

Effect of Maternal Factors and C-Peptide and Insulin Levels in Cord Blood on the Birth Weight of Newborns: A Preliminary Study from Southern Sri Lanka

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Abstract : Macrosomia is common in infants born to not only women diagnosed with gestational diabetes mellitus but also non-diabetic obese women. Maternal Body Mass Index (BMI) correlates with the incidence of large for gestational age infants. Obesity has reached epidemic levels in modern societies. During the past two decades, obesity in children and adolescents has risen significantly in Asian populations including Sri Lanka. There is increasing evidence to believe that infants who are born large for gestational age are more likely to be obese in childhood and adolescence and are at risk of cardiovascular and metabolic complications later in life. It is also established that Asians have lower skeletal muscle mass, low bone mineral content and excess body fat for a given BMI indicating a genetic predisposition in the occurrence of obesity. The objective of this study is to determine the effect of maternal weight, weight gain during pregnancy, c-peptide and insulin concentrations in the cord blood on the birth of appropriate for and large for gestational age infants in a tertiary care center in Southern Sri Lanka. Umbilical cord blood was collected from 90 newborns (Male 40, Female 50; gestational age 35-42 weeks) after double clamping the umbilical cord before separation of the placenta and the concentration of insulin and C-peptide were measured by ELISA technique. Anthropometric parameters of the newborn such as birth weight, length, ponderal index, occipital frontal, chest, hip and calf circumferences were measured, and characteristics of the mother were collected. The relationship between insulin, C-peptide and anthropometrics were assessed by Spearman correlation. The multiple logistic regression analysis examined influences of maternal weight, weight gain during pregnancy, C-peptide and insulin concentrations in cord blood as covariates on the birth of large for gestational age infants. A significant difference ($P < 0.001$) was observed between the insulin levels of infants born large for gestational age ($18.73 \pm 0.52 \mu\text{U/ml}$) and appropriate for gestational age ($13.08 \pm 0.56 \mu\text{U/ml}$). Consistently, A significant decrease in concentration (41.68%, $P < 0.001$) was observed between C-peptide levels of infants born large for gestational age and appropriate for gestational age. Cord blood insulin and C-peptide levels had a significant correlation with birth weight ($r = 0.35$, $P < 0.05$) of the newborn at delivery. Maternal weight and BMI which are indicators of maternal nutrition were proven to be directly correlated with birth weight and length. To our knowledge, this relationship was investigated for the first time in a Sri Lankan setting and was also evident in our results. This study confirmed the fact that insulin and C-peptide play a major role in regulating fetal growth. According to the results obtained in this study, we can suggest that the increased BMI of the mother has a direct influence on increased maternal insulin secretion, which may subsequently affect cord insulin and C-peptide levels and also birth weight of the infant.

Keywords : C-peptide, insulin, large for gestational age, maternal weight

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