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**Assignment**

Questions

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

Answer

Zinc is an essential mineral known to be important for many biological functions including protein synthesis, cellular division and nucleic acid metabolism. Severe zinc deficiency is rare in humans, but mild to moderate deficiency may be common, especially in populations with low consumption of zinc-rich animal-source foods and high intakes of foods rich in phytates, which inhibit zinc absorption. It is estimated that over 80% of pregnant women worldwide have inadequate zinc intake, consuming on average 9.6 mg zinc per day, well below the recommended minimum daily levels for the last two trimesters of pregnancy in settings of low zinc bioavailability. It has been suggested that maternal zinc deficiency may compromise infant development and lead to poor birth outcomes. Low plasma zinc concentrations reduce placental zinc transport and may affect the supply of zinc to the foetus. Zinc deficiency also alters circulating levels of a number of hormones associated with the onset of labour, and because zinc is essential for normal immune function, deficiency may contribute to systemic and intra-uterine infections, both major causes of pre-term birth. Low birth weight and prematurity are significant risk factors for neonatal and infant morbidity and mortality. It has been hypothesized that zinc supplementation may improve pregnancy outcomes for mothers and infants. Studies of the effects of zinc supplementation during pregnancy have shown inconsistent results, possibly in part because of the challenges in establishing baseline zinc status in populations. Two recent systematic reviews report meta-analyses of randomised controlled trials of zinc supplementation during pregnancy conducted across five continents between 1977 and 2008, largely among women of low socioeconomic status, on a variety of maternal and neonatal outcomes. Both reviews concluded that zinc supplementation was associated with a significant reduction in preterm birth of 14% (summary relative risk (RR) 0.86 [95% CI 0.75, 0.99] and [95% CI 0.76 to 0.97]). However, zinc supplementation had no apparent effect on other infant outcomes including neonatal mortality, mean gestational age or any parameter of foetal growth such as risk of low birth weight or mean weight, length or head circumference at birth or on primary maternal outcomes such as pre-eclampsia. The effect of zinc supplementation on premature birth may be due to a reduction in the incidence or severity of maternal infections, which are a known risk factor for premature birth. The overall nutritional status of the mother during pregnancy is a significant contributor to both maternal and perinatal mortality and morbidity and improving the quality, or nutrient density, of the mother’s diet is known to improve pregnancy outcomes. Given the limited effect observed for zinc supplementation on pregnancy outcomes, it may be more prudent to focus research on identifying ways of improving the overall nutritional status of women in low-income areas. Currently UNICEF is promoting antenatal multiple micronutrient supplements which include zinc, iron and folic acid, for all pregnant women in developing countries, given that they are likely to have low micronutrient intakes from diet alone. Although there appears to be no harmful effects of zinc supplementation. The overall public health benefit of zinc supplementation in pregnancy currently appears limited.

Measures to alleviate Zinc deficiency:

1. Bio fortification:

Fortification is the practice of deliberately increasing the content of an essential micronutrient, i.e. vitamins and minerals (including trace elements) in a food, so as to improve the nutritional quality of the food supply and provide a public health benefit with minimal risk to health. Bio fortification is the process by which the nutritional quality of food crops is improved through agronomic practices, conventional plant breeding, or modern biotechnology. Bio fortification differs from conventional fortification in that bio fortification aims to increase nutrient levels in crops during plant growth rather than through manual means during processing of the crops. Bio fortification may therefore present a way to reach populations where supplementation and conventional fortification activities may be difficult to implement and/or limited.

1. Improving maternal nutrition:

The nutritional status of women prior to and during pregnancy plays a key role in foetal growth and development. Undernourished pregnant women may be at increased risk for adverse pregnancy outcomes, including giving birth to low-birth-weight infants. Providing balanced protein energy supplementation (i.e. supplements in which protein provides less than 25% of the total energy content) to undernourished pregnant women has been shown to promote gestational weight gain and improve pregnancy outcomes. Current evidence indicates that balanced energy and protein supplementation improves foetal growth, and may reduce the risk of stillbirth, low-birth-weight infants and infants born small-for-gestational age, especially among undernourished pregnant women. High-protein supplementation during pregnancy does not appear to be beneficial and may be harmful to the foetus. The evidence further suggests that antenatal nutritional advice with the aim of increasing maternal energy and protein intake may be effective in increasing maternal protein intake and reducing the risk of preterm birth.

1. Nutrition counselling during pregnancy:

Maintaining good nutrition and a healthy diet during pregnancy is critical for the health of the mother and unborn child. Nutrition education and counselling is a widely used strategy to improve the nutritional status of women during pregnancy. The strategy focuses primarily on:

1. promoting a healthy diet by increasing the diversity and amount of foods consumed
2. promoting adequate weight gain through sufficient and balanced protein and energy intake
3. promoting consistent and continued use of micronutrient supplements, food supplements or fortified foods.

Available evidence suggests that nutrition education and counselling may support optimal gestational weight gain (i.e. neither insufficient nor excessive), reduce the risk of anaemia in late pregnancy, increase birth weight, and lower the risk of preterm delivery. Counselling may be more effective in undernourished populations when women are also provided with nutrition support such as food or micronutrient supplements where needed.