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Leptin Levels in Cord Blood and Their Associations with the Birth of Small, Large and Appropriate for Gestational Age Infants in Southern Sri Lanka

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Abstract : In recent years childhood obesity has increased to pan-epidemic proportions along with a concomitant increase in obesity-associated morbidity. Birth weight is an important determinant of later adult health, with neonates at both ends of the birth weight spectrum at risk of future health complications. Consequently, infants who are born large for gestational age (LGA) are more likely to be obese in childhood and adolescence and are at risk of cardiovascular and metabolic complications later in life. Adipose tissue plays a role in linking events in fetal growth to the subsequent development of adult diseases. In addition to its role as a storage depot for fat, adipose tissue produces and secrets a number of hormones of importance in modulating metabolism and energy homeostasis. Cord blood leptin level has been positively correlated with fetal adiposity at birth. It is established that Asians have lower skeletal muscle mass, low bone mineral content and excess body fat for a given body mass index indicating a genetic predisposition in the occurrence of obesity. To our knowledge, studies have never been conducted in Sri Lanka to determine the relationship between adipocytokine profile in cord blood and anthropometric parameters in newborns. Thus, the objective of this study is to establish the above relationship for the Sri Lankan population to implement awareness programs to minimize childhood obesity in the future. 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 leptin was 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. Pearson's correlation was used to assess the relationship between leptin and anthropometric parameters while the Mann-Whitney U test was used to assess the differences in cord blood leptin levels between small for gestational age (SGA), appropriate for gestational age (AGA) and LGA infants. There was a significant difference ($P < 0.05$) between the cord blood leptin concentrations of LGA infants (12.67 ng/mL ± 2.34) and AGA infants (7.10 ng/mL ± 0.90). However, a significant difference was not observed between leptin levels of SGA infants (8.86 ng/mL ± 0.70) and AGA infants. In both male and female neonates, umbilical leptin levels showed significant positive correlations ($P < 0.05$) with birth weight of the newborn, pre-pregnancy maternal weight and pre pregnancy BMI between the infants of large and appropriate for gestational ages. Increased concentrations of leptin levels in the cord blood of large for gestational age infants suggest that they may be involved in regulating fetal growth. Leptin concentration of Sri Lankan population was not significantly deviated from published data of Asian populations. Fetal leptin may be an important predictor of neonatal adiposity; however, interventional studies are required to assess its impact on the possible risk of childhood obesity.

Keywords : appropriate for gestational age, childhood obesity, leptin, anthropometry
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