

**REVIEW ON PREVALENCE OF LOW BIRTH WEIGHT IN INDIA: CONSEQUENCES
AND ERADICATION PROGRAMMES****Dr. Maitrayee Banerjee Mukherjee¹ and Kuntal Gupta*²**¹Assistant Professor, Dept. of Physiology Krishnagar Government College, Krishnagar, Nadia.²Assistant Professor, Dept. of Physiology, Hooghly Mohsin College, Chinsurah, Hooghly.***Corresponding Author: Kuntal Gupta**

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Article Received on 23/04/2021

Article Revised on 13/05/2021

Article Accepted on 02/06/2021

ABSTRACT

The incidence of low birth weight in India varies between 30-35%. Birth weight is a good reflector of status of maternal health and is the single most important factor for infant mortality and morbidity. The health status of mother and infants arise as a result of synergistic effects of malnutrition, poverty, lack of education, unhygienic living condition, chronic infections of mother and unplanned fertility. Low birthweight babies suffer from complications like infant respiratory distress syndrome, infections, sudden infant death syndrome and poor immunity. Low birth weight is also responsible for progression of some life-threatening health risks like insulin resistance, cardiovascular diseases in adult age. The Government of India is committed to fulfil maternal and child rights to nutrition and working in accordance for achieving Millennium Development Goals. Our country has successfully implemented several welfare strategies addressing proper nutritional care and counselling of pregnant mother, antenatal care, promotion of institutional delivery through conditional cash transfer. In addition, several State Governments implemented financial schemes for improvement of adolescent and maternal health.

KEYWORDS Low birth weight, maternal nutrition, immunity, adult disease.**INTRODUCTION**

The nutritional and health status of women and children is of great global concern since they face multiple challenges among all socioeconomic classes in various countries with poor literacy rates and poverty. Many women suffer from a combination of chronic energy deficiency, anaemia and micronutrient deficiency, as well as HIV infections, malaria and in developing countries experience various biologic and socioeconomic stresses that increases the risk of malnutrition.^[1] The socioeconomic distresses include food insecurity, inadequate diets, heavy household work burden, lack of access to adequate health services and gender inequality etc.^[2] Globally an estimated 20 million babies are born with a low birthweight (LBW) each year, contributing to approximately 10-15% of the global child mortality under 5 year and a large equity of childhood morbidity and observable physiological and cognitive developmental loss.^[3] The health of Indian women is intrinsically linked to their status in the society. Gender discrimination, female infanticide, higher death rate, lower sex ratio and low literacy levels reflects the status of women in India. At household level, cultural norms and practices, socioeconomic factors determine the nutritional and health status of women. While malnutrition in India is prevalent among all segments of

population, poor nutrition among women germinates in childhood and continues throughout the lifetime.^[4,5] Additionally, the health problems of mother and new born infants arise as a result of synergistic effects of malnutrition, unhygienic living, infections and unregulated fertility.^[3] Poor medical infrastructure and ineffective public health services is also responsible for low inadequate obstetric care, intra uterine growth retardation (IUGR), preterm birth (PTB), low birth weight (LBW) and maternal mortality.^[6] Low birthweight babies experience higher risk of neonatal and infant morbidity and mortality, as well as long-term impairments like physical and developmental delays and adulthood chronic diseases.^[7] Approximately 30-35% babies born in India are of low birth weight (less than 2.5 Kg), however more than half of the them are full term babies. India alone accounts for 40% of low weight babies in the overall developing countries and more than half of those born in Asia.^[8] Moreover, studies have shown slowdown, pauses and reversals in infant mortality decline in several states of India in 2017 and 2018. Very unfortunately overall infant mortality raised in Chhattisgarh, Jharkhand, Madhya Pradesh and Uttar Pradesh.^[9] These makes it mandatory and extremely important to plan effective and outcome-based

interventions in order to improve birth weight among Indian babies.

Factors contributing LBW

Contributing factors for LBW are multifaceted and mostly include two factors such as the rate of growth during fetal period and the duration of pregnancy. Thus, an LBW may be a result of either intrauterine growth restriction (IUGR), preterm birth (PTB), or both. Though the definite molecular mechanism of early onset labour or restricted fetal growth are unknown, epidemiological studies across world identified a number of risk factors for both conditions.^[3] These factors may be categorized into maternal conditions, infant characteristics or environmental or other factors (stress, smoking, alcohol abuse, high altitude etc). Among all factors maternal nutrition as reflected in mothers body composition, height, maternal genetics, anaemia, placental pathology, gestational diabetes, preeclampsia/eclampsia is of great concern as it contributes mostly. Maternal or fetal infections, especially those of the reproductive tract, placenta or amniotic membranes also have consistently associated with IUGR and PTB.^[10] In experimental models the main causes of LBW are protein malnutrition, Vitamin A deficiency, antibiotic administration, corticosteroid administration, insulin resistance etc.^[11] The physiological stress of extra nutrient demands makes pregnancy and lactation high risk periods in the life of a woman. The woman's tissue become depleted with essential nutrients and micronutrients because of recurrent occurrence of closely spaced pregnancies.^[3] Others include many biological and socioeconomic factors. In India, women who defecated in the open or used available latrines infrequently, or who bathed in surface water sources were more likely to experience pre term birth (PTB) and LBW babies. Another study revealed that maternal exposure to air pollution during pregnancy is adversely affecting fetal growth.^[12]

Consequences of low birth weight

Low birth weight has been defined by World Health Organization (WHO) as a weight of <2500gm at birth, very low birthweight (VLBW) as <1500 gm. Birth weight that is <1000gm is defined as extremely low birthweight (ELBW). Newborns who are lower than the expected weight whether pre term or full term are referred to as small for gestational age (SGA). LBW referring simply to being <2500 gm at birth includes some newborns who are preterm, some who are SGA, some who are both with the relative proportions in populations varying by setting and other factors.^[13] Neonatal complications such as hypothermia, hypoglycaemia, asphyxia, respiratory distress, fluid and electrolyte imbalance, hyperbilirubinemia, infection, neurological and sensory problems are common in low birthweight babies. Clinical studies have shown that premature SGA infants are at greater risk for developing both neonatal respiratory distress and Bronchopulmonary Dysplasia (BPD) when compared with premature infants with a birth weight appropriate for gestational age

(AGA).^[14] Other significantly affected biological functions and disease categories in the LBW newborns are infectious disease, respiratory diseases, antimicrobial response, inflammatory response, antigen presentation, hematological system development and functions, and immune cell trafficking.^[15] LBW newborns are at greater risk to acquire recurrent bacterial and viral infections during their first few weeks of life possibly as an outcome of compromised innate immune function. These complications are more manifested in VLBW and especially in ELBW births. A study reported that infants with LBW or IUGR or who were SGA have a decreased percentage of T or B lymphocytes and reduced vaccine-specific IgG responses than do newborn infants with normal body weight.^[16] In one study, schoolchildren born preterm had a significantly lower percentage of CD4+ T cells and lower CD 4: CD 8 ratios than did children born at term.^[17] According to Barker hypothesis by Dr. David JP Barker, a disturbed intrauterine growth has a negative influence on the development of cardiovascular system and favours the occurrence of hypertension, insulin resistance, hypercholesterolemia and hyperuricemia in adult life. Fetal undernutrition programs the structure and functions of the developing fetal organs and results in diseases later in life. Subsequent work has shown that lower birth weight of newborn are associated with higher levels of some classical cardiovascular disease risk factors.^[18] Epidemiological studies searching correlations with low body weight and neuroendocrine axis concludes that middle-aged adults born with a low weight present a higher prevalence of diabetes and obesity and also higher leptin levels and leptin to fat mass ratio than adults born with a normal weight.^[19]

The physiological and clinical manifestations related to low birth weight related nutritional challenges sometimes follow an intergenerational cycle. It passes across generations to the next, as malnourished mothers in many cases give birth to either LBW infants or infants who struggle to thrive or grow well, giving rise to malnutrition from infancy. If these infants are girls, they often become malnourished mothers themselves who trail almost similar cycle. The prevalence of LBW remained high in girl children, whose mothers were adolescent and were stunted.^[20]

Prevention of Intrauterine growth retardation (IUGR)/Low birth weight

Women's nutrition matters not only to women but also to their children and families. Conventional and appropriate intercession targeted at improving women's nutrition are incorporated into National Health Strategies. To eliminate IUGR and LBW, basic nutrition specific interventions should be supplemented by upgradation of the social policies which addresses poverty, illiteracy, disease burden and women empowerment. The nutritional status of a woman before conception and during influences the growth and development of her baby and forms the foundations for her child's later

health.^[21] Mother's own health both in short and long term also depends on how well-nourished she is before, during and after pregnancy.^[22] Poor nutrition during pregnancy has been linked to an increased risk of having a baby with low birth weight.^[23] The relationship of low birth weight and infant mortality remains robust and if they survive these underweight babies suffer from higher rates of chronic childhood illness and conditions such as hearing and visual impairment, neurodevelopmental challenges and behavioural disorder, cognitive disability and lower academic achievement.^[24] Targeting improvement of maternal nutrition, the focus should not only be the "window of opportunity" or the first thousand days of the infant but emphasis should also be given on the preconception period that is the adolescent period. Balanced protein energy supplementation of an additional >700kcal/day of malnourished mother has been found to significant rise in infant body weight. Also, consumption of tobacco and smokeless tobacco during pregnancy decreases gestational age at birth and birth weight independent of gestational age.^[25] So, effective prevention of IUGR/LBW should include improvement of adolescent/maternal nutrition, discontinuance of addictive substances, proper antenatal care, timely intervention for any obstetric emergency.

Nutrition counselling and Government Initiatives

More low birthweight (LBW) infants are born in developing countries (16.5 vs 7%) than in first world countries and they are often born to women with serious antenatal risk factors.^[26] Low birth weight (LBW) is the strongest determinant of morbidity and mortality in India. In Indian context, the peaking statistics of low birth weight has been attributed to widespread maternal undernutrition. Several studies suggest that although child mortality has declined in India, there is a pronounced regional and socioeconomic inequality. The percentage of children with small childbirth size varied from 9.7% in the southern to 21.6% in the north-eastern regions. Also, the percentage of poor socioeconomic status, uneducated mothers and childbirths at home facility were much higher in the central and eastern region compared to southern part of India.^[27]

The Government of India is committed to fulfil Mother and Children's right to nutrition. Ministry of Women and Child Development, Government of India is working in accordance to the guidelines and advise of several research organizations. There are various welfare programs launched and adopted by Government of India which provide comprehensive nutrition services, adequate antenatal care to pregnant mothers at community level to prevent intra uterine growth retardation (IUGR) and pre term LBW. Pradhan Mantri Matru Vandana Yojana (PMMVY) previously known as Indira Gandhi Matritva Sahyog Yojana (IGMSY) is such a maternity benefit program by the Ministry of Women and Child Development which was introduced in 2010. This is a conditional cash transfer scheme for pregnant and lactating mothers of 19 years of age or

above for the first live birth for promotion of good nutrition, safe delivery and feeding practices. In 2013, the scheme was brought under the National Food Security Act (NFSA), 2013 to implement the provision of cash maternity benefit of Rs 6000 stated in the act.^[28]

Integrated Child Development Services (ICDS) program is formulated and launched in our country which has an all-round approach. This is the world's largest early child developmental program which covers child health, nutrition, pre-school education and also health components of pregnant women and lactating mother. The program is implemented at the grassroot level through a network of dedicated trained health workers called Anganwadi workers who deliver service through community level Anganwadi centre. Services for prenatal women include physical and obstetrical examinations, serial recording of body weight, blood pressure, haemoglobin and urinalysis, tetanus immunization, iron and folic acid supplementation and food supplementation.^[29] Other important services provided by Anganwadi workers are identification and referral of high-risk mothers, counselling on health and hygiene education, antenatal care, breast feeding, child rearing and family planning.^[30]

National Rural Health Mission (NRHM) was launched in 2005 by Government of India for improving accessibility to quality healthcare for the rural populations. For effective impart of nutrition education to rural women active involvement of NGO s are ensured under various NRHM programmes.^[31]

Janani Suraksha Yojana (JSY) is a safe motherhood intervention under the National Health Mission which is being implemented with the objective of reducing maternal and neonatal mortality by promoting institutional delivery among poor pregnant women. The scheme is under implementation in all states and Union Territories (UTs), with a special focus on Low Performing States (LPS) namely the states of Uttar Pradesh, Uttarakhand, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Assam, Rajasthan, Orissa, and Jammu and Kashmir that have low institutional delivery rates. JSY is a centrally sponsored scheme, which integrates cash assistance with delivery and post-delivery care. The Yojana has identified Accredited Social Health Activist (ASHA) as an effective link between the government and pregnant women. ASHA counsel women on birth preparedness, importance of safe delivery, breastfeeding and complementary feeding, immunization, contraception and prevention of common infections including Reproductive Tract Infection/Sexually Transmitted Infection (RTIs/STIs) and care of the young child.^[32] A study from west Bengal revealed that regardless of some inclusion and exclusion errors, cash incentive under JSY was associated with escalated institutional delivery, especially in government institutions although there were other factors influencing the decision as well.^[33]

Rajiv Gandhi Scheme for empowerment of adolescent Girls (RGSEAG)-SABLA is another salient scheme that aims at empowering adolescent girls (11-18 years) along with improving their nutritional and health status. Girls under this scheme get information on health and family welfare, hygiene and guidance on existing public services. The scheme also aims to mainstream out of school girls into formal education or non-formal education.^[34] The scheme provides iron and folic acid supplementation, nutrition & health education, Adolescent Reproductive and Sexual Health (ARSH), life skill education and vocational training for girls aged 16 and above under National Skill Development Program.^[35]

CONCLUSION

India has made substantial progress in the past decades toward achieving optimal birth weight in Indian population. An investigation study from the National Family Health Survey (NFHS 3 and 4) suggested a significant decline from 20.4% to 16.4% in the LBW last decade.^[36] With ICDS being the world's largest running schemes, approach to nutrition intake and maternal nutrition, immunization in various parts of India has been changed. To achieve wholesome maternal and infant health, we need to have a multidimensional approach covering all the maternal, adolescent health problems with special emphasis on healthy lifestyle, empowerment and positive socioeconomic environment.

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