

Pregnancy Related Thyroidal Dysfunction and its Feto-Maternal Outcomes

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ABSTRACT

Aim: To detect the thyroidal dysfunction during pregnancy and the related outcomes.

Study Design: Prospective study.

Place and duration of study: Department of Obstetrics & Gynaecology, S. Z. Hospital Lahore from 01-01-2021 to 30-06-2022

Methodology: One thousand pregnant women in third trimester were enrolled for thyroid function test and screening, analysis of TSH, free T₃ and T₄ level.

Results: Only 30 (3%) was having thyroid dysfunction while the dysfunction was reported highest in the women within 29-38 years of age. Most of the cases suffering from thyroid dysfunction are suffering from the subclinical hypothyroid condition (43%). The reduction in Apgar score was observed up to almost 3.59 times in newborns of thyroid dysfunction women. The risk of preeclampsia and cesarean section was also significantly raised in thyroidal dysfunction women. Odds ratio for low birth weight was observed as 6.32 with a significant association with thyroid dysfunction in pregnancy.

Conclusion: There are poor feto-maternal outcomes of thyroid dysfunction during pregnancy with 43% of the cases as having subclinical hypothyroidism.

Key words: Pregnancy, Thyroid dysfunction, Feto-maternal outcome

INTRODUCTION

Thyroid hormones are related with various body functions including metabolic functioning as well as regulation of body temperature, weight and energy levels. It has a strong impact on overall health and growth. In conditions where thyroid gland functioning is affected there is a severe reaction seen in overall body function and process^{1,2}. Thyroid dysfunction has been related with weight changes, metabolic irregularities and growth retardation in early stages of life. Hormones released from pituitary gland and thyroid gland itself a highly important in maintaining a proper body function. A homeostasis between their activities and secretion is the key for efficient functioning³⁻⁶.

A decrease in the thyroid stimulating hormone (TSH) leads to hypothyroidism where free T₃ (FT₃) and free T₄ (FT₄) which are biologically active thyroid hormones levels increases. In cases where TSH level increases hyperthyroidism is presented with vice versa T₃ and T₄ hormones levels. Subclinical state is considered when peripheral hormones are within range however the serum levels of the hormones is high elevated or decreased^{7,8}.

Pregnancy is a crucial period which requires intensive self care and attention. Various events happen during the pregnancy. An adequate amount of minerals and vitamins are required to the body for proper and optimal growth of fetus. There has been a high risk of miscarriages and poor outcomes of pregnancy in pregnant women where thyroid dysfunction is observed. During gestation period there is an increased requirement of the iodine resulting into escalation in tri-iodothyronine a thyroxine formation by 50% enhance than the normal need^{9,10}.

The current study was intended to evaluate the maternal and fetal gestation associated outcomes in women suffering from thyroidal dysfunction. This study outcome's would contribute in improved information on feto-maternal outcomes of thyroidal dysfunction and manage negative outcomes.

MATERIALS AND METHODS

This prospective study conducted at Department of Obstetrics & Gynaecology, Shaikh Zayed Hospital Lahore from 1st January 2021 to 30th June 2022. A total of 1000 pregnant women in third trimester were enrolled for thyroid function test and screening. The sample size was generated through WHO sample size calculator using 80% power of test and 95% CI. An age between

20 and 35 years was selected for consideration of thyroidal status of pregnant women. An informed consent was received from each participating woman. Women having multiple abortion history or suffering from chronic thyroid dysfunction were not included in the research. Women suffering from known chronic hypertension or diabetes were also not included in this research. A 3cc blood was withdrawn from each patients and serum was separated through centrifugation at 3000 rpm. The serum was stored at -20 degree Celsius until analysis of TSH, free T₃ and T₄ level. All the tests were conducted through ELISA based assay using competitive assay protocol. A well-structured questionnaire was developed to document demographic details of the patients as well as clinical, gravida and parity details and biochemical analysis results. Clinical history as consumption of iodized salt, irregular menstruation was also entered in the questionnaire. The thyroid profile levels were used to select pregnant women suffering from thyroid dysfunction from the normal females. Within the various thyroid functions identified the outcomes of pregnancy were assessed in comparison to the woman with normal thyroid function. Those women who were having thyroid dysfunction were labelled as P1 while normal females were labelled as P2. Data was analyzed while using SPSS version 26.0 through Chi square and odds ratio test where P value <0.05 was taken significant.

RESULTS

Only 30 (3%) were having thyroid dysfunction while the dysfunction was reported highest in the women within 29-38 years of age (Table 1). In the 30 identified cases of thyroid dysfunction there were 43% with subclinical hypothyroidism, 35% with overt hypothyroidism where as 12% were having subclinical hyperthyroidism. This showed that most of the cases suffering from thyroid dysfunction are suffering from the subclinical hypothyroid condition (43%) and proper management can be affective in keeping their thyroid levels within normal range during pregnancy (Fig. 1).

The feto-maternal outcome's of thyroid dysfunction during pregnancy shows that C sections, anemia and preeclampsia are the major maternal outcomes as a result of thyroid dysfunction. In case of fetus low birth weight, decreased Apgar score was most prominent outcomes. There were 6% women who presented preterm labor (Fig. 2).

In the present study the reduction in Apgar score was observed up to almost 3.59 times in newborns of thyroid dysfunction women. The risk of preeclampsia and cesarean

Received on 29-07-2022

Accepted on 27-10-2022

section was also significantly raised in thyroidal dysfunction women. Odds ratio for low birth weight was observed as 6.32 with a significant association with thyroid dysfunction in pregnancy (Table 3).

Table 1: Frequency of thyroidal dysfunction related with age of pregnant women (n=1000)

Variable	P1	P2	P value
Thyroid dysfunction	30 (3%)	970 (97%)	
Age (years)			
18-28	5 (16.6%)	620 (63.9%)	0.003
29-38	17 (56.6%)	280 (28.8%)	0.002
>38	07 (23.3%)	70 (7.21%)	0.23

Table 2: Occurrence of thyroidal hormone levels in pregnancy

Thyroid status	Mean TSH (mIU/L)	Mean fT4 (ng/dl)	Mean fT3 (pg/ml)
Subclinical hypothyroidism	8.12 ± 1.4	1.11±0.31	3.12±0.56
Overt hypothyroidism	11.95 ± 5.25	0.38±0.26	0.81±0.68
Subclinical hyperthyroidism	0.081 ± 0.05	1.22±0.12	4.21±0.42

Table 3: Feto-maternal outcomes in women with thyroidal dysfunction in pregnancy

Outcome	95% CI	Odds Ratio	P value
Anemia	1.51–15.7	4.90	0.007
Preeclampsia	1.07–19.21	4.54	0.043
Preterm	0.254–22.54	2.41	0.413
Oligohydramnios	0.04–1.22	0.21	0.072
Caesarean section	1.41–14.38	4.49	0.012
Low birth weight	2.03–19.56	6.32	0.002
Low Apgar Score	1.05–12.72	3.59	0.042
NICU admission	0.051–0.393	0.18	0.001

Fig. 1: Frequency of various thyroid dysfunction in pregnant women

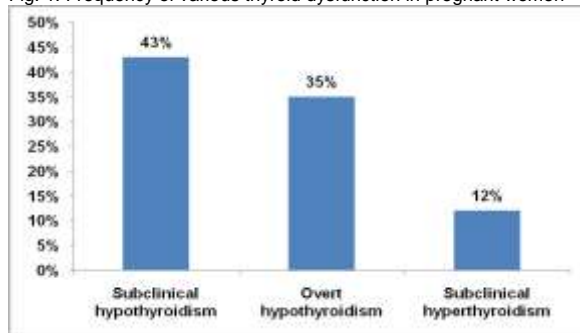
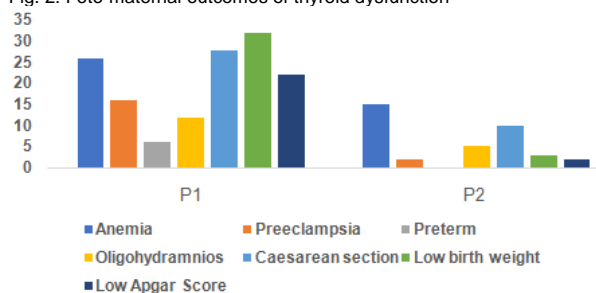


Fig. 2: Feto-maternal outcomes of thyroid dysfunction



DISCUSSION

Thyroid dysfunction is a common condition within women of fertility age. It is a common endocrine disorder related to iodine deficiency. A variable prevalence of thyroid dysfunction has been reported with regional disparities. There have been unfavorable feto-maternal outcomes of thyroid dysfunction in pregnant women; various studies have reported data in this context where most of the research have elaborated the higher incidence of miscarriages related to thyroid dysfunction specifically in the early trimester¹¹⁻¹³.

In the present study there were highest cases of subclinical hypothyroidism within the women who were identified to have thyroid dysfunction during pregnancy. There has been advancement in the normal levels of thyroid stimulating hormone

than previously reported guidelines. As per previous guidelines the first trimester value was considered as 0.1-2.5mIU/L while of second trimester as 0.2-3.0 mIU/L and of third as 0.3-3mIU/L. There has been a limited data which is specific to value of TSH in context with trimesters. This causes a regional disparity as well as literature discrepancies in account of determining the exact values of thyroid dysfunction pregnant women¹⁴⁻¹⁷.

The higher prevalence of subclinical hypothyroidism has been observed in India as well as reported through various studies. A study determined the value of subclinical hypothyroidism as 5.6% while of overt hypothyroidism as 3.5% and subclinical hyperthyroidism as 1.5% in general population of pregnant women coming for routine check-up in gynaecology department at third trimester¹⁸⁻²⁰. The previous studies correlate with the findings of the current research.

CONCLUSION

The feto-maternal outcome's of thyroid dysfunction during pregnancy shows that C sections, anemia and preeclampsia are the major maternal outcomes as a result of thyroid dysfunction. In case of fetus low birth weight, decreased Apgar score were most prominent outcomes with 43% of the cases as having subclinical hypothyroidism.

Conflict of interest: Nil

REFERENCES

- Ramezani Tehrani F, Aghaei M, Asefzadeh S. The comparison of thyroid function tests in cord blood following cesarean section or vaginal delivery. *Int J Endocrinol Metab* 2003;1:22-6.
- Zadeh-Vakilii A, Ramezani Tehrani F, Hashemi S, Amouzegar A, Azizi F. Relationship between sex hormone binding globulin, thyroid stimulating hormone, prolactin and serum androgens with metabolic syndrome parameters in iranian women of reproductive age. *Diabetes Metabol* 2012;S:2.
- The American Thyroid Association Taskforce on Thyroid Disease During Pregnancy and Postpartum. Guidelines of the American Thyroid Association for the Diagnosis and Management of Thyroid Disease during Pregnancy and Postpartum. *Thyroid* 2011;21:1081-1125.
- Yamamoto T, Amino N, Tanizawa O, Doi K, Ichihara K, Azukizawa M, et al. Longitudinal study of serum thyroid hormones, chorionic gonadotrophin and thyrotrophin during and after normal pregnancy. *Clin Endocrinol (Oxf)* 1979;10:459-68.
- Glinoe D, de Nayer P, Bourdoux P, Lemone M, Robyn C, van Steirteghem A, et al. Regulation of maternal thyroid function during pregnancy. *J Clin Endocrinol Metab* 1990;71:276-87.
- Ramezani Tehrani F, Tohidi M, Rostami Dovom M, Azizi F. A population based study on the association of thyroid status with components of the metabolic syndrome. *Diabetes Metab* 2011; 2:1-5.
- Azizi F, Delshad H. Thyroid derangements in pregnancy. *IJEM* 2014;15:491-508.
- Cignini P, Cafà EV, Giorlandino C, Capriglione S, Spata A, Dugo N. Thyroid physiology and common diseases in pregnancy: review of literature. *J Prenat Med* 2012;6:64-71.
- Stagnaro-Green A, Abalovich M, Alexander E, et al. Guidelines of the American Thyroid Association for the diagnosis and management of thyroid disease during pregnancy and postpartum. *Thyroid* 2011;21(10):1081-125.
- Glinoe D, de Nayer P, Bourdoux P, Lemone M, Robyn C, van Steirteghem A, et al. Regulation of maternal thyroid function during pregnancy. *J Clin Endocrinol Metab* 1990;71:276-87.
- Azizi F, Delshad H. Thyroid derangements in pregnancy. *IJEM* 2014;15:491-508.
- Cignini P, Cafà EV, Giorlandino C, Capriglione S, Spata A, Dugo N. Thyroid physiology and common diseases in pregnancy: review of literature. *J Prenat Med* 2012;6:64-71.
- Dong AC, Stagnaro-Green A. Differences in diagnostic criteria mask the true prevalence of thyroid disease in pregnancy: a systematic review and meta-analysis. *Thyroid* 2019;29(2): 278-89.
- Alexander EK, Pearce EN, Brent GA, Brown RS, Chen H, Dosiou C, et al. Guidelines of the American Thyroid Association for the diagnosis and Management of Thyroid Disease during Pregnancy and the postpartum. *Thyroid* 2017;27(3):315-89.
- Wang W, WeipingTeng ZS, Wang S, Li J, Zhu L, Zhou J, et al. The prevalence of thyroid disorders during early pregnancy in China: the benefits of universal screening in the first trimester of pregnancy. *Eur J Endocrinol* 2011; 164:263-8.
- Ajmani SN, Aggarwal D, Bhatia P, Sharma M, Sarabhai V, Paul M. Prevalence of overt and subclinical thyroid dysfunction among pregnant women and its effect on maternal and fetal outcome. *J Obstet Gynecol India* 2014; 64(2): 105-10.
- Singh A, Pedduri S. Prevalence of hypothyroidism in pregnancy. *J Obstet Gynecol* 2018;4(4):77-81.
- Mankar J, Sahasrabudhe A, Pitale S. Trimester specific ranges for thyroid hormones in normal pregnancy. *Thyroid Res Pract* 2016;13:106-9.
- Mahadik K, Choudhary P, Roy PK. Study of thyroid function in pregnancy, its feto-maternal outcome; a prospective observational study. *BMC Pregnancy Childbirth* 2020; 20: 769.
- Nazarpour S, Ramezani Tehrani F, Simbar M, Azizi F. Thyroid dysfunction and pregnancy outcomes. *Iran J Reprod Med* 2015;13(7):387-96.