



# Evaluation of TSH Concentration and Congenital Hypothyroidism in Infants of Pakistan

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## Abstract

Sub-clinical hypothyroidism (SCH) is the condition when the serum thyrotropin (TSH) level and normal serum thyroxine (T<sub>4</sub>) level has elevated. The most common congenital endocrine disorder is the congenital hypothyroidism (CH) which is considered major cause of mental retardation and body growth disorder. This retrospective study was performed on all 18 neonates, who were born during years 2014 and 2015. The infants with congenital hypothyroidism (CH) can be accurately diagnosed with laboratory tests performed at Nuclear Medicine, Oncology and Radiotherapy Institute (NORI) during the last five years. The data along with detailed history were collected with the help of clinicians in Nuclear Medicine, Oncology and Radiotherapy Institute (NORI) and entered in the Performa. TSH levels ranging from 0.27-4.2 $\mu$ U/ml was considered as normal for the diagnosis in thyroid function tests (TFTs). Thyroid scan, physical examination and ultrasound examination are the techniques that were used for evaluation of thyroid function tests (TFTs). These have evaluated through various statistical techniques in order to investigate thyroid dysfunctioning. The diagnostic evaluation relating to functional and morphological characterization has examined through serum TSH concentration and imaging. The results have determined non-significant difference between congenital hypothyroids and control infants. The study has concluded that the prevalence of congenital hypothyroidism is dependent on the higher concentration of thyroid stimulating hormone (TSH).

## Introduction

Vissenberg et al., 2015 have described that Sub-clinical hypothyroidism (SCH) is the condition when the serum thyrotropin (TSH) level and normal serum thyroxine (T<sub>4</sub>) level has elevated. Bain and Toub Blanc. 2002 have examined that the infants having congenital hypothyroidism were undergone through diagnosis for screening during early phase of treatment. [1] have described that a thyroid disorder is physical ailment that arises from its dysfunctioning that produces triiodothyronine (T<sub>3</sub>) and thyroxine (T<sub>4</sub>). They have further observed that this dysfunctioning have influenced functions of the pituitary gland and hypothalamus and consequently their secretions.

Velkeniers et al., 2013 have investigated that improved embryo implantation rate and live birth rate and a decreased miscarriage rate with LT<sub>4</sub> treatment, although no effects on the clinical pregnancy rate were observed. They have systematically reviewed the above-listed RCTs and conducted a meta-analysis to determine whether LT<sub>4</sub> treatment attenuated adverse pregnancy outcomes in patients

with SCH or Levothyroxine treatment and pregnancy outcome in women with subclinical hypothyroidism undergoing assisted reproduction technologies: systematic review and meta-analysis of RCTs. [2] have reported that the aforementioned disorder was continuously increased in Iran from the ratio of 1:1400 to 1:1900 being statistically higher than the global average [3]. have observed that a meta-analysis study about incidence of newborns' congenital hypothyroidism with the ratio of 2:1000 in Iran [4]. have reported infants have diagnosed with congenital hypothyroidism through screening programs and accordingly have applied the suitable treatment with Levothyroxine alternative dosage administration suppressing its adverse outcomes.

## Materials and Methods

The appropriate study was carried out at Nuclear Medicine, Oncology and Radiotherapy Institute (NORI), Islamabad in infants of congenital hypothyroidism (CH) and normal control infants. The meta-analysis study has reported 9 congenital hypothyroid

infants and 9 normal control infants [5]. The infants with congenital hypothyroidism were diagnosed through physical examination, clinical examination, Thyroid Scan, and Ultrasound reports. The infants having higher values of TSH were designated as congenital hypothyroid and were categorized into experimental group while, infants having normal values of thyroid functions tests (TFTs) were designated as normal and were placed into control group. Congenital hypothyroid infants were categorized according to the higher values of TSH levels. Hypothyroidism and hyperthyroidism can be accurately diagnosed with laboratory tests performed at NORI. The blood reports of thyroid function tests were collected from various laboratories of Pakistan and normal TSH concentration (0.27 to 4.2µIU/ml) was kept as criteria for the diagnosis of thyroid dysfunction.

**Setting and study area**

The appropriate study was carried out in Nuclear Medicine, Labs at NORI.

**Study population**

Total 18 infants that were referred for thyroid scan were included in the study.

**Inclusion Criteria**

All Congenital hypothyroid infants were included in the study.

**Exclusion criteria**

- Liver disease as evidenced by raised ALT level
- Drugs: Amiodarone, lithium, anti-thyroid medications (neomercazole/procarbizole), thyroxin

**Study Group**

The whole population sample constituting the patients of congenital hypothyroid infants was based on the incidence of thyroid functions tests (TFTs).

**Data Collection**

After having informed consent (Annexure-I) from patients, the data along with detailed history was collected with the help of clinicians in NORI and entered in the Performa (Annexure-II).

**Data Analysis**

The data were analyzed using SPSS version 17. The average values for age, history of goiter (duration) etc. were calculated. The percentage of different thyroid dysfunctions (hypothyroid, hyperthyroid) in infants of congenital hypothyroidism was analyzed through confidence interval (0.05). Statistically defined P-value of the study is (0.000). The study has considered thyroid stimulating hormone (TSH) as a criterion for the diagnosis of thyroid dysfunction [6]. The normal range of thyroid function

(TFTs) regarding TSH diagnosed at NORI hospital is (0.27-4.2µIU/ml) and other clinical laboratories of Pakistan. The infants having high TSH concentration have been designated as Hypothyroid and the infants having low serum TSH concentration have been designated as hyperthyroid while the infants having normal TSH values are considered as euthyroid. The chi-square statistic is 0.9. The p-value is .342782. Not significant at p < .05. The statistical difference between congenital hypothyroid infants versus normal control infants have demonstrated in the above Table 1. The congenital hypothyroid infants have incorporated (50%) and control (euthyroid) have constituted (50%) of proportion in whole sample of population. When the lipid profile of euthyroids clinical and subclinical hypothyroid versus control group was compared, statistically non-significant difference was observed by non-parametric tests (p > 0.05). This shows that disease is most frequently reported in congenital hypothyroid infants as compared to normal (euthyroid). Similarly, the study is correlated with the findings of that incidence of newborns’ congenital hypothyroidism was observed with the ratio of 2:1000 in Iran. Similar results were observed in other relevant Studies. Therefore, abnormal TSH concentration has induced sub-clinical hypothyroidism in infants. The disease is frequently observed in infants with high TSH levels comparatively to normal TSH levels. The congenital hypothyroid have altered the lipid profile of control individuals. The recent study is according to the findings of Ladenson et al. have also considered that the TSH test as a criterion for the diagnosis of thyroid dysfunction, especially in cases of minimal thyroid failure (subclinical hypothyroidism), while such results are rejected in this new finding. The study has inconsistency with the findings of Evered et al. have been investigated that in case of mild hypothyroidism serum TSH also have been observed high and the values of T3 and T4 have remained in normal range, while in case of present study serum TSH levels fluctuates. However, thyroid dysfunctioning was prominent in patients experiencing congenital hypothyroidism.

**Table 1:** X2 Calculations (Two-way Contingency) showing statistical difference between congenital hypothyroid infants versus normal TSH concentration infants (control) of Goiter.

Number of infants with TSH concentration		Total	
Number of infants with high TSH concentration	Male	Female	
	6	3	9
	(5)	-4	
	[0.2]	[0.25]	
Control			
	4	5	9
	(5)	(4)	
	[0.2]	[0.25]	
Totals	10	8	18 (Grand Total)

## Conclusion

The appropriate research strategy has concluded that prevalence of congenital hypothyroidism is dependent on the extent of hormonal dysfunctioning specifically normal and abnormal TSH levels. In future comprehensive investigation is warrant covering the epidemiological profile of the patients having congenital hypothyroidism.

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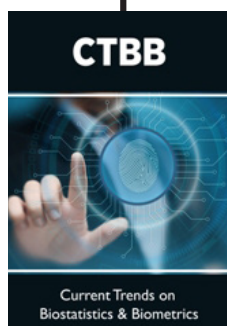


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