**NAME: BADASERAYE OGHENETEJIRI PAULET**

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**QUESTION**

1. Under maternal health care, discuss the implications of zinc deficiency on health of mother and child.
2. Suggest practical measures to alleviate this deficiency.

**ANSWER**

1. Zinc has been known to be an essential trace element for human and animals since the 1930s. In a study carried out in the 1960s in Iran, Prasad et al identified zinc deficiency as an underlying cause of stunting and delayed sexual maturation in humans and as of last century, severe or clinical zinc deficiency was defined as a condition characterized by short stature, hypogonadism, impaired immune function, skin disorders, cognitive dysfunction and anorexia (Prasad 1991). Zinc deficiency increases the risk of pregnancy complications, exacerbations of chronic diseases with chronic diseases with gestation as background, labour activities disorders, with hypogalactia and decreasing zinc concentrations in the breast milk as concomitant conditions. A relationship between the mother’s serum zinc concentration and trace element concentration in umbilical blood, body height and body mass, adaptive possibilities and child morbidity at birth has been established. Children in their first year of life with a zinc concentration in umbilical blood below13 micromol/L are characterized by reduced rate of linear growth, delay of psycho-motor development and increased morbidity. Moderate zinc deficiency in infants and children has been found to be associated not only with reduced growth and development but also with impaired immunity and increased mortality from infectious diseases. Zinc deficiency is widely prevalent in pregnant women, especially among those from less-developed countries suggesting low dietary zinc intake which can be associated with an increased preterm delivery. Lactation can also deplete maternal zinc stores, for this reason the RDA for zinc is higher in pregnant and lactating women than other women.

Zinc deficiency is largely related to inadequate intake or absorption of zinc from the diet, although excess losses of zinc during diarrhoea may also contribute (Gibson 1994; WHO 1996). Low plasma zinc concentrations have also been reported to correlate with pregnancy complications such as prolonged labour, hypertension, postpartum haemorrhage, spontaneous abortion and congenital malformation. It was hypothesized that in less developed countries where diets low in zinc are likely to result in zinc deficiency and where the prevalence of low birth weight is high, the positive effects of maternal zinc supplementation on pregnancy outcome would be even greater.

1. **Possible measures/strategies for combating zinc deficiency**
2. **Dietary modification/diversification**: Increased consumption of foods with a high content of absorbable zinc is the long term sustainable solution to problems of zinc deficiency. Strategies are being developed that target agricultural and food production, household food processing and dietary modification. Plant breeding efforts aim to produce new cereal varieties with higher zinc concentrations that are more available by reducing concentration of inhibitors such as phytate and increasing enhancers of absorption such as the sulphurous amino acids.
3. **Supplementation**: Zinc supplements improve the prognosis of children being treated for diarrheal disease. According to an analysis, children with persistent diarrhoea had a 42% lower rate of treatment failure or death if given zinc supplements. Zinc supplementation of babies with low birth weight in India reduced mortality during infancy by a third and maternal zinc supplementation during pregnancy improves neonatal immune status, early neonatal morbidity and infant infections but not birth weight.
4. **Fortification**: Food fortification with micronutrients in developing countries is largely limited to iodine. Research into zinc fortification either as a single nutrient or as a part of a multi-micronutrient approach is incipient. Initiative approaches will be needed to achieve fortification of foods with zinc in developing countries with the highest mortalities. These include the development of small scale community approaches for multiple micronutrient fortification, using hammer mills and the use of bouillon cubes and condiments.
5. **Bio-fortification**: Bio-fortified crops offer a rural-based intervention that by design initially reaches these more remote populations, which comprise a majority of the undernourished in many countries and then penetrates to urban populations as production surpluses are marketed. This entails application of minerals such as zinc or iron as soil factors and plant characteristics to get enhanced content of key minerals into the edible portion of the plant.