

## Essential Care of Low Birth Weight Neonates

A newborn infant weighing less than 2500g at birth is termed as low birth weight (LBW) neonate. Low birth weight in a newborn infant results due to intrauterine growth restriction (IUGR) or prematurity. According to UNICEF, the incidence of LBW neonates is 30% in India(1). Low birth weight neonates are further classified as very low birth weight (VLBW <1500 g) and extremely low birth weight (ELBW <1000 g) infants. Majority of LBW neonates in our country weigh between 2000-2499 g. According to the National Neonatal Perinatal Database of the National Neonatology Forum, India; the incidence of LBW in tertiary care centers is 32.8 percent with only 14% neonates weighing less than 2000 g(2). We are home to eight million LBW infants born each year and around three fourths of them are delivered at full term of gestation(2,3). This shows that the major low birth weight problem in India stems from intrauterine growth restriction and not prematurity, in contrast to the western world.

LBW is the most significant factor contributing to neonatal mortality and morbidity. These neonates are at higher risk of asphyxia, sepsis, hypothermia, and feeding problems, *etc.* Common illnesses tend to be more severe and last longer in this group. Apart from immediate problems, LBW neonates are prone to long term disorders like infections, malnutrition, and neurodevelopmental disabilities. Babies who are small or disproportionate at birth also have an increased risk of developing coronary heart disease, non-insulin dependent diabetes mellitus, stroke, and hypertension during adult life. It is postulated that these diseases are programmed by inadequate supply of nutrients to the developing fetuses (Barker hypothesis)(4). Thus, measures to increase the birth weight of babies constitute a priority area in developing nations.

The etiology of LBW is multifactorial. Maternal malnutrition and anemia are the most important

causes responsible for reduced birth weight in developing nations. Other maternal factors playing a part include young age at conception, multiple pregnancies, pregnancy induced hypertension, infections, substance abuse etc. Genetic factors also play a role(5).

Essential care of LBW neonate should commence *in utero* and be focused on preventive aspects. The impact of maternal nutritional supplementation in augmenting birth weight has been studied and documented(6). The micronutrients rich food impacts the weight of a neonate. Folic acid supplement during pregnancy has been shown to improve birth weight(7). Multimicronutrient supplementation to severely undernourished women during pregnancy has also been reported to decrease the incidence of LBW babies(8). Improving the nutritional status of mother and tackling anemia in adolescent girls can go a long way in preventing birth of low birth weight infants.

Small for gestational age (SGA) infants frequently do not tolerate labor and vaginal delivery. They have an increased incidence of low apgar scores at all gestational ages and these frequently need resuscitation. It is imperative that a team trained and skilled in neonatal resuscitation is present while a LBW neonate is being delivered. Also, the LBW-SGA infants have a narrow thermoneutral range. The large head to body ratio and greater surface area along with a thin layer of subcutaneous fat leads to a rapid heat loss. On the other hand, the heat production is also compromised due to hypoglycemia, and hypoxia. It is thus critical that the LBW-SGA neonate is resuscitated and nursed in a thermoneutral environment. The resuscitation must be prompt and the neonate dried and placed under a warmer. The wrapping of preterms (<28wks) in plastic bags or plastic wrappings (foodgrade) is currently recommended during resuscitation to maintain temperature. Subsequently, the neonate should be covered well.

The concept of Kangaroo mother care or the skin to skin care is an economical, acceptable and

practical way for maintaining temperature of the LBW neonates. It has the added advantage of providing adequate nutrition through frequent breast feeds. In this issue of the Journal, a randomized controlled trial has demonstrated that Kangaroo mother care improves growth and reduces morbidities in low birth weight infants. It is simple, acceptable to mothers and can be continued at home(9).

The diminished hepatic and skeletal muscle glycogen content and reduced alternate energy substrates along with deficient counter-regulatory hormones leads to early hypoglycemia. All LBW-SGA infants must have frequent monitoring of blood glucose and the concentration maintained above 50 mg/dL. Early enteral feeds or intravenous glucose for those with clinical problems must be instituted, preferably within half an hour of life. Although hypoglycemia is a major problem of LBW neonates, yet a contrast situation may result in hyperglycemia due to low insulin secretion rates or iatrogenically due to high rates of glucose infusion. This condition is usually noted in ELBW (preterm) neonates or stressed neonates. Indian Pediatrics is publishing a detailed review on hyperglycemia of ELBW in this issue(10). It needs to be investigated whether our population of ELBW neonates who are largely growth restricted also face the challenge of hyperglycemia.

The nutritional management of LBW-SGA neonates is complex. A rapid glucose supply can lead to hyperglycemia, but amino-acid intolerance is not exaggerated. There is reluctance in feeding SGA infants as aggressively as their deprived state would indicate. It needs to be ascertained, if aggressive feeding is tolerated and whether it results in nutritional rehabilitation and a better outcome(11). Breastfeeding in LBW infants is associated with lower mortality rates and better weight gain with lower morbidity rates. For infants on expressed breast milk, feeding with spoon or paladai is recommended to ensure better hygiene.

The immune function of SGA neonates is depressed. Deficiency of both T and B cell function has been demonstrated(12). This predisposes them

to neonatal infection. Early diagnosis and treatment and prevention through hand washing is recommended.

LBW neonates are a special group which needs attention and care, if the Millennium Development Goal 4 pertaining to infant mortality rate is to be achieved. Since the etiology is multifactorial, efforts at a multipronged approach alone could help achieve targets. Simple measures to prevent morbidity and mortality as Essential care of LBW must be exercised with emphasis on skilled attendance at birth, prompt resuscitation, adequate nutrition through breast feeding, prevention of hypothermia through KMC and successful referral of sick neonates.

*Competing interests:* None stated.

*Funding:* None.

**Arvind Saili,**  
*Professor of Pediatrics,*  
*Division of Neonatology,*  
*Lady Hardinge Medical College, New Delhi;*  
*and*  
*President, National Neonatology Forum, India.*  
*Email: sailiarvind@gmail.com*

## REFERENCES

1. United Nations Childrens Fund (UNICEF). The State of the World's Children 2004. New York; Unicef: 2003.
2. National Neonatology Forum of India. National Neonatal Perinatal Database-Report for year 2000. New Delhi: National Neonatology Forum, India; 2001.
3. Bang AT, Bang RA, Baitule S, Reddy MH, Deshmukh M. Effect of home based neonatal care and management of sepsis on neonatal mortality: field trial in rural India: Lancet 1999; 354: 1955-1961.
4. Barker DJP. Mothers, Babies and Health in Later Life. 2nd Edition. Edinburgh: Churchill Livingstone; 1998.
5. Dadhich JP, Paul VK. State of India's Newborns. New Delhi: National Neonatology Forum and Save the Children; 2004.
6. Agarwal KN, Agarwal DK, Agarwal A, Rai S, Prasad R, Agarwal S, *et al.* Impact of the integrated child

- development services (ICDS) on maternal nutrition and birth weight in rural Varanasi. *Indian Pediatr* 2000; 37: 1321-1327.
7. Christian P, Khattry SK, Katz J, Pradhan EK, LeClerq SC, Shrestha SR, *et al*. Effects of alternative maternal micronutrient supplements on low birth weight in rural Nepal: double blind randomized community trial. *Br Med Jour* 2003; 326: 571-576.
  8. Gupta P, Ray M, Dua T, Radhakrishnan G, Kumar R, Sachdev HPS. Multimicronutrient supplementation for undernourished pregnant women and the birth size of their offspring: A double blind, randomized, placebo controlled trial. *Arch Pediatr Adolesc Med* 2007; 161: 58-64.
  9. Suman Rao PN, Udani R, Nanavati R. Kangaroo mother care for low birth weight infants: A randomized controlled trial. *Indian Pediatr* 2008; 45: 17-23.
  10. Kairamkonda VR, Khashu M. Controversies in the management of hyperglycemia in the ELBW infant. *Indian Pediatr* 2008; 45: 29-38.
  11. Anderson MS, Hay WW. Intrauterine Growth Restriction and the Small for Gestational Age Infant. *In: MacDonald MG, Mulbett MD, Seshia MMK. Avery's Neonatology. Pathophysiology and Management of the Newborn. 6th edn. Philadelphia: Lippincott Williams & Wilkins; 2005. p. 490-522.*
  12. Chatrath R, Saili A, Jain M, Dutta AK. Immune status of full term small for gestational age neonates in India. *J Trop Pediatr* 1997; 43: 345-348.
-