ejpmr, 2018,(3), 365-371

SJIF Impact Factor 4.897

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

THE PREVALENCE OF THYROID DISORDERS AMONG PREGNANT WOMEN VISITING THE ANC OPD OF MAHATMA GANDHI MEDICAL COLLEGE AND HOSPITAL, JAIPUR

[1]*Dr. Shivani Shekhawat, [2]Dr. Swati Garg, [3]Dr. Urvashi Sharma, [4]Dr. Prateek Suren and [5]Dr. Drishti Jain

[1,4,5]PG. Resident, Dept. of Obst. and Gynae, Mahatma Gandhi Medical College and Hospital, Jaipur.
[2]Professor, Dept. of Obst. and Gynae, Mahatma Gandhi Medical College and Hospital, Jaipur.
[3]Assistant Professor, Dept. of Obst. and Gynae, Mahatma Gandhi Medical College and Hospital, Jaipur.

Corresponding Author: Dr. Shivani Shekhawat

PG. Resident, Dept. of Obst. and Gynae, Mahatma Gandhi Medical College and Hospital, Jaipur.

Article Received on 09/01/2018 **Article Revised on 30/01/2018** **Article Accepted on 20/02/2018**

ABSTRACT

Pregnancy is a physiological state, associated with significant, but reversible changes in thyroid function. There is a 10% increase in size of thyroid gland during pregnancy, as iodine requirement and production of thyroid hormone both increases during pregnancy. Maternal obstetric complications like hyperemesis gravidarum, abortions, pre-eclampsia, abruptio placenta, preterm labour, post partum thyroiditis, thyroid cancer and fetal complications like prematurity, low birth weight, still birth, perinatal death and respiratory distress syndrome are associated with thyroid disorders. Methods: For the prevalence of thyroid disorders during pregnancy, 2000 antenatal cases attending antenatal OPD at Mahatma Gandhi Medical College and Hospital, Jaipur, were studied. Detailed history, clinical examination and routine investigations were done along with thyroid profile. Results: In this study maximum number of patients,17% presented with subclinical hypothyroidism, 3% with subclinical hyperthyroidism,1% with overt hypothyroidism and no patient had overt hyperthyroidism. 9% of subclinical hypothyroidism had positive anti-TPO levels, while 33% of subclinical hyperthyroidism had positive anti-TPO levels. Highest number of patients were belonging to age group 21-25 years (46%) and lowest were under the age group >31 years (8%). Maximum number of patients (84%) were having normal BMI, underweight were (6.5%), overweight (9%) and obese(0.5%). Hindus were (83%), muslims (12%), christians(4%) and sikhs (2%). Conclusion: Looking at the high prevalence of thyroid disorders,21%,(majority being subclinical hypothyroidism 17%, and subclinical hyperthyroidism 3%), universal screening should be a part of routine antenatal investigations to avoid adverse maternal and fetal outcomes.

KEYWORDS: Subclinical Hupothyroidism, Anti-TPO Levels, Antenatal Cases.

INTRODUCTION

Pregnancy is a physiological state, associated with significant, but reversible changes in thyroid function. Thyroid disorders are one of the most common endocrinological disorder all over the world including India.[1] According to some recent researches about 42 million people in India suffer from thyroid disorders.[1] Pregnancy can be viewed as a state in which combination of events occur to modify thyroid economy.[2] Thyroid disorders are more common during pregnancy because there is 10% increase in size of thyroid gland during pregnancy as iodine requirement and production of thyroid hormone both increases during pregnancy.[3]

In early pregnancy mother is the only source of thyroid hormones for the neurological development of the foetus because development and activation of thyroid gland in fetus occurs between 10-12 weeks of gestation.[4] During the 1st 12 weeks of gestation the hCG levels are at peak causing weak TSH receptor stimulation leading to decline in S.TSH (Serum TSH) levels. Stimulation of thyroxine levels suppresses thyrotropin releasing hormone and further decrease in S.TSH.[4] Other changes which cause modification in regulation of thyroid function are increased renal loss of iodine due to increased glomerular filtration rate and modification in iodine transfer to placenta.[4] Through placental circulation fetus receives maternal thyroxine which gets partially converted to fT3 which binds to the receptors in fetal brain and is responsible for fetal brain development. Hypothyroidism is more common than hyperthyroidism during pregnancy.[5] According to some panels the prevalence of hypothyroidism in India ranges from 4.8 to 11%.[3]

Abnormaly high S.TSH levels along with abnormally low thyroxine levels confirms overt hypothyroidism. It is caused by Hashimoto thyroiditis most commonly due to glandular destruction by antithyroid peroxidase antibodies. This is not a common disorder during

pregnancy because it is associated with increased pregnancy loss and infertility.

Markedly decreased amount of S.TSH levels alongwith elevated fT 4 levels confirms hyperthyroidism. Grave's thyrotoxicosis caused by the presence of thyroid stimulating hormone receptor antibodies leads to worsening of the hyperthyroid symptoms during the first half of pregnancy. The symptoms gradually decreased in the later half of pregnancy because of the decrease in levels of hCG.[4,6]

High S.TSH levels with normal thyroxine levels confirms subclinical hypothyroidism which is associated with adverse neuropsychological development of fetus and is most common during pregnancy. [4] The cut off level of S.TSH taken for upper limit of normal is 2.5 mIU/L in 1st trimester and in 2nd and 3rd trimester a higher cut off of 3mIU/L is taken as normal.[7]

Thyroid disorders are characterised by fatigue, constipation, cold intolerance, muscle cramps and weight gain with clinical findings of hair loss, oedema, dry skin, prolonged relaxation of deep tendon reflexes leading to various maternal obstetric complications like hyperemesis gravidarum, abortions, pre-eclampsia, abruptio placenta, preterm labour, post partum thyroiditis, thyroid nodules and thyroid cancer. Fetal complications associated with thyroid disorders are prematurity, low birth weight, still birth, perinatal death and respiratory distress syndrome.[4,8]

As per 2011 American thyroid association guidelines, the upper reference limit of S.TSH concentration in pregnant females was defined as 2.5 mU/L in 1st trimester and 3mU/ L in 2nd and 3rd trimester on the basis of 6 studies comprising a cohort of 5500 subjects. These studies were conducted laying influence on BMI, geography and ethnicity.[9] According to 2017 American thyroid association guidelines the TSH reference range should be population and trimester specific. If not feasible then pregnancy specific reference range of S.TSH should be obtained from similar patients and similar S.TSH assays should be implied.[9] If pregnancy specific reference range of S.TSH are not available, an upper reference limit of mU/L should be used. This limit represents a reduction in non pregnant TSH upper reference limit of 0.5mU/L.[9]

Treatment algorithm has been advised in women with thyroid disorders during pregnancy. If first trimester thyrotropin >2.5mIU/L (especially if TPOAb +) then start treatment with levothyroxine. [10]

Thyrotropin levels during first trimester	Starting dose to be administered
2.5-5.0mIU/L	50mcg /day
5.0-8.0mIU/L	75mcg /day
>8.0 mIU/L	100mcg/day

Expert panels all over the world have suggested thyroid function screening during pregnancy in routine in view of adverse maternal and fetal outcome and benefits of early diagnosis and treatment.[11] During pregnancy thyrotropin monitoring is done every 4 weeks until 16-20 weeks of gestation and once between 26 to 32 weeks of gestation.[10] After delivery dose of levothyroxine is titled down and repeat test is done 4-8 weeks.[10]

Therefore this study is carried out in antenatal patients during 1st trimester and 2nd trimester who had regular antenatal visits in Mahatama Gandhi Hospital Jaipur to detect the prevalence of thyroid disorders during pregnancy and at the same time to manage them for improving the fetomaternal outcome by appropriate management.

MATERIAL AND METHODS

Its a cross sectional study done in the department of obstetrics and gynaecology at Mahatma Gandhi Hospital and Medical college Jaipur. 2000 cases belonging to urban, suburban and rural population attending the ANC OPD at MGMC for routine checkup from November 2016 for a period of 12 months were included in the study.

Institutional ethics committee and scientific committee approval was obtained. The patients were informed in detail about the nature of study and a written informed consent was obtained from all the patients before their enrolment into the study.

INCLUSION CRITERIA

- Willingness to participate in the study.
- Singleton pregnancy.
- Pregnancy upto 24 weeks of gestation.

EXCLUSION CRITERIA

- Multifoetal pregnancy.
- Known thyroid and metabolic disorder (diabetes, hypertension).
- History of trophoblastic disorder (by previous medical records and history).

Detailed history including menstrual history, obstetric history, past medical and surgical history, family history and personal history was taken. General examination including patient's weight, pulse, blood pressure and systemic examination of cardiovascular system, thyroid gland examination, per abdominal examination was done and findings were recorded.

Basic investigations like haemoglobin, blood grouping and Rh typing, RBS, HIV, HbsAg, VDRL, urine microscopy/albumin/sugar were done.

All the patients were sent for testing of S.TSH level. If S.TSH levels were deranged, S. T3,S.T4 and TPO antibodies were checked and their further management was done accordingly.

In the present study we followed American thyroid association guidelines in pregnancy published in the year 2015 which suggested the reference range of S.TSH as 2.5 mU/L in 1st trimester and 3mU/L in 2nd and 3rd trimester in pregnancy.[7]

On the basis of the hormonal values patients were classified into various categories -

SUBCLINICAL HYPOTHYROIDISM- High S.TSH levels with normal fT3 and fT4 levels.

In the present study out of the 2000 cases maximum number of patients 340(17%) presented with subclinical hypothyroidism, 60(3%) presented with subclinical hyperthyroidism, 20(1%) with overt hypothyroidism and there was no patient with overt hyperthyroidism. Total number of patients with thyroid disorders are 420(21%).

OVERT HYPOTHYROIDISM-
High S.TSH levels with fT3 and fT4 less than normal range.

SUBCLINICAL HYPERTHYROIDISM- Low S.TSH levels with normal fT3 and fT4 levels.

OVERT HYPERTHYROIDISM - Low S.TSH levels with fT3 AND fT4 more than normal range.

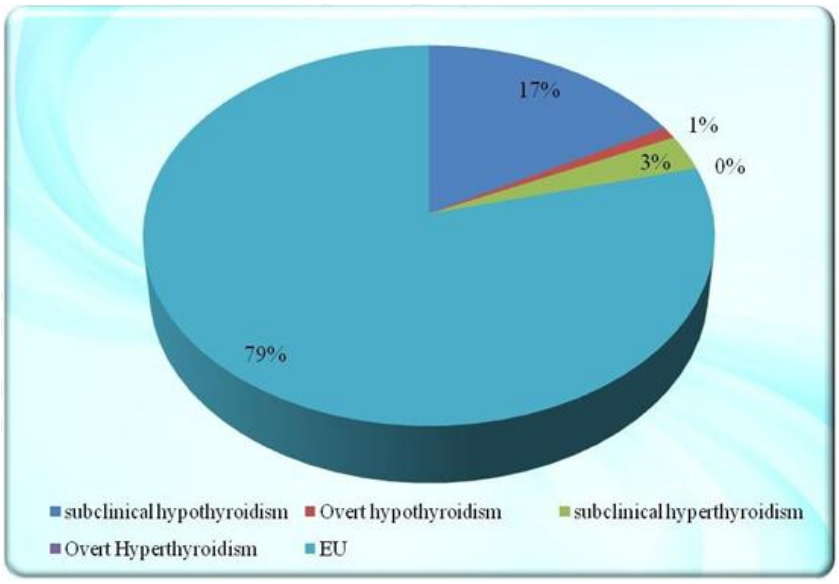
Patients with high S.TSH or low S.TSH were followed up every 4 weeks and dose of the drug was adjusted accordingly. Data was collected as per classification and statistical evaluation of data was done.

OBSERVATIONS AND RESULTS

The observation and results recorded in the study are as follows.

Table No. 1: Prevalence Of Thyroid Disorders In Pregnancy Patients.

Thyroid disorders	Observations (n-2000)	Prevalence
Subclinical hypothyroidism	340	17%
Overt hypothyroidism	20	1%
Subclinical hyperthyroidism	60	3%
Overt hyperthyroidism	0	0%
Total with Thyroid disorders	420	21%
Euthyroid	1580	79%
Total	2000	100%



In the present study out of the 2000 cases maximum number of patients 340(17%) presented with subclinical hypothyroidism, 60(3%) presented with subclinical hyperthyroidism, 20(1%) with overt hypothyroidism and there was no patient with overt hyperthyroidism. Total number of patients with thyroid disorders are 420(21%).

Table No. 2: Distribution According To Anti TPO Levels.

Thyroid disorders	Observations (n-2000)	Anti TPO -ve (n-310)	Frequency	Anti TPO +ve (n-30)
Subclinical hypothyroidism	340	310	91%	30
Overt Hypothyroidism	20	11	55%	9
Subclinical hyperthyroidism	60	40	67%	20

According to the present data positive anti-TPO levels were present in 60 patients. Maximum number of patients 30(9%) with positive anti-TPO levels have subclinical hypothyroidism and 20 (33%) patients with positive anti-TPO levels have subclinical hyperthyroidism.

In Asian countries the prevalence of hypothyroidism is much higher as compared to Western countries.[5] Rajesh Rajput et al.[5] in a study of 461 first trimester pregnant women found the prevalence of thyroid dysfunction to be 26.5% using the first trimester specific TSH cut-off of 2.5 mIU/L as compared to nonpregnant TSH cut-off of 4.5 mIU/L. These results were comparable to our study. Weiwei wang et al.[12] carried a study to establish the prevalence of thyroid dysfunction in first trimester pregnancy in China. The study cohort comprised of 2899 pregnant women in the first trimester attending the antenatal clinic of a tertiary care center. The study showed the prevalence of thyroid dysfunction in pregnancy as 10.2% and the prevalence of hypothyroidism was much higher in high risk patients as compared to the non high risk group in this study.[12] Diganta et al.[13] in their study found that thyroid dysfunction affects up to 54.3% of first trimester pregnancies. Sahu et al[14] in a study of 633 pregnant women found the prevalence of thyroid dysfunction to be 12.7%. Moreno Reyes et al.[15] in September 2013 studied the prevalence of thyroid disorders in pregnant women in Belgium and found to be 15.3%.

According to some studies, there is high prevalence of hypothyroidism in Asian countries due to decrease iodine intake, diet rich in goitrogens, deficiency of micronutrients in diet etc.[16,17] In the present study, the prevalence of subclinical hypothyroidism in first and second trimester of pregnancy, has been found to be 17% (340/2000). Dhanwal et al in March 2013 discovered 14.3% of antenatal patients attending a tertiary care centre in Delhi having hypothyroidism, among which maximum were having subclinical hypothyroidism. Diganta et al[24] in their study "Screening of prevalence of thyroid disorders among pregnant women in and around Barpeta" in Assam found that out of total 348 cases 181(52.01%) were having subclinical hypothyroidism. Rajesh rajput et al[5] in their study "Prevalence of thyroid dysfunction among women during the first trimester of pregnancy at a tertiary care hospital in Haryana" found 21.5% prevalence of subclinical hypothyroidism. Casey BM et al[8] in their study found 23% prevalence of subclinical hypothyroidism. Gayatri et al[9] in their study found that the prevalence Subclinical hypothyroidism among 495 pregnant women was 2.8%. In this study Subclinical hypothyroidism was defined as TSH from 5-10 mIU/L. In our study by taking trimester specific cut-off values from ATA guidelines 2015 the prevalence of subclinical hypothyroidism is 17% in contrast to some other studies where a higher cut off range for S.TSH is taken using non pregnant reference values of S.TSH.

The prevalence of overt hypothyroidism in the presence study was 1% (20/2000). Patients with S.TSH levels abnormaly high along with abnormally low thyroxine levels confirms overt hypothyroidism. Sahu MT et al in a study of 633 pregnant women found 4.58% prevalence of overt hypothyroidism. Diganta et al in their study "Screening of prevelance of thyroid disorders among pregnant women in and around Barpeta" in Assam found 1.72% prevalence of overt hypothyroidism which is consistent with the present study. Dinesh K Dhanwal et al in their study found 0.7% prevalence of overt hypothyroidism.

In the present study the prevalence of subclinical hyperthyroidism in first trimester and second trimester of pregnancy, has been found 3% (60/2000). Low S.TSH levels with normal thyroxine levels confirms subclinical hyperthyroidism. There is increased risks of obstetric complications such as low birth weight, preterm labour and increased metal and perinatal morbidity if hyperthyroidism is untreated.[18] Sahu MT et al[14] in their study found 0.9% prevalence of subclinical hyperthyroidism in first trimester pregnancy. Tuija mannisto et al found 3.5% prevalence of subclinical hyperthyroidism in first trimester pregnancy which is consistent with present study. The prevalence of subclinical hyperthyroidism was 0.5% in a study done by Stagnaro Green A. The prevalence of subclinical hyperthyroidism in our study is comparable to other studies.

The prevalence of overt hyperthyroidism in our study was 0% (0/2000). S.TSH levels <0.1 mIU/L with abnormally high thyroxine levels confirms overt hyperthyroidism. Sahu MT et al[14] in their study found 0.7% prevalence of overt hyperthyroidism in first trimester pregnancy. Tuija magnets et al found 1.3% prevalence of overt hyperthyroidism in first trimester pregnancy. Hypothyroidism is more common than hyperthyroidism during pregnancy.[5] There is increased risks of obstetric complications such as low birth weight, preterm labour and increased metal and perinatal morbidity if hyperthyroidism is untreated.[18] The prevalence of overt hyperthyroidism was 0.4% in a study done by Stagnaro Green A.[5]

As per Western literature autoimmunity by anti- TPO in euthyroid antenatal patients is about 10-15%.[16] In present study, anti-TPO was elevated in 60 (3%) patients, of these 30, 9 were found to have subclinical and overt hypothyroidism and 20 had subclinical hyperthyroidism. In our study TPO antibodies were elevated in maximum number of patients with subclinical hypothyroidism.

Table No. 3: Distribution Of Cases According To Age.

Age	Cases	Subclinical hypothyroidism	Overt hypothyroidism	Subclinical hyperthyroidism	Overt hyperthyroidism	EU
<21	320	50	0	20	0	250
21-25	930	160	10	30	0	730
26-31	590	110	10	10	0	460
>31	160	20	0	0	0	140

	Coefficient	P-value
Dependent variable: Thyroid disorder and Independent variable: Age	0.0013	.674

Patients in our study were in the age range from 18 to >30 years. They were divided into four groups, <2 years (16%), 21-25 years (46.5%), 26-30 years (29.5%) and >31 years (8%). It was seen that the highest number of patients were belonging to the age group 21-25 years (46%) and the lowest were under the age group >31 years. In our study we can also see that in all the age groups maximum number of patients were having subclinical hypothyroidism. The mean age of the patients is 24.8 ±3.9 years.

Mean age in study of Diganta et al[13] was 23.93±4.44 years. Mean age in study of Rajesh rajput et al[5] was 23.79 ± 3.47 years. Mean age in study of Weiwei wang et al[12] "The prevalence of thyroid disorder of pregnancy" in China, was 27.61±3.55 years. Vimal Nambiar et al. carried a study to establish the prevalence and the effect of thyroid dysfunction on pregnancy outcomes in Asian-Indian population and the mean age in their study was 25.19± 4.17 years. Dinesh K Dhanwal et al. [3] in March 2013,conducted study on prevalence of subclinical hypothyroidism during first trimester of pregnancy in North India and the mean age in their study was 25.65 ±1.12 years. The mean age in our study is similar as compared to other studies.

Table No. 4 - Distribution of Cases According To Religion.

Religion	Cases (n=2000)	Subclinical hypothyroidism	Overt hypothyroidism	Subclinical hyperthyroidism	Overt hyperthyroidism	EU
Hindu	1660	290	20	30	0	1320
Muslim	240	50	0	30	0	160
Christian	70	0	0	0	0	70
Sikh	30	0	0	0	0	30

	Coefficient	P-value
Dependent variable: Thyroid disorder and Independent variable: Religion	0.0018	.403

In the present study maximum number of the patients 1660(83%) were hindus, 240(12%) were muslims, 70(4%) were christians and 30(2%) were sikh. Among 2000 cases maximum patients were hindus and there was no thyroid disorder detected among Christian and Sikh population. P value with respect to case distribution according to religion was not significant and similar studies have not been found for comparison with the present study.

Table No. 5: Distribution According to BMI.

BMI	Cases (n-2000)	Subclinical hypothyroidism	Overt hypothyroidism	Subclinical hyperthyroidism	Overt hyperthyroidism	Euthyroid
Underweight (<18.5)	130	0	0	30	0	100
Normal (18.5-25)	1680	290	0	30	0	1360
Overweight (25-30)	180	50	20	0	0	110
Obese (>30)	10	0	0	0	0	10

	Coefficient	P-value
Dependent variable: Thyroid disorder and Independent variable: BMI	-.036	.000

In the present study maximum number of patients1680 (84%) were having normal BMI, 130(6.5%) were underweight, 180(9%) were overweight and 10(0.5%) were obese. Mean BMI in patients with thyroid disorders in our study is 21.86+-2.59. Mean BMI in study of Dinesh. K Dhanwal is 23.9+-7.0. Mean BMI in M. Altomare study is 24.6+-0.1. The mean BMI in our study is comparable to other studies.

Table No. 6: Distribution According To Parity.

Parity	Cases (n-2000)	Subclinical hypothyroidism	Overt hypothyroidism	Subclinical hyperthyroidism	Overt hyperth-yroidism	EUthyroid
Prima gravida	1020	180	10	30	0	800
Multi gravida	980	160	10	30	0	780
Total	2000	340	20	60	0	1580

	Coefficient	P-value
Dependent variable: Thyroid disorder and Independent variable: Parity distribution/Obstetric History	0.010	0.701

Among 2000 cases 1020 (51%) patients were primigravida and 980 (49 %) were multigravida. In both primigravida and multigravida maximum number of patients presented with subclinical hypothyroidism. Distribution of other thyroid disorders was almost equal in both primigravida and multigravida. Similar studies have not been found for comparison with the present study.

After comparing the data from previous studies we came to the conclusion that there is a secular trend in hypothyroidism prevalence during the antenatal period in India. In our study the prevalence of hypothyroidism is more as compared to hyperthyroidism. Maximum number of patients in our study were belonging to hindu religion and maximum number fall in the age group of 21 -25 years and these results were comparable to other studies. This signifies that in our country maximum number of patients who become pregnant fall in the age group of 21-25years. Maximum number of patients in our study had normal BMI and the results were comparable to other studies. This study concludes the prevalence of hypothyroidism is much higher even after excluding the high risk groups, so screening of the patients should be done during the antenatal natal period to detect thyroid disorders and to improve the maternal and fatal outcome during pregnancy.

CONCLUSION

From our study we came to the conclusion that the prevalence of thyroid disorders in the first and second trimester of pregnancy is 21%, majority being subclinical hypothyroidism 17%.

Prevalence of overt hypothyroidism was only 1% while subclinical hypothyroidism was present in 3% of antenatal population.

As our study revealed that 21% of the total antenatal patients have some of the thyroid disorders, universal screening should be a part of routine antenatal investigations so that all thyroid disorders are screened and treated at the earliest to avoid adverse maternal and fetal outcome.

REFERENCES

1. Ambika Gopalakrishnan Unnikrishnan, Usha V MenonDepartment of Endocrinology, Amrita Institute of Medical Sciences, Cochin, Kerala, Indiae Netherlands. Lancet, 1987; 2: 953-5.
2. Vimal Nambiar, Varsha S.Jagtap, Vijaya Sarathi, Anurag R.Lila, Sadishkumar Kamalnathan, Tushar R.Bandgar, Padmavathy S.Menon, Nalini S.Shah, Department of endocrinology, Seth G.S Medical College, Parel, Mumbai, Maharashtra, Rev, 24 May 2011.
3. Dhanwal DK, Prasad S, Agarwal AK, Dixit V, Banerjee AK. High prevalence of subclinical hypothyroidism during first trimester of pregnancy in North India. Indian J Endocrinol Metab, 2013; 17: 281–4. [PMC free article] [PubMed].
4. Williams obstetrics 24e F. Gary Cunningham, MD, Kenneth, J. Leveno, MD, Steven, L. Bloom - Endocrinological disorders (Chpater - 58).
5. Rajesh Rajput, Vasudha Goel, Shashi Seth. Prevalence of thyroid dysfunction among women during first trimester of pregnancy at a tertiary care hospital in Haryana.
6. Mandel SJ et al.2005 Thyroid, 15: 44-53.
7. ATA guidelines 2011.
8. Casey BM, Dashe JS, Wells CE, McIntire DD, Leveno KJ, Cunningham FG. Subclinical hyperthyroidism and pregnancy outcomes. Obstet Gynecol, 2006; 107: 337–41. [PubMed].
9. ATA guidelines 2017.

10. Negro R,Stagnaro-Green A,BMJ, 2014; 349: g4929.
11. Altomare M, La Vignera S, Asero P, Recupero D, Condorelli RA, Scollo P, et al. High prevalence of thyroid dysfunction in pregnant women. J Endocrinol Invest, 2013; 36: 407–11. [PubMed].
12. Weiwei Wang, Weiping Teng, Zhongyan Shan, Sen Wang, Jianxin Li et al. The prevalence of thyroid disorders during early pregnancy in China: the benefits of universal screening in the first trimester of pregnancy.European Journal of Endocrinology, 2011; 164: 263–268.
13. Das Diganta, Chisty Syed Javed Salman, Barman Karabi, Talukdar Bharat, Talukdar Uddip. Screening of prevelance of thyroid disorders among pregnant women in and around Barpeta,Assam. International journal of medical and applied sciences E-ISSN: 2320-3137.
14. Sahu MT, Das V, Mittal S, Agarwal A, Sahu M. Overt and subclinical thyroid dysfunction among Indian pregnant women and its effect on maternal and fetal outcome. Arch Gynecol Obstet, 2010 Feb; 281(2): 215-20.
15. Moreno-Reyes R. High prevalence of thyroid disorders in pregnant women in a mildly iodine-deficient country: a population-based study. J Clin Endocrinol Metab, 2013; 98: 3694–3701.
16. Yassa L, Marqusee E, Fawcett R, et al. Thyroid hormone early adjustment in pregnancy (the THERAPY) trial. J Clin Endocrinol Metab, 2010; 95: 3234–41.
17. Glinoer D. The regulation of thyroid function in pregnancy: pathways of endocrine adaptation from physiology to pathology. Endocr Rev, 1997; 18: 404–33.
18. Vaidya B, Anthony S, Bilous M, Shields B, Drury J, Hutchison S, Bilous R 2007 Detection of thyroid dysfunction in early pregnancy: universal screening or targeted high-risk case finding? J Clin Endocrinol Metab, 92: 203–207.