Research the Changes Across Three Phases of Pregnancy of Prolactin, Thyroid Hormones and Lipid Profile

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Abstract

Pregnancy allows the maternal blood to alter both the hormonal and biochemical material. This research was therefore aimed at investigating the shift in the profile of Thyroid stimulating hormone (TSH), triiodothyronine (T3), tetraiodothyronine (Thyroxin T4), prolactin and lipid during the three stages of pregnancy. The study included 30 pregnant women and 20 non-pregnant women as a control group (the age of women was 20-41 years). The study was performed from October to May 2017 at AL-Batool Teaching Hospital in Baqubah District, Diyala Governorate, Iraq. Hormones were assessed using an automated hormone analyzer (Cobase411, Roche, Germany) and the lipid profile was measured using an automated biochemistry analyzer (Cobase400Integra Plus, Roche, Germany). The findings revealed a substantial elevation of prolactin in the three phases of pregnancy ($p<0.05$). While T3, T4, total cholesterol (TC) and triglyceride (TG) showed no significant elevation ($p>0.05$) in the first trimester relative to the control group, TC and TG increased significantly ($p<0.05$) in the second and third stages of the trimester of pregnancy and T3 and T4 increased significantly ($p<0.05$) in the first trimester compared to the control group.

Keyword: *pregnancy, prolactin, thyroid hormones, lipid profile*

Introduction

The cycle of human reproduction, known as conception, gravity, as well as pregnancy. A woman bears one or more live descendants from the implantation of a fertilized zygote in the uterus during this time of fertility or 'pregnancy'. Thus, pregnancy is the phase during which one or more offspring grow inside the womb of a woman [(1)]. The internal and external physiological status of women is profoundly influenced by pregnancy. Several internal hormonal changes arise in pregnant women during this time of pregnancy [(2)]. For pregnant women, internal structural modifications have arisen including changes in blood parameters and these changes can appear pathological in the non-pregnant state [(3)]. These modifications related to the fetus' growth and development [(4)]. Thus, in pregnancy, the metabolism of women is significantly altered to provide the growing fetus with the necessary nutrients needed for growth and provide the fetus with the protection before birth, and also to provide the mother with the extra energy needed for childbirth [(5)]. The typical duration of pregnancy for women last for 40 weeks (approximately 280 days), separated into three trimester periods according to the growth and development period of the fetus [(6)].

1-First trimester (up to 13 weeks after conception) where the embryo measures up to 8 Cm long and weighs roughly 13 g [(7)].

2- Accelerated fetal development begins in the second trimester (13 to 26 weeks), and the fetus weighs about 70 g at the end of this trimester and is 30 Cm long, during which the fetal organs may have begun to develop [(8)].

3-Third trimester, complete maturation of the fetal organs during this trimester (26–40 weeks. During these three stages, conception is characterized by improvements in the metabolism and hormonal state of an individual. In order to determine the effect of normal pregnancy on blood profiles, a study like these variations is therefore necessary [(9)]. In trimesters of pregnancy,

thyroid gland is vital because it controls the production of tow hormones, both of which plays an important role in the growth of the baby's nervous system and brain, these thyroid hormones are triiodothyronine (T3) and thyroxin (T4) [10]. In the first trimester, the fetus depends on his mother's thyroid hormones supplied to him via the placenta, this additional requirement for thyroxin [11]. T3 and T4 development is caused by the induction of the thyroid stimulating hormone (TSH) produced and secreted by the pituitary gland [12].

Physiologically, during birth, the woman becomes a new human, and the maternal metabolic environment is changed by elevated amounts of progesterone, estrogen and pancreatic beta-cell hyperplasia in the blood. Insulin tolerance and ovarian estrogen (in women) play an important role in disrupting the lipid profile [9]. In this study, improvements in the lipid profile, T3, T4 TSH, and prolactin were examined in a group of pregnant women to determine how these parameters changed during normal pregnancy [13].

Materials and Methods

This research was conducted from May to October 2020 at AL-Batool Teaching Hospital in Baquba District, Diyala Governorate, Iraq. A total of 50 women volunteered for the research between the ages of 20 and 41 years old. 30 pregnant women and 20 non-pregnant women were included in this monitoring group of 50 volunteer women. Centered on the point of pregnancy, the 30 pregnant women were observed for around 32 weeks of pregnancy. Blood samples from all involved women were taken after having them fast overnight for 8-12hrs. Using 5ml of disposable syringes, 5ml of fasting venous blood was extracted from each woman and transferred into a plain container. The blood was to clotted for half an hour, then centrifuged for 5 minutes at 4000 rpm and used to assay the parameters tested. Using biochemistry-automated analyzers, serum total cholesterol (TC), triglycerides (TG), low density lipoprotein cholesterol (LDL-C) and HDL cholesterol (HDL-C) were analyzed (Cobase411, Roche, Germany). Hormones were assessed by automatic hormone analyzers (Cobase400Integra Plus, Roche, Germany).

Statistical Analysis

The SPSS statistical package was used for data processing and the findings were presented as mean± standard deviation (M±SD). For data interpretation, the student t- test was used, and $p < 0.05$ was found statistically important.

Results

The mean ± standard division(M±SD) values of the studied blood parameters are seen in the table for control and pregnant women in three trimester stages (1).

Table (1): M ± SD values of the monitoring parameters analyzed and three trimester pregnancy values

Parameters	Control	1st trimester	2nd trimester	3rd trimester
TSH mI U/L	3.50±1.08	2.90±1.23	3.40±0.69	3.50±1.15
TT3 nmol/L	2.00±0.30	3.20±0.44	2.90±0.96	2.60±0.47
TT4nmol/L	90.00±12.58	138.0±22.05	140.0±34.22	150.0±62.31
Prolactin µg/L	15.00±3.01	34.00±32.75	100.0±33.45	131.1±31.44
TC mg/dl	150.4±17.4	166.4±28.1	180.0±23.4	207.3±32.2
TG mg/dl	80.7±6.6	108.7±13.1	126.5±18.4	130.7±20.8
HDL-C mg/dl	43.1±5.4	44.7±4.2	48.0±6.3	52.0±5.8
LDL-C mg/dl	81.8±14.6	90.3±9.6	123.7±10.9	159.5±22.4

As seen in table (2), no substantial variations between the blood levels of these parameters were shown in the findings of the comparison of the studied parameters in the first trimester with the control group, except for prolactin, which showed significant elevation in the first trimester as opposed to the control ($p<0.05$).

Table (2): A contrast of studied parameters with regulation in the first trimester was shown.

Parameters	Control	1st trimester	P-value
TSH	3.50±1.08	2.90±1.23	0.784
T3	2.00±0.30	3.20±0.44	0.234
T4	90.00±12.58	138.0±22.05	0.439
Prolactin	15.00±3.01	34.00±32.75	0.01*
TC	150.4±17.4	166.4±28.1	0.195
TG	80.7±6.6	108.7±13.1	0.125
HDL-C	43.1±5.4	44.7±4.2	0.254
LDL-C	81.8±14.6	90.3±9.6	0.321

The finding shown in table (3) is an elevation in the levels of the studied parameters, but without substantial differences($p>0.05$), with the exception of prolactin, TC and TG levels, which displayed significant elevation($p<0.05$) in the second trimester relative to the control group, and TSH was almost standardized.

Table (3): Showed the comparison of studied parameters in second trimester with control.

Parameters	Control	2nd trimester	P-value
TSH	3.50±1.08	3.40±0.69	0.72
T3	+2.00±0.30	2.90±0.96	0.089
T4	90.00±12.58	140.0±34.22	0.077
Prolactin	15.00±3.01	100.0±33.45	0.000*
TC	150.4±17.4	180.0±23.4	0.049*
TG	80.7±6.6	126.5±18.4	0.045*
HDL-C	43.1±5.4	48.0±6.3	0.231
LDL-C	81.8±14.6	123.7±10.9	0.063

The result showed substantial elevation ($p<0.05$) in the levels of most studied parameters except HDL and LDL levels, which showed presence elevation without significant variations ($p>0.05$) in the second trimester relative to the control group, and TSH showed normalization as seen in the table (4).

Table (4): The contrast of the parameters studied in the third trimester with regulation was shown.

Parameters	Control	3rd trimester	P-value
TSH	3.50±1.08	3.50±1.15	0.733
T3	2.00±0.30	2.60±0.47	0.023*
T4	90.00±12.58	150.0±62.31	0.017*
Prolactin	15.00±3.01	131.1±31.44	0.000*
TC	150.4±17.4	207.3±32.2	0.042*
TG	80.7±6.6	130.7±20.8	0.044*
HDL-C	43.1±5.4	52.0±5.8	0.09
LDL-C	81.8±14.6	159.5±22.4	0.051

Discussion

During the findings showed an increase in thyroid hormone levels of T3 and T4 in pregnant women, especially in the third trimester stage [14]. This finding was consistent with the scientific fact that the thyroid gland is hyper-stimulated during pregnancy, resulting in changes in thyroid hormone levels to improve the sufficient basal metabolic rate for mother and fetus[15]. Thus, correct measurement of thyroid activity during pregnancy is important for thyroid hormone modification. If thyroid is deficient during birth, this case can be linked with adverse maternal obstetric outcomes and lead to defects in infant neurodevelopment. Knowing the predicted natural changes in concentrations of thyroid hormones during pregnancy enables individualized supplementation when necessary [16]. Women who have been diagnosed with thyroid gland dysfunction are usually treated and are able to complete a normal pregnancy [17]. The pregnancy period causes complex changes in the concentration of thyroid binding globulin(TBG) and maternal steroid hormones circulating (estrogens). Estrogens have stimulatory effects on TBG synthesis and serum TBG rises in total T4 and total T3 concentration. Pitches [18]. Concentrations. TBG concentrations double at 16 to 20 weeks of gestation [21]. In the first trimester, thyroid-stimulating hormone (TSH) levels are low, with normalization in the second and third trimesters [11]. Pregnancy may be thyroid stress and the

size of the gland typically increases by 10%. The output of T3 and T4 is therefore rising by around 50 per cent. As a result, the average level of TSH during pregnancy is lower than or normal relative to the level of non-pregnancy [19]. Because normal thyroid activity changes during pregnancy, as the mother progresses from the first to the third trimester, TSH levels can change. The normal TSH value will range from 0.2 to 4.0 ml U/L, under normal circumstances.

In this analysis, the concentration of prolactin showed substantial elevations in the first trimester compared with the control group and then gradually increased with high significant elevations in the second and third stages of pregnancy [6]. This elevation is for the mammalian gland to plan and stimulate milk production for neonate feeding. This finding is consistent with certain earlier studies [20]. Increases in lipid fractions were seen in the current study (TC, TG, HDL and LDL). Metabolic fuels are increased by the growth and development of the fetus and sustain its systems throughout the pregnancy cycle. Lipids are foodstuffs of high energy. Lipids are important food groups during pregnancy that provide nutrition for the mother's multisystem and for increased fetal cell proliferation [22]. This is appropriate because of the high energy needed to increase maternal uterine enlargement cell proliferation, expansion of blood flow, fetal implantation, development of blood vessels in the utero placenta zone, fetop [23]. High concentrations of certain steroids are important during normal pregnancy development. Because most steroids are synthesized from cholesterol, the levels in the bloodstream of normal pregnant women have risen. Increases in lipid fractions have been identified in many previous studies and the rise in blood lipids is assumed to be linked to the growth of the mammary apparatus and to fetal requirements [24]. However, hyperlipidemia raises the likelihood of coronary artery disease (CAD) and may adversely impact the health of the pregnant woman and her fetus. The elevated lipid profile is thus a natural finding [25].

Conclusion

The typical pregnancy duration is followed by prolactin elevation, thyroid hormones, and lipid fraction elevation. If thyroid hormone levels are down, this means that the pregnant woman has hypothyroidism and needs to be monitored. Strong prolactin is natural for the mammalian gland to be enhanced to secrete milk for lactating the neonate. High lipid fractions are engineered to provide the fetus with the requisite energy and compounds to create its structures. Lipids are also important food forms that supply nutrition to the mother's multisystem.

Ethical Clearance: In this study, the project was taken from the ethical committee Education / Pure Science College / Diyala University.

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Conflict of Interest: Nil

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