A comparative study on serum thyroid hormone level in asphyxiated preterm and term newborn in cord blood at birth and 72 hrs of life, in a tertiary care center

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Abstract

Introduction: Thyroid hormone is essential for somatic growth and neurodevelopment. Its level is influenced by various factors. Perinatal asphyxia which altered several hormones in neonate still less is known about the effect on neonatal thyroid hormone levels. Our study is to evaluate the effect of perinatal asphyxia, that alters the thyroid function in both term and preterm asphyxiated newborn by comparing cord blood and 72 hours venous blood.

Materials and Methods: A prospective case-control study was carried out at Tertiary care Gayatri Hospital. we evaluated thyroid function in 40 asphyxiated term newborns and 40 preterm newborns (34-36 wks) with with history of low apgar score at birth (< 6 at 1 and 5 min) with acidosis (pH < 7.20), and 40 normal healthy preterm, born by spontaneous vaginal delivery were taken. In all the cases proper maternal and perinatal history was taken and categorized accordingly. Cord blood and 72 hours after birth venous blood were collected in both babies and compared the level of thyroid hormones (T3, T4, TSH) via radioimmunoassay.

Results: There was no significant difference in thyroid hormone, observed in cord blood and in venous sample 72 hours after birth in asphyxiated preterm as compared to term baby.

Conclusion: Perinatal asphyxia affects thyroid function but there were less studies done so far over asphyxiated premature baby, to know the association between thyroid hormone level and asphyxia as term babies. So a larger study is needed to support and confirm our observations.

Keywords: Hypoxic Ischemic Encephalopathy (HIE), Thyroid stimulating Hormone (TSH), Non-thyroidal illness syndrome.

Introduction

Thyroxine is essential for optimal brain development and low levels are associated with adverse neurodevelopmental outcome. Thyroid hormone levels are vary with term and those born preterm, depending upon gestational age at birth. Thyroid hormones levels can alter by several factors. Perinatal asphyxia one, which triggers rapid alterations in the concentration of thyroid hormones. Several studies were done over asphyxiated term babies, where the Thyroid hormone levels and TSH were found to be low and different in different stages of HIE. In premature babies, an association between low thyroid activity at birth and respiratory distress syndrome were reported in some studies and the effect might be due to stress or illness. But there were less or no studies done over asphyxiated premature baby, to know the association between thyroid hormone and asphyxia as term babies.

The objective of our study was to compare the effect of perinatal asphyxia on the serum levels of thyroid hormones (FT3&FT4) & TSH in asphyxiated Preterm and Term newborns, in blood collected from Umbilical cord and at 72hrs of venous blood.

Materials and Methods

The study was conducted in a tertiary level teaching hospitals, Gayatri medical college and general hospital over two years period from Nov 2015 to Oct 2017. After the parental consent and consent from the Hospital Ethics Committee of GVPMC, Visakhapatnam, AP, we evaluated thyroid function in 40 asphyxiated term newborns and 40 preterm newborns (34-36 wks) with with history of low apgar score at birth (< 6 at 1 and 5 min) with acidosis (pH < 7.20), and 40 normal healthy preterm, born by spontaneous vaginal delivery were taken. In all the cases proper maternal and perinatal history was taken and categorized accordingly. Thyroid hormones (FT3&FT4) and TSH levels from the blood collected at birth and 72hrs of life were measured by radioimmunoassay.

Inclusion Criteria: 1. All term and Preterm (34-36 wks) baby with low apgar score at birth. 2. All neonates born by spontaneous vaginal delivery

Exclusion Criteria: 1. Normal healthy term babies, 2. Preterm neonate < 34 wks with complication other than Perinatal asphyxia, 3. Neonates born by LSCS, and assisted delivery.

Statistical Analysis: It was a hospital based observational, Analytical, case-control study. Results are tabulated and analyzed based on chi-square test.

Result

During the study period, total 120 babies were admitted in NICU with low apgar score and metabolic acidosis at birth. Out of 120 newborn babies, 40 Preterm babies of gestational age of 34 to 36 wks and 40 term of 37 to 40 wks were with low apgar score and 40 normal healthy preterm of 34 to36 wks.

Table 1: Characteristic and S.FT3, FT4 and TSH levels of asphyxiated and normal newborn in study

Newborn(n)	G/A(wks)	Wt(kg)	T3(ng/ml)		T4(ug/dl)		TSH(uIU/ml)	
			Cord Blood	72 hr	Cord Blood	72 hr	Cord Blood	72 hr
Asphyxiated **Preterm (40)**	34-36	1.5-2.5	0.3-0.5	0.9-1.5	6.0-7.9	5.5-12.5	5.5-6.5	5.5-6.5
Asphyxiated **Term (40)**	37-40	2.5-3.2	0.8-1.2	2.4-2.7	10.5-12.0	12.0-13.5	6.5-7.5	6.5-7.5
Normal Preterm(40)	34-36	1.5-2.5	0.35-0.41	0.7-1.5	5.7-7.1	5.8-10.7	5.2-6.2	5.2-5.6

In our study, blood sample was collected from the umbilical cord of all babies, at birth and then serially at 24 hrs and 72hrs of life. In all the term newborn baby, with low apgar scores at birth had, FT3 level (0.8-1.2), FT4 level (10.5-12.0) and TSH level (6.5-7.5), which was low below the baseline to normal healthy term newborn. At 72 hrs of life, their thyroid hormone concentration were, FT3 level(0.8-1.2), FT4 level (10.5-12.0), TSH level (6.5-7.5), which failed to increase above the baseline as compared to normal babies. Whereas in Preterm babies with gestation 34-36 wks with low apgar scores, had no significant change or same in thyroid hormone concentration to healthy normal preterm babies. Their thyroid hormone concentration in cord blood, FT3 (0.3-0.5), FT4 (6.0-7.9), TSH (5.5-6.5) and at 72hrs of life were, FT3 (0.9-1.5), FT4 (5.5-12.5), TSH (5.5-6.5).

Discussion

Perinatal asphyxia triggers rapid alterations in the concentration of several hormones such as thyroid hormones, catecholamine, glucocorticoids, antidiuretic hormone, aldosterone, renin, atrial natriuretic peptide and insulin.[1-3] In our study, term newborn babies have decreased in thyroid function in comparison to normal baby, may be due to diminish in oxygen supply to brain, leads to occurrence of central hypothyroidism which is similar to the study by Pereira et al.[4] Low levels of thyroid hormones secondary to, reduced production of TSH. Our aim is to, evaluate the degree of effect of asphyxia in preterm thyroid level in comparison to term asphyxia baby. In preterm asphyxiated baby, even alteration was found in hormone level, we got no significant change in hormone concentration from the physiologically low hormone level. In some studies, one reported by cuestas et al[5] on premature infant, they found an association between low thyroid activity and respiratory distress syndrome at birth. However, in an another study by. Klein AH et al[6] there was no significant differences in thyroid function indices in respiratory distress syndrome and nonrespiratory distress syndrome in premature infants at birth. Several factors, alter levels of thyroid hormones, thyroid stimulating hormone and less is known about the effect of perinatal asphyxia on neonatal thyroid hormone levels despite their importance. Hence large study needed, to know whether asphyxia has any effector not on thyroid level in premature baby.

Conclusion

Perinatal asphyxia affects thyroid function centrally by lowering levels of thyroid hormones secondary to reduced production of TSH in term baby. But there were less studies done so far over asphyxiated premature baby, to know the association between thyroid hormone level and asphyxia as term babies. So a larger study is needed to support and confirm our observations.

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