ORIGINAL RESEARCH

Evaluation of thyroid hormone levels in healthy newborns born to mothers with hypothyroidism during pregnancy

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ABSTRACT

Background: The present study was aimed to evaluate the thyroid hormone levels in healthy newborns born to mothers with hypothyroidism during pregnancy. **Materials & methods:**A total of 100 pregnant subjects were enrolled. All the subjects were divided into two study groups with 50 subjects in each group: Study group (Hypothyroid pregnant subjects), and Control group. On day 4 of life a plain venous blood sample was collected for evaluation of thyroid profile and results were analyzed statistically. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. Chi-square test and student t test were used for evaluation of level of significance. **Results:**82 percent of the subjects of the study group and 90 percent of the subjects of the control group were appropriate for gestational age. While comparing the weight for gestational age among the two study groups, significant results were obtained. While comparing the thyroid profile among the two study groups, non-significant results were obtained. **Conclusion:**Thyroid disorders during pregnancy do affect the fetal development. Prematurity and dysmaturity may compromise neonatal thyroid function, leading to transient or permanent thyroid dysfunction, and to metabolic and cardiovascular disorders.

Key words: Thyroid, Hypothyroidism, Newborn

INTRODUCTION

The thyroid gland disorders are the commonest endocrine disorder in India and commonest preventable cause of mental retardation. In the absence of the neonatal screening programme thyroid disorders remain unrecognized in Indian children. Hypothyroidism, both overt and subclinical, is common in women of reproductive age and during pregnancy, with frequencies ranging from 0.3% to 2.5%.Maternal Hypothyroidism has multiple deleterious impacts on pregnancy, the postpartum and the developing fetus. Unrecognized and untreated Maternal hypothyroidism has previously been shown to increase risk for neonatal intensive care treatment, but still the association between thyroid diseases and neonatal morbidity is understudied in literature.[1- 3]

Due to increased awareness, many pediatricians now screen newborns at private institutions and a few states governments support screening of newborns in government facilities.Screening of newborn with congenital hypothyroidism is complicated by the fact that there is dramatic change in TSH and thyroid hormone levels at birth and first month after birth. These levels differ in preterm, small for gestational age and normal term neonates making single measurement difficult to interpret. Diagnosis Newborn screening- Ideally universal screening at 3-4 days of age should be done for detecting CH. Alternatively cord blood can also be used if screening is being done only for CH and no other inborn errors of metabolism.[4- 6]

The classic symptoms and signs of hypothyroidism develop progressively during the early weeks and months of extrauterine life. The absence of symptoms and signs in most affected neonates suggests either that metabolism and development in the fetus are not dependent on T4 or that the small amounts of maternal thyroid hormone in the fetal circulation are sufficient to prevent most clinical manifestations of thyroid deficiency.[7] Hence; the present study was aimed to evaluate the thyroid hormone levels in healthy newborns born to mothers with hypothyroidism during pregnancy.

MATERIALS & METHODS

The present study was aimed to evaluate the thyroid hormone levels in healthy newborns born to mothers with hypothyroidism during pregnancy.A total of 100 pregnant subjects were enrolled. All the subjects were divided into two study groups with 50 subjects in each group: Study group (Hypothyroid pregnant subjects), and Control group.On day 4 of life a plain venous blood sample was collected for evaluation of thyroid profile and results were analyzed statistically. Exclusion criteria for the present study included pregnant subjects with any other co-morbid condition. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. Chi-square test and student t test were used for evaluation of level of significance.

RESULTS

Mean gestational age of the subjects of the study group and control group was 38.63 weeks and 38.79 weeks respectively. Majority of the subjects of both the study groups were Term.82 percent of the subjects of the study group and 90 percent of the subjects of the control group were appropriate for gestational age. While comparing the weight for gestational age among the two study groups, significant results were obtained. While comparing the thyroid profile among the two study groups, non-significant results were obtained.

Table 1: Comparison of gestational age

Gestational age (weeks)	Study group		Control group	
	Number	Percentage	Number	Percentage
31 to 34: Early preterm	2	4	2	4
35 to 36: Later preterm	6	12	5	10
37 to 41: Term	42	84	43	86
Total	50	100	50	100
Mean gestational age (week)	38.63		38.79	
p-value	0.442			

Table 2: Comparison of weight for gestation age

Weight for gestation age	Study group		Control group		p-value
	Number	Percentage	Number	Percentage	
Appropriate for gestation age (AGA)	41	82	45	90	0.001*
Large for gestational age (LGA)	5	10	2	4	
Small for gestational age (SGA)	4	8	3	6	
Total	50	100	50	100	

*: Significant

Table 3: Thyroid profile

Thyroid hormone	Study group	Control group	p-value
T3 (ng/mL)	1.13	1.28	0.717
T4 (µg/dL)	12.59	12.34	0.465
TSH (IU/mL)	2.59	3.53	0.981

DISCUSSION

Thyroid dysfunction is common in women of reproductive age and during pregnancy, with frequencies ranging from 0.3% to 5% and this number constitutes a significant proportion.Hypothyroidism in pregnancy has adverse effects both on the course of pregnancy and on the physical as wells as neurodevelopment of the fetus. Several studies have reported that maternal hypothyroidism is associated with increased risks of abortions, stillbirths, preterm delivery, pregnancy-induced hypertension,Gestational diabetes mellitus, neonatal thyroid diseases etc. Conversely, other reports have also shown successful pregnancy outcomes in women who were profoundly hypothyroid.[8- 10]The effects of thyroid dysfunction during pregnancyon the developing fetus are currently of interest, with the most devastating observation in the literature being decreased intelligence quotient of the offspring. It is known that the fetus is totally dependent on maternal thyroid hormone supply during the first trimester of pregnancy, which is the crucial time in organogenesis especially neurodevelopment. This dependence has been postulated by various studies by demonstrating saturation of T3 receptors in fetus brain during early part of first trimester before the onset of endogenous thyroid hormone production by fetus.[11- 13]Hence; the present study was aimed to evaluate the thyroid hormone levels in healthy newborns born to mothers with hypothyroidism during pregnancy.

In the present study, mean gestational age of the subjects of the study group and control group was 38.63 weeks and 38.79 weeks respectively. Majority of the subjects of both the study groups were Term.82 percent of the subjects of the study group and 90 percent of the subjects of the control group were appropriate for gestational age. Basu et al compared thyroid profile between preterm / term SGA babies

and normal birth weight babies It was conducted for a period of 1 year from 2015 to 2016, on 90 newborns which comprised three groups including preterm AGA, term SGA, term AGA of 30 newborns in each group. They were screened for thyroid hormones (T3,T4, TSH) between day 3 and day 7 of life. 90 newborns. Both Preterm AGA and term SGA babies have significant thyroid profile abnormality compared to term AGA newborns with lower T3, T4 and higher TSH levels than term AGA.[10]Nam JY et al investigated relationships among neonatal hypothyroidism, family income, and intellectual disability, as well as the combined effects of neonatal hypothyroidism and low family income on intellectual disability.The risk of intellectual disability was higher in infants with hypothyroidism than in those without hypothyroidism. The risk of intellectual disability was higher in infants with low family income than in those with high family income. The risk of intellectual disability was higher in infants with hypothyroidism and low family income than in those without hypothyroidism and with high family income.[11]

While comparing the weight for gestational age among the two study groups, significant results were obtained. While comparing the thyroid profile among the two study groups, non-significant results were obtained.Torky A assessed the frequency of pediatric inpatient thyroid testing, frequency of detection of abnormal results, and apparent impact on patient management. Of the 205 abnormal tests (17.1%), the most common abnormalities in the combined TFTs group were normal FT4 and increased TSH (35.4%), normal FT4 and TSH 0.1 to 0.5 μIU/mL (33.1%), and high FT4 but normal TSH (14.3%). Patients with new-onset type 1 diabetes had borderline high or high TSH in about 20% of cases, but all abnormalities resolved at outpatient follow-up. Overall, 8 patients (0.66%) were started on levothyroxine. They concluded that pediatric inpatient thyroid testing is relatively common and although results are often abnormal, they do not point to thyroid disease that has contributed to the reason for hospitalization and do not identify patients in urgent need of starting therapy.[12]Desai et al gave the guidelines for newborn screening for congenital hypothyroidism. Preterm and low birth weight infants should undergo screening at 48–72 h postnatal age. Sick babies should be screened at least by 7 d of age. Venous confirmatory TSH >20 mIU/L before age 2 wk and >10 mIU/L after age 2 wk, with low T4 or FT4 indicate primary CH and treatment initiation.[13]

CONCLUSION

Thyroid disorders during pregnancy do affect the fetal development. Prematurity and dysmaturity may compromise neonatal thyroid function, leading to transient or permanent thyroid dysfunction, and to metabolic and cardiovascular disorders.

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