

Growth Hormone in Birth Asphyxia

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Growth hormone is 191 amino acid polypeptide secreted from somatotrophic cells of anterior pituitary. Secretory granules appear in fetal pituitary towards the end of the third month of embryonic development. Growth hormone level have been reported to be altered in many perinatal events including perinatal asphyxia(1), abnormal modes of deliveries(2) and low Apgar score(3). In view of paucity of similar data from the country, the present study was undertaken to measure growth hormone levels in normal term and preterm neonates and to evaluate the alteration in growth hormone levels in birth asphyxia.

Subjects and Methods

The present study was conducted on 64 cases (18 preterm and 46 term) of birth asphyxia and 64 normal neonates (14 preterm and 50 term) matched for gestational age, sex and weight, who were delivered in the hospital. Neonates were enrolled into the study consecutively, satisfying the inclusion criteria (see below).

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A detailed careful antenatal and perinatal history was taken. Apgar scoring was done at one minute after birth and gestational age was calculated by LMP and correlated with Ballard modification of Dubowitz scoring system(4). Weight was recorded within one hour of birth. Neonates with gestational age less than 30 weeks, SGA babies and babies with congenital malformation were excluded from the study. Neonates with Apgar score less than or equal to 7 were included in the study as cases and those with Apgar score more than 7 were taken as controls. Asphyxiated newborns were further divided into 3 groups according to their 1 minute apgar score(5); mild asphyxia (Apgar score between 5-7), moderate asphyxia (Apgar score between 3-4), severe asphyxia (Apgar score between 0-2). Two ml nonoxalated blood was taken from umbilical cord at the time of delivery in all neonates. Serum was separated in glass vial and stored at 2-8° C for the assay on the same day, or frozen at -20° C, if the test was done later than 24 hours after collection.

Growth hormone was estimated by radioimmunoassay method using code RIAK-3 Kits supplied by Radiopharmaceutical Division of Bhabha Atomic Research Center, India. The sensitivity of the assay is 0.7 ng/ml based on the 90% B/Bo intercept and intra assay variation is less than 5%(6). Statistical analysis was done for preterm and term neonates separately using analysis of variance (ANOVA).

Results

The mean birth weight and gestational age of neonates included in the study was 2.59 ± 0.57 kg (1.3-3.5 kg) and 37.42 ± 2.5 weeks (30-41 weeks), respectively. Full term neonates had mean birth weight 2.99 ± 0.34 kg (2.5-3.5 kg) and mean gestational age 38.6 ± 1.16 weeks (37-41 weeks) while

preterms had mean birth weight 1.92 ± 0.36 kg (1.3-2.4) and mean gestational age 34 ± 1.54 weeks (30-37 weeks).

In cord blood of term neonates (n=50), growth hormone concentration ranged from 15 to 30 ng/ml with a mean of 25.2 ng/ml (SD 3.8) while in preterm neonates (n=14) the concentration ranged from 27 to 40 ng/ml with a mean of 37.3 ng/ml (SD 4.5). The growth hormone levels in cases of birth asphyxia (18 preterm and 46 term) are shown in *Table I*. There was a statistically significant ($p < 0.0001$) difference among neonates in four categories, namely, controls, mild asphyxia, moderate asphyxia and severe asphyxia.

Discussion

In the present study, growth hormone concentration in term babies was almost similar to an earlier series(7) but slightly lower than other reports(8,9). In preterm neonates, human growth hormone was significantly higher in comparison to term babies. Our observations in preterm neonates are almost similar to an earlier western series(10) while in case of both term and preterm infants they are slightly different from another report. These variation could be because of different populations studied and individual analytic laboratory differences.

In both preterm and term neonates,

human growth hormone levels increased with the severity of birth asphyxia. Similar findings have been reported earlier(3). It was also documented that growth hormone levels were higher in asphyxiated premature babies in comparison to term asphyxiated babies. The elevated growth hormone levels in asphyxia have been explained on the basis of stress(9,11).

The significance of elevated growth hormone levels in perinatal life is not completely understood till date. It is suggested that this may occur due to increased secretion of growth hormone releasing factor from hypothalamus in the perinatal period(7). Others opine that the presence of Somatomedin C; a non suppressible insulin like factors, may be responsible for fetal growth *in utero*(3). Although this may reflect the effect of gestational age, stress cannot be excluded from consideration and further studies to understand significance of such alterations are needed.

It is concluded that human growth hormone levels are elevated in preterms and birth asphyxia, the exact implications of which are still uncertain.

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TABLE I—Growth Hormone Levels (ng/ml) in Controls and Cases of Birth Asphyxia (Mean \pm SD).

Groups	Apgar score	No. of cases	Preterm	(N)	Term	(N)
Controls	8-10	64	36.3 ± 4.5	(14)	25.0 ± 3.8	(50)
Asphyxia						
Mild	5-7	16	40.0 ± 2.0	(4)	28.3 ± 2.1	(12)
Moderate	3-4	20	48.5 ± 7.2	(6)	34.4 ± 5.4	(14)
Severe	0-2	28	66.6 ± 24.2	(8)	43.8 ± 8.7	(20)

N = Number of cases in that group

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