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EFFECT OF MATERNAL THYROID STATUS AT DELIVERY ON NEONATAL THYROID STATUS : A RETROSPECTIVE STUDY IN A TERTIARY CARE CENTRE

Gynaecology

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ABSTRACT

BACKGROUND The fetus develops its own HPT axis by 20-22 weeks. Maternal transfer of T4 have a protective role in fetal neurodevelopment. Thyroid-stimulating hormone in the first postnatal week is higher than at any other time of life. Congenital hypothyroidism is the most frequent cause of preventable mental retardation. Neonatal hypothyroidism 1) Permanent type 2) Transient type Even transient hypothyroidism can cause adverse neurological outcome in a newborn. Thus, early diagnosis and treatment is recommended. **OBJECTIVES** To correlate the maternal thyroid status at delivery with the neonatal thyroid status **METHODS** A retrospective cohort study of women admitted in labor ward KIMSH &RC Bangalore from 01/07/2018 to 30/09/2018.Maternal thyroid status at delivery irrespective of thyroid status in pregnancy and neonatal Thyroid status (TSH, T4) measured at 3-5 days of age. **RESULTS** During this period total no of the babies along with their mothers were evaluated were 148.Total no of thyroid disorders detected in 34 (23%) of mothers, among which hypothyroidism in 30 (20.2%) and hyperthyroidism in 4 (2.8%) were found. From total 34 cases, 10 (33.3%) mothers were known hypothyroid and all 4 (100%) were known hyperthyroid. Among the hypothyroid mothers 20(66%) were during present pregnancy. New born screening for thyroid function was done in all 148 babies between3-5 days of age. Neonates with lower T4 levels [mean =0.84ng/dl] had mothers with higher TSH . Gestational hypothyroidism [6 %], overt hypothyroidism [22%], euthyroid [10%] resulted in neonatal hypothyroidism. Low normal TSH in mother may result in transient neonatal hyperthyroidism.[25% of babies with maternal hyperthyroidism].**CONCLUSION** Thyroid screening should be done in pregnancy as universal screening instead of only high-risk cases. Maternal thyroid status at delivery irrespective of thyroid status in pregnancy can be indirect indicator of neonatal Thyroid status.It also guides the neonatologist or paediatrician doing thyroid function test of their babies. Ideally all newborns should be screened for congenital hypothyroidism as a part of new born screening (NBS) programme. Neonatal hypothyroidism has to be further diagnosed as transient or congenital based on successive evaluation.The earlier detection of thisill substantially help in retrospectively assessing the effectiveness of treatment for thyroid dysfunction and modulation of treatment guidelines for early detection of its effect on neonate in future.

KEYWORDS

Hyperthyroidism, Hypothyroidism, Newborn, Pregnancy

INTRODUCTION

Thyroid disorders are well known entity in pregnancy. Both hypothyroid and hyperthyroid whether subclinical or overt, can cause problem in mother and in the baby.1-8 Timely detection and treatment will definitely reduce the outcomes of the pregnancy, fetus and of the neonate. This can happen only when the mother and the family understand this. As each pregnancy, delivery, neonatal care is managed by different specialists at different places and in different times, documentation and personal communication are very much essential. Over the time though lot of works and guideline has been released but post-partum aspects still remained mostly uncovered part and also not very clear.

Thyroid metabolism in pregnancy is operated by 3 component model. Hypothalamic pituitary axis in woman, placenta and fetal hypothalamic pituitary axis.1Maternal hyperplasia of thyroid gland occur in pregnancy with 10% increase in size. During 1st trimester usually between 7th-11th week there is increase in HCG which stimulate the TSH receptor due to structural similarity with TSH, cause transient increase in thyroid hormone production and partial suppression of TSH. Estrogen causes increase in thyroid binding globulin. Increased renal excretion of thyroxine, placental deiodination of thyroxine and transfer of thyroxine to the fetus leads to transient thyroid deficiency.2 Functioning of fetal thyroid occurs at 10th-12th weeks of gestation but get matured by third trimester. Till then the fetal metabolic requirements are met by maternal thyroxine.1

METHODOLOGY

SOURCE OF DATA:

148 Pregnant women admitted in KIMSH admitted for delivery from 01/07/2018 to 30/09/2018.

METHODS OF COLLECTION OF DATA:

1. A study of 148 Pregnant women admitted in KIMSH admitted for delivery
2. Detailed history was taken as per study proforma from the hospital record retrospectively

RESULTS

- In the study 65.5% were Primigravida and 34.5% were Multigravida.
- Out of 10 (0.4%) overt hypothyroid. 60 % of them were primigravida and 40%were multigravida, all of them were on treatment.
- Majority (75%) of them were on 50mcg LT 4.
- Gestational hypothyroid constituted about 13.5 % out of which majority were diagnosed in first trimester –primigravida 12, Multigravida 08
- Overt hyperthyroidism were 4 (0.27%) of which majority were primigravida with ongoing treatment.
- 77% of the women were in euthyroid status.

Table 1:

	primigravida	multigravida
euthyroid	76	38
Overt hypothyroidism	6	4
Gestational hypothyroidism	12	8
Overt hypertghyroidism	3	1

This study group includes both booked and unbooked cases Thyroid status assessed at delivery based on Indian thyroid association guidelines and patients continued to receive treatment during delivery also.

Table 2:

- Overt hypothyroidism the TSH values were ranging from 2.1IU/ml to 3.8IU/ml with the median as 2.5 IU/ml.
- Gestational hypothyroidism the TSH values were ranging from 5IU/ml to 16 IU/ml with the median as 7IU/ml
- overt hyperthyroidism the TSH values were ranging from 0.09 IU/ml to 0.2IU/ml with the median as 0.2 IU/ml

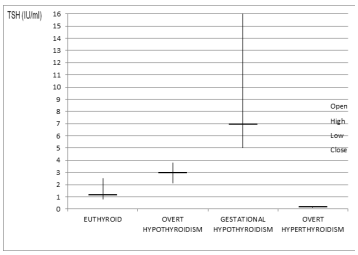
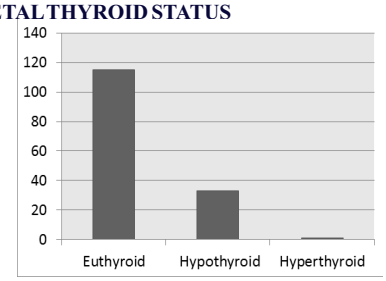


Table 3: FETAL THYROID STATUS



- Out of 148 neonates 33(22.3%) neonates had low T4.
- 9(0.06%) neonates had high TSH and normal T4 needing them further follow up for sub clinical hypothyroidism.
- 114(77%) of neonates have euthyroid status.
- Only 1 baby out of 148 had hyperthyroidism

Table 4: fT4 levels in neonate

fT4 (ng/dl)	Frequency (n=148)	percentage
<1	28	18.9
1-1.9	115	77.7
>1.9	5	3.4

Normal fT4 levels in neonate: 1-1.9 ng/ml

- 18 out 33 (54.5%) neonatal hypothyroidism had hypothyroid mothers (high TSH and lowT4).
- 10 (30.3%) cases of neonatal hypothyroidism had euthyroid mothers.
- This signifies the importance of other causes of neonatal hypothyroidism such as

1. Iodine deficiency or excess
2. Maternal consumption of goitrogens
3. Antithyroid medications during pregnancy
4. Transplacental passage of TSH receptor-blocking antibodies
5. Neonatal very low birth weight and prematurity

Table 5: Neonatal TSH levels

TSH(IU/ml)	Frequency (n =148)	Percentage
<5	6	4.2
5-15	116	78.3
>15	26	17.5

- Normal TSH levels in neonate : 5-15 IU/ml
- 55% of mothers having TSH in lower normal range had neonates with high T4 and normal TSH.

Table 7: Comparison of maternal thyroid status with neonatal thyroid status

maternal euthyroid (114)	neonatal thyroid status		
	Euthyroid	hypothyroidism	hyperthyroidism
	102	10	2

- Out of 114 women , 102 (90%) neonates were euthyroid .
- 10(8%) neonates were hypothyroid and 2(1%) neonates were hyperthyroid .
- This variation 10% could be transient.

Table 8: Comparison of maternal thyroid status with neonatal thyroid status

	neonatal thyroid status			
maternal hypothyroid 30	Gestational 20	Euthyroid	hypothyroidism	hyperthyroidism
		8	12	0
	Overt 10	4	6	0

- Out of 30 women , 20(66%) were gestational hypothyroid and 12(40%) neonates of them were hypothyroid
- It includes 8women who were diagnosed at the first time at delivery .
- Hence around 26% were additionally diagnosed.
- 10(34%) were overt hypothyroid and 6(60%) neonates were hyporthyroid .
- Hence of 30 women 18 neonates were hypothyroid (60%)

Table 9: Comparison of maternal thyroid status with neonatal thyroid status

Maternal hyperthyroid (4)	Neonatal thyroid status		
	Euthyroid	hypothyroidism	hyperthyroidism
	1	0	3

- Out of 4 women , 1 (25%) neonate was euthyroid
- 3(75%) neonates were hyperthyroid .

DISCUSSION

Maternal thyroid deficiency, even subclinical, has been reported to be associated with adverse pregnancy outcomes that may be improved by T4 replacement. Fluctuations that occur in T4 metabolism during pregnancy make it difficult to maintain meticulous normal thyroid hormone values during gestation in hypothyroid mothers.

Causes include
1) Increased thyroid gland vascularity,
2) increased renal iodide clearance and iodide losses to the foetus
Fluctuations in thyroxine metabolism that occur during pregnancy may further impair maternal-foetal transfer of thyroxine despite apparently optimal maternal thyroid status .

Pregnant women who at first presentation had above 98 percentile of TSH levels or those whose TSH remained suboptimal in the final trimester of pregnancy may be more likely to give birth to a low-birth weight infant .

Dussault and Fisher documented that elevated TSH concentrations were more frequent (7.0% versus 0.9%;) in the mothers of hypothyroid newborns. They also documented that the prevalence of newborn transient hypothyroidism was significantly higher (27% versus 15%,) in the mothers with autoimmune thyroid disease.

Women with thyroid disorders should be followed closely throughout pregnancy for the prevention of obstetric complications, and their newborn infants should be followed closely in the first months of postnatal life for thyroid dysfunction.

Hypothyroidism

All mothers had undergone universal screening for thyroid disorders in pregnancy. In pre pregnant group the thyroid function test was not clear most of them advised to continue same dose.

Hyperthyroidism

Both hypothyroidism and hyperthyroidism can occur in subclinical state. The prevalence of overt hyperthyroidism in pregnancy is of 0.1-0.4%. Graves' disease account for 85%, followed by HCG mediated gestational transient thyrotoxicosis which is limited to first half of the pregnancy.8 Less common non-autoimmune cause are toxic multinodular goiter and toxic adenoma.Very rare cause is thyroid secreting pituitary adenoma, struma ovarii, functional thyroid cancer metastasis or germline TSH receptor mutations. Though the number was less ,we find similar 0.16 % of cases of hyperthyroidism. Graves' disease too likely to be most important cause. Over treatment or factitious intake of thyroid hormone remains a special cause for hyperthyroidism.13 Country like us in which the pre pregnancy follow up is poor and post-partum follow is still more poor, we should focus on this over treatment of thyroid hormone group.

Postnatal status

At present authors do not have national newborn screening program (NBS) in India. Physicians were following existing guidelines by different professional bodies. Recently Indian society of pediatric and adolescent endocrinology (ISPAE) in 2018 formulated guidelines and recommends till NBS is integrated in national health programmed in India, pediatricians and health authorities should make concerted efforts to initiate NBS for CH for all in their care. The guideline is very much clear regarding the screening, confirmation of diagnosis,

imaging, treatment and follow up. Newborn should be screened for CH by cord blood or day 3 to day 5 postnatal venus blood either serum or dried blood spot (DBS). Primary TSH based CH screening is more practical and cost effective in our scenario. Comparing with our newborn screening and treatment follow up status, authors suggest our pediatrician and neonatologist to be familiar with it.

CONCLUSION

The infants with lower T4 levels had mothers with higher TSH, low T4 resulting in neonatal hypothyroidism.Neonatal hypothyroidism has to be further diagnosed as transient or congenital based on successive evaluation.

The earlier detection of this will substantially help in retrospectively assessing the effectiveness of treatment for thyroid dysfunction and modulation of treatment guidelines for early detection of its effect on neonate in future.

DECLERATION

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ETHICAL APPROVAL : APPROVED BY INSTITUTIONAL ETHICAL COMMITTEEOF KEMPEGOWDA INSTITUTE OF MEDICAL SCIENCES

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