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Original Research

Assessment of prevalence of thyroid dysfunction in newborns born to mothers with thyroid dysfunction: An observational study

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ABSTRACT:
Background: The thyroid gland disorders are the commonest endocrine disorder in India and commonest preventable cause of mental retardation. Hence; the present study was undertaken for assessing the prevalence of thyroid dysfunction in newborns born to mothers with thyroid dysfunction. **Materials & methods:** A total of 120 newborns were included in the present study. Inclusion criteria for the present study included newborns with positive history of maternal thyroid dysfunction. Blood samples were obtained from all the neonates and were sent to the department of general pathology for assessment of serum thyroid profile. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. **Results:** The overall prevalence of thyroid dysfunction among newborns with positive history of maternal thyroid dysfunction was 7.5 percent (9 neonates). Non-significant results were obtained while correlating distribution of newborns with thyroid dysfunction according to gestational age, gender, type of delivery and birth weight (p- value >0.05). **Conclusion:** Newborns with positive history of maternal thyroid dysfunction are at a significant risk for development of thyroid dysfunction.
Key words: Dysfunction, Newborns, Thyroid

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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%.[1- 2] Maternal Hypothyroidism has multiple deleterious impacts on pregnancy, the postpartum and the developing fetus. Congenital hypothyroidism is the most frequent cause of preventable mental retardation. Neonatal hypothyroidism has an incidence of one in 3.000–4.000 births and includes both permanent and transient types. Diagnosis Newborn screening- Ideally universal screening at 3-4 days of age should be done for detecting CH.[3-5]

Despite the critical importance of thyroid hormones on multiple organ systems, especially the brain, most infants with congenital hypothroidism appear normal at birth. Universal newborn screening is currently being done in many parts of the world including Western Europe, North America, Japan, Australia, and parts of Eastern Europe, Asia, South America, and Central America.[6- 8] Hence; the present study was undertaken for assessing the prevalence of thyroid dysfunction in newborns born to mothers with thyroid dysfunction.

MATERIALS & METHODS

The present study was conducted in the department of paediatrics of medical institute and it included evaluation of prevalence of thyroid dysfunction in newborns born to mothers with thyroid dysfunction. Ethical approval was obtained from institutional

ethical committee and written consent was obtained from guardians/parents all the neonates after explaining in detail the entire research protocol. A total of 120 newborns were included in the present study. Inclusion criteria for the present study were as follows:

- Newborns with positive history of maternal thyroid dysfunction,
- Newborns with negative history of any other systemic illness,
- Newborns with negative history of presence of any other congenital malformation

Exclusion criteria for the present study were as follows:

- Very low birth weight (<1500 grams)
- Prematurity (< 28 weeks of gestational age)

Blood samples were obtained from all the neonates and were sent to the department of general pathology for assessment of serum thyroid profile. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Chi- square test and independent t test were used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

In the present study, a total of 120 newborns were analysed. Among these 120 patients, 81.67 percent belonged to the gestational age group of 37 to 41 weeks. 15.83 percent of the patients belonged to the gestational age group of 35 to 36 weeks. Out of 120 patients, 59 patients were males while the remaining 61 patients were females. In 73 patients, the mode of delivery was caesarean while in the remaining 47 patients, the mode of delivery was vaginal.

In the present study, 48.33 percent of the patients, birth weight of the newborns belonged to the weight range of 2500 to 3000 gram. In 32.5 percent of the patients and 11.67 percent of the patients, birth weight of the newborns belonged to the weight range of more than 3000 gram and 2000 to 2499 gram respectively.

In the present study, the overall prevalence of thyroid dysfunction among newborns with positive history of maternal thyroid dysfunction was 7.5 percent (9 neonates). Among these 9 patients, 5 were males while the remaining 4 were females. Mode of delivery in 6 patients was caesarean while in the remaining 3 patients, the mode of delivery was vaginal. Non-significant results were obtained while correlating distribution of newborns with thyroid dysfunction according to gestational age, gender, type of delivery and birth weight (p- value >0.05).

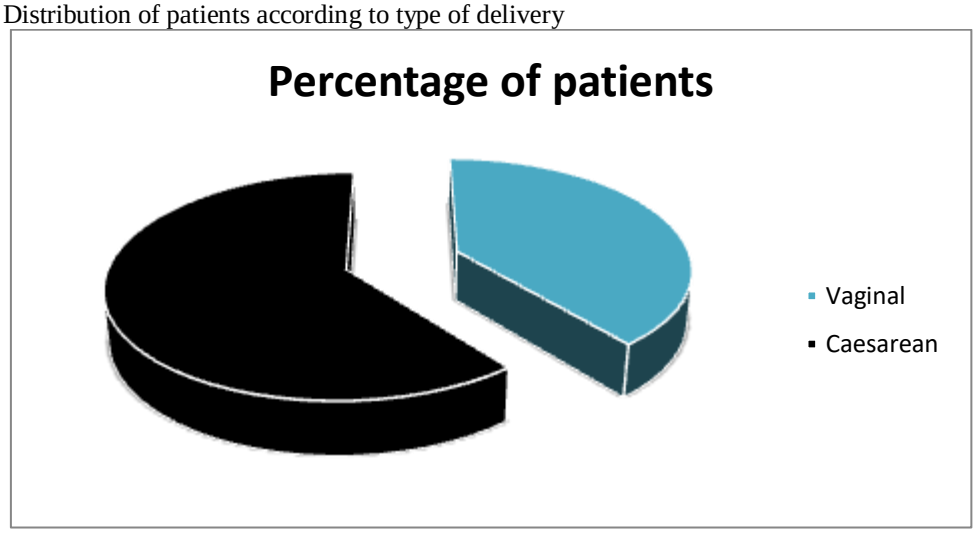
Table 1: Distribution of patients according to gestational age

Gestational age (weeks)	Number of patients	Percentage of patients
31 to 34 weeks- early preterm	3	2.50
35 to 36 weeks- late preterm	19	15.83
37 to 41 weeks- term	98	81.67
Total	120	100

Table 2: Distribution of patients according to gender

Gender	Number of patients	Percentage of patients
Males	59	49.17
Females	61	50.83
Total	120	100

Graph 1: Distribution of patients according to type of delivery



Graph 2: Distribution of patients according to type of birth weight

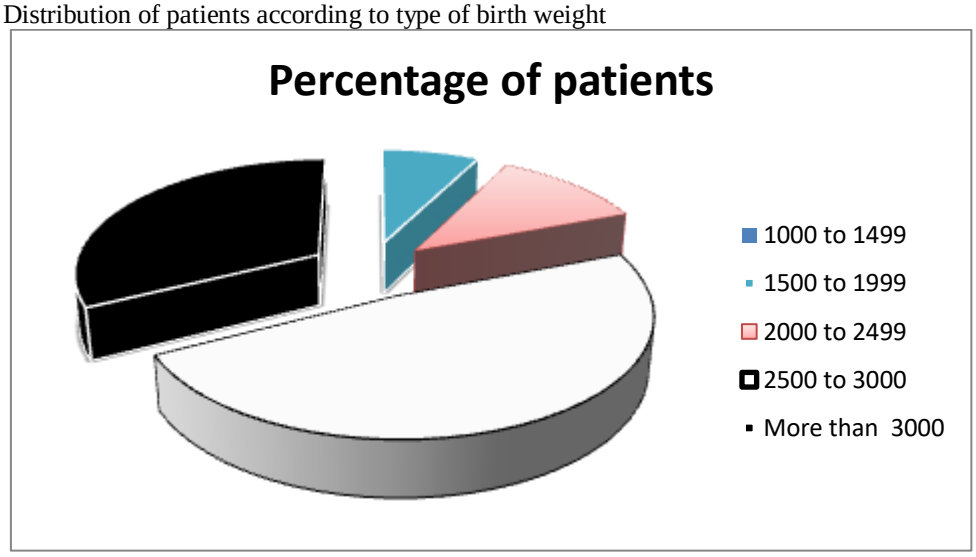


Table 3: Prevalence of thyroid dysfunction among newborns

Parameter	Number of patients	Percentage of patients
Thyroid dysfunction	9	7.5

Table 4: Correlation of distribution of newborns with thyroid dysfunction according to gestational age, gender, type of delivery and birth weight

Parameter		Number of newborns with thyroid dysfunction	Percentage of newborns with thyroid dysfunction	p- value
Gestational age (weeks)	31 to 34 weeks- early preterm	1	11.11	0.25
	35 to 36 weeks- late preterm	3	33.33	
	37 to 41 weeks- term	5	55.56	
Gender	Males	5	55.56	0.33
	Females	4	44.44	
Type of delivery	Vaginal	3	33.33	0.18
	Caesarean	6	66.67	
Birth weight (gm)	1000 to 1499	0	0.00	0.75
	1500 to 1999	1	11.11	
	2000 to 2499	2	22.22	
	2500 to 3000	4	44.44	
	More than 3000	2	22.22	

DISCUSSION

In the present study, among these 120 patients, 81.67 percent belonged to the gestational age group of 37 to 41 weeks. 15.83 percent of the patients belonged to the gestational age group of 35 to 36 weeks. Out of 120 patients, 59 patients were males while the remaining 61 patients were females. In 73 patients, the mode of delivery was caesarean while in the remaining 47 patients, the mode of delivery was vaginal. 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. Data were extracted from the National Health Insurance Service-National Sample Cohort from 2002 to 2011. This retrospective study included 91,247 infants. The presence of intellectual disability was based on the disability evaluation system in Korea. Newborn hypothyroidism was identified from diagnosis. Family income was determined from average monthly insurance premiums. Cox proportional hazards models were used to calculate adjusted hazard ratios. Of the 91,247 infants, 208 were considered to have intellectual disability (29.18 cases per 100,000 person-year). 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. Neonatal hypothyroidism and low family income were associated with the risk of intellectual disability in Korea.[9]

In the present study, 48.33 percent of the patients, birth weight of the newborns belonged to the weight range of 2500 to 3000 gram. In 32.5 percent of the patients and 11.67 percent of the patients, birth weight of the newborns belonged to the weight range of more than 3000 gram and 2000 to 2499 gram respectively. Torky A et al assessed the frequency of pediatric inpatient thyroid testing, frequency of detection of abnormal results, and apparent impact on patient management. It is a retrospective study of admissions from July 2015 to June 2016 at a large urban children's hospital. Chart review was conducted on all hospitalized pediatric patients who underwent thyroid testing. They used a normal range of 0.5 to 5.0 μIU/mL for thyroid-stimulating hormone (TSH) and 1.0 to 2.0 ng/dL for free thyroxine (FT4), except for neonates for whom they used the higher reference ranges specified by the hospital laboratory. Thyroid testing occurred in 1202 (5.7%) of 20 907 hospitalizations; 79.3% had combined thyroid function tests (TFTs) with TSH + FT4 being most common, and 20.6% had TSH only. . Of the 205 abnormal tests (17.1%), the most common abnormalities in the combined TFTs group were normal FT4 and increased TSH (35.4%) (76% of which were between 5 and 10 μIU/mL), 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 at their institution, 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.[10]

In the present study, the overall prevalence of thyroid dysfunction among newborns with positive history of maternal thyroid dysfunction was 7.5 percent (9 neonates). Among these 9 patients, 5 were males while the remaining 4 were females. Mode of delivery in 6 patients was caesarean while in the remaining 3 patients, the mode of delivery was vaginal. Non-significant results were obtained while correlating distribution of newborns with thyroid dysfunction according to gestational age, gender, type of delivery and birth weight (p- value >0.05). Desai et al gave the guidelines for newborn screening for congenital hypothyroidism. It suggested that: screening should be done for every newborn using cord blood, or postnatal blood, ideally at 48 to 72 h of age. On this screen sample, neonates with TSH > 20 mIU/L serum units (or >34 mIU/L for samples taken between 24 to 48 h of age) should be recalled for confirmation. For screen TSH > 40 mIU/L, immediate confirmatory venous T4/FT4 and TSH, and for milder elevation of screen TSH, a second screening TSH at 7 to 10 d of age, should be taken. 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 (<10 μg/dL) or FT4 (<1.17 ng/dL) indicate primary CH and treatment initiation.[11]

CONCLUSION

From the above results, the authors conclude that newborns with positive history of maternal thyroid dysfunction are at a significant risk for development of thyroid dysfunction. However; further studies are recommended.

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