

FREQUENCY OF CONGENITAL HYPOTHYROIDISM IN PRETERM AND LOW BIRTH WEIGHT NEONATES

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ABSTRACT

Objective: To find frequency of congenital hypothyroidism in preterm and low birth weight neonates admitted at neonatal unit.

Study design: Cross sectional study

Place & Duration of study: The study was done at neonatal ICU department of Pediatrics, Lahore General Hospital from Jan - July 2018

Methods: Total of 225 neonates were taken from the neonatal unit of department of Paediatrics Lahore General Hospital. After taking informed consent form parents of neonates their demographic data including name, age, sex, weight, gestational age, and contact details were recorded. After aseptic measures, 2-3 ml venous blood was taken and sent to Hospital Laboratory for TSH level, where it was analyzed by immunoradiometric assay. Congenital hypothyroidism was diagnosed as per operational definition. All data was recorded by researcher himself on prescribed proforma

Results: The mean age of cases was 17.76 ± 6.40 days with minimum and maximum age as 8 and 28 days. There were 116(51.6%) male and 109(48.4%) female cases. The mean gestational age was 33.10 ± 1.98 weeks with minimum and maximum gestational age as 30 and 36 weeks. The mean birth weight was 1846.27 ± 330.58 g with minimum and maximum birth weight as 1211 and 2397 g. Congenital hypothyroidism was seen in 27(12%) of the cases while 198(88%) of the neonates were euthyroid.

Conclusion: Through the findings of this study the frequency of congenital hypothyroidism was seen in 27(12%), that seems to be high. So, screening programs of congenital hypothyroidism should be established for better management of the disorder and preventing its related neurodevelopmental consequences.

Keywords: Low birth weight, preterm, Neonatal screening, Congenital hypothyroidism, thyroxine, thyroid stimulating hormone (TSH)

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INTRODUCTION

Primary hypothyroidism occurs when there is thyroid hormone deficiency T3, T4. Primary Hypothyroidism at birth is caused by thyroid dysgenesis or thyroid dysmorphogenesis.¹ Congenital Hypothyroidism leads to mental retardation and growth impairment in newborns. In many countries, neonatal thyroid screening programs are performed for early diagnosis and treatment of

hypothyroidism.^{2, 3} The most sensitive screening test is determining TSH level after 24 hrs of life. Most centres used TSH cut off value of 20IU/L. Lowering of the screening TSH cutoff and changes in birth demographics have been associated with an approximate doubling of the incidence of CH, from 1:3500 to 1:1714.4

Congenital hypothyroidism causes neurodevelopmental impairment, which is preventable if properly treated.⁵ A study was done on 24 preterm neonates with low birth weight and they found percentage of congenital hyperthyroidism in 21.7% at first evaluation.⁶ While another study reported twenty-six patients (9.1%) were diagnosed with thyroid dysfunction among 286 preterm birth cases.⁷

The rationale of this study is to calculate congenital hypothyroidism in our preterm population. Global studies give variation of frequency of hypothyroidism from 9.1% to 21% (that is 2 times more than 9.1%) in preterm neonates. Therefore, it is necessary to screen congenital hypothyroidism in preterm infants and low birth weight neonates, to prevent and minimize neurodevelopmental impairment by starting early treatment.

OBJECTIVE:

To find frequency of congenital hypothyroidism in preterm and low birth weight neonates admitted at neonatal unit.

OPERATIONAL DEFINITION:

Preterm birth: If baby is born before 37 weeks of gestation (according to LMP and USG)

Low birth weight: If baby's birth is < 2500 g (on birth record)

Congenital Hypothyroidism: Those neonates having serum level of TSH >20 mIU/L

METHODS

This is Cross sectional study, done at Neonatology department of Paediatrics, Lahore General Hospital. The study was done in six months from Jan 6, 2018 till July 6, 2018. Probability sampling & the study was done at department of Paediatric Lahore General Hospital. 225 cases are estimated using expected percentage of congenital hypothyroidism in 21.7% at first evaluation. We used 95% confidence level and 5.5% margin of error using WHO software.

INCLUSION CRITERIA

- All neonates of age (8-28 days of life)
- Neonate with both genders
- Preterm as per operational definition
- Low birth weights per operational definition

EXCLUSION CRITERIA

- Neonates with congenital malformation (was assessed clinically)
- Cases with incomplete birth record (was assessed on birth history)

Two hundred twenty-five neonates were taken from the neonatal unit of department of Paediatrics Lahore General Hospital. After taking informed consent form parents of neonates their demographic data including name, age, sex, weight, gestational age, and contact details were taken. After aseptic measures, 2-3 ml venous blood was taken and sent to Hospital Laboratory for TSH level, where it was analyzed by immunoradiometric assay. Congenital hypothyroidism was diagnosed as per operational definition. All data was recorded by researcher himself on prescribed proforma.

All collected data was entered and analyzed using SPSS version 20. Mean \pm S.D was used for quantitative data like age, gestational age, birth weight, TSH level. Frequency (%) was used for categorical data like gender and Congenital hypothyroidism. To address effect modifiers data was stratified for age, gender, gestational age (< 34 weeks, \geq 34 weeks) & birth weight (<1500 g, \geq 1500 g). Post stratification chi-square test was used taking p-value \leq 0.05 as significant.

RESULTS

The mean age of cases was 17.76 ± 6.40 days with minimum and maximum age as 8 and 28 days. There were 116(51.6%) male and 109(48.4%) female cases.

The mean gestational age was 33.10 ± 1.98 weeks with minimum and maximum gestational age as 30 and 36 weeks. The mean birth weight was $18.46.27 \pm 330.58$ g with minimum and maximum birth weight as 1211 and 2397 g. The mean TSH levels were 16.53 ± 4.62 mIU/L with minimum and maximum levels as 11 and 32.10 mIU/L. Congenital hypothyroidism was seen in 27(12%) of the cases while 198(88%) of the neonates.

Among 8-14 days old cases, congenital hypothyroidism was seen in 12(13.5%) of the cases and in 15-28 days of age congenital hypothyroidism was seen in 15(11%) of the neonates. The frequency of congenital hypothyroidism was statistically same in both age groups, p-value > 0.05. Table -1

In male cases congenital hypothyroidism was seen in 12.9% and in females congenital hypothyroidism was seen in 11% of the cases. The frequency of congenital hypothyroidism was statistically same, p-value > 0.05. Table -6. In cases who had gestational age < 34 weeks, congenital hypothyroidism was seen in 14.6% of the cases while in \geq 34 weeks of gestation congenital hypothyroidism was seen in 8.4%. The frequency of congenital hypothyroidism was statistically same in both

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gestational age groups, p-value > 0.05. Table -7 In cases with birth weight < 1500 g congenital hypothyroidism was seen in 14.3% and in cases who had weight ≥ 1500 g congenital hypothyroidism was seen in 11.5% of the cases. The frequency of congenital hypothyroidism was statistically same in both groups of weight. Table 2-4

Table-1: Comparison of Congenital Hypothyroidism in Age groups (days)

Age groups (days)	Congenital Hypothyroidism		Total
	Yes	No	
8-14	12(13.5%)	77(86.5%)	89(100.0%)
15-28	15(11.0%)	121(89.0%)	136(100.0%)
Total	27(12.0%)	198(88.0%)	225(100.0%)

Chi-square = 0.307

P-value = 0.580 (Insignificant)

Table-2: Comparison of Congenital Hypothyroidism with respect to gender

Gender	Congenital Hypothyroidism		Total
	Yes	No	
Male	15(12.9%)	101(87.1%)	116(100.0%)
Female	12(11.0%)	97(89.0%)	109(100.0%)
Total	27(12.0%)	198(88.0%)	225(100.0%)

Chi-square = 0.197

P-value = 0.658(Insignificant)

Table-3: Comparison of Congenital Hypothyroidism with respect to Gestational age (weeks) groups

Gestational age (weeks)	Congenital Hypothyroidism		Total
	Yes	No	
<34	19(14.6%)	111(85.4%)	130(100.0%)
≥34	8(8.4%)	87(91.6%)	95(100.0%)
Total	27(12.0%)	198(88.0%)	225(100.0%)

Chi-square = 1.994

P-value = 0.158 (Insignificant)

Table-4: Comparison of Congenital Hypothyroidism with respect to both Birth weight (g) groups

Birth weight (g)	Congenital Hypothyroidism		Total
	Yes	No	
<1500 g	6(14.3%)	36(85.7%)	42(100.0%)
≥1500 g	21(11.5%)	162(88.5%)	183(100.0%)
Total	27(12.0%)	198(88.0%)	225(100.0%)

Chi-square = 0.255

P-value = 0.613 (Insignificant)

DISCUSSION

In current study the mean gestational age was 33.10 ± 1.98 weeks and mean birth weight was 18.46.27 ± 330.58 g. Another study reported in their study mean gestational age of 30.5±2.29 weeks and mean birth weight of 1246.90±193.58 g was enrolled in this study. These findings are compared with current study. In current study congenital hypothyroidism was seen in 27(12%) of the cases while 198(88%) of the neonates. A study was done on 24 preterm neonates with low birth weight and they found percentage of congenital hyperthyroidism in 21.7% at first evaluation.⁶ This frequency is higher as found in current study. While another study reported twenty-six patients (9.1%) were diagnosed with thyroid dysfunction among 286 preterm birth cases.⁷ This frequency is low as found in current study. Recently a prospective cohort study was conducted on 126 very-low-birth-weight (VLBW) neonates referred to the neonatal intensive care units (NICUs). They found that Transient hypothyroxinemia (low free T4 level, normal TSH) was the most frequent thyroid disorder detected in 42 infants (33.33%). Moreover, neonatal hypothyroidism, transient primary neonatal hypothyroidism, and transient hyperthyrotropinemia were observed in 8(6.34%), 15 (11.90%), and 9 neonates (7.14%), respectively.⁸ Similarly, another study was performed to evaluate the incidence of congenital hypothyroidism (CH) with delayed TSH elevation among low-birthweight (LBW) newborns. The incidence of this condition in North-Eastern Italy is therefore 1:908. The remaining infants presented a subclinical hypothyroidism (21.25%) or a complete normal serum thyroid function (21.25%).⁹

CONCLUSION

Through the findings of this study the frequency of congenital hypothyroidism was seen in 27(12%), that seems to be high. So, screening programs of congenital hypothyroidism should be established for better management of the disorder and preventing its related neurodevelopmental consequences.

ETHICAL REVIEW BOARD APPROVAL

The study was approved from Institutional Review Board of Postgraduate Medical Institute / Ameer-ud-Din Medical College / Lahore General Hospital, Lahore.

CONFLICT OF INTEREST: None

FINANCIAL DISCLOSURES: None

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AUTHOR'S CONTRIBUTIONS**MSA:** Manuscript writing, Data collection**FH:** Manuscript writing**MM:** Statistical analysis, data collection.**ASA:** Supervision