

## **Maternal Nutrition during Pregnancy and Lactation**

There is a general association between diets of poor nutritive values and conditions like low birth weight (LBW) and high fetal and infant mortality rates. We can conclude that under-nutrition among mothers, especially in developing countries contributes to impaired maternal, fetal and infant health and vitality.

### **Nutrition in Pregnancy**

Fetal development is accompanied by extensive changes in the composition of the maternal body, as well as its metabolism. Many of these changes begin very early in pregnancy. They include changes in the followings:

- Increase in the general metabolism (BMR), leading to an anabolic state.
- Changes in the GI tract (nausea, vomiting, constipation and impaired absorption of some nutrients such as iron).
- Changes in renal function ( $\uparrow$  GFR leading to loss of sugar and amino acids in the urine).
- Changes in the blood volume ( $\uparrow$  plasma volume by 50% and red cell mass by 20%) leading to haemo-dilution and a reduction of Hb concentration in the peripheral blood by 2 g/dl which is called “relative anaemia of pregnancy” .
- Changes in water metabolism, where the amount of water in the maternal body is increased by about 7 litres most of which is in the extra-cellular compartment.

### **Some Possible Outcomes of Maternal Under-Nutrition:**

1. Low Birth Weight and Prematurity: They are more common among lower social classes and in developing countries.
2. Fetal and Neonatal Morbidity and Mortality: The under-nourished fetus and neonate usually show a general depression of vitality and have an increased chance of death during the neonatal period. Congenital malformations have been produced in pregnant animals maintained on deficient diets.
3. Toxemia of pregnancy: Is more common in lower socio-economic groups and in developing countries. It may be related to certain nutritional deficiencies.
4. Anaemia: During pregnancy plasma volume increases by 50% and the red cell mass increases by 20% leading to relative anaemia of pregnancy. The causes of anaemia during pregnancy are:
  - a. Increased iron requirements due to fetal growth.
  - b. Impairment of iron metabolism during pregnancy.
  - c. Short spacing.
  - d. Dietary iron deficiency (low iron content).
  - e. Blood loss due to parasites (anchoylostoma).

Anaemia may also be due to the deficiency of folic acid and/or vitamin B12. This is manifested by very low HB values of <7g/dl. In Iraq, low Hb levels not responding to iron supplements may indicate thalassaemia or sickle cell anaemia.

### **Weight Gain During Pregnancy**

Healthy pregnant women gain 10-12Kg throughout pregnancy. On the other hand, under-nourished women usually gain <7Kg, especially those performing heavy physical work. The sources of weight gain are:

1. Products of conception (fetus, placental, amniotic fluid and membranes).
2. Enlargement of the organs of reproduction (uterus and breasts).
3. Increase in the fat stores.
4. Expansion of the extracellular fluid compartment.

### **Lactation**

The daily milk flow of  $\approx 850$  ml/day means the loss of nearly 1000Kcal/day. If this amount is not balanced by energy intake, it will be subsidized from body stores. Well fed women lay down considerable quantities of body fat during the earlier part of pregnancy, which will be used for foetal growth during late pregnancy, or later to subsidize lactation.

In developing countries and poor communities, most women are in a continuous state of pregnancy and lactation and it seems doubtful that such reserves of fat can be accumulated. Unless energy requirements during lactation are balanced by food intake, such women must lose weight.

### **Low Birth Weight (LBW) and Prematurity**

The criterion which was used to define prematurity was birth weight less than 2500g. An additional criterion was later added which was length at birth, the cut-off point of which was 47cm (18.5 inches). Both weight below 2500g and length below 47cm were found to occur more frequently in infants born before completing 37 weeks of intra-uterine life.

## **Definitions:**

LBW infant: A live born infant weighing less than 2500g at birth.

Pre-term infant: An infant born before 37 completed weeks of gestation calculated from the first day of the last menstrual period.

Full-term infant: An infant born between 37-42 completed weeks of gestation calculated from the first day of the last menstrual period.

Post-term infant: An infant born after 42 completed weeks of gestation calculated from the first day of the last menstrual period.

## **Importance**

LBW and preterm infants have reduced chances of survival. These survival chances are directly proportional to birth weight and gestational age at birth.

About 2/3 of all neonatal mortalities occur in preterm infants. They die from infections, intracranial haemorrhages, or respiratory disorders. In some, no specific cause of death other than prematurity can be identified. It is estimated that 20 million LBW infants are born annually all over the world, of whom 95% are born in developing countries where there are no facilities to care for those neonates during the critical neonatal period.

## **Aetiology of LBW and Prematurity**

The same factors, in most instances, will cause intrauterine growth retardation or restriction (IUGR) causing LBW and shorten gestation (causing premature birth).

### **I. Complications During Pregnancy:**

1. Hypertension: It can happen with or without proteinuria (pre-eclampsia or essential hypertension). It can be associated with or

lead to placental abnormalities. These conditions may lead to both IUGR & pre-term delivery.

2. Diabetes Mellitus: sometimes pregnancy is terminated before 37 completed weeks of gestation, to protect the vitality of the infant. This will lead to the birth of a pre-term infant.
3. Heart Diseases: associated with pre-term delivery, which is sometimes induced.
4. Anaemia: associated with LBW and pre-term delivery.
5. Infections: during pregnancy are associated with fever, immunological reactions, and release of toxic substances. The damage caused is related to the infectious agent, the timing of the infection and the organs or tissues involved. These infections may be:
  - a. Viral: rubella, cytomegalovirus, and herpes.
  - b. Bacterial: can either be amniotic fluid infections (ascending antenatal bacterial infections, which are the most common, are associated with protein energy malnutrition and heavy physical work and lead to preterm delivery), trans-placental infections (TB or syphilis which cause placental insufficiency and preterm delivery), or urinary tract infections (UTIs which are associated with preterm delivery).
  - c. Parasitic: congenital malaria is very rare as the foetus is protected by trans-placentally transmitted antimalarial antibodies, and the LBW and preterm delivery are caused by the associated fever and severe anaemia; and toxoplasma (which is associated with pre-term delivery and congenital malformations rather than LBW).