

**SERUM ZINC LEVELS AMONGST PREGNANT WOMEN IN TERTIARY CARE
TEACHING HOSPITAL IN SOUTH INDIA****Dr. R. P. Sathvika MD¹ and Dr. S. Sindu Priya MD^{2*}**¹Associate Professor, Department of Biochemistry, Government Dharmapuri Medical College, Dharmapuri.²Assistant Professor, Department of Biochemistry, Annapoorana Medical College and Hospitals, Salem.***Corresponding Author: Dr. S. Sindu Priya MD**

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ABSTRACT

Introduction: Zinc deficiency is prevalent in emerging countries. Its deficiency during pregnancy has been known to be associated with growth retardation, congenital abnormalities, and low birth weight. Not many studies are available on the serum zinc levels during pregnancy in South India. Hence the present study was started to evaluate among our population in this geographical area. **Methods:** A cross sectional study was conducted amongst 350 pregnant women with gestational age of 28 weeks or more. Each pregnant woman was questioned about her age, other characteristic features Blood was drawn to assess the serum zinc levels Statistical tests were applied according to the data collected. **Results:** 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 revealed that 66.3 % of the women were consuming calories less than 75% of the recommended, indicating an overall poor food intake among pregnant women. Dietary zinc intake revealed that 83.6 % of the women were consuming less than 50% of the recommended (15 mg). A high prevalence of zinc deficiency was found amongst the pregnant women possibly due to the low dietary intake of zinc. **Conclusion:** Multiple micronutrient supplementation in the form of iron, folic acid and zinc has to be emphasized to meet the overall requirements of micronutrients which are increased during pregnancy. Dietary counselling for the pregnant mothers regarding the increased consumption of animal food sources for non-vegetarians and milk, nuts and legumes for vegetarians has to be advocated.

KEYWORDS: Serum zinc levels, zinc deficiency, pregnancy.**INTRODUCTION**

Zinc deficiency is a major public health problem in India with nearly 95% of the population being at risk due to low dietary zinc intake.^[1] Its deficiency has been associated with complications during pregnancy, growth retardation, congenital abnormalities, and low birth weight.^[2] It has been documented that 82% of the pregnant women worldwide are likely to have inadequate dietary intake of zinc.^[6]

Zinc is an essential nutrient required for normal development and growth. The requirement for zinc increases with pregnancy and adverse effects of zinc deficiency during pregnancy have been documented in experimental animals. For example, a severe restriction of dietary zinc during embryogenesis in rats caused severe congenital malformations and fetal death.^[4] Marginal zinc deprivation induced at conception produced growth restriction, skeletal anomalies, delivery complications, and impaired immune function in animals but was not associated with foetal malformation.^[5]

Zinc plays an important role in many biological functions including protein synthesis, cellular division

and nucleic acid metabolism.^[6] Zinc intake data suggest that the risk of deficiencies is high. Using a model that related reported zinc intakes of pregnant women to the recommended intake, Caulfield estimated that 82% of the pregnant women worldwide have 2 inadequate zinc intakes.^[7] Higher intakes were observed in population with higher income⁸. More recent prevalence based on food balance data revealed 31%.^[9]

Studies in rats, mice, pigs and ewes show that severe zinc deficiency increases foetal death due to spontaneous abortions or multiple congenital anomalies.^[10] Every organ system is affected; malformations of the heart, lungs, brain, urogenital system and skeletal system are especially common. These malformations seem to stem from an abnormal synthesis of nucleic acids and protein, impaired cellular growth and morphogenesis, abnormal tubulin polymerisation, chromosomal defects and excessive lipid peroxidation of cellular membranes.

Very few studies are available 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 community based cross sectional study was conducted in a tertiary care teaching hospital from November 2019 to October 2020. All pregnant women with gestational age of 28 weeks or more were enrolled for the study. The gestational age of the women was calculated by inquiring about the last menstrual period of the women. 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. The serum was collected in eppendorf vials and stored at (-) 80°C until analysis.

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, Indian Council of Medical Research (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 20.0 version.

RESULTS

Three hundred and fifty 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.

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

Blood collection was undertaken amongst 350 women. 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).

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%

Data on dietary intake could be collected all 350 pregnant women. 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 recommended.

Further statistical analysis revealed that no variable was found to be significantly associated with zinc deficiency. However, it was observed 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)

DISCUSSION

The present study revealed a high prevalence 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 similar 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 ($47 \pm 24 \mu\text{g/dL}$).^[15] The variation in the serum zinc levels of the studies may be possibly due to the variation in the laboratory estimations.

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

The high prevalence of zinc deficiency amongst pregnant women (59.8%) in the present study was due to inadequate dietary zinc intake. Studies conducted in India and other developing countries have also documented 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. The presence of higher amount of phytates and dietary fiber in such diet, known to cause poor zinc absorption could be a major contributing factor for high prevalence of zinc deficiency in our study population. Hemodilution during last trimester of pregnancy could be another factor 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.

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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