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Normal Values And Variation Of Thyroid Stimulating Hormone (Tsh) In Cord Blood Of Babies Bornover A Period Of 1 Year

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ABSTRACT

A hospital-based prospective study was conducted with 1200 neonates to evaluate the normal values of cord blood TSH and its variations among term babies and identify maternal factors affecting the cord blood TSH. Majority of the mothers (53.8%) were in the age group of 26-35 years.44.6% mothers were primigravida, None of the mothers had a history of anti-thyroid drug intake or a history of maternal goitre. Majority of the mothers (97.1%) were from a rural area, 70 (55.11%) and 22 (17.32%) mothers developed hypertension and hypothyroidism respectively while 20 (15.74%) and 15 (11.81%) patients developed Gestational diabetes mellitus and HTN+GDM respectively of 127 mothers with antenatal complications: 708 (59%) and 48 (4%) newborns delivered through Normal Vaginal Delivery. Maximum neonates (98.9%) were Appropriate for Gestational Age (AGA) while 0.8%. The incidence of male and female neonates was 640 (53.3%) and 560 (46.7%) respectively. 655 (54.6%) and 531 (44.3%) neonates weighed in the range of 2.501 – 3.000 kgs and 3.001– 3.500 kgs respectively. 1125 (93.7%) neonates had an APGAR score of 5-7. Eighty-two neonates had CBTSH level of >20mIU/L. Eighty-two neonates with CBTSH level of >20mIU/L were followed up on 7thday and 21stday of life. On 7th day, 12 neonates had raised TSH and low T4. On the 21st day out of these 12 neonates, only two neonates had significant raised TSH and low values of T4. Treatment was started for these two neonates. The CBTSH levels were found to increase with increasing maternal age. There was a significant association of CBTSH levels and maternal age, mode of delivery, antenatal complications. There is an urgent need for adopting universal screening of all neonates for congenital hypothyroidism. Babies with CBTSH levels of >20mIU/L should be evaluated on 7th and 21st day of life for TSH and T4 levels for earlier interpretation of congenital hypothyroidism.

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INTRODUCTION

Congenital hypothyroidism (CH) is the most notable natural endocrine issue in youth, and besides is one of the most notable preventable purposes behind a mental obstruction. In the wake of making finding if the treatment is started inside a large portion of a month of birth, the neurodevelopmental result is all things considered typical (LaFranchi and Austin, 2007). The clinical highlights of inborn hypothyroidism are regularly unpretentious, and numerous babies stay undiscovered at birth (Rastogi and

LaFranchi, 2010), which is expected to some extent to the action of maternal thyroid hormone over the placenta living a defensive impact, particularly to the fetal mind and covering the clinical signs (Julvez *et al.*, 2013). Also, even the most widely recognized types of CH have some tolerably working leftover thyroid tissue (Delange, 1997) making clinical analysis troublesome. Inside scarcely any long stretches of birth as hypothyroxinemia advance clinical signs and side effects of hypothyroidism become progressively clear and put a neonatal mind in danger of irreversible injury. As a result of this peril, it is critical to begin treatment as quickly as time permits after birth. For the entirety of the above reasons, screening has become an ideal approach to recognize newborn children with CH in numerous pieces of the world. Pilot screening programs for CH were created in Quebec, Canada and Pittsburgh, Pennsylvania in 1974 and have now been built up in Western Europe, North America, Japan, Australia and parts of Eastern Europe, Asia, South America and Central America (Dussault *et al.*, 1975; Müller *et al.*, 1999). As Indian information are missing, In North America, more than 5 million babies are screened, and around 1400 newborn children with CH are recognized yearly. The overall frequency is 1:3000-4000 live births and the evaluated rate in India is 1:2500-2800 live births (Desai *et al.*, 1987, 1994). Over 95% of babies with congenital hypothyroidism have hardly any clinical indications. Taking into account the principal significance of early finding and treatment, different screening programs have been started (Lafranchi *et al.*, 1993; Nanayakkaral *et al.*, 2007).

String blood TSH (CBTSH) estimation has the upsides of being anything but difficult to gather, non-obtrusive and low paces of follow up misfortune as the outcomes would be accessible before the mother leaves the emergency clinic, empowering continue testing if necessary at the soonest, which is fundamental for the early organization of treatment if essential. Changes in TSH levels because of T3 and T4 levels frames the premise of screening utilizing CBTSH. Be that as it may, different factors, for example, maternal age, gestational age, maternal diseases during pregnancy, sexual orientation of the child, perinatal put-down and so forth can impact the CBTSH levels (Fuse *et al.*, 1991; Rashmi *et al.*, 2007). CH happens when any piece of the hatchling's thyroid framework neglects to create correctly (Kleigman *et al.*, 2012). It is a significant preventable reason for mental impediment with a frequency of 1 out of 4000 births in a different neonatal programme (Lafranchi *et al.*, 1993). Most infants with CH show no away from the turmoil and might go for quite a long time with the illness undetected. Going with the unmistakable clinical changes in the babies is the more subtle harm to the cerebrum bringing about mental impediment. Even though treatment at this point will turn around the clinical signs and side effects, the damage to the infant's mind is irreversible. The more extended the turmoil goes unrecognized (and in this manner untreated) the more prominent is the affront to the cerebrum. It is consequently fundamental to get the babies tried for CH inside a quarter of a year of birth. On the off chance that the underlying screening shows a low degree of T4 hormone and raised TSH, a further test should be possible to affirm a conclusion of hypothyroidism. Not many examinations are accounted for concerning the screening for congenital hypothyroidism. Screening for inborn hypothyroidism (CH) is far-reaching throughout the previous two decades. It has not had the option to be actualized in creating nations like India on account of a few components like cost, absence of solid research facilities for a vast scope, and non-accessibility of benchmark information in our populace. Utilization of line blood TSH as a screening device is an appealing relational word due to its straightforwardness and accessibility (Lafranchi, 2007). Fuse et al. had demonstrated that blended line blood is a decent examining method for screening for CH (Fuse *et al.*, 1991). Walfish presumed that line TSH had superior explicitness and affectability when contrasted with a line or channel paper T4 at 3-5 days of age (Walfish, 1976). Even though neonatal screening for CH is being directed all over India, a large portion of these are being done everywhere urban medical clinics and next to no information is accessible among the provincial populace. Hence the present study was done at our tertiary care to evaluate the average values of cord blood TSH and its variations among term babies and identify maternal factors affecting the cord blood TSH.

Aims And Objectives

1. To evaluate the normal values of cord blood TSH and its variations among term babies born at Krishna Hospital, Karad.

2. To identify maternal factors affecting the cord blood TSH.

MATERIALS AND METHODS

Study Design

A hospital-based prospective Cross-sectional study was conducted with 1200 neonates to evaluate the normal values of cord blood TSH and its variations among term babies and identify maternal factors

affecting the cord blood TSH at our tertiary care hospital Krishna Institute of Medical Sciences Deemed University. Karad

Period Of Study

2 Years. Written informed consent was taken from the parents of children before the enrolment of the subjects in the study.

Clinical data were obtained from the case files of the patient. The laboratory data of the subject's samples were collected from hospital laboratory records.

Sample Size

Considering a confidence level of 95% and a confidence interval of 3, the number of patients in our study to achieve statistical significance is 1067. Considering a 10% drop-off ration, a sample size of 1200 was deemed to be adequate for our study.

Inclusion Criteria

All inborn babies

Exclusion Criteria

Preterm and babies with gross congenital anomalies

Methodology

Cord blood samples from all inborn babies were screened for TSH as per the routine screening protocol of Krishna Hospital. Only those babies with CBTSH>20mIU/L were advised to give a second venous sample for estimation of serum T4 and TSH.

Umbilical string blended blood tests were gathered in a sterile holder drawn from the placental side of the umbilical line etched while cutting it off at the hour of birth of the infant. The mother's age, parity, residence, community, blood pressure, diabetes, use of iodine antiseptics on the mother before delivery were recorded. At birth, the babies weight, sex, time to first cry, Apgar scores were noted. TSH was estimated within 24 hrs. By electrochemiluminescence immunoassay, ECLIA' on elects 2010 analyzer.

All babies wherein the cord TSH was found to be over 20mIU/L were intimated within 24hrs of the test. The babies were advised to give fresh samples for T4 and TSH between 2-4 day of life.

Statistical Analysis

Quantitative data was presented with the help of Mean and Standard deviation. Comparison among the study group was made with the help of unpaired t' test as per results of normalcy test.

Observations And Results

A hospital-based prospective study was conducted with 1200 neonates to evaluate the normal values of cord blood TSH and its variations among term babies and identify maternal factors affecting the cord blood TSH.

Distribution of mothers according to Age-Majority of mothers (53.8%) were in the age group of 26-35 years followed by 44% in the age group of 18-25years and 2.2% in the age group of >35 years.

Distribution of mothers, according to Obstetric Score, -44.6% of mothers were primigravida, and multigravida constituted 55.4% of the study group.

Distribution of mothers according to Anti-thyroid drug intake -None of the mothers had a history of anti-thyroid drug intake.

Distribution of mothers according to History of Goiter -None of the mothers had a history of maternal goitre.

Distribution of mothers according to Residence - Majority of the mothers (97.1%) were from the rural area while 2.9% of patients were from an urban area.

Distribution of mothers according to Antenatal Complications -70 (5.8%) and 22 (1.8%) mothers developed hypertension and hypothyroidism respectively while 20 (1.7%) and 15 (1.2%) patients developed Gestational diabetes mellitus and HTN+GDM respectively. There were no antenatal complications in 1073(89.5%) patients.

Distribution of neonates according to Mode of Delivery -708 (59%) and 48 (4%) neonates delivered through Normal Vaginal Delivery (NVD) and Assisted Vaginal Delivery respectively while 444 (37%) neonates delivered through Caesarean Section.

Distribution of neonates according to Appropriateness for Gestational Age -Maximum neonates (98.9%) were Appropriate for Gestational Age (AGA). In comparison, 0.8% and 0.3% were Small for Gestational Age (SGA) and Large for Gestational Age (LGA) respectively.

Gender of Neonates -The incidence of male and female neonates was 640 (53.3%) and 560 (46.7%) respectively.

Birth Weight of Neonates -10 (0.8%) neonates weighed <2.5 kgs while 655 (54.6%) and 531 (44.3%) neonates weighed in the range of 2.501 – 3.000 kgs and 3.001 – 3.500 kgs respectively. 4 (0.3%) neonates weighed in the range of 3.501 – 4.000 kgs

APGAR score of Neonates -19 (1.6%) neonates had an APGAR score of <5 while 56 (4.7%) and 1125 (93.7%) neonates had APGAR score of 5-7 and >7 respectively.

Distribution of neonates according to Cord Blood TSH (CBTSH) Levels - 82 neonates had CBTSH level

of >20mIU/L.

Repeat TSH and T4 Levels in Neonates with CBTSH Level of >20mIU/L -82 neonates with CBTSH level of >20mIU/L were followed up on 7thday and 21stday of life. On 7th day, 12 neonates had raised TSH and low T4. On the 21st day out of these 12 neonates, only two neonates had significant raised TSH and low values of T4. Treatment was started for these two neonates.

Association of Cord Blood TSH (CBTSH) Levels and Maternal Age -The CBTSH levels were found to increase with increasing maternal age. There was a significant association between CBTSH levels and maternal age., mode of delivery. And antenatal complications. There was no significant association of CBTSH levels and Gender of a neonate. The male to female ratio was 1:1.41 (34:48), showing a female predominance. However, there was no significant association of CBTSH level>20 mIU/L and Gender of a neonate. There was a significant association of CBTSH levels and Appropriateness for gestational age. There was no significant association of CBTSH levels and Birth Weight of neonates. There was a significant association of CBTSH levels and APGAR score of neonates. There were 12 neonates with CBTSH level of 30.1-40.0mIU/L. Eight neonates were associated with maternal age of 26-35 years, while four neonates were associated with maternal age of 18-25 years.

DISCUSSION

General screening of all neonates has for since quite a while ago been perceived as the best strategy to forestall the serious formative and physical morbidities related to inborn hypothyroidism (Manglik *et al.*, 2005). Different centres use different tools for screening such as cord blood TSH alone, serum T4 levels alone or both T4 and TSH levels. 535 (44.6%) mothers in our study were primigravida, and multigravida constituted 665 (55.4%) of the study group. Gopaliah *et al.* (2016) study reported Maximum neonates 37-41 (term) 786 (80.28%) were Appropriate for Gestational Age (AGA), whereas 32-36 118 (12.05%) were preterm, <32 58 (5.92%) were extreme preterm and >40 17 (1.74%) were post-term. Ng *et al.* (2011) study reported an inverse relationship in their study. In our study, there was no significant association of CBTSH levels and Birth Weight of neonates as per the Chi-Square test (p>0.05). It was observed in the present study that 10 (0.8%) neonates weighed <2.5 kgs while 655 (54.6%) and 531 (44.3%) neonates weighed in the range of 2.501 – 3.000 kgs and 3.001 – 3.500 kgs respectively. 4 (0.3%) neonates weighed in the range of 3.501 – 4.000 kgs. In our study, the mean value of CBTSH was 9.92mIU/L (range1-33.6mIU/L, SD=5.83) and mean birth weight of the neonates was 2.96kg (range 2.1-3.995kg, SD=.029).

Gopaliah *et al.* (2016) in a cross-sectional retrospective study reported mean value of CBTSH was 7.82 mIU/L(range 0.112–81.4, SD = 5.48). Mean birth weight of the neonates was 2.75 kg (run 0.72,4.32 kg, SD = 0.57). Raj *et al.* (2014) in a cross-sectional investigation on Cord Blood TSH Level Variations in Newborn revealed mean estimation of TSH was 12.88 mIU/L. Of the 430 neonates contemplated, there were a greater number of females than guys. The male to female proportion was 1:1.07. Mean birth weight of the neonates was 2.77kg. Nayak *et al.* (2012) observed Low birth weight newborns had significantly lower TSH than normal or high birth weight in one of the studies. In the present study, the CBTSH levels were found to increase with increasing maternal age.There was a significant association of CBTSH levels and maternal age as per the Chi-Square test (p<0.05).

In the present study, majority of the mothers (53.8%) were in the age group of 26-35 years followed by (44%) in the age group of 18-25 years and (2.2%) in the age group of >35 years which is similar to study done by Raj *et al.* (2014) in which majority of the mothers were in the age group of 26-35 years 235 (54.65%) followed by18-25 years 190 (44.19%) and above 35 years 5 (1.16%) respectively. There was a significant association of CBTSH levels and mode of delivery as per the Chi-Square test (p<0.05).In our study, 708 (59%) and 48 (4%) newborns delivered through Normal Vaginal Delivery (NVD) and Assisted Vaginal Delivery respectively while 444 (37%) newborns delivered through Caesarean Section. A similar study by Gopaliah *et al.* (2016) study detailed mean CBTSH (mIU/L) was higher in neonates conveyed by helped vaginal (13.36). Typical vaginal mode (7.91) or then lower fragment cesarean segment (LSCS) (elective [7.69] or crisis [7.39]) the difference was that it was statistically significant (P < 0.01).

Lee (2016) study reported Infants born by vacuum-assisted delivery had higher CBTSH values than those born by spontaneous vaginal delivery (P=0.048). There were no significant differences in CBTSH according to labour induction. It was observed in our study that there was a significant association of CBTSH levels and antenatal complications as per the Chi-Square test (p<0.05). In the present study, 70 (55.11%) and 22 (17.32%) mothers developed hypertension and hypothyroidism respectively while 20 (15.74%) and 15

(11.81%) mothers developed Gestational diabetes mellitus and HTN+GDM respectively of the total 127 mothers with antenatal complications. There were no prenatal complications in 1073(89.5%) patients.

Raj *et al.* (2014) in a cross-sectional study on Cord Blood TSH Level Variations in Newborn reported Pregnancy Induced hypertension in 21 (79.07%) and Gestational Diabetes Mellitus 9 (20.93%) of the patients respectively. Raj *et al.* (2014) study reported male to female ratio was 1:1.07. The authors reported of the 430 neonates there were more females than males. Similar findings were reported by Lakshminarayana SG et al. (Gopaliah *et al.*, 2016) majority of the neonates had APGAR score of >7 918 (93.77%) followed by 5- 7 46 (4.70%) and <5 15 (1.53%).

Bhakhri *et al.* (2014) in an investigation revealed there were no noteworthy contrasts in CBTSH level as per the nearness of maternal infection, for example, diabetes, hypertension, and thyroid illness. In the present study, there were 12 neonates with CBTSH level of 30.140.0mIU/L. 8 neonates were associated with maternal age of 26-35 years, while four neonates were associated with maternal age of 18-25 years. Of the patients individually. Gopaliah *et al.* (2016) in a cross-sectional review study announced the mean CBTSH level was higher in neonates whose moms had hypertension (8.95) trailed by those with of both hypertension and diabetes mellitus (8.40), no maternal comorbidities (7.66), diabetes mellitus just (7.46) and was least in those with hypothyroidism (7.45); be that as it may, it was factually irrelevant (P = 0.56). The present study reported 2 in 1200 babies confirmed as congenital hypothyroidism with serum T4 and TSH values.

CONCLUSIONS

Different centres use different tools for screening such as cord blood TSH alone, serum T4 levels alone or both T4 and TSH levels. 535 (44.6%) mothers in our study were primigravida, and multigravida constituted 665 (55.4%) of the study group. There is an urgent need for adopting universal screening of all neonates for congenital hypothyroidism. Babies with CBTSH levels of >20mIU/L should be evaluated on 7th and 21st day of life for TSH and T4 levels for earlier interpretation of congenital hypothyroidism.

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Conflicts of interest

Nil

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