ORIGINAL ARTICLE

Lipid Profile Changes in Young Pregnant Females with Low-Socioeconomic Status in Nanded, Maharashtra

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Abstract

***Background**: Pregnancy is associated with several physiological changes in the body of females, it may also influence the way by which body handles lipids and lipoproteins. **Aim**: In the present study, it was tried to evaluate the changes in lipid profile in young pregnant females with low-socioeconomic status in Nanded District, Maharashtra. **Methods**: A total of 120 women were selected for the present study following inclusion and Exclusion criteria. Out of them 90 were diagnosed healthy pregnant women in first, second and third trimester, they were included in Group I, Group II and Group III respectively, selected from the antenatal clinic and 30 healthy non-pregnant women were selected as control included in Group IV. Both the case and control groups were compared with each other for lipid parameter changes. **Results**: The mean ± SD of Serum TC in Group I, Group II, Group III, and Group IV were 157.43 ± 10.83, 179.13 ± 19.63, 195.43 ± 15.14 and 144.46 ± 5.73 respectively. Similarly, serum HDL-C in four groups were 47.1 ± 6.9, 52.7 ± 4.3, 49.33 ± 1.21 and 46.76 ± 4.42. The mean ± SD of Serum LDL-C in four groups were 91.8 ± 6.50, 103.06 ± 20.72, 120.26 ± 15.29 and 81.86 ± 8.05. The mean ± SD of Serum VLDL-C in four groups were 18.53 ± 2.24, 23.36 ± 3.31, 25.83 ± 3.1 and 15.76 ± 1.79 respectively. **Conclusion**: Lipid profile changes increase during pregnancy. The changes in lipid profile during pregnancy are attributed to alteration in body metabolism of lipids due to changes in levels of several hormones during pregnancy.*

***Keywords**: Lipid Profile, Low-socioeconomic status, Young pregnant females*

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Introduction

Pregnancy is the process whereby the life of a baby begins in the mother's womb and progress up to the stage when it is safe to expose the baby to the outside world. The process takes a little more than nine months and needs the coordinated activity of all parts of the baby and the mother for its success. [1] Mothers and children constitute a top priority group in any community. In numbers, they constitute approximately 71.14% of the population of developing countries. In India, women of childbearing age, i.e. 15-44 yrs of age constitute 22.2% and children less than 15 yrs of age about 35.3% of the total population. Together they constitute nearly 57.5% of the total population.[2] The health status of a child mainly depends on the health status of the mother before, during and after the pregnancy. So, the health of a woman is really of prime importance. They are vulnerable or special risk groups. Maternal mortality in developed regions is 8 per 100,000 live births and in developing regions it is 450 per 100,000 live births. Much of the sickness of the mother can be prevented. By improving the health status of mothers and then children, we contribute to the health of the general population. [3] Although pregnancy is not a disease itself, a plethora of physiological changes that occur during this period. They may be anatomical, physiological and biochemical may be systemic or local. These changes or alterations occurring during pregnancy are for

maintaining a healthier environment for the fetus without much affecting the mother. [4] Blood lipid concentrations increase significantly during pregnancy. Fat storage occurs during the mid-pregnancy. [5] There is some evidence that progesterone, which increases significantly in the second half of pregnancy may act to reset the lipostat in the hypothalamus. Maternal fuel adjustments during late pregnancy include a sparing of glucose (for the fetus) and an increased concentration of fatty acids in plasma. It has been suggested that the increase in plasma LDL-C, triglycerides during pregnancy might be used to identify women who will develop atherogenic changes in later life. [6] Framingham Heart study reported that women with a history of more than 6 pregnancies had a significantly elevated risk of developing cardiovascular diseases when compared with nulliparous women at a relative risk of 1.6. [5] Pregnancy causes extensive changes in lipid profile like total cholesterol, triglyceride, LDL-C, and HDL-C. [6] Many scientific pieces of evidence have raised concern about the adverse effects of abnormal blood lipid levels, like cholesterol and other lipids and lipoproteins, on atherosclerotic disease.[7] The importance attached to the need for routine examination of the serum lipid and lipoprotein profile in human subjects, especially during pregnancy is well established Seymour. [8] The serum lipid and lipoprotein profile of many communities, especially in this area, remain to be established. This study is therefore designed to assess the variation of the serum lipid and lipoprotein profile among the non-pregnant and pregnant women. According to some studies, hyperlipidemia is a normal prenatal finding but many questions in this field remained unanswered. Understanding and appreciating the normal physiological adaptations to gestations are important for health status assessment of pregnant women. [9] It is necessary to understand the physiological findings so that pathological changes can be distinguished. Very less work is seen in this region on lipid profile in pregnancy in low-socioeconomic status individuals. In light of this, the present work is designed to study the lipid changes in the pregnant women in this region.

Materials and Methods

This was a cross-sectional type of study. The present study was conducted in the Department of Obstetrics and Gynecology with the collaboration of Department of Biochemistry, Dr. Shankarrao Chavan, Govt Medical College and Hospital, Nanded District, Maharashtra. Prior approval of the Institutional Ethical committee was obtained; written consent was obtained from all the participants of the study. A total of 120 women were selected for the present study following inclusion and Exclusion criteria. Out of them, 90 were diagnosed healthy pregnant women in the first, second and third trimester, they were included in Group I, Group II and Group III respectively, and 30 healthy non-pregnant women were selected as control included in Group IV. The age group of 19-23 years and height ranged from 145 to 155 cm and free from any cardiovascular, respiratory and metabolic disorder. Cases and controls were from poor socioeconomic status and from an urban area. Gestational age of cases was calculated from the first day of last menstrual period of the history of the subject.

Inclusion criteria: Healthy pregnant women of 19 to 23 years of age and height ranged between 145 to155 cm were included as cases. Healthy non-pregnant women of 19 to 23 years of age were included as a control. Both cases and controls were consumers of normal mixed diet.

Exclusion criteria: Women who do not fitting in the inclusion criteria and women having significant cardiovascular disorders, Diabetes Mellitus, Obesity, Thyroid disorders, taking medications that are likely to affect the readings like Thiazides, Tegretol, Niacin, Estrogen, Steroids, Beta Blockers Etcand those who are not willing to participate in the study.

Lipid parameters: Lipid parameters studied in this study were serum total cholesterol, serum triglyceride, serum LDL-C, serum HDL-C and

serum VLDL-C. These tests were performed in overnight fasting subjects.

Collection of blood samples: Each subject was called in the early morning for sample collection for lipid profile. Under all aseptic precautions, 2 ml of median cubital venous blood sample was collected by plastic disposable syringe. It was collected in the plain bulb for serum analysis of the lipid profile. It was collected in sitting position without applying a tourniquet. The sample was withdrawn during 7 am to 9 am. Serum was separated in the centrifuge machine for 8-10 min at 2000-3000 RPM, and used for various lipid estimation tests.

Total cholesterol, triglyceride, and HDL-C were directly measured by enzymatic methods, with the help of ERBA kit for fully automated, Transasiaclinical chemistry auto analyzer, XL 640 (ERBA). LDL-C and VLDL-C were calculated by Friedewald's equation. [11]Estimation of serum Low-Density Lipoprotein Cholesterol (LDL-C): with the help of following Frederickson - Friedewald's formula, LDL–C was calculated. LDL-C (mg%) = Total Cholesterol (mg%) - HDL(mg%) + VLDL (mg%). Estimation of serum Very Low-Density Lipoprotein Cholesterol (VLDL-C): VLDL-C was calculated by formula proposed by Frederickson-Friedewald in 1972 VLDL-C = Triglyceride/5. [10] All the data were entered into Microsoft Excel, tabulated and analyzed by using statistical software, OpenEpi Version 2.3. Mean of two groups compared by applying the unpaired 't' test and by applying ANOVA test when there are more than two groups.

Results

The study included a total of 120 subjects. Out of them, 30 were normal, healthy, non-pregnant women and 90 were healthy pregnant women. Out of 90, 30 women were in the first trimester, 30 in second trimesters and 30 in the third trimester of pregnancy shown in table 1.

Table1: showing the distribution and percentage of patients involved in the study

	Pregnant			Non- Pregnant
	First trimester	**Second trimester**	**Third trimester**	
Groups	**I**	**II**	**III**	**IV**
No. of Subjects	30	30	30	30
Total	90			30
Percentage	75			25

Table 2: shows the comparison of baseline parameters recorded in different groups

Groups	**Age in years**		**Height in cms**		**Weight in Kgs**		**BMI**	
	Mean	**± SD**	**Mean**	**± SD**	**Mean**	**± SD**	**Mean**	**± SD**
I	20	1.01	151.03	2.12	50.26	3.27	22.03	1.31
II	20.5	1.30	151.36	2.56	51.0	2.19	22.28	1.3
III	20.33	1.53	151.3	2.50	51.0	2.49	22.28	1.09
IV	20.56	1.35	151.06	2.33	48.13	3.00	21.07	0.99
P Value	0.35		0.93		>0.5		>0.5	

Table 3: Showing Serum Total Cholesterol (mg/dl) and Serum Triglyceride (mg/dl) in different groups

		Serum Total Cholesterol		**Serum Triglycerides**	
Groups	**Subjects**	**Mean ± SD**	**P value**	**Mean ± SD**	**P value**
I	First trimester	157.43 ± 10.83	>0.05	92.66 ± 11.12	>0.10
II	Second trimester	179.13 ± 19.63	<0.04	116.83 ± 16.58	<0.05
III	Third trimester	195.43 ± 15.14	<0.01	129.16 ±15.54	<0.01
IV	Non-Pregnant	144.46 ± 5.73	>0.07	78.83 ± 8.97	>0.8

Table 2 shows the mean ± SD of age in Group I, II, III, and IV were 20 ± 1.01, 20.5 ± 1.3, 20.33 ± 1.53 and 20.56 ± 1.35 respectively. The difference was statistically insignificant. The mean ± SD of height in the groups were 151.3 ± 2.12, 151.36 ± 2.56, 151.3 ± 2.5 and 151.06 ± 2.33 respectively. The difference was statistically insignificant. The mean ± SD of weight in the groups first trimester, second trimester, third trimester and non-pregnant women was 50.26 ± 3.27, 51 ± 2.19, 51 ± 2.49 and 48.13± 3 respectively. The difference was statistically significant. The mean ± SD of BMI in the groups were 22.03 ± 1.31, 22.28 ± 1.3, 22.28 ± 1.09 and 21.07 ± 0.99 respectively. The difference was statistically significant.

The values of Serum Total Cholesterol in different groups were 157.43 ± 10.83, 179.13 ± 19.63, 195.43 ± 15.14 and 144.46 ± 5.73 respectively. Serum TC slightly increased significantly in the first trimester, which was not significant, however, Serum TC increased highly significant in the second trimester when compared to first-trimester pregnant women. Serum TC increased highly significantly in the third trimester when compared to first and second trimester pregnant women. Similarly, Serum Triglycerides were founded to a slight increase in the first trimester and higher levels were found in the second and third trimester as compared to controls shown in table 3.

The mean ± SD of Serum LDL-C (mg/dl) in the different groups were 91.8 ± 6.50, 103.06 ± 20.72, 120.26 ± 15.29 and 81.86 ± 8.05 respectively. The mean ± SD of Serum HDL-C (mg/dl) in Group I, II, III, and Group IV were 47.1 ± 6.9, 52.7 ± 4.3, 49.33 ± 1.21 and 46.76 ± 4.42 respectively, and The mean ± SD of Serum VLDL-C (mg/dl) in the different groups were 18.53 ± 2.24, 23.36 ± 3.31, 25.83 ± 3.1 and 15.76 ± 1.79 respectively. The values were significant Group II and Group III patients when compared with Group IV patients given in table 4.

Table 4: Showing Serum LDL-C (mg/dl) and Serum HDL-C (mg/dl) and VLDL-C (mg/dl) in different groups

	Serum LDL-C (mg/dl)		Serum HDL-C (mg/dl)		Serum VLDL-C (mg/dl)	
Groups	**Mean ± SD**	**P value**	**Mean ± SD**	**P value**	**Mean ± SD**	**P value**
I	91.8 ± 6.50	>0.06	47.1 ± 6.9	>0.9	18.53 ± 2.24	>0.10
II	103.06 ± 20.72	<0.05	52.7 ± 4.30	<0.05	23.36 ± 3.31	>0.05
III	120.26 ± 15.29	<0.03	49.33 ± 1.21	<0.04	25.83 ± 3.1	<0.04
IV	81.86 ± 8.05	>0.1	46.76 ± 4.42	>0.8	15.76 ± 1.79	>0.15

Discussion

Pregnancy is a state of physiological adaptation, in which profound alterations in the functioning of all the systems of the mother occur to accommodate the needs of the developing fetus. The present study included 75% healthy pregnant women and 25% healthy non-pregnant women. Among 75% pregnant women, 25% women were in the first trimester, 25% in the second trimester and 25% in the third trimester. Pregnant and non-pregnant women were matched for age and height to avoid the effect of age and height on study parameters. This study is similar to the studies done in this area.[11-14] In this study, the mean ± SD of weight in the first trimester, second trimester, third trimester and non-pregnant women was statistically highly significant. Weight and BMI of pregnant women rose higher significantly as compared to non-pregnant women. This is in agreement with other similar studies in this area. [4, 15, 16]

There was a progressive increase in the serum TC level from the first trimester to the third trimester. The serum TC reached highest in the third trimester. The increase in serum TC was statistically highly significant in all the three trimesters when compared to non–pregnant women and when compared in between the trimesters, it is in agreement with the study of Roopam Bassi et al; and Festus O Okojie et al; They showed a progressive increase in plasma TC as pregnancy advances. The serum TC reached the highest level in the third trimester. [12, 17]In the study of David Mankuta et al; blood total cholesterol increased significantly in second and third trimesters after an initial significant fall in the first trimester. [6] The first-trimester fall may be due to increased activity of lipoprotein lipase in first trimester of pregnancy.

Increase in TC level during pregnancy has been shown to be positively correlated with 17 β–oestradiol, progesterone, human placental lactogen, and Insulin levels throughout the whole period of gestation. [19]

In this study, there was the progressive increase in the serum TG level from the first trimester to the third trimester. The serum TG reached highest in the third trimester. The increase in serum TG was statistically highly significant in all the three trimesters when compared to non–pregnant women and when compared in between the trimesters. A study, by Roopam Bassiet al; showed that there is a progressive increase in plasma Triglycerides as the pregnancy advances. The serum TG reached the highest level in the third trimester.[12]In the study of David Mankuta et al; blood triglyceride increased significantly in second and third trimesters after an initial significant fall in the first trimester. The first-trimester fall may be due to the activity of lipoprotein lipase in the first trimester of pregnancy.[6]

In this study there was a progressive increase in the serum LDL-C level from the first trimester to the third trimester. The serum LDL-C reached highest in the third trimester. The increase in serum LDL-C was statistically highly significant in all the three trimesters when compared to non –pregnant women and when compared in between the trimesters. This study was in agreement with the study of RoopamBassi et al; who showed a progressive increase in plasma LDL-C as pregnancy advances. The serum LDL-C reached the highest level in the third trimester.[12] The serum HDL-C increased significantly in second and third trimesters when compared to non-pregnant women. In the first trimester the increase was insignificant. There was a fall in the third trimester as compared to the second trimester. This study was in agreement with the study other similar studies. [12, 18]There was non – significant increase in the first trimester when compared to non-pregnant women. HDL-C increased significantly in second and third trimester as compared to non-pregnant women. There was a slight decrease in the third trimester when compared to the second trimester of pregnancy. In this study, there was a progressive increase in the serum VLDL-C level from the first trimester to the third trimester. The serum VLDL-C reached highest in the third trimester. The increase in serum VLDL-C was statistically highly significant in all the three trimesters when compared to non-pregnant women and when compared in between the trimesters. Raghuram P et al; showed a progressive increase in serum VLDL-C as pregnancy advances. The increase in the first trimester was insignificant as compared to control, whereas the serum VLDL-C increased significantly in second and third trimester when compared to control.[19]

Conclusion

Lipid profile changes were found to significantly increase during pregnancy. Changes in lipid profile were significantly found during all the three trimesters when compared to normal controls. The serum HDL-C increased significantly in second and third trimesters when compared to non-pregnant women. There was a progressive increase in the serum LDL-C level from the first trimester to the third trimester and reached highest in the third trimester. The changes in lipid profile during pregnancy are attributed to alteration in body metabolism of lipids due to changes in levels of several hormones during pregnancy.

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