Original Article

Estimation of Some Biochemical Parameters in the Serum of Pregnant Women

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Abstract

Pregnancy is a unique time in the life of woman when complex hormonal and physiological changes occur. Pregnancy, which is both a normal circumstance and a change in physiology, is the most frequent altered physiological state to which humans are subject. After conception, the body begins to undergo physiological changes, which have an effect on all organ systems.

The study is cross sectional study achieved in Al-Alam city from 1st March to 30th May 2022 , data and blood samples collected from 50 pregnant women aged from 18-35 year. Several devices and equipment used in our study . All individuals are submitted to collecting the blood samples about 5ml from hand vein , all the samples submitted to the blood analysis of four biochemical tests . The result of this study show that the value of Hb is (10.03±0.8)(10.2±1.4)(9.8±0.7) in first , second and third trimesters ,the value of fasting blood sugar is (82.7±12.3)(82.4±14.8)(80.5±16.5) in first , second and third trimesters respectively.

The result of calcium is (6.9±1.7),(6.5±2.1),(7.7±2.5) in first , second and third trimesters respectively. The result of urea is (34.5±3.1),(30.6±5.2),(27.2±7.1) in first , second and third trimesters respectively .The result of this study show that in pregnancy period occur a lot of changes in the level of some parameters like calcium , urea , glucose and hemoglobin.

Keywords: pregnancy , calcium , fasting blood sugar , urea , hemoglobin

Introduction

During a woman's pregnancy, significant hormonal and physiological changes occur, making it a unique moment in her life. Pregnancy is the most prevalent altered physiological state to which humans are subject., which is both a normal situation and a change in physiology. The body's physiological changes start occurring after conception and have an impact on all organ systems. They also help pregnant women adjust to their condition and promote fetal growth. The pharmacodynamics and pharmacokinetics (absorption, distribution, metabolism, and elimination) characteristics of various medicinal drugs are profoundly impacted by many of these changes(1).

In pregnancies that are not problematic, these alterations disappear after delivery with no lasting impact. During a pregnant woman's clinical evaluation, such anatomical and physiological changes could be confusing. Some changes in blood biochemistry during pregnancy could make interpretation challenging of outcomes. To enhance the health of the mother and fetus ,the pathogenic changes in these anatomical and physiological recognizing physiologic changes is important(2). As a normal pregnancy progresses, plasma volume gradually rises. By week 34 of pregnancy, the majority of this 50% increase occurs, and it is proportional

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to the baby's birth weight. Red blood cell count, hematocrit, and hemoglobin concentration decrease as a result of a difference between the growth in red blood cell mass and the expansion of plasma volume (3). The need for iron increases two to three times during pregnancy, not only for the fetus but also for the creation of several enzymes and for the synthesis of hemoglobin .The requirements for folat and vitamin B12 have increased by 10 to 20 times and by 2 times, respectively(4). The main metabolic result of protein catabolism in humans that contains nitrogen is called urea. It is produced in the liver from toxic ammonia, which results from the deamination of an amino acid, which the kidneys then filter out (5). The changes in glucose metabolism that occur during pregnancy, which is a diabetogenic state, allow for the shunting of glucose to the fetus to stimulate development while preserving appropriate mother nutrition(6). The development of insulin-secreting pancreatic beta-cell hyperplasia occurs early in pregnancy and increases both insulin production and insulin sensitivity (7). Lipolysis is caused by insulin resistance and relative hypoglycemia, which enables the expectant woman to use fat as fuel more frequently while protecting the fetus's access to reducing protein catabolism while utilizing glucose and amino acids. Although it is impermeable to big lipids, the placenta permits the transfer of glucose, amino acids, and ketones to the fetus. Gestational diabetes develops in the event that a woman's endocrine pancreas is damaged and she is unable to overcome the insulin resistance brought on by pregnancy (8). Maternal calcium status must meet significant needs due to fetal growth(9). Even if intestinal calcium absorption has risen(10), the mother's appropriate calcium intake is still crucial in meeting the demand. Both the mother and the fetus are at risk from inadequate calcium consumption. Reduced intrauterine growth, preterm birth, low birth weight, inadequate bone mineralization are dangers for the fetus, while preeclampsia and hypertension are concerns for the mother(11). In numerous studies, calcium supplements were found to be helpful in preventing preeclampsia(12).

Materiales And Methods

Study Design

The study is cross sectional study achieved in Al-alam city from 1st March to 30th May 2022, data and blood samples collected from 50 pregnant women aged from 18-35 year.

Tools and apparatus

Several devices and equipment used in our study, the study shows in Table (1) and equipment is shown in Table (2).

Methods

All individuals are submitted to collecting the blood samples about 5ml from hand vein , all the samples submitted to the blood analysis of four biochemical tests .

Glucose

Principles : enzymatic colorimetric determination of glucose according to the following reaction.

Reaction: -

1. Glucose + O_2 + H_2O —*Glucose Oxidase*→ Gluconic acid + H_2O_2.

2. H_2O_2 + Phenolic Compounds + 4-aminoantipyrine —*Peroxidase*→ Quinoneimine (Red colour complex) + H_2O

Calcium

Principle : The basis of the calcium OCPC technique is the interaction of an alkaline solution containing calcium ions and an O-cresolphthalein compound to produce an intensely compound that is violet in hue and absorbs most light at 578 nm. The 8-hydroxy quinoloine prevents Mg++ interference upto 4mmol/L.

Urea

Principle: Urease converts urea into ammonia and carbon dioxide after hydrolyzing it. A green cromophone is produced as a coupling agent, sodium nitroprusside and alkaline hypochlorite combine with the ammonia generated.

The intensity of the resulting color is directly correlated with the amount of urea contained in the sample.

Urea + H2O → 2NH3 + CO2

NH4 + Salycilate + NaCLO→ Indophenol +NaCl

Table 1 : The used tools and material in our study.

N	*Tools and material*	*Company*
1	Disposable syringes	Mirab-Syria
2	Disposable tips	Germany
3	Micropipette	Germany
4	Test tubes	Germany
5	Plane tubes	AFma - Dispo, Jordan
6	Bottle washing water	India

Table 2: Used apparatus in our study

N	Apparatus	Company
1	Incubator	Turkey Elektromag
2	Centrifuge	Germany-Dupont
3	Ultra Violet & Visible Spectrophotometer	Cecil Instrument Limited, Amerca

Results And Discusions

(Mean±S.D.) PARAMETERS	BP	Hb	PCV	FBS	CALCIUM	UREA
FIRST TRIMESTER	108±10.1/ 72±9.5	10.03±0 .8	33.5± 2.8	82.7±1 2.3	6.9±1.7	34.5±3.1
SECOND TRIMESTER	119±11.3/ 78±5.2	10.2±1. 4	33.6± 2.2	82.4±1 4.8	6.5±2.1	30.6±5.2
THIRD TRIMESTER	113±9.3/81±10	9.8±0.7	32.6± 1.6	80.5±1 6.5	7.7±2.5	27.2±7.1

After conception, the pregnant woman begins to experience profound physiological and anatomical changes that allow her to nourish and adapt the growing fetus. These changes affect every organ system(13).

In this study the results of Hb showed that in the first trimester Hb is (10.03±0.8) and in the second trimester Hb is (10.2±1.4) while in the third trimester there is decrease in the Hb value (9.8±0.7) . This result confirm by study high maternal Hb levels in the first trimester were discovered in an earlier observational study of 730 Chinese pregnant women (14). The correlation between Hb levels and the risk of GDM and PE seen in this study and others appears biologically plausible. Notably, the findings of this study and those of others(14) demonstrated those women with high hemoglobin levels had higher pre-pregnancy BMI levels, suggesting that the high hemoglobin levels could be due to their superior nutritional condition. Additionally, an increased risk of GDM a may be linked to the high nutritional status. Additionally, the development of GDM has been linked to large dosages of iron supplementation (15), this study postulated that elevated Hb levels may indicate iron overload. Iron is a powerful prooxidant, and excess iron can enhance oxidative stress in -cells, which results in insulin resistance(16). Placental blood flow as well as other low kinetic force microvasculature can be significantly decreased by hyperviscosity(17). This could result in decreased oxygen delivery because of decreased placental tissue perfusion and oxygenation. This results show low level of calcium during the three trimesters and this results are confirm by other study in which As the pregnancy went on, a drop in the mother's calcium level was seen (18). The female body experiences a large rise in blood levels of progesterone and estrogen during pregnancy, which has an impact on the concentrations of numerous chemicals, including calcium. During pregnancy, there is a sharp increase in bone remineralization and a decrease in the urine excretion of calcium. In order to provide the fetus with enough calcium later in pregnancy, a rise in 1,25-dihydroxyvitamin D production also causes a rise in calcium intake through the intestine and its storage in the mother's

bones (19). Our study show there is low level of fasting blood sugar during the three trimesters where the level in first trimesters was (82.7±12.3) , in second trimesters was (82.4±14.8) and in third trimesters was (80.5±16.5) .

In this study, the urea levels significantly decreased over each trimester. This is comparable to a study that revealed an overall decline in urea levels among pregnant women, despite the fact that the decline was not statistically significant. This drop may be brought on by increased hydration, a rise in GFR, an increase in anabolic rate, and an increase in the fetus's need for maternal protein (5).

Conclusions

The result of this study show that in pregnancy period occur a lot of changes in the level of some parameters like calcium , urea , glucose and hemoglobin.

Compliance with Ethical Standards statements

Ethical approval :Tikrit University / Iraq / certifies the ethical approval, Funding details (In case of Funding) :I am responsible for paying the financing, Conflict of interest : There is no conflict of interest, Informed Consent: Department of Research and Studies, Tikrit University \ Agreed

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