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A STUDY OF CHANGES IN THE LIPID PROFILE AND LEVELS OF C-REACTIVE PROTEIN DURING PREGNANCY AMONG SOME WOMEN IN AL-NAJAF GOVERNORATE, IRAQ

Zainab Salah Abdul Jabar[1], Maysoon Khudair AL Hadrawi[*2], Raja Jawad Mohamed[3], Sarah Hasan Kadhum AL-Huchaimi[4]

[1,2,3]Department of Medical Laboratory Techniques, Kufa, Technical Institute, Al-Furat Al-Awsat Technical University 31001, Kufa, Al-Najaf, Iraq.

[4]Department of Community Health, Kufa, Technical Institute, Al-Furat Al-Awsat Technical University31001, Kufa, Al-Najaf, Iraq.

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***Corresponding Author: Maysoon Khudair AL Hadrawi**
Department of Medical Laboratory Techniques, Kufa, Technical Institute, Al-Furat Al-Awsat Technical University 31001, Kufa, Al-Najaf, Iraq.
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ABSTRACT

Background: Pregnancy increases metabolic fuel demands for fetal growth and development. It has been estimated that the total energy cost of gestation is approximately 83000 kcal. Also, the energy usage is change and lipid accumulation across pregnancy stages. **Aim:** To study the changes in the lipid profile and CRP levels among pregnant women in AL Najaf governorate during all pregnancy trimesters. **Methods:** The current study included 60 pregnant women with different stages of pregnancy, ranging from 6-40 weeks, enjoying a good pregnancy, and their ages ranged between 17-35 years, attending some primary health care centers for motherhood and childhood in AL Najaf, and after obtaining the verbal consent of the women, 5 ml of blood was drawn and placed in Gel tube to prepare the serum needed to measure the level of lipids and C Reactive protein. **Results:** Our current study, which included 60 women at different stages of pregnancy, recorded a significant change in the level of active protein C at all stages of pregnancy, evidence of a significant effect of pregnancy on this protein compared to the control group. The current study also showed that pregnancy causes significant changes in the levels of lipids (HDL, LDL, Cholesterol, and VLDL), knowing that the results were analyzed based on the SPSS program version 2022, where the effect is considered significant when ($p<0.05$). **Conclusion:** This study concluded that pregnancy in women affects CRP levels and levels of lipids in blood.

KEYWORDS: Lipid profile, C-Reactive protein, pregnancy, SPSS, HDL.

INTRODUCTION

During pregnancy, there are many significant and noticeable adjustments that occur in the body, including anatomical, physiological, and biochemical changes.[1] Pregnancy can cause significant changes in women's body, where it increases the needed for metabolic fuels to support fetal growth and the development of a linked structure, Hormonal changes during different trimesters of pregnancy as the rise in progesterone and estrogen in the blood and output from a modification an environment the metabolic during first trimester of pregnancy, which is followed by an increase in the level of insulin due to hypertrophy of pancreatic beta cells, and thus a decrease in the level of sugar glucose in the bloodstream due to an increase in peripheral consumption of this sugar and its storage in tissues in the form of glycogen, followed by storage of fat and decrease in lipolysis, all these changes may lead to changes in the body's lipid profile.[2,3]

Maternal lipids are crucial in promoting fetal growth. During pregnancy, the placenta absorbs various maternal lipid profiles, such as total cholesterol (TC), high-density lipoprotein cholesterol (HDL-c), low-density lipoprotein cholesterol (LDL-c), and, triglyceride (TG)which are primarily used for maternal metabolism and fetal development.[4,5] To support fetal development, maternal lipid levels change during gestation, reflecting maternal-fetal physiology.[6]

Cholesterol is a crucial component in cell membrane formation, playing a role in keeping the integrity of the membranes and keeping cholesterol-rich zones. These zones are major for most membrane-associated signaling cascades.[7] Also, cholesterol is necessary for many vital hormones, such as vitamin D, steroids, and bile acids. Cholesterol is important for fetal development and can be provided through endogenous and exogenous pathways.[8]

In clinical practice during pregnancy, the only inflammation marker used is CRP. C-reactive protein is a biochemical marker that is used to predict the presence of inflammation or disease in the body. CRP is termed an acute-phase protein, The C-reactive protein (CRP) is a member of the pentraxin family and Hepatocytes are the main producers of this substance.[9] It has been described that a higher concentration of CRP correlates with disease severity[10] and indicates both inflammatory and nutritional status simultaneously.[11,12]

The purpose of this study was to investigate potential variations in lipid profile and CRP levels during the stages of a pregnancy and to establish a relationship between pregnancy with its effects on lipid profile and CRP level.

Measurement of lipid profile parameters

The estimation of serum cholesterol levels was carried out using the enzymatic method test, where cholesterol esters are hydrolyzed by cholesterol esterase to yield cholesterol and fatty acids.[13] Enzymatic and colorimetric methods were used to measure triglyceride levels in serum. Lipoproteins are present in the serum, including LDL and VLDL, along with HDL. The concentration of HDL is determined by sedimentation and measured using phosphotungstic acid solution.[14] To calculate the concentration of very low-density lipoprotein and the concentration of Low-Density Lipoprotein was determined by using specific formula.

Low density lipoprotein =Serum cholesterol - (v LDL +HDL).[15,16]

CRP test

Patients' CRP levels were measured using the agglutination technique with a CRP reagent from ESTEVE DE BAS (Girona, Spain). A titer of more than 6 IU/ml was considered positive.

Statistical analysis

The current study analyzed the results using SPSS version 2022 and compared them with the control group based on a p-value of P≤ 0.05.

RESULT AND DISCUSSION

Our study involved 60 pregnant women who were divided into three groups, each comprising 20 samples. The first group consisted of pregnant women in their early stage of pregnancy (1-3 months), the second group included those in their mid-stage (4-6 months), and the third group included women in their late stage of pregnancy (7-9 months). The ages of the participants ranged from 18 to 36 years, as shown in Tables (1 and 2).

Table 1: Explained the study sample dependent on pregnant stage.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	First	20	33.3	33.3	33.3
	Second	20	33.3	33.3	66.7
	Third	20	33.3	33.3	100.0
	Total	60	100.0	100.0	

Table 2: Explained the study sample dependent on women s age.

	N	Minimum	Maximum	Mean	Std. Deviation
Age of Pregnant	60	18	36	25.48	5.113
Valid N (listwise)	60				

The maternal immune system faces foreign antigens came from the fetus and placenta during pregnancy, leading to significant immunological changes. During the different stages of development, the immune system undergoes changes. In the first trimester of pregnancy, the body undergoes a pro inflammatory state to help with the implantation of the blastocyst. The second trimester is characterized by a Th2 anti-inflammatory environment promoting fetal growth.[17,18] Pro-inflammatory Th1 response switch on which is necessary during the third trimester of pregnancy. Infections commonly occur during pregnancy, thus CRP is often measured as an indicator of infection.[19,20,21]

Based on our findings, it is evident that pregnancy has a notable impact on the level of C-reactive protein in the body. The study observed a significant rise in protein concentration as the pregnancy stage progressed (as shown in Fig. 1). but the amount of the increase in the last stage was higher than the first and second stages. This indicates that there is a significant correlation between the stage of pregnancy and the concentration of C-reactive protein ($P < 0.01$), as stated in Table(3). So, It is possible to use the increased level of CRP in the blood as an indicator of the negative effects of pregnancy on women[22] and CRP has been used in the diagnosis of various diseases and infections in preterm labor, with good predictive value.[23] Although the effective protein is vital for diagnosing infection in newborns, there is limited information about it during pregnancy despite its affordability and simplicity. Elevated levels of CRP in the first trimester correlated with increased occurrence of PTB.[24]

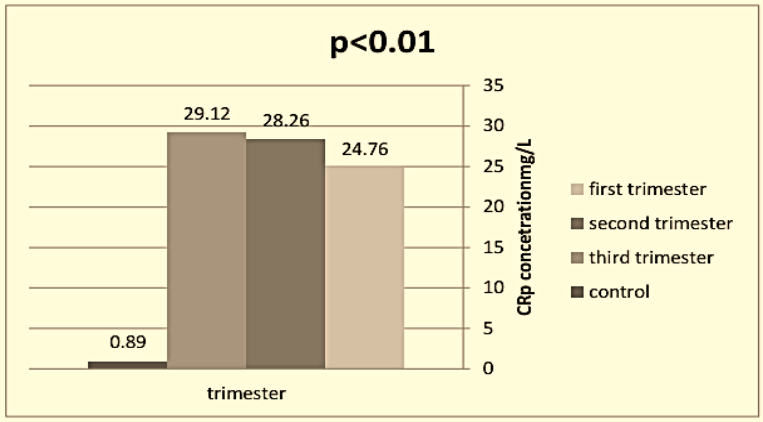

Figure (1):- shows the level of CRP during the three stages of pregnancy.

Table 3: Explained the CRP level dependent on pregnant stages.

			Sum of Squares	df	Mean Square	F	Sig.
Period of pregnant * CRP level	Between Groups	(Combined)	6608.953	22	300.407	2.154	.012
	Within Groups		7252.167	52	139.465		
	Total		13861.120	74			

As part of our study, we found that there was a variation in cholesterol levels among pregnant women. Specifically, we noticed a decrease in cholesterol levels during the first trimester of pregnancy, then the level began increase in the second and third trimesters of pregnancy (Figure 2). This change is believed to be linked to common pregnancy symptoms, including vomiting, loss of appetite, and nausea, which often lead to a reduction in food intake. During pregnancy, the production of cholesterol and triglycerides in the liver increases and the activity of lipoprotein lipase decreases. Therefore, when measuring the levels of triglycerides and cholesterol in the serum, it was found that there is an increase in their levels.[25,26]

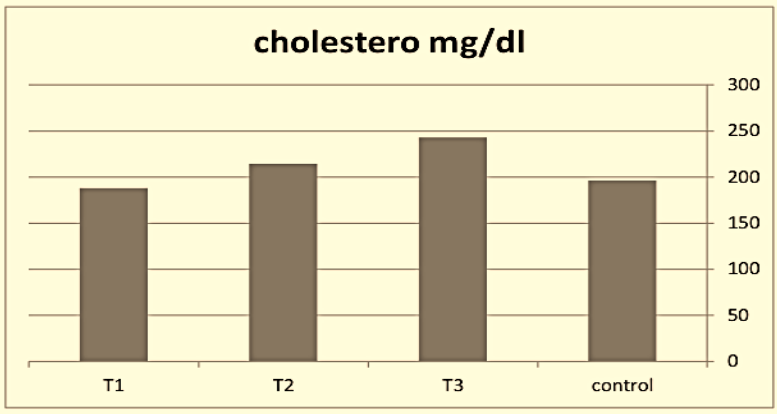

Figure (2):- shows the cholesterol level during the three stages of pregnancy compared with the control group.

Our study showed (Figure 3) that HDL levels increased significantly in the second trimester of pregnancy, followed by a decrease in the third trimester. The study supports previous research that pregnancy negatively impacts vascular and heart health due to persistent effects on HDL levels.[25] In the first trimester of pregnancy, the level of HDL cholesterol

rises, but then begins to gradually decrease until the last trimester of pregnancy. However, this decrease is strong, as its level remains high compared to its level before pregnancy. It has also been found that triglycerides increase in pregnant women to provide energy for the mother and glucose for the fetus and maintain the health of the lining of the blood vessels in the pregnant mother.[27]

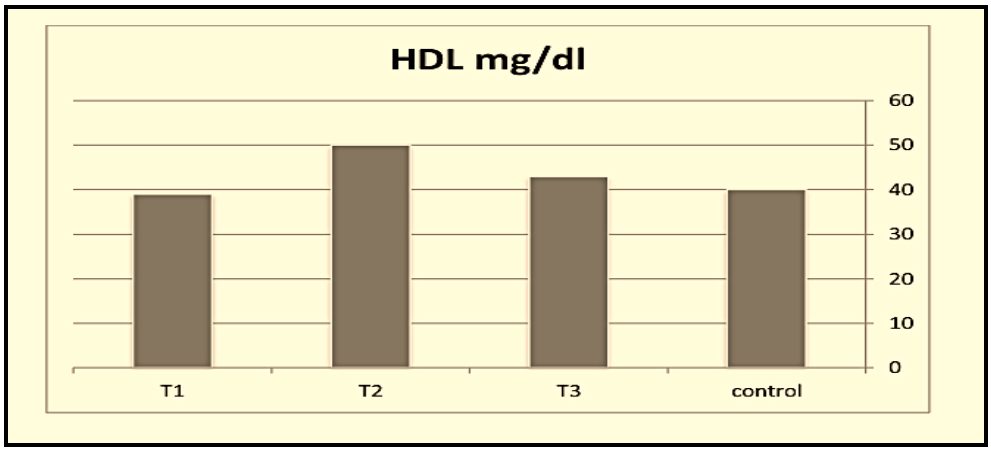

Figure 3: Shows the HDL level during the three stages of pregnancy compared with the control group.

LDL cholesterol increases throughout pregnancy, These increases are consider a crucial for placental steroid genesis, with a 50% increase by term.[28]

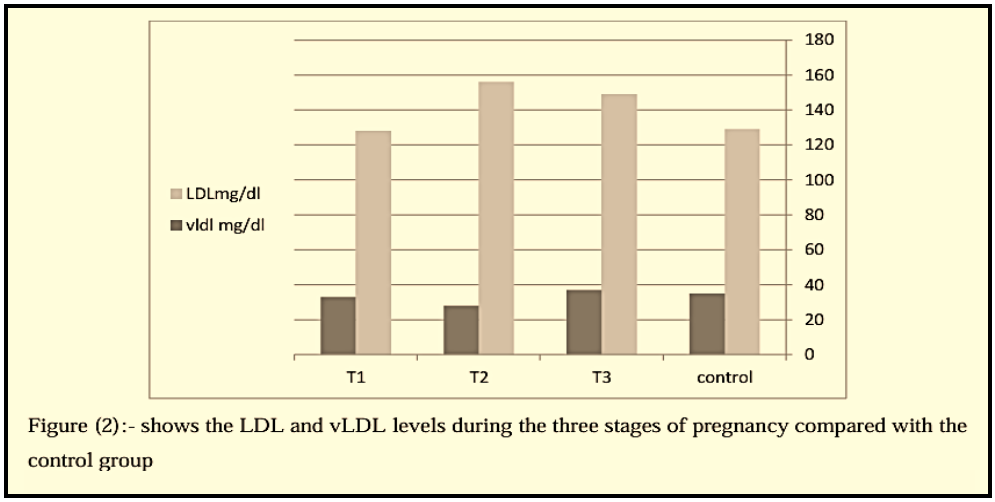

Figure (2):- shows the LDL and vLDL levels during the three stages of pregnancy compared with the control group

CONCLUSION

Our study has shown that pregnancy can significantly affect the levels of lipid profile in a woman's body, leading to higher levels of TC, LDL, and VLDL, as well as a decrease in HDL. These changes may serve as biomarkers for pregnancy outcomes. The degree of impact varies depending on the stage of pregnancy. Additionally, pregnancy can affect the levels of CRP, an important immune marker that can indicate the presence of inflammation or disease. Therefore, it is possible to use protein C levels as evidence of potential risks during pregnancy.

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