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Original Research Paper

Medicine

THYROID PROFILE AMONG PREGNANT WOMEN ATTENDING AT MATERNITY AND CHILDREN HOSPITAL, QASSIM.

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ABSTRACT

Introduction: Thyroid gland that regulate the body's metabolic rate controlling heart, muscle and digestive function, brain development and bone maintenance. Thyroid problems are quite common in pregnancy and can be affected both maternal and foetal, also can lead to various adverse outcomes. **Methods:** This was a cross-sectional study conducted at Maternity and Children Hospital, Qassim, Saudi Arabia. Study participants data included from July 2020 to March 2021 and included all the women attending the antenatal clinics subjected for thyroid function test. The sample size of 195 and analyzed for thyroid hormone profile which included free T3, free T4, TSH and haemoglobin (HGB) levels. The data were retrieved from the electronic files of pregnant women at Maternity and Children Hospital and appropriate statistical tests were applied. **Results:** In the current study, mean age and standard deviation observed in the study population was 34.87 ± 5.67 and 53.8% were in the age group of 31-40 years age group, sub clinical hypothyroidism was 9.2%. Among the pregnant women, about 16.4% were Diabetes and 8.7% were having gestational Diabetes. Mean haemoglobin and standard deviation was 11.24 ± 1.29. There was statistically significant association was observed between personal history of thyroid disease versus classification of thyroid disease in the study population. (87.4% and 15%, P<0.001). **Conclusions:** Based on the study findings, increase prevalence of Diabetes and Gestational Diabetes was more among the pregnant thyroid people. Relatively Hypothyroid, hyperthyroid and sub clinical hypothyroidism was more in the present study. Nearly close to half (44%) of pregnant women thyroid status was only controlled. Still, there is health education and counselling sessions periodically required to the women visiting at MCH hospital with thyroid disorder.

KEYWORDS : Thyroid control status, gestational diabetes, Buraidah, MCH hospital, Saudi Arabia.

Background:

The thyroid tissue is made up of glands that produce, store, and release hormones into the bloodstream so the hormones can reach to all body organs. It is a gland that controls all metabolic system, regulation of your weight, energy levels, internal temperature, skin, hair, even nail growth and more [1]. Pregnancy is a normal physiological event and is associated with changes in body organs. Thyroid hormones are indispensable for normal development of baby brain and nervous system.

The developing embryo/foetus is dependent on maternal supply of thyroid hormone [2]. Thyroid hormone is essential for foetal development and maturation. Until the foetus synthesizes its own thyroid hormones, it is dependent on the thyroid hormone that passes through the placenta from the mother [3], so early detection and management of thyroid diseases can prevent various complication on maternal and foetus.

Pregnant women are affected by thyroid dysfunction closely 2-3%. Hyperthyroidism occurs in 0.2%–0.4% of pregnant women and is most associated with Grave's disease. The incidence of hypothyroidism in pregnancy is between 0.5%–3.5%. Hashimoto's thyroiditis is its most common cause, but it is also seen in regions with iodine deficiency [4]. Subclinical hypothyroidism is associated with increased TSH levels and normal serum T4 values and is more common than overt hypothyroidism. Sub clinical hypothyroidism prevalence among pregnant women in Riyadh study was 13% [5].

A retrospective study done at the Haydarpaşa Numune Training and Research Hospital between January 2014 and January 2015 revealed that the prevalence of thyroid dysfunction was 13.2% in study population. Thyroid dysfunction had no adverse effects on birth weight, caesarean section rates, and Apgar scores [6].

A study conducted in Ujjain, India among women with subclinical and overt hypothyroidism and revealed that anaemia was present as 26.3% among the pregnant women, being significantly associated with hypothyroidism (P =0.008) [7]. A cross-sectional study was conducted at Tehran-Iran and stated that subclinical hypothyroidism and overt hypothyroidism were shown as 131 (89.1%) and 16 (10.9%) women respectively [8], another study conducted in North India, mean age and standard deviation as 25±11.1 yrs and 18.5% of subclinical hypothyroidism status [9].

Many studies mentioned and stated that prevalence of thyroid status, adverse outcomes mentioned with thyroid problem among the pregnant women. Very less studies mentioned about control of thyroid condition during pregnancy in relation to trimester level and TSH level. In view of the above conditions, we aimed to conduct the study in our Province at Maternity and Child Hospital to know the thyroid control status and associated factors with thyroid condition.

Objectives:

This study was designed to determine the prevalence hyperthyroidism, hypothyroidism and subclinical hypothyroidism and to find the demographic features in the study population. And to determine the demographic and risk factors associated with hypothyroidism among pregnant women attending at Maternity and Children Hospital, Qassim.

MATERIALS AND METHODS:

Description Of The Study Area And Location:

Buraidah is the capital city of Al-Qassim Region. In this region,

there are many hospitals, of which one of the specialized hospital meant for Maternity and Children health care including preventive, promotive and curative healthcare services.

Study Design And Setting:
This was a cross sectional record review study carried out at Maternity and Children Hospital, Qassim, Saudi Arabia from 2020-2021. All women attending the antenatal clinics and participants aged above 20 years will be selected for thyroid function test.

Sampling Method:
Systematic random sampling method was applied. Data retrieved and records verified for the current study at the Maternity and Children Hospital during the period from July 2020 to March 2021 period. During this period, total numbers of patients available records with TSH report was 1020. Approximately every 5th patient record was taken till the completion of our sample 195.

Sample Size:
Our sample size was calculated, based on the previous study conducted in National guard Health affairs, Riyadh in the year 2016 revealed as subclinical hypothyroidism reported as 13% [5]. Based on 13% prevalence, 95% confidence interval and precision of the study was 0.05 and all these parameters applied in WHO statistical package for sample size calculation and we got sample of 174. So, our sample size was 174 participants [10]. But, we took 195 sample details in our study to maintain the more precision.

Target Population:
All female pregnant patients who visited the Maternity and Children Hospital, during their antenatal clinic for regular follow-up visit with the indication TSH investigation.

Criteria:
The study population included all female pregnant patients, who visited the Maternity and Children Hospital, antenatal clinic for their regular follow-up visit.
1. Adult females aged >20 years.
2. Saudi and non-Saudi patients.
3. Pregnant women, who completed the TSH level.

Exclusion Criteria:
1. Non pregnant women and not completed TSH level in the Medical records section excluded from the study.

Questionnaire:
Questionnaire consists of mainly two parts. First part related basic demographic information like age, nationality of the participant and second part included all specific details like height, weight, body mass index, family history of certain chronic diseases, thyroid profile details (T3, T4 and TSH) and related to the study objectives. Questionnaire was developed based on the objectives and available information in Medical record section. Regarding the validation of questionnaire about the study and its objectives, initially discussed with experts in the field of Research, Supervisor and Family Medicine consultants. Later, discussed about questionnaire with Consultants working at MCH hospital and also taken some concepts from them.

Ethical Considerations:
After obtaining the Institutional Ethical Committee (IEC) certificate and permission from concerned MCH Hospital Director, Buraidah, the data collection and execution of the study started. Institutional ethical committee certificate was received from Regional Ethics committee, Buraidah, Qassim province, registered at National Bio & medical ethics committee, registration No: H-04-Q-001. Privacy and confidentiality of individual record information was maintained.

Data Analysis:
Data was entered in SPSS 21.0 version. Statistical analysis was done by using the statistical software SPSS version. A descriptive analysis was done (Percentages, means and standard deviation) for certain variables like age, gender and nationality. For the categorical analysis of variables chi square test was applied. The level of significance of probability (P) was considered as 'p' less than equal to 0.05.

Pilot Study:
Initially pilot study was done and collected 30 patients information. These pilot study subjects information was not included in the main study. The main purpose of the pilot study to see the technical feasibility in our study.

RESULTS:
In the current study, mean age and standard deviation in the study population was 34.87 ± 5.67 and range of the age from 22 years to 48 years of age. About 75 percent of the study group under 39 years of age group. In this study, almost 100% of distribution of females as study conducted among the pregnant women. Data was collected in the month of November 2021 from the MCH hospital and those participants visited during the period from July 2020 to March 2021 as we mentioned in the Research study proposal time. In the present study thyroid control status classified based on the Gestational age and TSH level according to trimester and classified into 3 categories, as controlled, uncontrolled and lastly not applicable in case of sub clinical hypothyroidism, hyperthyroidism and normal people.

Table: 1 - Demographic Characteristics Among The Pregnant Women Attending At Mch Hospital

Demographic factors	Number of participants	Percentage
Nationality - Saudi	191	97.9
Non Saudi	4	2.1
Age ± SD	34.87 ± 5.67	
Age Category		
20-30 years	45	23.1
31-40 yrs	105	53.8
> 40 yrs	45	23.1
Total	195	100

Table- 1 depicts that about 97.9% were Saudi population. Mean age observed in the study population was 34.87 ± 5.67 and majority (53.8%) were in the age group of 31-40 years age group.

Table: 2 - Prevalence Of Subclinical, Hypo And Hyper Thyroidism Status In The Study Population:

Thyroid status	Number	Prevalence
Subclinical	18	9.2
Hypo thyroidism	127	65.1
Hyper thyroidism	7	3.6
Normal people	43	22.1

Table 2 stated that in the study population, about 65.1% were hypo thyroid people and hyper thyroid people were only 3.6%.

Table: 3 - Chronic Diseases Status In The Study Population.

Chronic disease	Yes	No	Total
Diabetes	32 (16.4%)	163 (83.6%)	195 (100%)
Gestational Diabetes	17 (8.7%)	178	195 (100%)
Hypertension	09 (4.6%)	186 (95.4%)	195 (100%)
IHD	0 (0%)	195 (100%)	195 (100%)
Thyroid	135 (69.2%)	60 (30.8%)	195 (100%)
Anaemia	59 (30.3%)	136 (69.7%)	195 (100%)

Table 3 revealed that in the study population, about 16.4% were Diabetes and 8.7% were gestational Diabetes, only 4.6% were having hypertension.

Table: 4 - Means And Standard Deviations Of Some Demographic And Biochemical Quantitative Variables.

Variables	Mean ± Standard Deviation	Range
Age	34.87 ± 5.67	22-48 yrs
BMI	31.97 ± 6.20	15.40 - 50.70
Haemoglobin (HGM)	11.24 ± 1.29	7.50 - 13.60
Gestational Age	25.45 ± 7.95	4 - 39 weeks
TSH	3.29 ± 5.14	0.01 - 49.50
FT3	5.13 ± 0.98	3.50 - 8.30
FT4	9.32 ± 2.42	2.66 - 19.0

Table 4 revealed that in the study population, mean age and standard deviation was 34.87 ± 5.67, mean body index and standard deviation was 31.97 ± 6.20. Similarly mean haemoglobin and standard deviation was 11.24 ± 1.29, range of haemoglobin was from 7.50 gms% to 13.60 gms%.

Table: 5 - Some Demographic And Other Variables Associations With Thyroid Problem

Age Category	Normal	Other Thyroid problem	Hypo thyroid problem
20 - 30 yrs	12 (26.7%)	5 (11.1%)	28 (62.2%)
30 - 40 yrs	22 (21%)	14 (13.3%)	69 (65.7%)
> 40 yrs	8 (17.7%)	7 (15.5%)	30 (66.8%)
X^2 - 1.27, 4 df, P-0.86.			
BMI < 25	5 (21.7%)	5 (21.7%)	13 (56.6%)
BMI > or = 25	37 (21.5%)	21 (12.2%)	114 (66.3%)
X^2 - 1.67, 2 df, P-0.43.			
GDM - No	39 (21.9%)	25 (14.1%)	114 (64%)
GDM - Yes	3 (17.6%)	1 (5.8%)	13 (76.6%)
X^2 - 1.27, 2 df, P-0.52.			
Personal H/o of Thyroid - No	39 (65%)	12 (20%)	9 (15%)
Personal H/o of Thyroid - Yes	3 (2.2%)	14 (10.4%)	118 (87.4%)
X^2 - 112.33, 2 df, P-0.001.			
GA - 1st trimester	5 (22.7%)	2 (9.0%)	15 (68.3%)
GA - 2nd trimester	19 (26.3%)	10 (13.9%)	43 9 (59.8%)
GA - 3rd trimester	18 (17.8%)	14 (13.8%)	69 (68.4%)
X^2 - 2.29, 4 df, P-0.682.			

Table 5 stated that more than 40 years age group, hypothyroid problem was 66.8%. There was gradual increase of hypothyroid problem as age increases. More than 25 BMI individuals, hypothyroid problem was 66.3% and less than 25 BMI persons, hypothyroid problem was 56.6%. Among 3rd trimester attendees, hypo thyroid problem was 68.4%, relatively than that of 2nd trimester.

Table: 6 - Some Chronic Disease Condition Variables Associations With Thyroid Control Status.

Age Category	Control	Uncontrolled	Not Applicable
20 - 30 yrs	22 (48.9%)	10 (22.2%)	13 (28.9%)
30 - 40 yrs	44 (41.9%)	36 (34.3%)	25 (23.8%)
> 40 yrs	20 (44.4%)	16 (35.6%)	9 (20%)
X^2 - 2.79, 4 df, P-0.59.			
HTN - No	84 (45.2%)	58 (31.2%)	44 (23.7%)
HTN - Yes	2 (22.2%)	4 (44.4%)	3 (33.3%)
X^2 - 1.83, 2 df, P-0.40.			
DM - No	67 (41.1%)	55 (33.7%)	41 (25.2%)
DM - Yes	19 (59.4%)	7 (21.9%)	6 (18.7%)
X^2 - 3.66, 2 df, P-0.16.			
Anaemia - No	56 (45.9%)	32 (26.2%)	34 (27.9%)
Anaemia - Yes	23 (39%)	26 (44.1%)	10 (16.9%)
NA	7 (50%)	4 (28.6%)	3 (21.4%)
X^2 - 6.59, 4 df, P-0.15.			
GA - 1st trimester	7 (31.8%)	9 (40.9%)	6 (27.3%)
GA - 2nd trimester	27 (37.5%)	22 (30.6%)	23 (31.9%)
GA - 3rd trimester	52 (51.5%)	31 (30.7%)	18 (17.8%)
X^2 - 6.94, 4 df, P-0.14.			

Table 6 revealed that 20-30 years age group, about thyroid control status was 48.9%. There was gradual decrease of hypothyroid control status as age increases. Among the Diabetes people, hypo thyroid control status was 59.4% and Anaemic suffering group thyroid control status was 39%. Relatively good control status of thyroid was observed in 3rd trimester people.

DISCUSSION:

The present study was conducted among pregnant women attending at the Maternity and Children Hospital during the period from July 2020 to March 2021 with the objective of identification of Hypothyroidism prevalence and other factors association with Hypothyroidism.

In the present study, mean age observed in the study population was 34.87 ± 5.67. A study conducted in Iran, among the 147 pregnant women, the mean age and standard deviation was 27 ± 5 and patients age range was 17 - 38 years [8]. Control of hypothyroidism is considered based on the TSH level and trimester level. In case of first trimester, TSH level would less than 2.5 mIU/L and where as in 2nd and 3rd trimester, the TSH level was considered less than <3 mIU/L. Similar classification was adopted in the study conducted in Teleghani University Hospital, Iran [8].

In the present study, we observed 9.2% were having sub clinical hypothyroidism, a previous study conducted in National guard Health affairs, Riyadh in the year 2016 revealed as subclinical hypothyroidism prevalence as 13% [5], 13.7% in Spain [11] and another study mentioned prevalence of hypothyroid condition as 25.5% [12].

Similar study done by Yassaee F, Farahani M et al and revealed that sub clinical hypothyroidism was 4.15% [8], low prevalence (2.3%) of sub clinical hypothyroidism was noticed in the study conducted in Texas, USA by Casey BM, Dashe JS et al in the year 2005 [13].Similarly in other studies conducted at different geographical region, the sub clinical hypothyroidism prevalence was noticed and ranging from 2-5% [14,15].

In the current study, about 65.1% were hypo thyroid people and hyper thyroid people were only 3.6%. Almost same finding was observed in the study done by Fatima SS et al stated that hypothyroid condition reported among 61.5% of women [16]. The high percentage of hypothyroidism could be due to our selection criteria included as TSH indicated study participants and TSH record available people at MCH hospital were included in our study, of which majority already taking hypothyroid medication as MCH hospital was tertiary care set up during their follow up visits. Hence, prevalence was escalated and this picture will not give real accurate magnitude of the problem in hospital settings.

A study conducted by Al Jabri KS et al in Jeddah primary health care centres electronic records from age criteria taken

from 12 to 105 years, the prevalence of Hypothyroidism was reported as 29.1% [17]. In the above study, among hypothyroidism, there were 85.7 % cases were females and also observed male to female ratio was1 to 6.0 [17]. A Study conducted at Teaching hospital in Turkey by Dulek H, Vural F et al in the year 2015 and revealed that thyroid dysfunction was 13.2% and hyperthyroidism was 2.8% [6].

Among the study population, about 16.4% were Diabetes and 8.7% were gestational Diabetes and study conducted in China by Yang S, Shi FT et al in Shangai at International Peace Maternity and Child hospital from year 2013 to 2015 in China revealed that Gestational Diabetes mellitus was observed as 13.44% which prevalence was more than USA and European countries GDM prevalence and also stated that low thyroid levels at early pregnancy is one of the risk factor for developing Gestational Diabetes mellitus [18].

Another study conducted in Iran by Parham M, Asgarani F et al revealed that subclinical hypothyroidism during pregnancy 4 folds increase of Gestational Diabetes mellitus incidence [19]. Another study done in Pakistan by Fatima SS et al revealed that Gestational Diabetes was 6% among hypothyroid patients [16].

We reported mean serum TSH in the study group was 3.29 ± 5.14, respectively while a report from India in 2016 quoted reference values for TSH as 0.47–5.78 (uIU/ml), 0.24–3.61(ng/100 ml) and 0.47–5.1 (ng/100 ml) in 3rd trimester[20], Also in A study was carried out by Marwaha et al [21] in 2008 to establish reference range for thyroid hormones in normal pregnant Indian women. The composition of reference population comprised of 107 women in first trimester, 137 in second trimester, and 87 in third trimester. The trimester wise values in the first, second, and third trimester were TSH (0.6-5, 0.44-5.78, 0.74-5.7 mIU/L).

The prevalence of anemia (hemoglobin level < 11 g/dl), in the present study we recorded haemoglobin levels of pregnant women, the anaemic population prevalence was 30.2% (59/195). A similar study conducted in Jawaharlal Nehru Medical College, KAHER, Belagavi recorded haemoglobin levels of pregnant women which showed 31% of anaemia prevalence [22] (11.11% were mild iron deficient, 16.67% were moderate and 2.78% were severe anaemic.)

This study revealed that the mean (± SD) hemoglobin level of pregnant women was 11.24 ± 1.29 with a range of 7.50 - 13.60 g/dl. The current result obtained in this study was similar with the findings reported in the previous studies carried out in the Bsidimo Hospital 11.4 (±2.3) g/dl [23], Southern Ethiopia 11.9 (±1.4) g/dl [24]. However, it was higher than the reports from Accra, Ghana 10.9 (±1.3) g/dl [25], Karnataka, India 9.6 (±1.63) g/dl [26].

Hypertension remaining the leading preventable risk factor for premature death and disability worldwide. Thyroid dysfunction, both hypo- and hyperthyroidism may increase the risk of hypertension. In the current study, among the study population, only 4.6% were having hypertension. A study done by Berta E, Lengyel I et al and published in the year 2019 stated that hypertension affects 26% of global population, also mentioned that haemodynamic effects of hypo and hyperthyroidism are different, but hypo thyroidism accelerates the increased diastolic blood pressure among 30% of individuals [27]. The prevalence of pulmonary hypertension was more among the hyperthyroid patients [27-29].

One of the limitation of the study is we have taken high risk group and TSH report available people in the study, all the people may not have the other thyroid profile reports like T3 & T4 reports. There is no segregation of exclusive TSH, T3 and T4 reports for pregnant women. This made me lot of time to segregate to collect the data.

CONCLUSIONS:

Based on study results, prevalence of hypothyroid, sub clinical thyroid and hyperthyroid problem was more and half of pregnant women status of hypothyroid condition was controlled. Chronic morbidity like gestational diabetes and anaemia problem also observed more in the present study. There is need to adopt specific changes like Health education and periodic counselling sessions to the participants at MCH Hospital and also life style changes like adherence of hospital appointments and also medical advice and care as a primordial prevention strategy.

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Conflict of Interest: None

Ethical Clearance: Institutional ethical committee approval taken from the Regional ethics Committee, Qassim with approval number is 1443-930705.

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