

## Comparison of Biochemical Profiles in Pregnant and Non-Pregnant Women of Bihar

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Conflict of interest: Nil

### Abstract:

**Background:** Pregnancy is associated with several physiological changes in the body, like hormones and metabolic changes that help the growth and survival of the fetus. However, biochemical profile derangement may lead to pregnancy complications. Hence, it is essential or mandatory to study the biochemical profiles during pregnancy.

**Method:** 50 pregnant women and 50 non-pregnant women aged between 18-45 were selected. BMI, lipid profile, and blood pressure were studied and compared.

**Results:** 13 (26%) women had the first trimester, 20 (40%) had the second trimester, and 17 (34%) had the third trimester. BMI mean value for pregnant women was 24.82 ( $\pm 1.08$ ) and for non-pregnant females was 22.19 ( $\pm 1.03$ ) t test 12.4 and  $p > 0.00$ . The mean value of systolic BP in pregnant women is 110 ( $\pm 2.2$ ) and 105 ( $\pm 1.2$ ) in non-pregnant women (t test 14.1 and  $p < 0.000$ ). Diastolic BP 72 ( $\pm 2.1$ ) pregnant 70 ( $\pm 1.3$ ) in on-pregnant females t test 5.7 and  $p < 0.000$ . Glucose levels, TC, TG, HDL, and LDL were elevated in pregnant females as compared to non-pregnant females.

**Conclusion:** This pragmatic evaluation of the biochemical profile will be helpful to obstetricians and gynecologists in predicting the status of pregnancies and fetal outcomes because nutritional status plays a vital role in pregnancy and the growth of the fetus.

**Keyword:** lipid profile, BMI, ERBA, Chem-5, semi-auto analysis, spignomanometer.

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### Introduction

Pregnancy is related to typical physiological changes that help sustain and extend the life of the embryo. Biochemical profiles show versatile changes in most organ framework and are unmistakably non-pregnant states [1]. These biochemical changes are inevitable to maintain the pregnancy. Moreover, pregnancy may be associated with preeclampsia and gestational diabetes [2]. Hence, it is mandatory to study the biochemical profile to get fruitful pregnancy results. Lipid profile [3], sugar metabolism, protein profile, liver capacity, and kidney functions during pregnancy predict the results of neonatal outcomes and morbidity in pregnant women [4].

Biochemical profile levels reflect the adaptive alteration in most organ systems in pregnancy and are visibly different from those in a non-pregnant state. Adaptations of maternal lipid metabolism taking place throughout gestation have major consequences for fetal growth. It has been observed that, in normal pregnant women, with the advancement of gestational age, there is an increase in the concentration of serum cholesterol (TC),

serum triglyceride (TG), high-density lipoprotein (DHL), and low-density lipoprotein (LDL).

Hence, the aim of this study is to evaluate the anthropological measurements and biochemical profile of pregnant women and compare them with those of normal, non-pregnant women so that obstetricians and gynecologists can predict the status of pregnancy and fetal outcomes.

### Material and Method

50 pregnant women aged between 18-45 who regularly visited the obstetrics and gynecology departments at Narayan Medical College Hospital, Sasaram, Bihar-821305 were studied.

**Inclusive Criteria:** Healthy pregnant women who had no past history of chronic disease were selected for the study.

**Exclusion Criteria:** Women with DM, HTN, and any other chronic diseases, HIV, and above 45 years of age were excluded from the study.

**Method:**

Apart from 50 pregnant women, 50 non-pregnant (controlled) women were also included in the study. BMI (Body Mass Index)

$$\frac{\text{Weight}}{\text{Height}^2} \times 100 = \text{BMI}$$

Blood samples of 5 ml of fasting venous blood were collected in plain bottles from the ante cubital view after a minimum of 8 hours of overnight fasting. After the clot has retracted, the sample is centrifuged at 4000 rpm for 5 minutes.

The serum is then separated and stored at 4°C pending assay for the lipid profile. Serum TGS, TC, and HDL cholesterol were analyzed by enzymatic methods with the help of Glaxo kits on the ERBA chem-5 semi-auto analyzer.

Serum LDL cholesterol has been calculated by Frederickson Fried Wald's formula, according to which LDL cholesterol = TC - (HDL cholesterol + very LDL [VLDL] cholesterol).

VLDL cholesterol was calculated as 1/5 of TGS, and blood pressure was recorded by sphygmomanometer.

The duration of the study was June 2020 to July 2021.

**Statistical analysis:** The findings of both pregnant and non-pregnant women were compared with the z test. The statistical analysis was carried out in SPSS software.

### Observation and Results

**Table 1:** Comparison of the distribution of age in both pregnant and non-pregnant women 4 (8%) were pregnant, 5 (10%) non-pregnant were aged between 18-21 years, 19 (38%) pregnant, 14 (28%) non-pregnant women were aged between 22-25 years, 15 (30%) pregnant, 16 (32%) non-pregnant women were aged between 26-29 years, 5 (10%) pregnant, 7 (14%) non-pregnant were aged between 30-35 years, 4 (8%) pregnant, 4 (8%) non-pregnant were aged between 36-40 years, 3 (6%) pregnant, 4 (8%) non-pregnant were more than 40 years 13 (26%) first trimesters, 20 (40%) second trimesters, and 17 (34%) third trimesters

**Table 2:** Comparison of anthropometric measurements and biochemical profiles in pregnant and non-pregnant women – BMI (kg/m<sup>2</sup>) was 24.82 (±1.08) in pregnant women and 22.19 (±1.03) in non-pregnant women. The t test was 12.4 p<0.00. Systolic BP: 110 (±2.2) in pregnant women, 105 (±1.2) in non-pregnant women, t test: 14.1 p<0.00, Diastolic BP: 72 (±2.1) in pregnant women, 70 (±1.3) in non-pregnant women, t test: 5.7 and p<0.00, Glucose level: 94.33 (±12.4) in pregnant women, 80.6 (±9.80) in non-pregnant women, t test 6.1 and p<0.00, Total cholesterol was 210.3 (±38.44) in pregnant women and 170.20 (±28.63) in non-pregnant women (t test 5.9 p<0.00).

Triglyceride 189.4 (±78.03) in pregnant, 106.2 (±43.7) in non-pregnant, t test 6.5 p<0.00, HDL (mg/dl) 57.56 (±8.21) in pregnant, 61.60 (±9.8) in non-pregnant, t test -2.2 and p<0.02, LDL (mg/dl) 114.01 (±29.24) in pregnant, 84.10 (±25.28) in non-pregnant, t test 5.4, p<0.00.

**Table 1: Comparison of Distribution of age in both pregnant and non-pregnant women**

a) Variables Age	Pregnant (50)	Non-pregnant (50)
18-21	4 (8%)	5 (10%)
22-25	19 (38%)	14 (28%)
26-29	15 (30%)	16 (32%)
30-35	5 (10%)	7 (14%)
36-40	4 (8%)	4 (8%)
> 40	3 (6%)	4 (8%)
b) Trimester First	13 (26%)	-
Second	20 (40%)	-
Third	17 (34%)	-

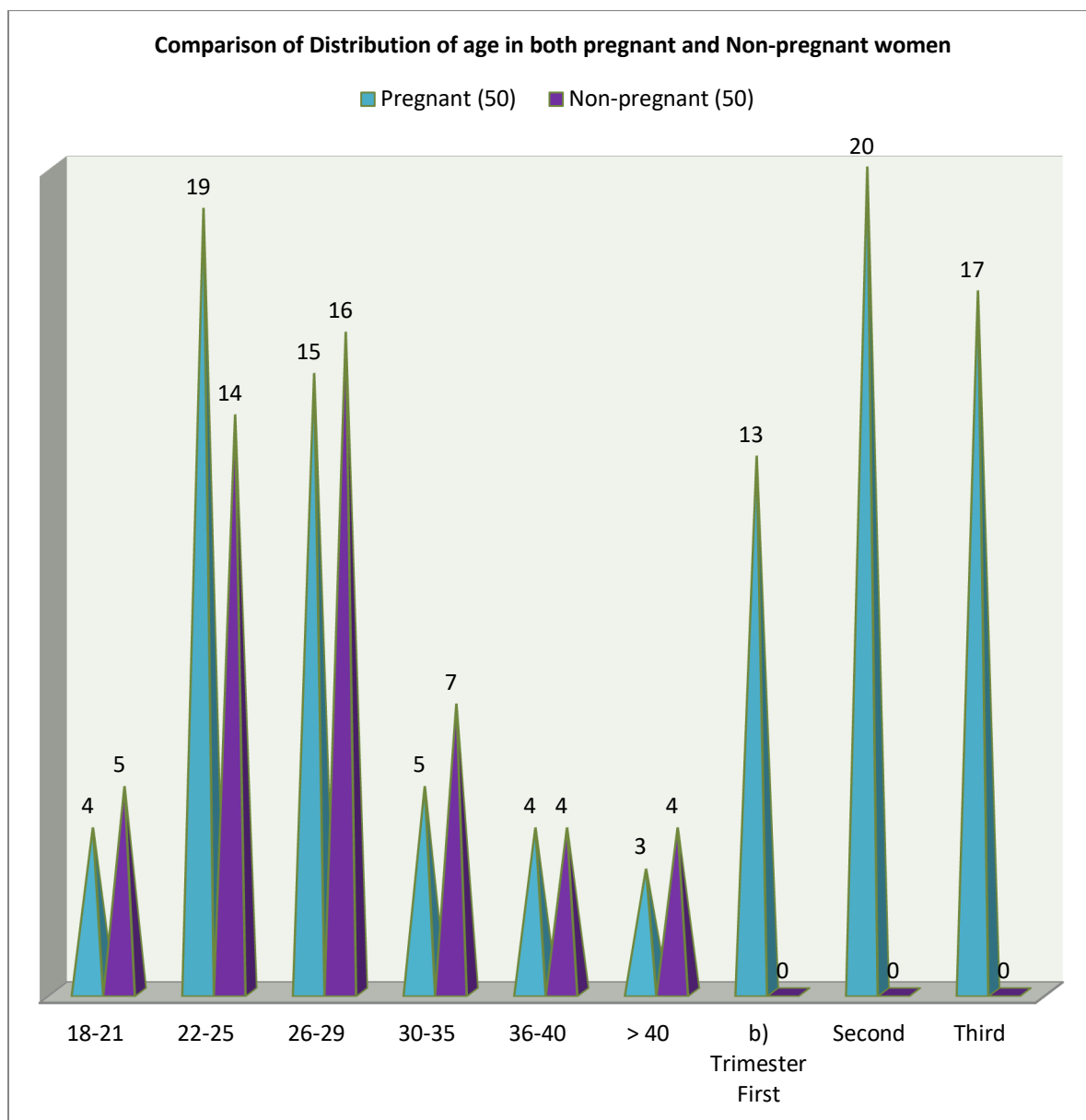
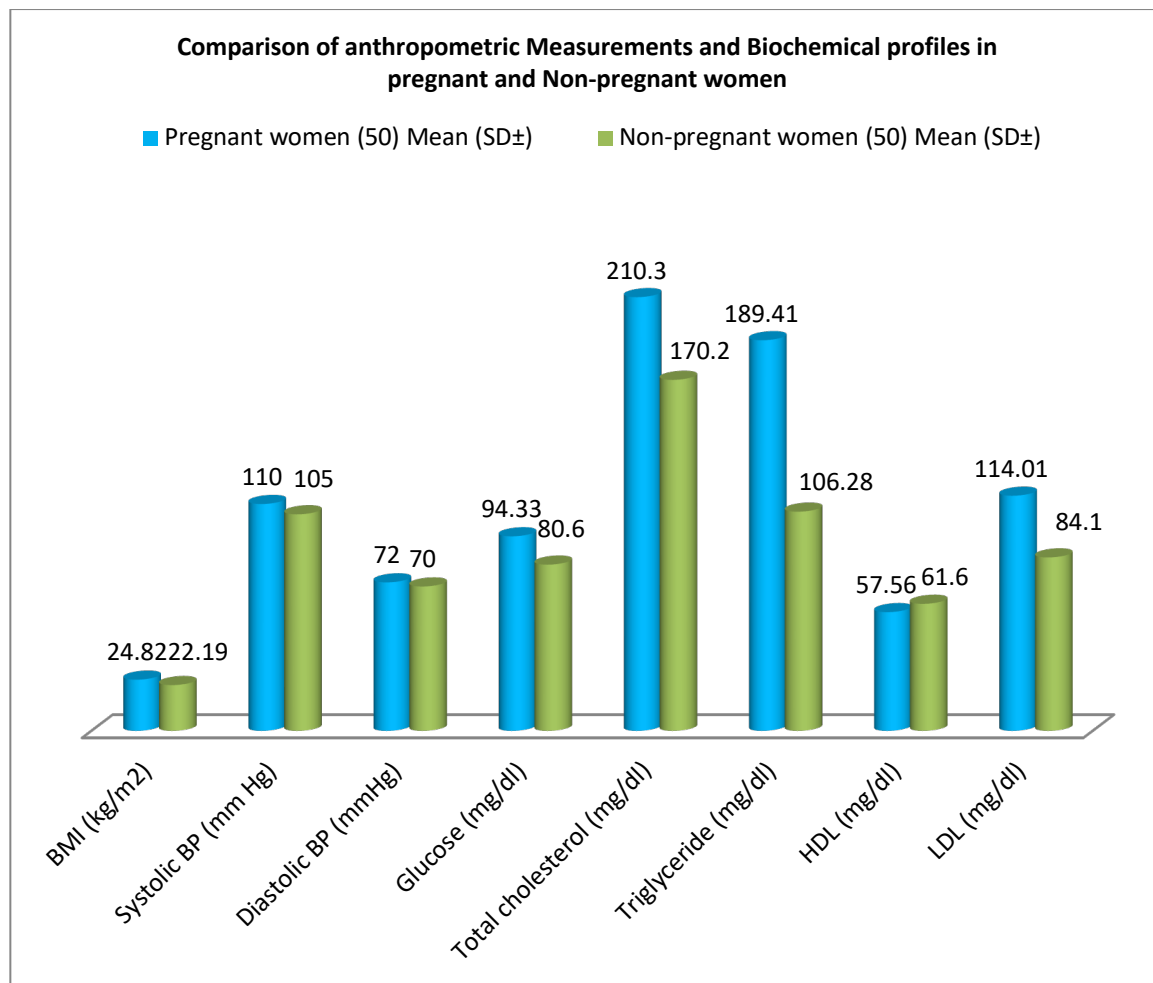


Figure 1: Comparison of Distribution of age in both pregnant and non-pregnant women

Table 2: Comparison of anthropometric Measurements and Biochemical profiles in pregnant and Non-pregnant women

Parameters	Pregnant women (50) Mean (SD±)	Non-pregnant women (50) Mean (SD±)	t test	p value
BMI (kg/m <sup>2</sup> )	24.82 (SD±1.08)	22.19 (SD±1.09)	12.4	P<0.00
Systolic BP (mm Hg)	110 (SD±2.2)	105 (SD±1.2)	14.1	P<0.00
Diastolic BP (mmHg)	72 (SD±2.1)	70 (SD±1.3)	5.7	P<0.00
Glucose (mg/dl)	94.33 (SD±12.4)	80.6 (SD±9.80)	6.1	P<0.00
Total cholesterol (mg/dl)	210.3 (SD±38.44)	170.20 (SD±28.63)	5.9	P<0.000
Triglyceride (mg/dl)	189.41 (SD±78.03)	106.28 (SD±43.78)	6.5	P<0.00
HDL (mg/dl)	57.56 (SD±9.23)	61.60 (SD±9.8)	2.2	P<0.02
LDL (mg/dl)	114.01 (SD±29.24)	84.10 (SD±25.25)	5.4	P<0.00



**Figure 2: Comparison of anthropometric Measurements and Biochemical profiles in pregnant and Non-pregnant women**

### Discussion

The present comparative study of biochemical profiles in pregnant and non-pregnant women in Bihar. The distribution of age in both pregnant and non-pregnant women 4 (8%) pregnant women, 5 (10%) non-pregnant women aged between 18-21 years, 19 (38%) pregnant women, and 14 (28%) non-pregnant women aged between 22-25 years. 35 (30%) pregnant and 16 (32%) non-pregnant women were aged between 26-29 years. 5 (10%) pregnant and 7 (14%) non-pregnant were aged between 30-35 years. 4 (8%) pregnant and 7 (14%) non-pregnant were aged between 36-40 years. 3 (6%) pregnant and 4 (8%) non-pregnant women were over 40 years old (Table 1).

BMI (kg/m<sup>2</sup>) 24.82 (±1.08) in pregnant women, 22.19 (±1.03) in non-pregnant women t test 12.4 and p<0.000, Systolic BP 110 (±2.2) in pregnant, 105 (±1.2), non-pregnant t test 14.1 and p<0.00, Diastolic BP 72 (±2.1) in pregnant, 70 (±1.3) in non-pregnant t test 5.7 and p<0.00, Glucose level: 94.33 (±12.4) in pregnant women, 80.6 (±9.80) in non-pregnant women, t test: 6.1, and p<0.00 Total cholesterol: 210.3 (±38.44) in pregnant women,

170.20 (±27.63) in non-pregnant women, t test 5.9, and p<0.000. Triglyceride level 189.41 (±78.03) in pregnant, 106.28 (±43.78) in non-pregnant, t test was 6.5 and p<0.00, HDL level 57.56 (±8.23) in pregnant, 61.60 (±9.8) in non-pregnant, t test -2.2 and p< 0.02, LDL level 114.01 (±29.24) in pregnant, 84.10 (±25.25) in non-pregnant women, t test was 5.4 and p<0.00. These findings are more or less in agreement with previous studies [5,6,7].

As pregnancy progresses, a well-integrated metabolic shift occurs for an adequate supply of nutrients to a constantly feeding fetus from an intermittently fasting and feeding mother, which is the reason for the higher serum glucose level in pregnant women. Besides, pregnancy is also associated with an insulin-resistant situation, similar to that of type-2 DM.

Increase in triglyceride (Tg), total cholesterol (TC), and LDL serum levels in pregnant women due to an increase in hepatic lipase (HL) activity, a decrease in lipoprotein (LPL) activity, delayed uptake of the remnant chylomicrons, and hormonal changes [9]. It is also observed that an increase in triglyceride (Tg) plays a role in decreasing HDL lev-

els. It is due to impaired transport of cholesterol from peripheral tissues to the targeted areas of utilization. Elevation of lipids during pregnancy is due to the formation of zygote in the uterine wall in the first trimester in response to the maternal switch from carbohydrate to fat metabolism, which is an alternative pathway for energy generation due to high energy demand in the second trimester and for the development of fetal organs in the third trimester [10,11].

In the present study, the values of BMI were positively correlated with biochemical profiles in both pregnant and non-pregnant women.

### Summary and Conclusive

The present comparative study of biochemical profiles in pregnant and non-pregnant women has significant variables. These variables in the biochemical profiles of pregnant women may adversely affect the pregnancy outcome.

Hence, this study is quite helpful to obstetricians and gynecologists to predict the consequences of pregnancy outcomes and treat them efficiently to avoid morbidity and mortality in the mother and fetus as well.

**Limitation of study:** Owing to the tertiary location of the research centre, the small number of patients, and the lack of the latest techniques, we have limited findings and results.

This research paper was approved by the Ethical Committee of Narayan Medical College, Sasaram, Bihar (821305).

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