

SERUM ZINC LEVELS AMONGST PREGNANT WOMEN IN TERTIARY CARE TEACHING HOSPITAL IN SOUTH INDIA

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Abstract

Background: Zinc deficiency is predominant in emerging countries. Its insufficiency during pregnancy has been known to be related with growth retardation, congenital abnormalities, and low birth weight. Not many studies are existing on the serum zinc levels during pregnancy in South India. Hence this study was aimed to evaluate zinc deficiency among our population particularly in this geographical area. **Materials and Methods:** A cross sectional study was done in 350 pregnant women with gestational age of 28 weeks or more. Each pregnant woman was quizzed about her age, other distinctive features Blood was drawn to measure the serum zinc levels. Statistical tests were used accordingly. **Result:** Mean serum zinc level was $58.3 \pm 15.2 \mu\text{g/dL}$. Almost 59.8 % of the women had zinc deficiency. The dietary data discovered that 66.3 % of the women were consuming calories less than 75% of the required, showing an overall poor food intake among pregnant women. Dietary zinc intake levels exposed that 83.6 % of the women were consuming less than 50% of the recommended levels. A high frequency of zinc deficiency was found among the pregnant women possibly due to the low dietary intake of zinc. **Conclusion:** Multivitamin and nutrient supplementation in the form of iron, folic acid and zinc has to be stressed to meet the overall necessities of micronutrients which are augmented during pregnancy. Dietary counselling for the pregnant mothers about the improved consumption of animal food sources for non-vegetarians and milk, nuts and legumes for vegetarians has to be encouraged.

INTRODUCTION

Zinc deficiency is a major public health problem in India with nearly 95% of the population being at danger due to lesser dietary zinc intake.^[1] Its deficit has been linked with problems during pregnancy, growth retardation and low birth weight.^[2] It has been recognized that 82% of the pregnant women globally are apparently having insufficient dietary intake of zinc.^[6]

Zinc is an important nutrient mandatory for normal development and growth. The prerequisite for zinc surges with pregnancy and adverse effects of zinc deficiency during pregnancy have been recognized in experimental animals. For instance, a severe restraint of dietary zinc during embryogenesis in rats caused severe congenital malformations and fetal death.^[4] Marginal zinc deficit induced at conception shaped growth restriction, skeletal anomalies, delivery complications, and impaired immune function in animals but was not linked with fetal malformation.^[5]

Zinc plays a vital role in many natural functions including protein synthesis, cellular division and nucleic acid metabolism.^[6] Zinc intake data advocate that the risk of deficiencies is high. Caulfield estimated that 82% of the pregnant women worldwide have inadequate zinc intakes.^[7] Higher intakes were detected in people with higher income.^[8] More recent incidence based on food balance data revealed 31%.^[9]

Studies in animals show that severe zinc deficiency rises fetal death due to spontaneous abortions or multiple congenital anomalies.^[10] These malformations seem to stem from an abnormal synthesis of nucleic acids and protein, compromised cellular growth and morphogenesis, abnormal tubulin polymerisation, chromosomal defects and excessive lipid peroxidation of cellular membranes. Very few studies are existing on the serum zinc levels during pregnancy from South Indian population. Hence, the present study was conducted to evaluate this in a tertiary care teaching hospital in South India.

MATERIALS AND METHODS

A cross-sectional study was conducted in Government Medical College Krishnagiri from March 2022 to October 2022. All pregnant women with gestational age of 28 weeks or more were registered for the study. The gestational age of the women was calculated by LMP. The Ethical Committee of Institute ethically approved the study. The objectives of the study were explained to the women and informed consent was obtained. Women willing to participate were enrolled for the study. Each eligible pregnant woman was inquired about her age, first date of her last menstrual period and socio-economic status by utilizing a pre-tested semi-structured questionnaire

Non-fasting morning blood samples from the antecubital vein and collected in labeled polypropylene tubes. The blood samples were centrifuged at 3500 rpm at 4°C for 30 minutes, which separated the serum. Zinc level was determined in triplicates by the standard atomic absorption spectrophotometric method. Mean of the three values was reported as the serum zinc level of the study subject. Serum samples with zinc levels less than 66.0 µg/dL were considered as deficient zinc samples.

Data on dietary intake of zinc and calories was collected utilizing the 24-hour dietary recall methodology. The intake of zinc and calories was obtained by using the food composition data published in book entitled Nutritive Value of Indian Foods, published by National Institute of Nutrition, (ICMR). Recommended Dietary Allowances

suggested by the ICMR were utilized to assess the adequacy of nutrient intake.11 the data collected was subjected to statistical tests utilizing the SPSS 24.0 version.

RESULTS

In our study 350 pregnant women (mean age: 23.5 ± 2.9 years) with gestational age of 28 weeks or more were included in the study. The obstetric profile of the pregnant women revealed that 50.9, 32.5 and 16.6 percent of them were with gestational age of 28 to less than 32 weeks, 32 to less than 36 weeks and 36 weeks and more, respectively. The distribution of the pregnant women according to their socio-economic status is shown in Table 1.

The mean zinc concentration of the women was 58.3 ± 15.2 µg/dL. Almost 59.8 % women of the study subjects had deficient serum zinc levels (Table 2).

The dietary pattern of the women revealed that 70 % of them vegetarians. The dietary data revealed that 66.3% of them were consuming calories less than 75% of the recommended, indicating an overall poor food intake. Dietary zinc intake revealed that 83.6 % of the pregnant women were consuming less than 50% of the suggested.

Further statistical analysis exposed that no variable was found to be significantly associated with zinc deficiency. However, it was witnessed that the pregnant women with the calorie consumption of less than 50% of the recommended had a lower serum zinc level compared to the women who had a higher calorie intake (57.6 ±12.1 vs 60.9±13.5 µg/dL).

Table 1: Socioeconomic status

SOCIO-ECONOMIC STATUS (SES)	NUMBER OF PTS	PERCENTAGE
LOWER SES	14	4
LOWER MIDDLE SES	140	40
MIDDLE SES	147	42
MIDDLE UPPER SES	42	12
UPPER SES	7	2

Table 2: Zinc level of study population

ZINC LEVEL (MG/DL)	NO OF PATIENTS	PERCENTAGE
LESS THAN 66	209	59.80%
MORE THAN 66	141	40.20%

DISCUSSION

The present study revealed a high occurrence of zinc deficiency as 59.8% amongst pregnant women residing in rural areas of the block studied. A recent study reported a prevalence of zinc deficiency as 55.5 % in urban slums of Delhi with a lower cut-off of serum zinc levels (<60µg/dL).^[12] another study conducted in India reported a zinc deficiency prevalence of 22% amongst pregnant women of III trimester with a cut-off of only 50 µg/dL.^[12]

The mean serum zinc level amongst pregnant women in the present study was 58.3 ± 15.2 µg/dL which was nearly comparable to that reported by

other studies.^[13] The mean serum zinc level observed in the present study was lower than reported by few other studies.^[14]

A recent study conducted in Bangladesh reported a lower serum zinc level amongst pregnant women as compared to our study (47±24 µg/dL).^[15] The disparity in the serum zinc levels of the studies may be possibly due to the difference in the laboratory estimations.

Though serum zinc levels cannot conclusively assess zinc deficiency, this biochemical indicator has been acknowledged to be the best available marker of risk of zinc deficiency as it imitates the dietary zinc intake.

The high prevalence of zinc deficiency amongst pregnant women (59.8%) in the present study was due to insufficient dietary zinc intake. Studies conducted in India and other developing countries have also recognized zinc deficiency in pregnant women due to less intake of dietary zinc. The present study was undertaken in a community, which consumed a diet where the main source of energy was cereals and rice. The presence of higher amount of phytates and dietary fiber in such diet, known to cause poor zinc absorption could be a major causal factor for high prevalence of zinc deficiency in our study population. Hemodilution during last trimester of pregnancy could be another cause for lower zinc levels amongst the pregnant women. Poor pre-pregnancy nutritional status and low serum zinc levels could be other contributing factors leading to low serum zinc levels during pregnancy.

CONCLUSION

There is a high prevalence of zinc deficiency amongst pregnant women. There is need to undertake multi-centric studies to assess the serum zinc levels and magnitude of zinc deficiency amongst pregnant women in India.

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