Original Article

Limited Screening of Thyroid Function for Preterm and Clinically Suspected Hypothyroidism Term Neonates

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Abstract:

Purpose: To help develop a nationwide guideline for screening and appropriate measure for prevention of mental handicap due congenital hypothyroidism.

Introduction: Congenital hypothyroidism is an important cause of mental retardation which is preventable if early diagnosis is done and treatment start within 3 months of life especially within 4 weeks of life. Severe cretinism may present within few days of life but milder degree of cretinism is difficult to diagnose until later infancy or early childhood [8]. Early diagnosis and treatment prevent brain damage and allows the child to grow like a normal child. Late diagnosis leads to severe neurodevelopment and intellectual deficit.

Method: This Purposive prospective study conducted in Dhaka Shishu Hospital, Dhaka from May, 2014 to October, 2014. A total of 100 babies were selected among them 50 preterm and 50 term neonates for clinically suspected congenital hypothyroidism (CH). In preterm neonate blood sample was taken on 5^{th}–7^{th} days, because after birth the TSH level is transiently high and it goes to base line level usually after 72 hours. In this study blood sample of term neonates was taken after 7 to 28 days after birth.

Result: The mean gestational age of the baby was 35.58 ±4.29 weeks among them 62 male and 38 female. Mean body weight was 2.14±0.71kg and mean TSH level were 1.69 ±0.7mIU/L. Out of 50 premature neonates, mean age was 31.57 ± 1.94 weeks. 30 males and 20 females. Mean body weight 1.50±0.27kg.Mean TSH level 1.60 ± 0.84mIU/L. Suspected term babies mean age was 39.37 ± 1.34 weeks, 64%(32) male and 36% (18) female, mean body weight 2.77±0.34kg and Mean TSH level 1.84±0.83mIU/L. The mean maternal age was 23.04±0.53 years.

Conclusion: There was no significant difference of TSH level of the study babies. It is not possible to make any comment regarding congenital hypothyroidism with this small sample size study.

Keywords: Suspected term baby, Hypothyroidism, TSH, preterm baby.

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Introduction:

Thyroid hormone is essential for human being in maintaining basal metabolic rate and metabolism of all nutrients.[1] It plays a crucial role in foetal life, infancy and childhood for normal somatic and brain growth and development. 80% of brain development occurs in intrauterine life and rest 20% development occurs within first few years of life mainly within two years after birth.[2] During this time normal serum level of thyroid hormone is essential. Thyroid function is also affected by gestational age, birth weight, birth asphyxia, respiratory distress and severe illness.[3] Congenital hypothyroidism is one of the commonly recognized disorders on screening and its incidence has been reported as 1:2700 to 1:6900 in different literature.[4]

Congenital hypothyroidism is an important cause of mental retardation which is preventable if early

diagnosis in done and treatment start within 3 months of life especially within 4 weeks of life.[5-7] It is more common in preterm babies than term babies. Some preterm babies suffer from transient hypothyroidism. That is why it is very important to screen the newborns for hypothyroidism. Early diagnosis prevents brain damage and allows the child to grow like a normal child. Klein showed the IQ of those who were treated before 3 month of age was 89: IQ was 70 if started between 3 to 6 months and 54 Where treatment started after 6 months of age.[8] Neonatal screening program for detection of congenital hypothyroidism is now establish in all developed and many developing countries [7].In most of the countries it is done along with the screening of other inborn errors of metabolism like phenylketonuria, Tyrosinaemia (Guthrie test).[9,10,11-15]

Methods:

This purposive prospective study was conducted in Dhaka Shishu Hospital, Dhaka from May, 2014 to October, 2014. Preterm and clinically suspected hypothyroidism in term neonates in Neonatal unit of Paediatrics department of Dhaka Shishu Hospital, Dhaka. Due to time and economic constraints sample determined purposively, one hundred were selected, 50 preterm and 50 term neonates forclinically suspected congenitally hypothyroidism (CH). Each case was selected randomly until the desired sample size was fulfilled. In this limited screening. Only risk group like preterm, low birth weight and those term neonate showing sign symptoms suggestive of congenital hypothyroidism were included as because these group has more chance to develop congenital hypothyroidism.

Inclusion criteria:

Preterm neonates less than 35 weeks of gestational age and weight less than 2000gm (2kg). Term neonate after one week of birth with sign-symptoms related to Congenital Hypothyroidism. Exclusion criteria Full term babies without sign-symptoms of congenital hypo-thyroidism. Preterm babies weighting more than 2 kg and gestational age more than 35 weeks. Informed consent was taken from the parents of the neonates about the prospect and procedure of the study before drawing the heel prick blood sample. A total of 100 cases were included in this study. Heel prick capillary blood was taken between 5^{th} and 7^{th} days after birth for preterm babies and after 7 days for clinically suspected hypothyroidism in term babies.

Under aseptic precaution capillary blood was collected by pricking heel applying single drop of blood ample enough to spread out over the required area penetrating the filter paper from one side to other. Blood spots were allowed to dry in air in a horizontal position for one hour at room temperature avoiding direct light and not touch the surface. These filter papers were sent to laboratory of the Institute of Nuclear Medicine, Shahbag, Dhaka for thyroid stimulating hormone estimation.

Statistical Methods and data Analysis Collected data was compiled, and analysed by 'Special Package for Social Science (SPSS), appropriate statistical test (Un Paired Student 't' test) was done and presented in the form of table, pie diagram, bar diagram.

Results:

In this study a total of 100 case, 50 premature baby, age less than 35 weeks and body weight less than 2000gm and 50 suspected term baby were included for screening the TSH level for diagnosis of congenital hypothyroidism. The mean age of the baby was 35.58 ±4.29 (table-1) weeks (Mean ± SD) among them 62 male and 38 female (Table-II). The Mean body weight were 2.14±0.71kg (Table-VI) and Mean TSH level were 1.69 ±0.7mIU/L (Figure-3). Out of 100 mothersMean age were 22.98 ±4.02 years (Figure-1) and educational qualification 13mother passed HSC, 45 mother passed SSC, 20 mother studied in secondary school, 15 mother in primary level and 7 illiterate (Figure-2).

Gestational age was diagnosed by Ultrasonography (USG) 48 % and Last menstrual period (LMP) 15%and USG &LMP were 37% (Table-IV). Among 100 mothers, 45% from Dhaka district, 11% from Gazipur, from Mymensingh, 10% from Faridpur, 5% from Madaripur, 10% Narshingdi, 12 from Narayangonj and 3% from Pirojpur (Table-3).Out of 50 premature neonates, Mean age was 31.57 ± 1.94 weeks (Table-I) and 30 male and 20 female (Table-II). Mean body weight 1.50±0.27kg (Table-VI).

Mean maternal age 22.70 ± 3.39 years (Figure-1) and Mean TSH level 1.60 ±0.84mIU/L(Figure-3). Out of 50 suspected term babies sign-Symptoms of congenital hypothyroidism were respiratory distress 20% (10), prolong jaundice 14 (7%), cry little and hoarse6%(3), abdomen distension 12%(6), poor feeding 16%(8), decrease heart rate 8%(4), delayed passes of meconium 4%(2), cool body 8%(4) reflex diminished8%(4) and umbilical hernia 4%(2), (Table-V).

Mean age was 39.37 ± 1.34 weeks (Tables-1), 64%(32) male and 36% (18) female (Table-II), Mean body weight 2.77±0.34kg (Table-VI) and Mean TSH level 1.84±0.83mIU/L (Figure-3). The mean maternal age was 23.04±0.53 years (Figure-1).

Table-I: Age distribution of the preterm and clinically suspected hypothyroidism term neonates n=100

Study cases	Number	Mean Age in Wks (Mean± SD)
Premature baby (less than 35 weeks)	50	31.57±1.94
Hypothyroidism suspected term neonates	50	39.37±1.34
Mean age value of 100 babies	100	35.58±4.29

Table-II: Sex distribution of the preterm and clinically suspected hypothyroidism term neonates n=100

Study babies	Male	Female	Total
Premature baby	30	20	50
Hypothyroidismsuspectedterm neonates	32	18	50
Grand Total	62	38	100

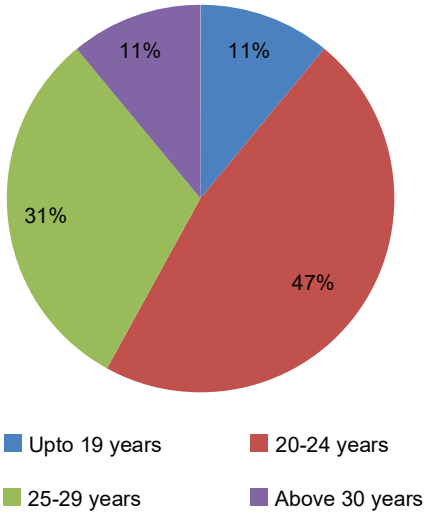

Figure-1: Maternal age distribution for study babies

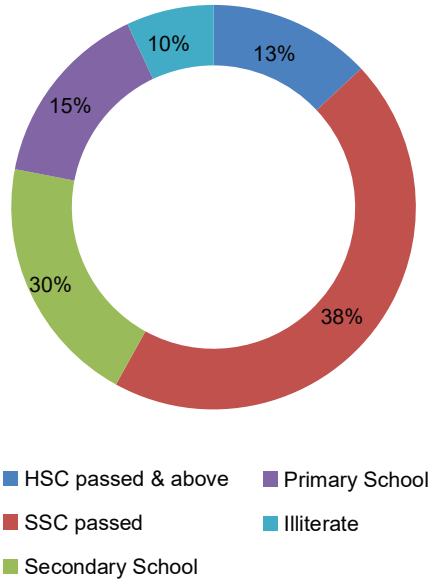

Figure-2: Maternal Educational Qualification of the study babies

Table- III: Locality or residence of Mothers of the study babies

Locality	Number	Percentage
Dhaka District	45	45%
Gazipur District	11	11%
Mymensingh	04	4%
Foridpur	10	10%
Madharipur	05	5%
Narshingdi	10	10%
Narayangang	12	12%
Pirojpur	03	3%

Table-IV: Technique of Gestational age determination of the study neonates

Investigation	Number	Percentage
Ultrasonography	48	48%
Last menstrual period (LMP)	15	15%
USG &LMP	37	37%
Total	100	100%

Table-V: Sign-Symptoms of clinically suspected hypothyroid term neonates. N=100

Sign and symptoms	Number	Percentage
Respiratory distress	10	20%
Prolong Jaundice	7	14%
Cry little and hoarse	3	6%
Abdomen distended	6	12%
Poor feeding	8	16%
Decrease heart rate	4	8%
Delayed passes of meconium	2	4%
Cool body	4	8%
Reflex diminished	4	8%
Umbilical hernia	2	4%

Table-VI: Body Weight of the study Neonates.

Study baby	Weight in kg (Mean±SD)	P value
Preterm baby	1.50 ± 0.27	> 0.10
term Neonates	2.77 ± 0.34	> 0.10
Total 100 Study baby	2.14 ± 0.71	> 0.10

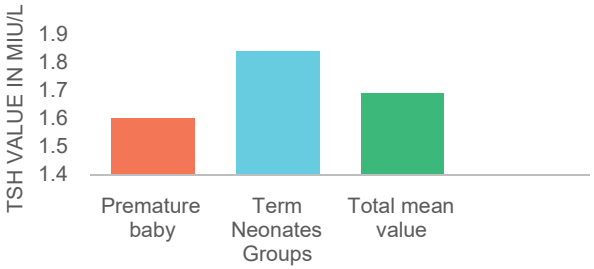

Figure – 3: Mean TSH Value of the Study neonates

Discussion

In this study estimation of Thyroid Stimulating Hormone was done in 100neonates, fifty premature baby, age less than 35 weeks and body weight less than 2000mg and 50 clinically suspected term baby were included for screening the TSH level for diagnosis of congenital hypothyroidism. The mean age of the neonates was 35.58 ±4.29 weeks (Mean ± SD) among them 62 male and 38 female . Male and female ratio about 2:1 The Mean body weight were 2.14±0.71 kg and MeanTSH level was 1.69 ±0.78,IU/L which is consistent with other studies done in our country in verity studies.[5,6,22] But it was done by others.[7,13,24-27] Out of 100 mothers Mean age was 22.98 ±4.02 years. Regarding literacy of the mother-13 passed HSC, 45 passed SSC, 20 studies in secondary school, 15 in primary level and 7 illiterates. Regarding age-48% from Ultrasonography report (USG) and 15% from maternal history of last menstrual period (LMP) and 37% from maternal history (LMP) which correlates with Ultrasonography and these finding are similar with other study done.[5,6] Among 100 mothers, 45% from Dhaka district, 11% from Gazipur, 4% from Mymensingh, 10% from Faridpur, 5% from Madaripur, 10% Narshingdi, 12% from Narayangong and 3% from Pirojpur. No mother was from endemic iodine deficiency zone and none of them had goiter and these finding are similar with other study done[5]differs from other study.[4,25] Out of 50 premature neonates, Mean age was 31.57±1.94 weeks and 30 male and 20 female. Mean body weight 1.50±0.27kg (p>0.10). Mean maternal age 22.70±3.39 years and Mean TSH level 1.60±084mIU/L (p>0.10) and these finding issimilar with other study done by in our country.[5]

Out of 50 clinically hypothyroidism suspected term babies, sign symptoms of congenital hypothyroidism were respiratory distress 10(20%), prolonged jaundice 7(14%), hoarse cry 3(6%), abdominal distension 6(12%), poor feeding 8(16%), decreased heart rate 4(8%), delayed passes of meconium 2(4%), cool body 4(8%), diminished reflexes 4(8%) and umbilical hernia 2(4%), Mean age was 39.37±1.34 weeks, 32(64%) male and 18(36%) female, Mean body weight was 2.77±0.34kg (p>0.10) and Mean TSH level 1.84±0.83mIU/L (p>0.10). Thyroid Stimulating Hormone value of more than 20mIU/L was regarded to be abnormal.In this study Thyroid Stimulating Hormone (TSH) value of the preterm and suspected term neonates were within normal level and did not show significant difference (p>0.10) and these findings are similar with the study done.[5,6,16-18] Approximately one infant in every 3500 to 4500 has congenital hypothyroidism.[20-22] Sample of this study was very small for TSH assay in comparison with the incidence of congenital hypothyroidism and none of the sample was from anyendemic zone for iodine deficiency and all mothers gave history of ingestion anduse of iodinated salt in their routine daily practice. Therefore, failure of detection of congenital hypothyroidism in the present study is not unusual. Further study with large sample including samples from goiterous zone specially Rongpur, Dinajpur, Takurgone (North Bangal) for iodine deficiency, using different samples and appropriate

screening method for estimating TSH are required for detection of congenital hypothyroidism[23], similar to studies conducted by others.[24,25]

Conclusion:

There was no significant difference of TSH level of the study babies. It is not possible to make any comment regarding congenital hypothyroidism with this small sample size study. A Nationwide mass screening urgently needed to detect the incidence of congenital hypothyroidism and appropriate measure should be taken to overcome the serious complication like mental handicap resulting from congenital hypothyroidism.

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