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Raising Awareness of the Pregnant Women with Regard to the Importance of Thyroid Hormonal Assay during Early Antenatal Care

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Abstract
Background
Thyroid disorders; thyroid creates and produces hormones that play a role in many different systems throughout body. When thyroid makes either too much or too little of these important hormones, it's called a thyroid disease. There are several different types of thyroid disease, including hyperthyroidism, hypothyroidism, thyroiditis and Hashimoto's thyroiditis. ***Aim of the study:*** *to raise awareness of the pregnant women regard to the importance of thyroid hormonal assay during early antenatal care.* ***Research design:*** *Quasi experimental research design was be used in this study.* ***Sample:*** *Purposive sample of 60 pregnant women at antenatal care.* ***Tools:*** *Two tools were be used to collect the data: Tool 1: Interviewing and Questionnaire Sheet, that included three parts, Part I: Socio Demographic Data, Part II: Health Relevant Information, Part III: Knowledge Assessment Sheet, Tool 2: Thyroid Hormonal Analysis.* ***Result:*** *showed that, the majority of the studied pregnant women demonstrated wrong answer or were didn't know the thyroid gland items before intervention. The difference was significant statistically. This result improves our research hypothesis which state "the pregnant women awareness regard to the importance of thyroid hormonal assay during early antenatal care will be improved".* ***Conclusion:****current study concluded that there was a relation between raising awareness about thyroid disorders for pregnant women during antenatal care and results of pregnancy for mother and fetus. The result supported the research hypothesis.* ***Recommendations:*** *Continuous follow and research on thyroid disorders and its relation with pregnancy on a large sample and apply thyroid gland analysis routinely during antenatal care for pregnant women*

Key words *Thyroid; Hypothyroidism; Hyperthyroidism; Pregnancy; Screening, Antenatal Care.*

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I. Introduction:

The thyroid is a butterfly-shaped gland that sits low on the front of the neck. Thyroid lies below Adam's apple, along the front of the windpipe. The thyroid has two side lobes, connected by a bridge (isthmus) in the middle. When the thyroid is its normal size, human can't feel it. Brownish-red in colour, the thyroid is rich with blood vessels. Nerves important for voice quality also pass through the thyroid **(Ghassabian et al., 2019).**

The thyroid secretes several hormones, collectively called thyroid hormones. The main hormone is thyroxine, also called T4. Thyroid hormones act throughout the body, influencing metabolism, growth and development, and body temperature. During infancy and childhood, adequate thyroid hormone is crucial for brain development **(Alexander et al., 2017).**

Thyroid disease is a general term for a medical condition that keeps thyroid from making the right amount of hormones. Thyroid typically makes hormones that keep body functioning normally. When the thyroid makes too much thyroid hormone, body uses energy too quickly. This is called hyperthyroidism. Using energy too quickly will do more than make body tired — it can make heart beat faster, cause body to lose weight without trying and even make human feel nervous **(Negro and Stagnaro-Green, 2020)**

On the flip-side of this, thyroid can make too little thyroid hormone. This is called hypothyroidism. When body have too little thyroid hormone in body, it can make body feel tired, body might gain weight and may even be unable to tolerate cold temperatures **(Yoshihara et al., 2019)**

Thyroid diseases are common in women of childbearing age and it is well known that untreated thyroid disturbances result in an increased rate of adverse events, particularly miscarriage, preterm birth and gestational

hypertension. Furthermore, thyroid autoimmunity seems to be associated with complications such as miscarriage and preterm delivery **(Medici et al., 2020).**

While strong evidence clearly demonstrates that overt dysfunctions (hyper- or hypothyroidism) have deleterious effects on pregnancy, subclinical disease, namely subclinical hypothyroidism, has still to be conclusively defined as a risk factor for adverse outcomes. Additionally, other conditions, such as isolated hypothyroxinemia and thyroid autoimmunity in euthyroidism, are still clouded with uncertainty regarding the need for substitutive treatment **(Attina et al., 2016).**

In the last twenty years there has been a substantial increase in understanding of the importance of thyroid hormones for maintaining a successful pregnancy and foetal development, especially with regard to its neurological development. In particular, there has been a growing appreciation that maternal thyroid hormone levels are especially important in the first half of pregnancy whilst the foetal thyroid is developing **(Pillar et al., 2020).**

Significance of the study:

According to the World Health Organization **(WHO. 2020),**about 500 million people worldwide, about 10 percent of thr world's population, suffer from thyroid disorders, 6 percent of women especially at ages from 20 to 45 years, 3 percent of men and about 1 percent of children especially theages between 10 to 16 years. About 5 percent of pregnant women suffer from thyroid disorders around the world, about 3 percent of them suffer from hypothyroidism and about 2 percent of them suffer from hyperthyroidism.

According to American Thyroid Association Guidelines **(ATA, 2020)**, the percentage of pregnant women with thyroid disorders about 3 percent, 2 percent suffer from hypothyroidism and about 1suffer from hyperthyroidism.Thyroid disorders are a common problem in pregnant women which may lead to many complications. Thyroid disorders are common in pregnancy, and the most common disorder is subclinical hypothyroidism.

Aim of the Study

The aim of the study was to raise awareness of the pregnant women with regard to the importance of thyroid hormonal assay during early antenatal care .

II. Subjects and Methods

Research design:

A Quasi experimental research design.**Setting:**Obstetric clinic - Central Ibshaway Hospital- Fayoum Governorate – Egypt.**Sampling:** purposive sample **(60 pregnant women)** was selected according to inclusion and exclusion criteria.

Tools for data collection:

Two tools were used for data collection:

1- Interviewing and Questionnaire Sheet:

This tool was developed by the investigator based on literature review and include three parts.

1- Socio Demographic Data:

It was concerned with Socio Demographic data of the pregnant women such as age, marital status, educational level, occupation and residence.

2- Health Relevant Information:

Which consist of the following items; present diagnosis, medical history, thyroid health history, surgical history, menstrual history, life style and current history of medications.

3- Knowledge Assessment Sheet: (pre and post)

It was concerned with the information about thyroid gland and thyroid disorders pre and post the educational session, such as; definition, location and its function. This sheet was administered two times (pre and post).

2- Thyroid Hormonal Analysis:

This tool involves laboratory tests related to (Thyroid Hormones) according to normal ranges as: TSH (0.49 – 4.67 ulu/ml), T3 (0.79 - 1.49) ng/dl and T4 (4.5 - 12 ug/dl). This adopted from **Central Department Of Laboratories, Ministry Of Health In Egypt. (2015)**.

Preparatory phase:

During this phase, the researcher reviewed related current and past, local and international literature and theoretical knowledge of various aspects of the study using books, articles, internet and magazines to get more acquainted with the problem and develop tools for data collection.

III. Administrative item:

An official permission was secured through a letter from the dean of faculty of nursing - Helwan University and the director of The Central Ibshaway hospital in Fayoum Governorate before starting the study. The letter explained the aim of the study for obtaining the permission for data collection.

Ethical considerations:

An approval was obtained from a scientific research ethics committee of the faculty of nursing - Helwan University and an informed consent was obtained from the pregnant women individually before starting the study, and after The aim and objectives of the study was clarified to the pregnant women included in the study by the investigator. Pregnant women were assured that anonymity and confidentiality were guarantee. They were also informed that they are allowed to choose to participate or withdraw from the study at any time, Ethics, culture, values were respected.

Pilot study:

A Pilot study was conducted on a sample of 6 cases, to test the applicability, clarity, efficiency and feasibility of the tools, no necessary modifications were carried out and tools finalized, so they were included in the study sample.

Field work:

- The study started after obtained the needed aapproval of the pregnant women agreement to participate in the study.
- The study was conducted from the beginning of September 2019 to the end of November 2019.
- The investigator attended to the study setting two days weekly from 10 Am to 2 Pm.

Each interview with each pregnant woman take from 15 to 20 minutes.

- The interview performed individually with each pregnant woman begin with questions about name, age, marital status then about medical and surgical history and followed by questions regard thyroid gland and thyroid gland disorders especially with pregnancy.
- Each interview with each pregnant woman take from 15 to 20 minutes.
- Appointment with the obstetrician and assessed the pregnant women to discover any thyroid disorder during the antenatal care. Through this step the obstetrician asked each woman to make the following analysis (TSH, T3and T4).
- The obstetrician and the investigator discussed with the pregnant woman the medical and surgical history especially about the thyroid gland, observe any signs and symptoms of thyroid gland disorders and applied physical examination.
- The investigator took permission from the pregnant woman to withdrawal a sample analysis of thyroid gland hormones (TSH, T3 and T4) to discover any thyroid disorders.
- The sample analysis of thyroid gland hormones implemented at previous laboratory.
- The specialist describe a curative programme for the cases according the status (Hyperthyroidism or Hypothyroidism).
- The cases with thyroid disorders referred to the specialist.
- The pregnant women with thyroid disorders and the fetus followed-up during the period of the study through; observe signs and symtomps on pregnant women, apply physical examination of thyroid gland, withdraw a sample analysis of thyroid gland hormones and apply sonography to follow up the fetus status.
- The investigator implemented three educational sessions through the three months of the study. Each educational session implement monthly, take from 45 to 60 minutes and implemented for 20 pregnant women approximately that includes lecture with pregnant women about thyroid gland and thyroid gland disorders then explanation about thyroid gland, thyroid gland disorders, importance of thyroid gland analysis during antenatal care, ways of coping with thyroid gland discussion during pregnancy and at the end the lecture the investigator give them the tool again to evaluate pregnant women informations after the lecture .
- The investigator evaluate the information about thyroid and thyroid disorders among pregnant women immediately after the educational session through the tool of the study.
- The investigator explain to pregnant women with thyroid gland disorders how to follow-up their status and the fetus status through; observe signs and symtomps on pregnant women, apply physical examination of thyroid gland, withdraw a sample analysis of thyroid gland hormones and apply sonography to follow up the fetus status.

IV. Statistical item:

Data was coded and transformed into specially designed form to be suitable for computer entry process. Data was entered and analyzed by using SPSS (Statistical Package for Social Science) statistical package version 22. Graphics were done using Excel program.

Quantitative data were presented by mean (X) and standard deviation (SD). It was analyzed using student t- test for comparison between two means, and ANOVA (F) test for comparison between more than two means.
Qualitative data were presented in the form of frequency distribution tables, number and percentage. It was analyzed by chi-square (χ^2) test. However, if an expected value of any cell in the table was less than 5, Fisher Exact test was used(if the table was 4 cells), or Likelihood Ratio (LR) test (if the table was more than 4 cells). Level of significance was set as P value <0.05 for all significant tests.

Limitations of the study:-

1. Difficult to find the cases with the inclusion criteria of the study.
2. Difficult to take approval from studied pregnant women to withdraw a laboratory analysis.
3. Difficult to invite the studied pregnant women for educational sessions at the same time.

V. Results

Table (1): Distribution of the studied pregnant women according to the socio -demographic characteristics (N = 60)

Socio demographic characteristics	No.	%
Age (Years):		
Less than 25 years	45	75
equal 25 years	15	25
Residence:		
Rural	44	73.3
Urban	16	26.7
Educational Level		
Illiterate	9	15
Basic education	15	25
Secondary education	19	31.7
University	17	28.3
Occupation:		
House wife	30	50
Hand made work	11	18.3
Employee	19	31.7
Marital status:		
Married	59	98.3
Divorced	1	1.7
Marriage duration groups:		
1 – 3 years	30	50
4 - 6 years	22	36.7
7 – 10 years	8	13.3
Total	**60**	**100**

Table 1 demonstrated that, three quarters (75%) of the studied pregnant women were aged < 25 years, approximately three quarters live at rural areas (73.3%), and more than one third of them had secondary school or a technical diploma (31.7%). Concerning occupation, half of them were housewives, and more than one third of them were employee. As regards marital status and duration of marriage, 98.3% of them were married and half of them were married for 1 – 3 years.

Table (2): Health relevant information among studied pregnant women (N=60)

Health relevant information	N0.	%
Suffering from chronic. disease:		
Yes	0	0
No	60	100
Had surgeries before: (such as abcesses, tonsillectomy, vision repair surgery and appendicitis)		
Yes	36	60
No	24	40
Implement laboratory analysis for thyroid hormones		
Yes	10	16.7
No	50	83.3
Total	**60**	**100**

Table 2 demonstrated that no one of studied pregnant women was suffering from chronic disease. Majority of studied pregnant women had a history of performing surgeries (60%). This was unexpected result as three quarters of studied women (75%) were <25 years old, but may be due to the fact that 40 % of current study participants were either illiterate or basically educated which reflect a misunderstanding in meaning of surgery as; opening an abscess, or extraction of a tooth. All studied pregnant women denied that they suffer from thyroid dis-function (100%). However 16.7% of them mentioned that they perform laboratorial analysis for thyroid hormones.

Table (3): Distribution of the studied pregnant women according to their knowledge about thyroid gland before intervention (n = 60)

Variable (pre)	Wrong answer and I don't know		Incomplete correct answer		Complete correct answer	
	No	%	No	%	No	%
1. Definition of thyroid gland	40	66.7	14	23.3	6	10
2. Location of thyroid gland within human body	37	61.7	23	38.3	0	0
3. The function of the thyroid gland	45	75	14	23.3	1	1.7
4. Importance of thyroid hormone analysis during early antenatal care.	44	73.3	13	21.7	3	5
5. Knowing the effect of thyroid gland disorders on pregnant woman health	49	81.7	10	16.6	1	1.7
6. Knowing the symptoms of the thyroid gland disorders complained by the pregnant woman	47	78.3	12	20	1	1.7
7. The effect of thyroid gland disorders on health of the fetus	49	81.7	10	16.6	1	1.7
8. Similarity between symptoms of thyroid disorders and symptoms of complicated pregnancy?	54	90	5	8.3	1	1.7
9. Safe thyroid treatment during pregnancy	55	91.7	3	5	2	3.3
10. Completing pregnancy safely, can happened after the treatment of disorders of the thyroid gland during pregnancy.	53	88.3	4	6.7	3	5
Mean total score	**12.5 ± 1.7**					

Table 3 shows that, the majority of the studied pregnant women demonstrated wrong answer or were didn't know the thyroid gland items before intervention. 73.3%, 75%, 81.7%, and 91.7% were don't know or showed wrong answer regarding the importance of thyroid hormone analysis during early antenatal care, thyroid gland' function, its disorder effect on pregnancy, and its safe medications that can be used during pregnancy, respectively. However, only 1.7% of them correctly know its effect on the fetus. The mean total score of studied mothers knowledge about thyroid gland before intervention was 12.5 ± 1.7.

Table (4): Distribution of levels of total knowledge about thyroid gland pre and post intervention among studied pregnant women (N=60)

Items	Pre –intervention				Post intervention				P value
	Poor knowledge (10-19)		Good kn. (20-30)		Poor kn. (10-19)		Good kn. (20-30)		McNemar test = 7.2,p=0.000
	No	%	No	%	No	%	No	%	
	56	93.3	4	6.7	0	0	60	100	
Range	10 – 16				25 – 29				
Mean ± SD	12.5 ± 1.7				28.3 ±0.8				Tpaired=9.4, p=0.000 HS

Table (4) highlights the efficacy of the intervention for the knowledge aspects of the studied mothers. Post intervention revealed a highly significant improvement (p<0.0001) in the total knowledge about thyroid gland. The post' good knowledge responses was 100% compared to 6.7% in preintervention. In addition the mean total score of knowledge. Increased from 12.5 ±1.7 pre intervention, to 28.3 ±0.8 post intervention. The difference was significant statistically (p,0.0001). This result improve the research hypothesis which state " the pregnant women awareness regard to the importance of thyroid hormonal assay during early antenatal care will be improved".

Table (5): Thyroid gland hormonal profile among studied pregnant women (N=60)

Thyroid gland hormonal profile	Frequency	Percent
TSH levels		
Low TSH (< 0.48 ulu/ml)	7	11.7
Normal TSH (0.48 - 4.67ulu/ml)	34	56.7
High TSH (> 4.67ulu/ml)	19	31.7
T3 levels		
High T3 (> 1.49ng/dl)	60	100
T4 levels		
Normal T4(0.49 - 4.67 ug/dl)	2	3.3
High T4(> 4.67 ug/dl)	58	96.7
Total	**60**	**100.0**

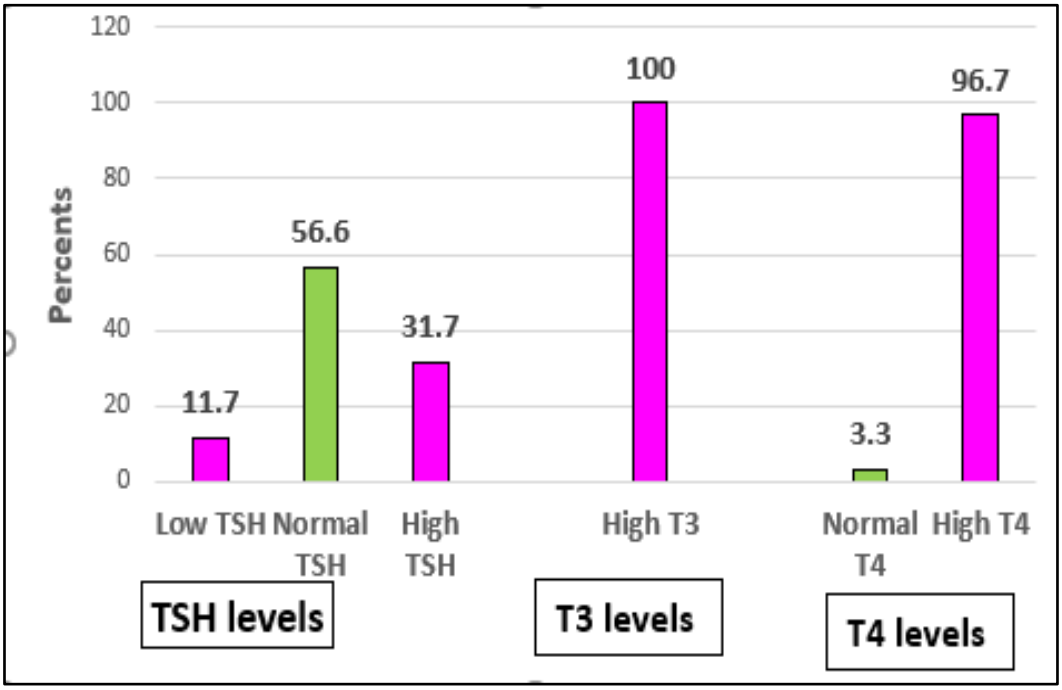

Figure (1): Thyroid gland hormonal profile of studied pregnant women (N=60)

Table 5 and Fig. 1 demonstrated the pregnant women's hormones levels through laboratory analysis. Unfortunately all studied pregnant women had high level of T3, more than 90 % of them had high level of T4 (96.7%), and more than one third of them had high level of TSH (31.7%). More than half of pregnant women had normal TSH (56.6%). And this mean that is important to examine thyroid gland hormones during antenatal care.

Discussion

Regarding Socio-demographic Characteristics, The finding of the current study revealed that, three quarters of the studied pregnant women were aged < 25 years. As regards marital status and duration of marriage, the majority of them were married and half of them were married for 1 – 3 years. These results was in the same line with **(Al Hadid*et al.*, 2018)** who conducted a study about the relationship between Iodine Nutrition, Thyroid Function and Obstetrical Outcomes for Jordanian Pregnant Women,whostated that, more than half of women under study their age ranged between 21-<25 years. also, the majority of them were married.

The current study revealed that, approximately three quarters live at rural areas, and more than one third of them had secondary school or a technical diploma. The present study was consistent with**Refaat and Azzeh (2020)** who conducted a study about factors associated with thyroid disorders and iodine adequacy in pregnant saudi women**,** who reported that less than two fifth of the studied women had secondary education. Also, (**Andersen, Andersen, Vestergaard, and Olsen, 2018)** who conducted study about maternal thyroid function in early pregnancy and child neurodevelopmental disorders: a Danish nationwide case-cohort studyreported that the majority of studied women were residing in rural areas.

From the researcher point of view, this finding may be due to the association between low of educational level and exposure to thyroid disorders. Also, this shed the light on the importance of strengthening the rural areas with proper health care services in order to fulfill their residences needs of effective and efficient health services.

Concerning occupation, the current study revealed that half of the studied pregnant women were housewives, and more than one third of them were employee. This result supported a study performed by **Momtazan et al. (2017)** who conducted study about risk factors accelerating hypothyroidism in pregnant women referred to health centers in Abadan, Iran, who stated that the majority of the women were housewife. From investigator view, these results might be due to social beliefs which play an important role, such as considering women's work outside the home unnecessary.

Also, the current study revealed that, all studied pregnant women reported that they suffer from thyroid disfunction. However, about one-fifth of them mentioned that they perform lab. analysis for thyroid hormones. previously these results supported with the study done by **(Xing et al., 2016)** who conducted study about trimester-and assay-specific thyroid reference intervals for pregnant women in China who revealed that, more than one quarter of the studied sample perform lab investigations as thyroid functions.

From the researcher point of view, this result may be due to the association between low of educational level, low income and the neglection of the cause of performing lab investigations. This finding shed the light about the importance of explaining to .

Related to pregnant women' knowledge about thyroid gland before intervention, the current study revealed that, the majority of studied pregnant women were don't know or showed wrong answer regarding the importance of thyroid hormone analysis during early antenatal care, thyroid gland' function, respectively. These results supported with the study done by **Rai et al. (2016)** who conducted study about assessment of knowledge and awareness regarding thyroid disorders among women of a cosmopolitan city of central Indiawho indicated that, Overall females have inadequate knowledge and many misconceptions regarding thyroid galand and its disorders. From the researcher point of view, this result may be due to lack of guidance and instructions about thyroid galand to those pregnant women.

Also, the current study revealed that, the majority of studied pregnant women were don't know or showed wrong answer regarding the thyroid gland' disorder effect on pregnancy, and its safe medications that can be used during pregnancy, respectively. However, only 1.7% of them correctly know its effect on the fetus. The mean total score of studied mothers knowledge about thyroid gland before intervention was 12.5 ± 1.7. These results supported with the study done by **Muthukumar and Mohanraj (2019)** who conducted study aboutprevalence, knowledge, and awareness of thyroid disorders among young adult women populationwho reported that, the majority of the studied women had unsatisfactory knowledge about complications of thyroid disorder and the safe medications that can be used during pregnancy.

From the researcher point of view, Bad level of knowledge, it could be a matter of service quality and they did not receive adequate amount of information and health education about the disease and its management at the health care facility.

Concerning to the levels of knowledge about thyroid gland pre and post intervention among studied pregnant women, the current study revealed that, there was a highly significant improvement in the total knowledge about thyroid gland post intervention program. The post program' good knowledge responses was 100% compared to 6.7% in preintervention. In addition the mean total score of knowledge increased from 12.5 ±1.7 pre intervention, to 28.3 ±0.8 post intervention. This result improves our research hypothesis which state "the pregnant women awareness regard to the importance of thyroid hormonal assay during early antenatal care will be improved". This result similar with the result of study performed by **Algaid, Mohammad, Mohsen, Sahar, and El Samie, 2019)** who conducted study about effect of nursing instructions on life style of Patients receiving radioactive iodine therapy for thyroid disorders who stated that, there was an improvement in knowledge level after implementation of the nursing instructions in the study group, 86.7%.

From the researcher point of view, this reflects the positive effect of educational instructions on modifying knowledge of those women.

The present study revealed that, there were no statistically significant differences between the total score of pre intervention knowledge about the importance of thyroid hormone analysis during early antenatal care and the pregnant women' socio-demographic characteristics such as age, education, residence and occupation. This could be explained as, the majority of the studied sample who were < 25 years old had poor knowledge score, (P > 0.05). also the majority of them who had University education had poor knowledge score (P > 0.05). This findings agree with study achieved by **Rai et al. (2016)** who conducted study about assessment of knowledge and awareness regarding thyroid disorders among women of a cosmopolitan city of central Indiawho mentioned that ge, education and marital status of the studied sample didn't have a significant effect on their levels of total knowledge about thyroid disorders. In the same field **(Algaid et al., 2019)** who conducted study about effect of nursing instructions on life style of patients receiving radioactive rodine therapy for thyroid disorderswhorevealed that there were no statistically significant differences between the total score of knowledge about thyroid disorders and women' socio-demographic characteristics such as residence and occupation.

In relation to their marital status characteristics, there was no statistical significant difference between married and divorced pregnant women regarding their total score of knowledge, although married women showed higher percentage of good knowledge. This result may be due to the small sample size of divorced in our study. Women married for 7-10 years showed higher percentage of good knowledge than women married for 1-<4 years, however the difference was not significant statistically (p>0.05). This findings agree with **Muthukumar, and Mohanraj (2019)** who conducted study aboutprevalence, knowledge, and awareness of thyroid disorders among young adult women population who mentioned that, there were no statistically significant differences between the total score of knowledge about thyroid disorders and women' marital status.

Regarding to thyroid gland hormonal profile among studied pregnant women, the present study revealed that, all studied pregnant women had high level of T3, the majority of them had high level of T4, and more than one third of them had high level of TSH. More than half of pregnant women had normal TSH. This result agrees with **Johns et al. (2018)** who conducted study aboutsubclinical changes in maternal thyroid function parameters in pregnancy and fetal growth. The Journal of Clinical Endocrinology & Metabolism **and Vrijkotte et al. (2017)** who conducted study aboutearly maternal thyroid function during gestation is associated with fetal growth, particularly in male newborns who mentioned that all studied pregnant women had high level of T3, T4 and TSH.

VI. Conclusion

The current study concluded that, This results supported the research hypothesis which state " the pregnant women awareness regard to the importance of thyroid hormonal assay during early antenatal care will be improved".

Recommendations

- In the light of the current study finding, the following recommendations are suggested:

○ Create educational sessions about thyroid gland and thyroid gland disorders during pregnancy regularly for women especially who search for pregnancy in obstetric clinics and MCH.

○ Make awareness campaigns for women about importance of thyroid gland and problems of thyroid disorders during pregnancy for mother and fetus.

Future Recommendations:-

- Assessment of thyroid function must be included in the routine investigations for every pregnant woman during antenatal care.

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