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Effect of Hypothyroidism of Women in the First Trimester of Pregnancy in Al-Basra City

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Abstract

Evaluating the thyroid gland's functioning in expectant women at Basra's Abi Al-Khasib Hospital, in order to better understand the physiological changes that women experience during pregnancy, especially those that affect the thyroid gland. Due to their significance in the healthy development of the embryonic brain. This study tried to concentrate on thyroid hormones, which depend on a steady supply of hypothyroidism; too little or too much of them can impair the fetus's neurological development. However, an imbalance in the thyroid gland increases the risk of complications during labor and delivery, including preterm birth, pre-eclampsia, and placental abruption.

The purpose of the study was to determine if hypothyroidism during the first

trimester of pregnancy affected the results of gland function tests or not.

Two groups of 20 women were selected for the study: one group included 15 pregnant women with the afflicted condition, while the other group included 5 normal, non-pregnant women who were in the first trimester of their pregnancies. The hormones FT4, FT3, and TSH were all scrutinized.

According to the study, there is a statistically significant difference between pregnant and non- pregnant women's levels of the two thyroid hormones, tri-thyronine, and thyroxin, when it comes to how well the thyroid operates during pregnancy.

Keywords: The Thyroid Gland, Thyroid Hormone, Expectant Women, Hypothyroidism.

1. Introduction

At all stages of life, the thyroid gland is essential for maintaining general body functioning. While it creates comparatively few hormones that control the entire body, it does so at the same rate as the body makes energy from food. Growth and development, oxygen intake, heat generation, and neurological processes are all stimulated by thyroid hormones. Moreover, there is the metabolism of fatty acids, carbohydrate, protein, vitamins, and inorganic ions. They also have a significant impact on how other hormones operate. (Costeira. etal, 2010) Thyroid disorders increase the risk of heart disease, osteoporosis, and infertility if left untreated. More than half of the 13 million Americans who have thyroid issues do not have a diagnosis. The growth of the fetus is greatly influenced by thyroid hormones, which are particularly crucial during pregnancy. The mother's thyroid gland is the only source of the thyroid hormones required for development throughout pregnancy, which are essential for the fetal brain's development. The thyroid gland of the fetus develops approximately by week 12 of pregnancy. Thyroid hormone

is transported in trace amounts from the mother to the fetus through the placenta and amniotic fluid (Chen & Hetzel, 2010).

2. Materials and Methods

2.1 Target Population

The target demographics were Basra Health Hospital's first-trimester pregnant patients.

2.2 Sampling and Sample Size

Between 1 and 13 weeks of pregnancy, there are about five normal pregnant women in the world who are between the ages of 18 and 40. They were chosen based on their gestational ages, which were determined using the date of the previous menstrual period and an ultrasound scan. There were 5 normal non-pregnant ladies in the control group, born and chosen at random.

2.3 Blood Sampling and Processing

A total of 20 pregnant women were included in the quality control and safe working technique of group models for the venous blood sample (5 mL), of whom 15 were infected during the first trimester of pregnancy. Also, 5 healthy non-pregnant women gave consent to the collection of (5 mL) of venous blood. Every sample's entire blood was centrifuged for 15 minutes at 3000 cycles to separate the serum from the blood. Within two hours after collection, serum samples were delivered to the laboratory for examination. In a laboratory, serum samples were used to measure the levels of TSH, FT3, and FT4.

2.4 Biochemical Analysis

2.4.1 Determination of Serum TSH

In this investigation, TSH is accurately measured in blood serum using the enzyme immunoassay method.

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2.4.2 Principles

The Abbot-automated Axsym immunoassay analyzer TSH assay system is what we utilize for this (Abbot laboratories, USA). The hTSH II ultra-sensitive Axsym kit includes solutions and samples that have been serially prepared for arrangement and is based on the MEIA technology, a micro-enzyme immunoassay. Micro-capillary tubes with Axsym ultrasensitive hTSH II samples, which are placed inside of them, need to be tested before being used as reaction vessel pit walls (plates). The walls of the plate, which are made up of antibody complexes and antigens (antibody and antigen), are filled with both sample and the antibody anti-hTSH. The direct transfer of the plate takes place inside the handling center.

2.4.3 Sampling

- Axsym ultrasensitive hTSH II samples and solutions to conduct the test, precise capillary tubes must be used to insert the samples into the reaction vessel's various pits (plates).
- Sample and anti-hTSH antibodies were embedded inside the plate's walls, forming an antibody and antigen combination antibodies and antigens. Inside the handling facility, the plate is immediately transferred.

Procedure

1. The Ag-Ab antibody and antigen complex reaction mixture into two halves. On the subsequent plate, it bonds to the little molecules that are being transported.
2. A lye solution from LDS is used to clean the pits.
3. The alkaline phosphatase conjugate enzyme is transported to the pits and binds to the antagonist complex, which is a hTSH antagonist. As well as the antigen AgAb.
4. Unbound material is taken out of the pits by washing them.

5. When 4-Methylumbelliferyl Phosphate is introduced to the pits, it creates luminescence, and we use ELISA equipment of the MEIA type to quantify the photosynthesis.

3. Results

3.1 Characteristics of the Study Population

The current study is based on a sample of 20 women from the city of Basra, of whom 15 were pregnant women who were infected and 5 were not pregnant women who were not infected. Pregnant women with the virus had an average age of 34.6 years, compared to 16.4 years for those without it. 8.7 weeks were averaged throughout gestation it was either 34.6 years for pregnant women who were infected or 16.4 years for pregnant women who were not affected. The gestation period lasted an average of 8.7 weeks.

Table (3.1): shows the thyroid - stimulating hormones TSH, FT3 in the study sample of normal woman

status in the study population (n=5)

The number	The age	TSH	FT4	FT3
1	15	3.54	113.02	1.98
2	14	2.24	91.9	1.76
3	18	2.96	88.36	1.97
4	19	1.55	91.2	2.52
5	16	1.19	88.33	1.85

3.2 Serum TSH, FT4 and FT3 Status in the Study Population

The study sample exhibited an increase in TSH levels (> 5 mIU/mL) in pregnant women (13.94%) and non- pregnant women (2.27%), according to Tables (3.3,

3.4). Pregnant women (106.30%) and non-pregnant women (94.56%) are the only groups with high FT4 levels, while pregnant women (2.22%) and non- pregnant women (2.22%) are the only groups with elevated FT3 levels. Expectant mothers (2.01).

Studies have demonstrated that during the first trimester of pregnancy, pregnant women's thyroid hormone levels differ significantly from those of non-pregnant women's (mean = 13.04 13.39 vs. 2.27 0.94 mIu/Ml for the level of significance (p> 0.05)). This difference can be seen in tables (3.3, 3.4). On the other hand, the average levels of FT4 and FT3 dramatically increased in

FT4 (mean=106.30 ± 58.93 vs 94.56 ± 10.44)

Ld

FT3 (mean = 2.22 ± 1.33 vs 2.01 ± 0.29)

Table 3.2 shows the thyroid-stimulating hormones FT4, TSH, FT3 in the study sample of infected pregnant women

Status in the study population (n=15)

The number	The age	TSH	FT4	FT3
1	25	6.64	85.93	1.74
2	23	5.68	86.30	1.32
3	26	5.54	22.84	1.32
4	29	7.51	89.50	1.46
5	24	5.66	80.07	2.27
6	30	19.02	96.03	1.71
7	35	29.89	53.30	1.16
8	35	6.52	167.58	2.53
9	37	5.24	96.14	1.57
10	31	8.34	105.65	3.10
11	45	25.05	167.35	3.50
12	49	5.52	94.61	2.54
13	48	7.44	103.14	1.93
14	42	25.55	273.85	6.36
15	41	5.36	72.32	1.17

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3.3 The Relationship Between Thyroid Hormones and Pregnancy

(As can be seen from the rates and standard deviation in the preceding sentence, the independent t-test demonstrates that women with thyroid issues exhibit a greater rate of TSH compared to those who do not). In table (3.4) as well as significant differences in the mean levels and standard deviation of FT3/FT4 in those with thyroid problems and among women with thyroid problems, we observed an increase in the number of miscarriages among pregnant women with thyroid problems compared to non-pregnant women without thyroid problems (mean = 0.47 0.88 vs. 0.45 0.91). According to this, children of pregnant women who are not afflicted by hypothyroidism have a closer relationship with the condition than children of pregnant women who are afflicted.

Table 3.3 (Abnormal)
TET2 (Mean ± St) P < 0.05:Significant ,P> 0.05:Non

	N	Mean	Std.Deviation	Std.Error	95%Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
TSH	15	13.0460	13.3920	3.4578	5.6297	20.4623	5.24	52.05
FT4	15	106.3073	58.9343	15.2168	73.6706	138.9441	22.84	273.85
FT3	15	2.2273	1.3375	0.3453	1.4867	2.9680	1.15	6.36
Total	45	40.5269	58.2702	8.6964	23.0206	58.0332	1.16	273.85

Test of Homogeneity of Variances

TEST

Levene Statistic	df1	df2	Sig.
8.982	2	42	0.001

ANOVA

TEST

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	98236.831	2	49118.416	40.323	0.000
Within Groups	51161.406	42	1218.129		
Total	149398.24	44			

Post Hoc Tests

Multiple Comparisons

Dependent Variable :TEST2
Scheffe

(I)GROP	(J)GROP	Mean Difference(I-J)	Std.Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
TSH	FT4	-93.2613*	12.7443	0.000	-125.6024	-60.9202
	FT3	10.8187	12.7443	0.700	-21.5224	43.1598
FT4	TSH	93.2613*	12.7443	0.000	60.9202	125.6024
	FT3	104.0800*	12.7443	0.000	71.7389	136.4211
FT3	TSH	-10.8187	12.7443	0.700	-43.1598	21.5224
	FT4	-104.0800*	12.7443	0.000	-136.4211	-71.7389

*. The mean difference is significant at the 0.05 level

Homogeneous Subsets

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Table 3.3 (Abnormal)

Scheffe* (Abnormal)

TEST

GROP	N	Subset for alpha=0.05	
		1	2
FT3	15	2.2273	
TSH	15	13.0460	
FT4	15		106.3073
Sig.		0.700	1.000

Means for groups in homogeneous subsets are displayed

A.Uses Harmonic Mean Sample Size = 15.000

TET2 (Mean ± St) P < 0.05:Significant ,P> 0.05:Non stage

	N	Mean	Std.Deviation	Std.Error	95%Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
TSH	5	2.2780	0.9426	0.4215	1.1076	3.4484	1.19	3.45
FT4	5	94.5620	10.4450	4.6711	81.5929	107.5311	88.33	113.02
FT3	5	2.0160	0.2960	0.1324	1.6484	2.3836	1.76	2.52
Total	15	32.9520	45.4414	11.7329	7.7874	58.1166	1.19	113.02

Test of Homogenelty of Variances

TEST

Levene Statistic	df1	df2	Sig.
8.982	2	12	0.017

ANOVA

TEST

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	28468.612	2	14234.306	387.949	0.000
Within Groups	440.294	12	36.691		
Total	28908.906	14			

Post Hoc Tests

Multiple Comparisons

Dependent Variable :TEST

Scheffe

(I)GROP	(J)GROP	Mean Difference(I-J)	Std.Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
TSH	FT4	-92.2840*	3.8310	0.000	-102.9632	-81.6048
	FT3	0.2620	3.8310	0.998	-10.4172	10.9412
FT4	TSH	92.2840	3.8310	0.000	81.6048	102.9632
	FT3	92.5460*	3.8310	0.000	81.8668	103.2252
FT3	TSH	-0.2620	3.8310	0.998	-10.9412	10.4172
	FT4	-92.5460*	3.8310	0.000	-103.2252	-81.8668

*. The mean difference is significant at the 0.05 level

Homogeneous Subsets

Table (3.4): Normal

Scheff* (normal)

TEST

GROP	N	Subset for alpha=0.05	
		1	2
FT3	5	2.0160	
TSH	5	2.2780	
FT4	5		94.5620
Sig.		0.998	1.000

Means for groups in homogeneous subsets are displayed

A.Uses Harmonic Mean Sample Size =5.000

3.4 Anatomy of the Thyroid Gland

The thyroid is one of the body's major endocrine glands, weighing 2-3 grams in neonates and 6-8 grams in adults. It is located in the neck in front of the thyroid cartilage, commonly known as the human "apple". The right lobe is one of the butterfly's two lobes, while the ischemia is connected to the left lobe. It is situated at the front of the neck, wraps around the neck, and is linked posteriorly to the esophagus and carotid artery sheath. (Melse & Jaiswal, 2010).

3.5 Thyroid Gland Physiology

The hormones T4, T3, and calcitonin are produced by the thyroid gland. Surrounding organs, including the liver, kidneys, and spleen, convert more than 80% of T4 into T3. Compared to T4, T4 is almost 10 times more effective (Licensee & Basel, 2011).

3.6 Thyroid Hormones

The thyroid gland secretes L-T4 and L-T3 hormones, which are substances with an iodine component that provide vertebrates with their physiological significance (Sheila & A.S., 2011). Deiodinases remove iodine from T4 to cause it to transition to T3 (Vander Pump, 2014). When these hormones reach the circulation, the liver

binds them to thyroid hormone transporter proteins, which are blood proteins (Krassas et al., 2010). The concentration and affinities of each binding protein affect the distribution of thyroid hormone (Glinor & Spencer 2010). The production of thyroid hormones is dependent on the cellular polarity of the cases and the close attachment of the alveolar cavity process (Tortosa, 2011).

Hormone release is dependent on the presence of pre-made hormone reserves in the vesicular cavity and cellular polarity during cellular transport and constipation. Iodine, the peroxidase enzyme, and the iodine receptor protein are necessary for maintaining polarity during the processes of cellular transport and constipation that result in the distribution of hormones into circulation (Glinor & Spencer, 2010).

The tyrosyl residue in thyrotropin (TG) is promptly oxidized and bound by iodide to the thyroid gland, where it undergoes iodide conjugation to produce T4 and T3. Iodine, the peroxidase enzyme (TPO), and the iodine receptor protein (TG) are all necessary for the process (Anekaert et al., 2010).

Thyroxine is the main hormone that stimulates physiological development, and deiodinases in the tissues convert thyroid hormone reserves to active T3, which is roughly four times more effective than T4 to T3. One week is the biological half-life (Midgley & Hormann, 2013).

Triiodothyronine is the most powerful of the thyroid hormones and has a significant impact on nearly every body function, including growth, body temperature, and heart rate. According to (Patil-Sisodia & Mestman 2010), the biological half-life is 2.5 days.

Because the intracellular movement of iodide against the concentration gradient is linked to sodium transport, the protein responsible for this has previously been termed the sodium/iodide symporter (NIS) (Rivkees & Szarfman, 2010).

Low blood TSH values in healthy women can lead to the development of

hyperthyroidism (Ashoor et al., 2010).

Women are more likely than men to have hypothyroidism. Cretinism (congenital hypothyroidism), which impairs breathing, is brought on by hypothyroidism during embryonic development or the first few months of infancy. Jaundice that doesn't stop, crying, stunting, atrophy of the muscles and bones, mental impairment in older children, and three times as many females as boys have infections. Untreated children under the age of two or newborns during the first trimester of pregnancy experience permanent retardation (Larakosta et al., 2012). Even in hypothyroidism, becoming pregnant is challenging since so many of the body's intricate processes slow down (Hen Rich et al., 2010).

Some claim that it is even more advantageous during pregnancy than TSH (Finken et al., 2013). The mother's thyroxine production throughout the first trimester is entirely necessary for the fetus. Even a little undiagnosed thyroid disorder in the mother, which has no effect on how the respiratory system develops (Julves et al., 2012), causes antibodies against the thyroid, thyroid peroxide enzyme, thyroglobulin, and autoantibodies. To examine the thyroid gland's suspicious structure and any abnormalities, it may be essential to do a thyroid scan, an ultrasound, or both (Cralg et al., 2012).

Patients who have normal T4 and T3 levels but slightly elevated blood TSH levels are said to have subclinical hypothyroidism (Mannisto et al., 2013).

The results must always be taken with caution because there are still considerable discrepancies across laboratories, making it crucial that each one establishes its own normal values (Stagnaro-Green et al., 2011).

In a 5-year follow-up, children and adolescents who received valproate or carbamazepine treatment for type 1 diabetes mellitus, juvenile arthritis, or epilepsy had a very low chance of developing severe hypothyroidism (Krassas et al., 2015).

In patients with type 1 diabetes, Glenoert and Spencerceived valproate or carbamazepine treatment for type 1 diabetes mellitus, juvenile arthritis, or epilepsy had a very low chance of developing severe hypothyroidism (Krassas et al., 2015). In patients with type 1 diabetes, Glenoert and Spencer (2010) demonstrated early diagnosis of subclinical hypothyroidism with thyroxine medication and metabolic management (Sahu et al., 2010).

According to recent research, autoimmune hypothyroidism (AITD) may have harmful impacts on a person's health, including postpartum depression, an increased chance of miscarriage and repeated miscarriages, fetal mortality, and possible repercussions on a child's cognitive development (Reid et al., 2013).

Discussion

During pregnancy, the specifically advised intervals for FT4, FT3, and TSH may be significant for a number of reasons. First, it's crucial to understand that in pregnant women who do not have hypogoiter, FT4 levels in the first trimester should be greater than those in the next two. Total maternal T4 the precise FT4 indication times set up the capability to detect deficiencies during this crucial phase and set up a complex signal for goiter absence. Similar to hyperthyroidism, hypothyroidism can go undetected during the first trimester of pregnancy if the diagnosis is based only on an increase in TSH brought on by the stimulation of the thyroid gland caused by high levels of hcG (chorionic gonadotropin). Additionally, it increases because estrogen levels increase at this time, which is related to the slow transit of TSH in the blood serum. (Weghofer et al., 2015). Thus, to the degree that it climbs beyond the average for normal pregnant women, a second record of normal maternal thyroid hormone levels is known to be a sufficient indicator of early fetal thyroid hormone levels in pregnancy (Krassa et al., 2015) and motor and mental development in the newborn. (Chai et al., 2014). The FT4 test early in pregnancy is the most accurate and convenient test. It will improve how the most

convergent approach to points is shown. At this crucial moment for the fetus, goiter insufficiency occurs. Complete impairment of the offspring's intelligence, nerves, and motor abilities (Medici et al., 2014). The best characterization of this disease will be made feasible by the precise stated times in early pregnancy. The effects on the fetus can potentially be severe in situations of severe hypothyroidism (Reid et al., 2013). The intensity of discomfort and labor for FT4 is revealed, but not for FT3, which is important for the fetus's motor and cognitive development (Bulmus et al., 2013).

The degree of TSH increase may be able to correct the deficit. A woman who intends to get pregnant must have her thyroid hormone levels checked, especially since T4 levels are crucial in the early stages of pregnancy and are used to identify potential hazards to the fetus and the pregnancy (Busneli et al., 2013).

The women used in this investigation are (15) pregnant women, (5) non-pregnant, uninfected women (control), and (15) pregnant women who have the infection. The average age in these instances in the existing study was 34.6 years in infected pregnant women or 16.4 years in non-infected pregnant women, the average gestational age for measuring FT3, FT4, and TSH, with an average of 8.7 weeks for pregnancy.

This study indicates substantial differences between infected pregnant women and non-infected non- pregnant women in the association between FT3 and FT4 rates. Studies that are identical to this one have contracted the infection (Craig et al., 2012). A FT3 shortage during pregnancy was discovered by Poison and colleagues, whereas FT4 increased. The peak lasts for nine to thirteen weeks (Dosion et al., 2012). The alterations in FT4 levels in our study's pregnant women who weren't affected were virtually identical to those seen in earlier research. We also discovered that the FT4 level the greater level of FT3 during the first trimester is similar to what was discovered in the research (Finken et al., 2013). It appears that

many traits, including living situations and social customs, are shared among the various research target groups. On the other hand, the results observed are discordant with certain research in this field. Levels of FT3 and FT4 are noticeably lower, according to (Fumarola et al., 2013). In addition, Julaves notes that TSH levels began to progressively rise around the halfway point of pregnancy (Julves et al., 2012). However, the fact that our samples were taken during the first trimester of pregnancy may account for the discrepancy between our trials and theirs.

Readings revealed that the levels of aberrant thyroid hormones and those of normal thyroid hormones in the afflicted group and the control group differed significantly from one another. In the group in which the thyroid gland activities are aberrant, the TSH level rises but the FT4 is normal, which suggests that the hypothyroidism is of a subclinical kind (Reid et al., 2013). Additionally, according to (Soccia et al., 2012), the intermediate hypothyroidism did not worsen**.**

Conclusions

20% of our population was found to have a goiter deficit, compared to 15% of pregnant women and 5% of non-pregnant women. Whereas 15% of pregnant women in our community had goiter deficiency, according to the study, there is a substantial difference in the levels of the hormones FT3, FT4, and TSH in pregnant and non-pregnant women. Pregnant women had average TSH levels that were greater than those of non- pregnant women. However, when comparing infected patients to control groups, these data showed significant differences between aberrant thyroid hormone levels and normal hormone levels at the level of P 0.05. In the control group, there is a strong correlation between age and both FT4 and FT3. Thyroid function and gestational age do not differ in any notable ways.

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