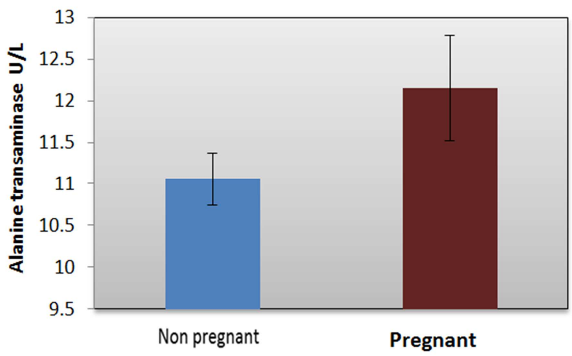

Figure 7. *Alanine transaminase (U/L) values in non pregnant and pregnant women.*

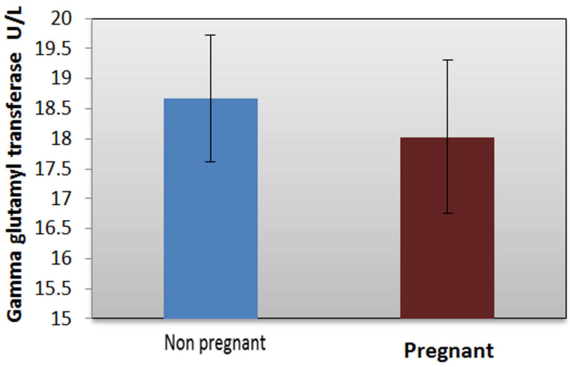

Figure 8. *Gamma glutamyl transferase (U/L) values in non pregnant and pregnant women.*

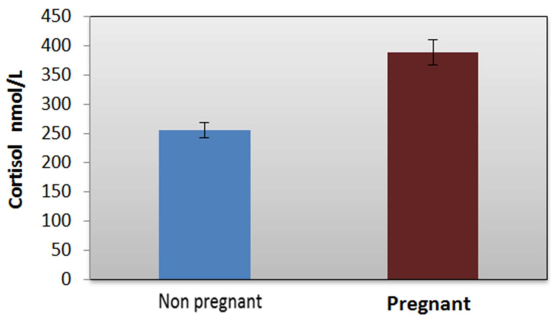

Figure 9. *Cortisol (nmol/L) values in non pregnant and pregnant women.*

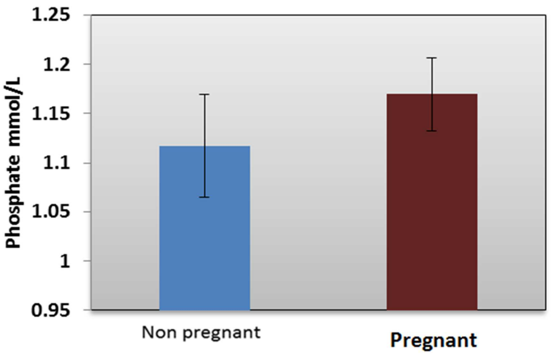

Figure 10. *Phosphate (mmol/L) values in non pregnant and pregnant women.*

Table 1 and figure (4, 6) shows the levels of TB (μmol/l) and AST (U/L) in non-pregnant women have (10.97 ± 0.54), (19.30± 0.69), In pregnant womenvalues have(5.73 ± 0.29), (17.0± 0.86). TB and AST shows significant decrease in pregnant womencompared with non-pregnant women. Cortisol nmol/Lin non-pregnant women (255.39 ± 13.61), And in pregnant women (388.13 ± 21.96).

The result shows that a pregnant affected in serum total bilirubin, Aspartate transaminase, Cortisol. It recorded a significance decrease in total bilirubin and Aspartate transaminase in pregnant women compared with non-pregnant women, While the pregnantcaused significant increase in Cortisol compared with non-pregnant women.

The results recorded decrease in total bilirubin in pregnant women compared with non-pregnant women. This finding was in line with the previous studies of Knopp et al. [12]; Järnfelt-Samsioeet al. [13]; Bacq et al. [14]; Frederiksen [4]; Lbdah, [15]; Costantine [5] Serum bilirubin concentrations are lower in pregnant than in nonpregnant women. The decrease in total bilirubinmay be caused by vitamin CorCaffeine or theophylline [16-18].

Also the current study found slightly decreased in total protein and albumin, The slightly decreased in albumin may be due to hemodilution. thisagreement with Carter [19]; Van Buul et al. [20] and Bacq et al [14]. They resulted that serum albumin levels were lower during all trimesters of pregnant because hemodilution. While Bar et al. [21]; Nallaet al. (2014) demonstrated significantly higher albumin excretion rate values in all pregnant compared to non-pregnant women, and the results were in correlation with higher urinary creatinine clearance values [21]. This study not agreement with our result.

However, the results recorded a slightly decreased in GGT. Previous studies have demonstrated that GGT were significantly decreased in pregnant women [13].

Also the present study reported a significant decrease in Aspartate transaminase in pregnant women compared with non-pregnant women. The decrease in Aspartate transaminase remained within the normal range in pregnant women. This study agreement with Carter [19] and Bacqet al. [14] they found serum transaminases within the normal range. Van Buul et al. [20] found that serum AST activity did not differ between pregnant and nonpregnant women.

While, there has been slightly decreased inalkaline phosphatase inpregnant women. The decreased inalkaline phosphatase may be duo tomalnutrition, which could be caused by celiac disease or a deficiency in vitamins and minerals. This finding was in line with Shrivastava et al. [22]; Sogabe et al. [23]; Obianime and Roberts. [24]; Haraikawa et al. [25] decreased inalkaline phosphatase levels in blood is rare, but can indicate malnutrition, which could be caused by celiac disease or a deficiency in vitamins and minerals. In contrast Knopp et al. [12]; Carter [19]; Bacqet al. (1996) They found that alkaline phosphatase is higher in pregnancy. Lata, [7] reported that increased alkaline phosphatase due to placental secretion. that was not agreed with these studies.

However, there was asignificant increase in cortisol in pregnant womencompared with non-pregnant women the increase in cortisol may be due to increasecortisol binding globulin or response to mifepristone in early pregnancy. This agreement with Honkanen et al. [26] resulted that serum cortisol concentrations increased response to mifepristone in early pregnancy. Moore et al. [27]; Demey-Ponsart et al [28]; Branch [29] demonstrate that cortisol binding globulin increase in normal pregnant women. The increase cortisol binding globulin may be due to a high of estrogen [27]. In pregnancy hypothalamic control of maternal adrenal secretion. (Demey-Ponsart et al. [28] found increase in 6-hydroxycortisol a major cortisol metabolite this reported by Saenger [30]; Ohkita and Goto [30] found that6-hydroxycortisol values were significantly higher in healthy pregnant women than those observed in the control group. These observations suggest that drug-metabolizing enzyme induction may occur during pregnancy [30-32].

4. Conclusion

The Reference values are usually defined based on blood samples from healthy men or non-pregnant women. This is not optimal as many biological marker changes during pregnancy and adequate reference values are of importance for correct clinical decisions. There are only few studies on the variations of laboratory tests during normal pregnancies, especially during the first two trimesters. It is thus a need to establish such reference values. It is important to consider normal reference ranges, specific to pregnancy when interpreting some laboratory results that may be altered by the normal changes of pregnancy.

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