



Research Article

## The effect of pregnancy and the occurrence of some biochemical changes during the first months of women in the city of Samarra

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### Abstract

This study dealt with the effect of pregnancy on the biochemical blood characteristics, where blood samples were collected from pregnant women during the three stages of pregnancy and from married women who were not pregnant as a control group. A woman. As for married women who are not pregnant, they reached (10) women, their ages ranged between (15-40) years. The results of this study showed that the BMI of pregnant women increased as the pregnancy progressed compared with the non-pregnant married women at a significant level ( $P < 0.01$ ). And it showed a significant increase in the concentration of cholesterol, triglycerides, and serum albumin concentration for pregnant women compared with married non-pregnant women at a significant level ( $P < 0.01$ ).

**Keywords** Pregnancy, Biochemistry, Albumin, Body Mass, Cholesterol, Triglycerides

### Introduction

Pregnancy is a natural condition that a pregnant woman adapts to during the period from fertilization of the egg to birth and lasts about nine months, during which pregnant women undergo many physiological changes to keep pace with the processes of growth and development in the fetus (Cimpoca et al., 2021). Pregnancy is a severe and total stress state associated with profound hormonal, biochemical, anatomical, and psychological changes that affect the metabolic processes and excretory liver functions (Bhargava et al., 2021)

### Objective

Estimation of the standard of body mass and measurement of several biochemical variables such as albumin, cholesterol, and triglycerides in the blood serum of married, non-pregnant women, and pregnant women during pregnancy.

### Materials and methods

#### Measurement of Weight and Length

The weight and height of each woman were measured to extract the values of the body mass index (BMI) according to the following equation by dividing the weight in kilograms by the square of the height in meters.

#### Determination of Albumin Concentration in Serum

The serum albumin concentration was estimated using a ready-made assay kit from the French company Biolabo (Jennifer and Finbarr, 1982).

**Determination of Serum Cholesterol**

The serum cholesterol concentration was estimated by using the Enzymatic Method, using a ready-made assay kit from the British Randox Company (Richmond, 1973).

**Determination of Triglycerides in Blood Serum**

The concentration of triglycerides in the serum was estimated using a ready-made assay kit from the French company Biomeireux (Werener, 1981).

**Results and discussion**

**BMI Standard**

Table 1 showed that there were significant differences during the three stages of pregnancy compared to married, non-pregnant women as a control group for BMI at a significant level  $P < 0.01$ .

It was at a rate of  $(19.2 \pm 2.779)$  Kg/M2,  $(21.057 \pm 3.995)$  Kg/M2, and  $(\pm 3.39)$

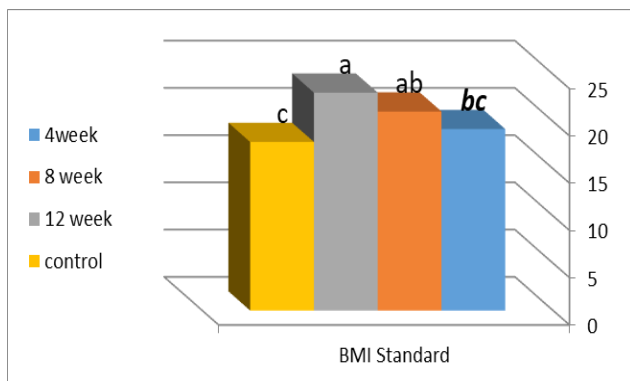
$23.05 \pm 3.282$  (Kg/M2) respectively for the three stages of pregnancy compared with the non-pregnant married women as a control group, which was an average of  $17.837 \pm 2.751$  c) Kg/M2.

**Table 1 Body mass index for pregnant women during pregnancy compared to married non-pregnant women as a control group**

Totals by week	BMI Standard
4 week	$19.2 \pm 2.779$ bc
8 week	$21.057 \pm 3.995$ ab
12week	$23.05 \pm 3.282$ a
Control	$17.837 \pm 2.751$ c

\*Different letters perpendicularly mean that there are significant differences at the level  $P < 0.01$

The values are expressed as the mean  $\pm$  standard error



**Fig. 1 Body mass index for pregnant women during pregnancy compared to married non-pregnant women as a control group**

It was noted when calculating the body mass index in the group of pregnant women during the three stages of pregnancy compared with the control group that there is a significant increase in the body mass index in pregnant women and it starts from the second stage and gradually rises until it reaches its maximum in the third and last stage and is attributed to the cause of weight gain, especially in the last two stages The second and third increase the appetite of the pregnant mother, in addition to the increase in the weight of the fetus, the amniotic fluid, the placenta, the fetal membranes, and all tissues and organs related to the growth and development of the fetus (Hall & Hall, 2020).

The hormonal and physiological changes are also related to weight gain, especially about the increase in body fluids and blood elements, in addition to changes that occur in the lipid profile, as studies indicate an increase in cholesterol, triglycerides, and some lipoproteins (Potter & Hotchkiss, 2012) In the first stage, there were no significant differences compared to the control group, because pregnancy is in its infancy, and the aforementioned criteria have not been affected yet, as well as the emergence of morning sickness symptoms represented by nausea and vomiting, which leads to the loss of many-body substances such as vitamins, carbohydrates, minerals, and bodily fluids. Therefore, it must be given Pregnant women should take folic acid and eat more foods containing vitamins and minerals (Al Arifi et al., 2022).

**Serum albumin concentration**

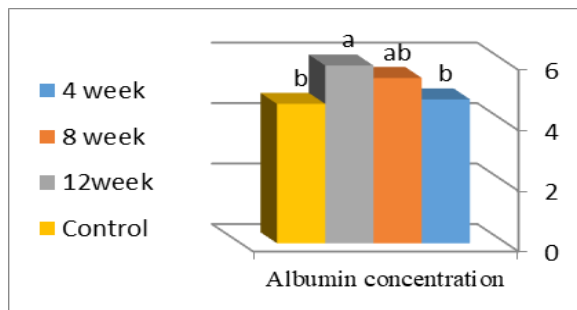
Table 2 showed that there were significant differences during the three stages of pregnancy compared to married non-pregnant women as a control group for albumin concentration at the significant level  $P < 0.01$ .

It was at a rate of  $(4.76 \pm 0.987)$  g/dl,  $(5.467 \pm 0.972)$  g/dl and  $(5.879 \pm 1.209)$  g/dl, respectively for the three pregnancy stages, compared with the non-pregnant married women as a control group, as it was at a rate of  $(4.61 \pm 0.451)$  g /dl.

**Table 2 The albumin concentration of pregnant women during the pregnancy stages compared to the non-pregnant married women as a control group**

Totals by week	Albumin concentration
4 week	$4.76 \pm 0.987$ b
8 week	$5.467 \pm 0.972$ ab
12week	$5.879 \pm 1.209$ a
Control	$4.61 \pm 0.451$ b

When estimating the serum albumin concentration in pregnant women during the three stages of pregnancy, compared with the control group, a significant increase was noted, especially in the last two stages of pregnancy.



**Fig. 2 The albumin concentration of pregnant women during pregnancy compared to married non-pregnant women as a control group**

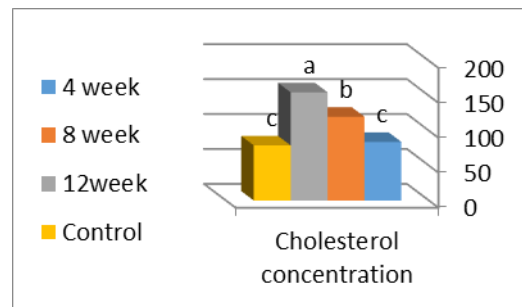
The study with the study carried out by Gowda and his group (2016), as he indicated that the albumin concentration increases during pregnancy as a result of the continuation of vomiting and symptoms of weaning in most women until the last months of it, and consequently the loss of bodily fluids and the occurrence of dehydration. Add to this the studies of Gowda (2016). It coincided with our results in the high concentration of albumin in pregnant women as a result of vitamin A deficiency, which causes cells to fill with water, so its deficiency leads to water loss and thus albumin rise. The studies (Livingstone, 2015) were inconsistent with our results, as they indicated a decrease in serum albumin during pregnancy as a result of increased vascular permeability and large plasma volume, in addition to the maternal diet and the lack of vitamins, carbohydrates, and minerals during the first period of pregnancy called diseases. Morning lead to albumin deficiency.

**Serum Cholesterol Concentration**

Table 3 showed that there were significant differences during the second and third pregnancy stages compared to the non-pregnant married women as a control group for the concentration of cholesterol in the blood serum at a significant level  $P < 0.01$ . It was at a rate of  $(186 \pm 10.974)$  mg/100ml,  $(232 \pm 17.011)$  mg/100ml and  $(18.985)$  mg/100ml respectively for the three stages of pregnancy, compared with married non-pregnant women as a control group, which was at a rate of  $(11.721)$  mg/100ml

**Table 3. Cholesterol concentration of pregnant women during pregnancy stages compared to non-pregnant married women as a control group**

Totals by week	Cholesterol concentration
4 week	$186 \pm 10.974$ c
8 week	$232 \pm 17.011$ b
12week	$265 \pm 18.985$ a
Control	$182 \pm 11.721$ c



**Fig. 3 Cholesterol concentration of pregnant women during pregnancy compared to married non-pregnant women as a control group**

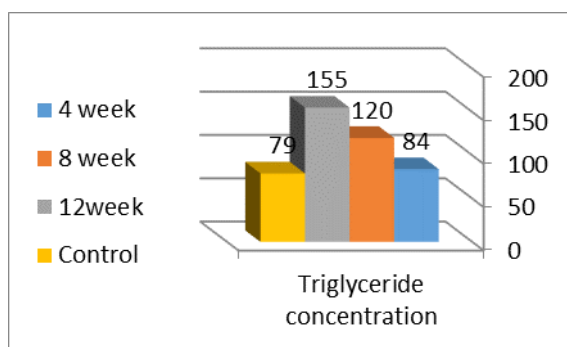
When estimating the cholesterol concentration in pregnant women during the second and third stages of pregnancy, compared with the control group, it is noted that a significant increase is because the liver is the first source of cholesterol formation and is responsible for its metabolism. In addition, some studies indicated that high cholesterol may be due to its importance in building the organs of the fetus, especially the central nervous system. (Mustafa & AL-Samarraie, 2020) Murray and his group (2020) indicated that the high concentration of cholesterol during pregnancy, especially in the last two stages, is evidence of women's infection with multiple diseases during pregnancy, especially heart disease, diabetes, high blood pressure, and preeclampsia or pre-eclampsia, as cholesterol is a major factor in the incidence of these diseases. Since pregnancy is a physiological stage that requires the expenditure of high energy to complete the functions of the body, the demand for oxygen increases and its entry in large quantities increases the state of oxidative stress, so free radicals accumulate and the derivative fats such as cholesterol are oxidized in the cell membranes, causing a rise in malondialdehyde, which causes a functional disorder in the inner lining of blood vessels (Guyton & Hall, 2006). The high concentration of cholesterol in the serum of pregnant women is a normal condition because it is included in the composition of cell membranes and digestive juices, such as bile acids, and in the composition of steroid hormones (progesterone and estrogen), and it also participates in building the nervous tissue of the fetus as mentioned above (Guyton & Hall, 2006).

### Triglyceride concentration

Table 4 showed that there were significant differences during the second and third pregnancy stages compared to the non-pregnant married women as a control group for the concentration of triglycerides in the blood serum at a significant level  $P < 0.01$ . It was at a rate of  $(84 \pm 6.11)$  mg/100ml,  $(120 \pm 8.01)$  mg/100ml and  $(155 \pm 9.71)$  mg/100ml respectively for the three stages of pregnancy, compared to the non-pregnant married women as a control group, as it was at a rate of  $(79 \pm 6.21)$  mg /100ml.

**Table 4. The concentration of triglycerides of pregnant women during pregnancy stages compared to married non-pregnant women as a control group**

Totals by week	Triglyceride concentration
4 week	$84 \pm 6.11$ c
8 week	$120 \pm 8.01$ b
12week	$155 \pm 9.71$ a
Control	$79 \pm 6.21$ c



**Fig. 4 The concentration of triglycerides of pregnant women during pregnancy stages compared to married non-pregnant women as a control group**

It was noticed when estimating the concentration of triglycerides in pregnant women during the three stages of pregnancy compared with the control group, a significant increase as a result of the increase in free fatty acids during pregnancy in the body, especially the liver, and the deficiency of amino acids led to the conversion of some of the fatty acids into phosphorylated fats and cholesterol transmitted with the triglycerides formed in the liver into the blood, thus increasing the level of blood fats. Triglycerides rise during pregnancy due to eating foods rich in fat. When they are decomposed in the intestine, fatty acids are released, leading to an increase in their amounts in the liver and the release of triglycerides in high concentrations (Guyton & Hall, 2006). And the current study agreed with many studies that high cholesterol and triglycerides result from fatty accumulation in fatty tissues. The nutrition of the pregnant mother, her age, and the frequency of pregnancy may be the reasons that led to the accumulation of fat. It is stored in the

form of triglycerides, then it is transported through the blood to the sites of metabolism in the liver and muscles, and the liver has a limited capacity to store it, and the excess is excreted into the blood, thus its concentration rises during pregnancy, especially in the second and third stages of pregnancy.

### Conclusions

The high body mass index for most pregnant women during the three stages of pregnancy compared with the non-pregnant married women as a control group and the body mass index increases with the progression of the pregnancy months.

An increase in the concentration of albumin, cholesterol, and triglycerides in the blood serum during the three stages of pregnancy compared with the control group.

### Recommendations

Studying the effect of pregnancy on the functions of other parts of the body.

Conducting a study dealing with changes in other enzymatic and non-enzymatic antioxidants during pregnancy.

### Conflict of Interest

The author hereby declares no conflict of interest.

### Consent for publication

The author declares that the work has consent for publication.

### Funding support

The author declares that they have no funding support for this study.

### Ethical Considerations

The study was approved by the institutional ethical committee

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