Intervention Strategies for Preventing Low Birthweight in Developing Countries: Importance of Considering Multiple Interactive Factors

Ricardo Uauy, Camila Corvalan, Paola Casanello and Juan Kuzanovic

The need to prevent low birthweight (LBW) defined as a birthweight equal to or below 2,500 g is presently well recognized, not only because of the immediate consequences increasing the risk of neonatal death and burden of disease but also in terms of impact of being LBW on lifelong health and well-being. Children are born LBW (<2,500 g) either because they were born too early (true preterm LBW infants) or they failed to grow adequately despite a normal duration of gestation (intrauterine growth retardation, IUGR). In this later case, the weight may be over 2,500 g, but the infant is lighter than expected for his/her gestational age. In summary, babies are of LBW because they were born too early (preterm birth) or because they did not grow well (IUGR). In fact, many preterm infants are to some degree growth retarded. Despite the differences in origin, all LBW categories are considered at increased risk of neonatal death and later morbidity. Recent figures indicate that presently between a third and a half of all LBW infants are growth retarded, and depending on the setting 30–50% of the total neonatal mortality can be attributed to this condition.

In most developing countries, even something as basic as establishing the timing of conception is a difficult task, early ultrasound is rarely available except in the larger cities, and even there it will be available only to those that can afford it. Even if it were available, it might not be used early enough since most women seek medical care when they are well into their pregnancy. Appropriate intrauterine growth is key to ensure survival in the first days of life; adequate liver glycogen stores are vital to prevent hypoglycemia and avoid its consequences. The maturation of the intestinal function is of vital importance since appropriate carbohydrate and protein supply is vital to secure early recuperation of the depletion typical of infants born IUGR. The early phase of recovery of IUGR is an
important factor in determining later linear growth during infancy and final adult stature. Further evidence suggests that there are transgenerational effects of being born IUGR, thus affecting the growth of the next generations. The IUGR condition has been associated with poor school performance and low adult productivity, thus optimizing fetal and early postnatal growth becomes a key factor in human capital formation, especially in developing countries. More recently, birthweight has been also associated with a myriad of outcomes that impact adult mortality and morbidity such as cardiovascular disease, some forms of cancer, diabetes, obesity and stroke. In fact, these observations support the concept of the early origin of adult diseases hypothesis recently coined as ‘developmental origins of health and disease’. However, there is great heterogeneity in the prevalence of these later outcomes; not all LBW children will develop diabetes or will have decreased cognitive performance; the short- and long-term outcomes of LBW will be also dependent on the underlying cause leading to LBW. An important role for growth during early development was first suggested by Barker who found higher risk of cardiovascular disease, hypertension and type 2 diabetes mellitus in adults with LBW. It is not clear whether these ‘programmed effects’ can be modified. It is interesting that preterm infants fed human milk during the first month of life have a significantly lower arterial pressure during adolescence. This and other data suggest that ‘fetal programming’ might be modifiable by dietary interventions after birth.

The International Fetal and Newborn Growth Consortium – INTERGROWTH 21st – have taken the responsibility of developing growth charts with a prescriptive approach. The study, published recently, succeeded in its ambitious agenda and will provide us not only with well-timed fetal measures of gestational age confirmed by early US taken at 9–13 weeks, but will also provide us with 6 serial US assessments. The adequacy of the prescriptive approach in developing the standard will be finally evaluated by linking the impact of the ‘new standard’ on short-term (i.e. neonatal morbidity and mortality, cognitive development) as well as long-term outcomes (i.e. disability, obesity, cardiovascular diseases). Thus, for the first time, clinicians and researchers will have sequential longitudinal data that will serve to characterize whole body as well as brain, liver, and long bone growth relating this indirectly to placental blood flow and transfer function, neonatal health, morbidity and mortality. The new fetal growth standards represent a major progress in terms of evaluating the effect of early life events on later growth, health and well-being.