International Journal of Medical and Pharmaceutical Research
Website: https://ijmpr.in/| Print ISSN: 2958-3675 | Online ISSN: 2958-3683
NLM ID: 9918523075206676
Volume: 4 Issue:2 (Mar-Apr 2023); Page No:478-485

Research Article

IJMPR

Thyroid Screening of Preterm and Term Newborn Discharged from SNCU

Dr. R.D. Dutt[1], Dr. Suraj Singh Yadav[2], Dr. Ajay Gaur[3] , Dr. Chandrakala Dutt[4] , Dr. Tarushi Dutt[5]

[1]M.D., P.G.D.D.N., M.B.A. (Hospital Management), Professor of Pediatrics, Department of Pediatrics, G.R. Medical College & Kamla Raja Hospital, Gwalior, M.P

[2]P.G. Student, Department of Pediatrics, G.R. Medical College & Kamla Raja Hospital, Gwalior, M.P

[3]M.D. Ph.D., F.I.A.P., Professor and Head, Department of Pediatrics, G.R. Medical College & Kamla Raja Hospital, Gwalior, M.P

[4]M.S., Associate Professor, Department of Surgery, G.R. Medical College & J.A Group of Hospitals, Gwalior, M.P

[5]Bonded Medical Officer, P.H.C., Porsa, District, Morena, M.P

ABSTRACT

Background: The TSH and T4 level rises in 24 hours and decline gradually to 4 weeks of age and stabilizes at slightly at higher level than the adult in term newborns. In the preterm T4 level decline profoundly after birth resulting in hypothyroxemia of prematurity most marked in infants born prior to 30 weeks gestation. There is also in delay rise of TSH. **Aims and Objections**: To do thyroid screening preterm and term newborns babies admitted and later discharged from Special Newborn Care Unit. **Material and Methods**: This study was conducted from 2022 in Department of Pediatrics, Kamla Raja Hospital, G.R.M.C., Gwalior. **Setting**: Department of Pediatrics, SNCU, KRH in GRMC, Gwalior. **Study design**: Prospective cohort study. **Sample size**:120 newborns (60term and 60 preterm). **Duration of study**: 2 years. **Statistical analysis**: SPSS version 25. **Results and Conclusion**: 120 newborns (60 term and 60 preterm) were taken. Out of 60 preterms, 40 (66.66%) males and 20 (33.3%) females while 32 (53.3%) males and 28 (46.7%) were female term newborns. In the study, 2 preterm (1.67%) were having true congenital hypothyroidism and delay TSH rise was reported 3 preterm (5.1%) and 2 (3.3%) term newborn. In the study 3(5%) preterm and 2(3.33%) term newborn were having congenital hypothyroidism on admission but on second and third screening their thyroid becomes normal. So they were level as transient hypothyroidism. No case of congenital hypothyroidism in term newborn.

Key Words: *Congenital hypothyroidism, delayed TSH rise, transient congenital hypothyroidism, T3 and T4*

***Corresponding Author**
Dr. Chandrakala Dutt
M.S., Associate Professor, Department of Surgery, G.R. Medical College & J.A Group of Hospitals, Gwalior, M.P

INTRODUCTION

The thyroid gland is the largest endocrine gland in the body. It derives its name from the Greek word 'Thyreos' meaning shield because of its shield like appearance. It is a highly vascular, brownish-red gland located anteriorly in the lower neck. The gland varies from an H to a U shape and is formed by 2 elongated lateral lobes with superior and inferior poles connected by a median. Thyroid stimulating hormone (thyrotropin, TSH) secreted from the anterior part of the pituitary gland binds to the TSH receptors (TSHR) and mediates several effects on thyroglobulin synthesis, thyroid hormone synthesis, release and also on thyroid cell growth.

TSH secretion is regulated by thyrotropin-releasing hormone (TRH) production from the hypothalamus. Both triiodothyronine(T3) and T4 are having negative feedback effect on TRH and TSH secretion. The thyroid secretes T4 (80%) and T3 (20%) and these hormones are carried in the blood stream bound to thyroid-binding globulin (TBG), transthyretin (TTR) and albumin. T3 is the active form & most of the circulating T3 is due toperipheral conversion of T4 to T3 by mono-deamination.

Thyroid Function in the Term Neonate: With exposure to cold and clamping of the umbilical cord, the serum TSH rises abruptly to 60–80 mU/L within 30–60 minutes of birth. This physiological surge of TSH then declines rapidly to about 20 mU/L at 24 hours and then gradually to about 6–10 mU/L at 1 week of age. Serum total and free T4 rises in parallel to the TSH surge and peaks at 24–36 hours. The hormonal levels then gradually fall in the first 4 weeks of life and stabilizes at slightly higher values than adults (Total T4 7–16 µg/dL, free T4 0.8–2 ng/dL, TSH 0.5–6 mU/L).

Thyroid Function in the Preterm: The decline in T4 levels after birth is more profound resulting in hypothyroxinemia of prematurity most marked in infants born prior to 30 weeks gestation. Preterm infants also have very low levels of T3 due to immaturity of hepatic de-iodinase. The immaturity of the HPT axis can also result in delayed rise of TSH in preterm hypothyroid baby and thereby affecting screening results.

AIM AND OBJECTIVES

Aim:

- To do the Thyroid screening of Preterm & Term newborn babies admitted & later discharged from Special newborn care unit (SNCU).

Objectives:

- To estimate the level of thyroid hormones in preterm and term neonates admitted & later discharged from Special newborn care unit.
- To study the relationship between congenital hypothyroidism and clinical findings and accordingly treat them.

MATERIAL AND METHODS

This prospective cohort study conducted at Kamla Raja Children Hospital, G.R. Medical College, Gwalior (M.P.). Written &informed consent from the parents was obtained.

SETTING: Department of Pediatrics, Kamla Raja Children Hospital, Gwalior (M.P.).
STUDY DESIGN: Prospective Cohort Study.
SAMPLE SIZE: 120 Newborns(60 Term&60 Preterm)
DURATION OF STUDY: Two years

INCLUSION CRITERIA:

- Preterm neonates (with gestational age less than 37 weeks) and term baby (with gestational age in between 37-42 weeks).
- Newborns whose parents have given written informed consent for investigation.

EXCLUSION CRITERIA:

- Cases with positive maternal history of thyroid disorders (such as hypo or hyperthyroidism)
- Newborns of mothers who had used iodine-containing medications,
- Neonates with obvious congenital disease
- Deteriorating conditions (such as sepsis) which can affect thyroid status

METHODOLOGY

This is a prospective cohort study conducted in Kamla Raja Children Hospital Gwalior (M.P.). Duration of study was two years. The study was stated after getting approval from the Institutional Ethics Committee. The aim of the study was to do early screening of congenital hypothyroidism in preterm & term newborns admitted & later discharged from SNCU. As per the calculated sample size 120 Newborns (60 Term & 60 Preterm) who admitted in Special Newborn Care Unit (SNCU) and follows the inclusion criteria were enrolled for the study after taking well and informed consent of parents. Serial thyroid hormones monitoring was done first at 3^{rd}-5^{th} postnatal days after birth, second at 3^{rd}-5^{th} weeks after birth and Third at 3-5 Months of age & data was recorded on a pre-designed proforma & analysed.

Statistical analysis

Collected data were entered in the Microsoft excel 2016 for further analysis, Data was presented with frequency and proportion, mean and standard deviation. Unpaired t-test were used to observe mean difference between bivariate variable,while one way ANOVA was used to observe the mean difference among multiple variable. P-value <0.05 was considered as statistical significant at 5% level of significance. Statistical analysis were done with help of statistical package of SPSS version 22.

OBSERVATION AND RESULTS

This study enrolled 60 term& 60 preterm newborns with gestational age, 30-33+6weeks 19(15.83%), 34-36+6weeks 41(34.16%), 37-39+6weeks 57(47.5%) and rest >40 weeks. There were 72 male (60%) & 48(40%) female newborns. The birth weight distribution in the study population were as follow: between 1000-1500g there were 7(5.8%) newborns, between 1500-2000g there were 20(16.6%), 55(45.83%) were between 2000-2500g and 38(31.6%) were between 2500-3000g birth weight. Majority of family of preterm babies belongs to the lower middle class (33.3%) & family of term babies belongs to the upper lower class (24%) according to modified kuppuswamy scale

Table 1:T3 values on serial visits (Preterm)

	No. of visit	Low T3		High T3		Normal T3	
		N	%	N	%	N	%
Preterm	1st visit	0	0%	0	0%	60	100%
	2nd Visit	0	0%	0	0%	60	100%
	3rd visit	0	0%	0	0%	60	100%

Table 2:T3 values on serial visits (Term)

	No. of visit	Low T3		High T3		Normal T3	
		N	%	N	%	N	%
Term	1st visit	0	0%	0	0%	60	100%
	2nd Visit	0	0%	0	0%	60	100%
	3rd visit	0	0%	0	0%	60	100%

- The value of T3 hormone in preterm & term babies on 1st visit,2nd visit and 3rd visit. Value of T3 hormone in within normal range at all visits in both preterm and term newborns.

Table 3: T4 values on serial visits (Preterm)

	No. of visit	Low T4		High T4		Normal T4	
		N	%	N	%	N	%
Preterm	1st visit	7	11.7%	5.0	8.3%	48.0	80.0%
	2nd Visit	2	3.3%	0.0	0.0%	58.0	96.7%
	3rd visit	2	3.3%	2.0	3.3%	56.0	93.3%

Table 4:T4 values on serial visits (Term)

	No. of visit	Low T4		High T4		Normal T4	
		N	%	N	%	N	%
Term	1st visit	3	5.0%	1	1.7%	56	93.3%
	2nd Visit	2	3.3%	0	0.0%	58	96.7%
	3rd visit	0	0.0%	3	5.0%	57	95.0%

- The value of T4 hormone in preterm & term babies on 1st visit, 2nd visit and 3rd visit. On 1st visit in preterm newborns out of 60, value of T4 is low in 7(11.7%), high value in 5(8.3%) and within normal range in 48(80%). In term babies 3(5.0%) were having low T4 value, 1(1.7%) having high T4 and 56(93.3%) were having normal T4 value. On 2nd visit in preterm newborn only 2 were having low T4& 58 were having normal T4 value while in term newborn on 2nd visit only 2 were having low T4 and 58 were having normal T4 value. All cases were followed up for 3rd visit on 3-5th month only 2 preterm were having low T4 & 58 were with normal T4 value.

Table 5: TSH values on serial visits (Preterm)

	No. of visit	Low TSH		High TSH		Normal TSH	
		N	%	N	%	N	%
Preterm	1st visit	0	0%	6	10.0%	54	90.0%
	2nd Visit	0	0%	4	6.7%	56	93.3%
	3rd visit	0	0%	4	6.7%	56	93.3%

Table 6:TSH values on serial visits (Term)

	No. of visit	Low TSH		High TSH		Normal TSH	
		N	%	N	%	N	%
Term	1st visit	0	0%	2	3.3%	58	96.7%
	2nd Visit	0	0%	1	1.7%	59	98.3%
	3rd visit	0	0%	2	3.3%	58	96.7%

- The value of TSH in preterm & term newborns on 1st, 2nd and 3rd visits. On 1st visit, 6(10.0%) preterm and 2(3.33%) term newborns were having high TSH value & 54 (90%)preterm and 58(96.7%) term newborn were having normal TSH value. On 2nd visit only 4(6.67%) preterm and only 1(1.67%) term newborn were having high TSH while 56(93.3%) preterm and 59(98.3%) term were having normal TSH value. On 3rd visit 4(6.67%) preterm and 2(3.33%) were having high TSH while 56(93.3%) preterm and 58(96.7%) term were having normal TS value.

- Weight wise thyroid status of preterm newborns on successive follow up visits. On 1st visit in birth weight 1-1.5kg, 2(3.33%) were having hypothyroidism and 5(8.3%) were having euthyroidism. While in weight between 1.6-2 kg 20(33.3%) were euthyroid. While in more than 2kg category 3(5%) were having hypothyroidism while 30(50%) were euthyroid.
- Mean T4 hormone was significantly lower in >2 kg birth weight newborns but no significant difference according to weight categories was observed for mean T3 and TSH hormone in preterm hypothyroid newborns.
- Preterm newborns on 2nd visit in 1-1.5 kg category 1 baby(1.6%) was having hypothyroidism and 6 were euthyroid. In 1.6-2 kg category 20(33.3%) babies were euthyroid. In more than 2 kg category 1(1.67%) baby having hypothyroidism while 32(53.4%) were euthyroid.
- In hypothyroidism cases mean T3, T4 and TSH level was almost similar in all three weight categories with non significant p-value. In euthyroid newborns Mean TSH hormone was significantly higher in 1-1.5 kg and 1.6-2kg newborns and Mean T4 hormone was significantly higher in 1-1.5 kg and >2kg newborns but no significant difference according to weight categories was observed for mean T3 hormone in preterm.
- Preterm newborns on 3rd visit in 1-1.5 kg category 1 baby(1.6%) was having hypothyroidism and 6 were euthyroid. In 1.6-2 kg category 20(33.3%) babies were euthyroid.
- preterm newborn on 3rd visit, there was no significant difference according to birth weight categories was observed for mean T3, T4 and TSH hormone in euthyroid as well as hypothyroid newborns on 3rd visit
- Weight wise thyroid status of term baby on 3-5th day (1st visit). In this between 2-2.5 kg weight 22 babies were euthyroid. In 2.6-3 kg category 2 were having hypothyroidism and 36 were euthyroid.
- No significant difference according to birth weight categories was observed for mean T3, T4 and TSH hormone in term hypothyroid newborns.
- Weight wise thyroid status of term baby on 3-5th week (2ndvisit). In this between 2-2.5 kg weight 22 babies were euthyroid. While In 2.6-3 kg category all 38 babies were euthyroid.
- 2nd visit among term euthyroid newborn mean T3 hormone was significantly normal in all birth weight category and mean T4 and TSH level was almost similar in all categories with non significant p-value.
- Weight wise thyroid status of term baby on 3-5th months (3rdvisit). 22 babies with birth weight between 2-2.5 kg were euthyroid. While In 2.6-3 kg birth weight category all 38 babies were euthyroid.
- no statistically significant difference of mean T3,T4 and TSH was found in any birth weight category of euthyroid newborn

40(33.3%) babies were having decreased activity, 33 (27.5%) babies were having excessive sleepiness, 33(27.5%) babies were having wide anterior fontanelle, 28(23.3%) babies were having hypotonia, 20(16.6%) were having constipation and 9(7.4%) were having prolonged jaundice.

Table 7: Transient and permanent CH cases in term and preterm

		No. of transient hypothyroid cases	**No. of permanent hypothyroid cases**
		N (%)	**N (%)**
Term	< 2 kg	0 (0%)	0 (0%)
	2-2.5 kg	0 (0%)	0 (0%)
	2.6-3 kg	2 (3.3%)	0 (0%)
Preterm	1-1.5 kg	1 (1.7%)	1 (1.7%)
	1.6-2 kg	0 (0%)	0 (0%)
	> 2 kg	2 (3.3%)	1 (1.7%)

- In Term babies none was having permanent hypothyroidism in any weight category while 2(3.33%) babies in 2.6-3 kg birth weight category were having transient hypothyroidism. In preterm babies in 1-1.5 kg birth weight category 1(1.67%) was having transient hypothyroidism and 1(1.67%) baby was having permanent congenital hypothyroidism. Similarly In more than 2 kg birth weight, 2 (3.33%) preterm was found to having transient hypothyroidism and only 1(1.67%) was having permanent congenital hypothyroidism.

Table 8: Delayed TSH rise cases in term and preterm Newborns

Gestation	**Cases with delayed TSH Rise**		
	N	**%**	**P value**
Term	2	3.33%	0.648
Preterm	3	5%	

- Out of 60 term babies 2(3.33%) were having delayed TSH rise. While in preterm babies out of 60 only 3(5%) were having delayed TSH rise.

- Socioeconomic status of preterm babies. Majority of preterm babies belongs to lower middle (33%) class as per modified kuppuswamy scale.
- Majority of term babies belongs to upper lower (40%) class as per modified kuppuswamy scale.

Out of 120 cases 19(15.8%) babies were having gestational age between 30-34 weeks, 63(52.5%) babies having gestational age between 35-37 weeks and 37(30.8%) babies were having gestational age between 38-40 weeks while only 1(0.8%) baby was having more than 40 week gestation.

Table 9: Distribution of cases according to gender (Preterm)

Term	Male		Female	
	N	Percentage	N	Percentage
1-1.5 kg	3	7.5%	4	20%
1.6-2 kg	17	42.5%	3	15%
> 2 kg	20	50%	13	65%

Table 10: Distribution of cases according to gender (Term)

Term	Male		Female	
	N	Percentage	N	Percentage
2-2.5 kg	12	37.5%	10	35.7%
2.6-3 kg	20	62.5	18	64.3%

- The gender wise distribution in preterm & term newborns. In preterm 40 (66.6%) newborn were male with 20 (50%) having >2kg birth weight, 17 (42.5%) 1.6-2 kg birth weight and 3(7.5%) 1-1.5 kg birth weight. while 20 preterm were female 13 (65%) .2 kg birth weight, 3 (15%) 1.6-2 kg birth weight and 4 (20 %) 1-1.5 kg birth weight. similarly in term newborns 32 (53.3%) were males with 20 (62.5%) having 2.6-4 kg birth birth weight and 12 (37.5%) with 2-2.5 kg birth weight. while 28 term newborn were female with 18 (64.3%) 2.6-4kg birth weight and 10 (35.7%) with 2-2.5 kg birth weight.

DISCUSSION

This study was conducted in Department of Pediatrics Kamla Raja Children Hospital, Gajra Raja Medical College, Gwalior (M.P.) from 2020 to 2022. In this study total 120 newborns were enrolled in which 60 were preterm and 60 were term newborns. The gestational age 30-34 weeks comprises 19(15.8%) newborn, 35-37 weeks comprises 63(52.5%) newborns, 38-40 weeks comprises 37(30.8%) newborns and 1(0.8%) newborn was more than 40 weeks gestation as also studied by **Birgit Odenwald et al. [1].**

Inpreterm newborns maximum number of males were 20 (50%) having >2 kg weight followed by 17(42.5%) cases having 1.6-2 kg weight and 3(7.5%) cases with 1-1.5kg cases, While in females maximum 13(65%) cases were having more than 2 kg weight followed by 3(15%) with 1.6-2 kg weight and 4(20%) cases with 1-1.5 kg weight as also studied by **Paolo Cavarzere et al. [2], Sunita Bijarnia et al. [3].**

Similarly among term newborn male newborn 20 (62.5%) were having 2.6-3 kg birth weight category followed by 12(37.5%) cases in 2-2.5 kg category, While in females 18(64.3%) cases were having birth weight between 2.6-3kg and 10(35.7%) cases were having 2-2.5 kg birth weight. Similar study done by **Shahab Rezaeian et al. [**4].

In this study maximum number of preterm newborns 33(55%) were having > 2 kg weight followed by 20(33.3%) cases within 1.6-2 kg weight and 7(11.7%) cases having birth weight between 1-1.6 kg. while in term newborns maximum cases 38(63.3%) were having birth weight between 2.6-3kg followed by 22 (36.7%) cases having birth weight between 2-2.5 kg. As similar study was also done by **Ji Hoon Lee et al. [5].**

In this study as per socioeconomic status maximum number of preterm newborn 20 (33.3%) belongs to lower middle class as also reported by **Aamer Imdad et al. [6]**. On maternal nutrition and birth outcomes.

In this study decreased physical activity was reported in 40 (33.3%) newborns followed by excessive sleepiness in 33(27.5%) cases and wide anterior fontanelle in 33(27.5%) cases also reported by **Chung-Yu Chen et al. [7]** and **Maynika V Rastogi etal. [8].**

The value of thyroid profile (T3, T4 and TSH) were taken in preterm newborns on 3 visits. Similar study was also done by **S Dalili et al. [9].**

The T3 value was reported normal in all 60 preterm newborns at 1st, 2nd and 3rd visits. No cases of low value of T3 were noted in any visits as also reported by **Pankaj Agrawal et al. [10]** The T4 value was low in 7(11.7%) cases out of 60 preterm on 1st visit, 2(3.3%) cases on 2nd visit and 2 (3.3%) cases on 3rd visit, while high value of T4 was noted in 5(8.3%) caseson 1st visit, 2 (3.33%) cases on 3rd visit and no high T4 case in 2nd visit. Normal T4 was noted in 48(80%) cases in 1st visit, 58(96.7%) cases in 2nd visit and 56 (93.3%) cases in 3rd visit. This clearly shows that T4 value is important for diagnosis of congenital hypothyroidism cases also reported by **Hye-Rim Kim et al. [11].**

TSH value is also significant for diagnosis of congenital hypothyroidism. Low value of TSH is not significant for diagnosis of congenital hypothyroidism and no cases of low TSH were reported in all 3 visits in preterm newborns. High TSH value were reported in all 3 visits. In 1st visit 6(10%), in 2nd visit 4(6.7%) and in 3rd visit 4(6.7%) cases were having high TSH value. TSH value was normal in maximus cases in all 3 visits. This clearly showing that high TSH value is significant in the diagnosis of congenital hypothyroidism in preterm newborn also reported by **Altaf Ahmad Bhat et al**. [12], **Steven J. Korzeniewski et al. [13]** and**Carlo Corbetta et al. [14].**

The assessment of thyroid profile (T3, T4 and TSH) were taken in term newborns on 3 visits. The T3 value was reported normal in all 60 term newborns at 1st, 2nd and 3rd visits. No cases of low value of T3 were noted in any visits. The high value of T3 was also not noted in any case in all 3 visits. In my study it was found that mean T3 value is not significant for measuring the thyroid profile. This is also reported by **Pankaj Agrawal et al. [10].**

The T4 value was low in 3(5.0%) cases out of 60 term on 1st visit, in 2(3.3%) cases on 2nd visit and no cases having low T4 on 3rd visit while high value of T4 was noted in 1(1.67%) cases on 1st visit, 3(5%) cases on 3rd visit and no high T4 case in 2nd visit. Normal T4 was noted in 56(93.3%) cases in 1st visit, 58(96.7%) cases in 2ndvisit and 57 (95%) cases in 3rd visit. This clearly shows that T4 value is important for diagnosis of congenital hypothyroidism cases in all visits. This study also shows that T4 level gradually decreases after birth and regain after some times also reported by**Quinn McCormick et al [15]**.

No cases of low TSH were reported in all 3 visits in term newborns. High TSH value were reported in all 3 visits. In 1st visit 2(3.33%), in 2nd visit 1(1.7%) and in 3rd visit 2(3.33%) cases were having high TSH value. Maximus cases were having normal TSH value in all 3 visits also reported by **Maria Cristina Vigone et al. [13]**, **Altaf Ahmad Bhat et al**. [31]and **Carlo Corbetta et al. [16].**

In this study, in preterm newborns during 1st visit 55(91.6%) were euthyroid, while 5(9%) preterm were having congenital hypothyroidism out of which 3(60%) were >2 kg birth weight and 2(40%) were having birth weight between 1-1.5 kg. Mean T4 hormone was significantly lower in >2 kg birth weight newborns but no significant difference according to weight categories was observed for mean T3 and TSH hormone in preterm hypothyroid newborns. In euthyroid newborn T3 hormone was significantly normal in all three weight category and T4 and TSH level was almost similar in all three categories with non significant p-value.as also reported by **Paolo Cavarzere et al. [17].**

On 2nd visit 58 (96.6%) preterm were euthyroid and only 2(3.33%) preterm were having congenital hypothyroidism. Out of which 1(1.67%) was having birth weight 1-1.5kg and 1 (1.67%) was >2 kg birth weight. In hypothyroidism cases T3,T4 and TSH level was almost similar in all three weight categories with non significant p-value. Mean TSH hormone was significantly higher in 1-1.5 kg and 1.6-2kg newborns and Mean T4 hormone was significantly higher in 1-1.5 kg and >2kg newborns but no significant difference according to weight categories was observed for mean T3 hormone in preterm. **Melanie A. Vincent et al. [18].**

On 3rd visit 58 (96.6%) preterm were euthyroid and only 2(3.33%) preterm were having congenital hypothyroidism. Out of which 1(1.67%) was having birth weight 1-1.5kg and 1 (1.67%) was >2 kg birth weight. there was no significant difference according to birth weight categories was observed for mean T3, T4 and TSH hormone in preterm on 3rd visit. **Hyung chu woo et.al. [19]** and **Dinushan C. Kaluarachchi et al. [20].**

On 2nd visit all 60 (100%) term were euthyroid and no case of congenital hypothyroidism were reported.

On 3rd visit also all 60 (100%) term were euthyroid and no term newborn was having congenital hypothyroidism.

In study in preterm newborns maximum no. (3.33%) of transient hypothyroidism were reported in weight >2kg, 2cases (3.33%) & 1 case (1.67%) of 1-1.5kg birth weight as also reported by **Dorota Tylek etal**. [21] and **Ramesh Srinivasan et al. [22].**

While in Term newborn transient hypothyroidism were more in >2.5 kg birth weight 2 cases (3.33%) & no cases in birth weight < 2.5 kg as also reported by **Maria Cristina Maggio et al. [23]** and **Ferda Evinetal. [24]**

In preterm newborn permanent congenital hypothyroidism cases were reported with birth weight 1-1.5 kg & also with birth weight > 2kg. Both were having male gender. This is due to developmental defect & no cases were reported in weight 1.6-2 kg birth weight as also reported by **Masanori Adachi et al [24].**

In our study delayed TSH rise in preterm newborn were reported in 3 (5%) cases as also reported by **Fariba Abbas et al. [25]** & in term newborns 2 cases were reported as having delayed TSH rise in our study as also reported by **Fariba Hemmati et al. [26].**

CONCLUSION

In this study 2 (1.67%) cases of congenital hypothyroidism are reported. Both these cases were preterm and both the cases were having male sex. In present study in term newborn no case of congenital hypothyroidism was reported. Both preterm & term newborns were having transient congenital hypothyroidism cases but after 2nd& 3rd visit their thyroid status was become normal. Delayed TSH rise cases were also common in preterm newborn (3 cases) as compared to term newborn (2 cases). Hence present study conclude that congenital hypothyroidism is more common in male preterm & no case of congenital hypothyroidism is reported in female gender as well as in term newborn. This study also support the hypothesis that Prematurity and low birth weight as the risk factors associated with higher incidence of congenital hypothyroidism.

RECOMMENDATIONS

Present study entitled "**Thyroid screening of preterm and term newborn discharged from SNCU**" was conducted in newborns that were admitted and later discharged from SNCU, Department of Pediatrics Kamla Raja Children Hospital, Gajra Raja Medical College, Gwalior (M.P.) recommends that-

- The serial thyroid screening methods as used in this study can more accurately diagnose the congenital hypothyroidism cases in newborn.
- This will help in early diagnosis and timely treatment of congenital hypothyroidism preventing neurodevelopmental delay in Indian newborns.

REFERENCES

1. Odenwald B, Fischer A, Röschinger W, Liebl B, Schmidt H, Nennstiel U(2021). Long-term course of hypothyroidism detected through neonatal TSH screening in a population-based cohort of very preterm infants born at less than 32 weeks of gestation. International Journal of Neonatal Screening;7(4):65.
2. Cavarzere P, Camilot M, Popa FI, Lauriola S, Teofoli F, Gaudino R, et al(2016). Congenital hypothyroidism with delayed TSH elevation in low-birth-weight infants: Incidence, diagnosis and management. European Journal of Endocrinology;175(5):395–402.
3. Bijarnia S, Wilcken B, Wiley VC(2011). Newborn screening for congenital hypothyroidism in very- low- birth- weight babies: The need for a second test. Journal of Inherited Metabolic Disease;34(3):827–33.
4. Rezaeian S, Moghimbeigi A, Esmailnasab N(2014). Gender differences in risk factors of congenital hypothyroidism: An interaction hypothesis examination. International Journal of Endocrinology and Metabolism;12(2).
5. Lee JH, Kim SW, Jeon GW, Sin JB(2015). Thyroid dysfunction in very low birth weight preterm infants. Korean Journal of Pediatrics;58(6):224
6. Imdad A, Bhutta ZA(2012). Maternal nutrition and birth outcomes: Effect of balanced protein-energy supplementation. Paediatric and Perinatal Epidemiology;26:178–90.
7. Chen C-Y, Lee K-T, Lee CT-C, Lai W-T, Huang Y-B(2013). Epidemiology and clinical characteristics of congenital hypothyroidism in an Asian population: A nationwide population-based study. Journal of Epidemiology;23(2):85–94.
8. Rastogi MV, LaFranchi SH(2010). Congenital hypothyroidism. Orphanet Journal of Rare Diseases;5(1).
9. Dalili S, Zamanfar D, Hassanzadeh Rad A, Najafi Chakoosari S(2022). Total insights on goiter in children: A Mini-review. Journal of Pediatrics Review;10(2):145–54.

10. Saran S, Agrawal P, Philip R, Gutch M, Razi MS, Agroiya P, et al(2015). Congenital hypothyroidism. Indian Journal of Endocrinology and Metabolism;19(2):221.
11. Chung HR(2019). Screening and management of thyroid dysfunction in preterm infants. Annals of Pediatric Endocrinology & Metabolism;24(1):15–21.
12. Saran S, Agrawal P, Philip R, Gutch M, Razi MS, Agroiya P, et al(2015). Congenital hypothyroidism. Indian Journal of Endocrinology and Metabolism;19(2):221.
13. Ahmad Bhat A, Ahmad Naik S, Mohd F, Akhter R, Bhat Sheikh Mushtaq I(2020). Thyroid stimulating hormone levels among newborn and association with congenital hypothyroidism in a tertiary care hospital of North India. International Journal of Advanced Research;8(5):1292–7.
14. LaFranchi SH(2021). Thyroid function in preterm/low birth weight infants: Impact on diagnosis and management of thyroid dysfunction. Frontiers in Endocrinology;12.
15. Corbetta C, Weber G, Cortinovis F, Calebiro D, Passoni A, Vigone MC, et al(2009). A 7-year experience with low blood TSH cutoff levels for neonatal screening reveals an unsuspected frequency of congenital hypothyroidism (CH). Clinical Endocrinology;71(5):739–45.
16. McCormick Q, Pitts L, Hughes Z(2019). Follow-up of infants with congenital hypothyroidism and low total thyroxine/thyroid stimulating hormone on newborn screen. Annals of Pediatric Endocrinology & Metabolism;24(4):237–42.
17. Vigone MC, Caiulo S, Di Frenna M, Ghirardello S, Corbetta C, Mosca F, et al(2014). Evolution of thyroid function in preterm infants detected by screening for congenital hypothyroidism. The Journal of Pediatrics;164(6):1296–302.
18. Vincent MA, Rodd C, Dussault JH, Van Vliet G(2002). Very low birth weight newborns do not need repeat screening for congenital hypothyroidism. The Journal of Pediatrics;140(3):311–4.
19. Woo HC, Lizarda A, Tucker R, Mitchell ML, Vohr B, Oh W, et al(2011). Congenital hypothyroidism with a delayed thyroid-stimulating hormone elevation in very premature infants: Incidence and growth and developmental outcomes. The Journal of Pediatrics;158(4):538–42.
20. Kaluarachchi DC, Allen DB, Eickhoff JC, Dawe SJ, Baker MW(2019). Increased congenital hypothyroidism detection in preterm infants with serial newborn screening. The Journal of Pediatrics;207:220–5.
21. Manglik AK, Chatterjee N, Ghosh G(2005). Umbilical cord blood TSH levels in term neonates: a screening tool for congenital hypothyroidism. Indian Pediatr;42(10):1029-32.
22. Lee JH, Kim SW, Jeon GW, Sin JB(2015). Thyroid dysfunction in very low birth weight preterm infants. Korean Journal of Pediatrics;58(6):224.
23. Srinivasan R, Harigopal S, Turner S, Cheetham T(2011). Permanent and transient congenital hypothyroidism in preterm infants. Acta Paediatrica;101(4).
24. Evin F, Balkı HG, Ata A, Er E, Vatansever Z, Özen S, et al(2022). Prediction of transient or permanent congenital hypothyroidism. The Journal of Pediatric Research;9(1):38–45.
25. Adachi M, Soneda A, Asakura Y, Muroya K, Yamagami Y, Hirahara F(2012). Mass screening of newborns for congenital hypothyroidism of central origin by free thyroxine measurement of blood samples on filter paper. European Journal of Endocrinology;166(5):829–38.
26. Hakim A(2022). Investigation of risk factors of congenital hypothyroidism in children in southwestern Iran. Global Pediatric Health;9.
27. Yang HH, Qiu L, Zhao JQ, Yang N, Gong LF, Kong YY(2016). [Epidemiologic characteristics and risk factors for congenital hypothyroidism from 1989 to 2014 in Beijing]. Zhonghua Yu Fang Yi Xue Za Zhi;50(8):728-32.
28. Abbasi F, Janani L, Talebi M, Azizi H, Hagiri L, Rimaz S(2021). Risk factors for transient and permanent congenital hypothyroidism: A population-based case-control study. Thyroid Research;14(1).
29. Hemmati F, Moghtaderi M, Hasanshahi P(2019). Congenital hypothyroidism in preterm newborns: A retrospective study arising from a screening program in Fars Province, southwestern Iran. Oman Medical Journal; 34(3):262–5.