**Original Research Article**

# Comparative study of serum iron and zinc levels in term and preterm babies delivered in RMMCH

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## Abstract

**Background:** Malnutrition is an important factor that influences the course of pregnancy and fetal development. It is a serious international problem which leads to a deficiency of metals, trace elements, vitamins, and proteins. Much attention has been given to the effects associated with protein deficiency. Nowadays the effects due to the deficiency of trace elements have been given much importance. Trace elements are essential for life. Deficient intake- leads to impairment of some functions. The impairment may be corrected by intake of the element in physiological amount. With the deficiency of these elements, the organisms can neither grow nor complete its life cycle. Death of an organism results when there is an absolute deficiency.
**Aim:** To compare serum iron and zinc level in term and preterm babies.
**Materials and methods:** Sixty pregnant women who came from in and around Chidambaram who fulfilled the inclusion criteria during the period from July 2001 to March 2002 were included in this study. Among them, 50 delivered at term (37 to 42 weeks) and the rest delivered prematurely (< 37 weeks). Serum iron and zinc level were estimated by standardized technique. The results are analyzed accordingly.
**Results:** The estimated mean iron value for the term babies was found to be 114.34 µg/dl with the standard deviation of 34 µg/dl. In case of preterm babies, the estimated mean value for iron was found

to be 97.35 μg/dl with the standard deviation of 46 μg/dl. The mean zinc value of term babies was found to be 76.26 μg/dl with the standard deviation of 23 μg/dl. For preterm babies mean zinc value was found to be 56.53 μg/dl with the standard deviation of 29 μg /dl.

**Conclusion:** Preterm birth deprives the fetus of a significant accumulation of iron in storage that occurs beyond 32nd week, total body iron deposits in tissues, Hb and zinc are low in premature babies. Iron deficiency affects perinatal growth, maturation, and function of multiple organ systems including the heart, skeletal muscle, gastrointestinal tract, and brain. Anemia of prematurity has been defined as low hematological constant levels of hemoglobin (Hb), hematocrit (Ht), serum iron, number of erythrocytes, the reticulocytes.

## Key words

Term Babies, Pre Term, Serum Iron, Zinc.

## Introduction

Iron deficiency is the primary cause of nutritional anemia. Deficiency of iron may be due to the intake of food deficient in iron or decreased absorption from the gastrointestinal tract. Iron and iodine deficiency is directly linked with cognitive and motor delay. Anemia is a common condition during pregnancy. This is particularly true in developing countries, where the intake of iron-rich food is low. Moderate anemia in pregnancy is not generally associated with preterm delivery. Mothers with a significantly lower concentration of Hemoglobin (Hb) only, deliver premature, low birth weight babies and have a high perinatal & mortality rates as compared to non-anemic mothers. Fetal iron concentrations are about twice as high as maternal concentrations. Iron is transported actively across the placenta to the fetus [1]. There are studies to show that a significantly lower iron level was found in the cord blood in the group with preterm premature rupture of membranes than in the other groups. Low birth weight babies constitute about 20 to 25% in the Indian scenario [2]. A small percentage of these subjects have preterm deliveries with low birth weight babies. Moreover, no attempt was made yet to determine the serum levels of iron, zinc, hemoglobin (Hb) and packed cell volume (PCV) in the maternal and cord blood in this part of Cuddalore district. Therefore, this study was aimed at to find out the serum levels of iron, zinc, hemoglobin and packed cell volume in newborns and their correlation with the maternal values [3]. Zinc and iron are the trace elements found in the plasma in micro quantities. Their concentration is expressed in (μg/dl). The trace element zinc is essential for cellular growth and enzyme production. These enzymes are involved in the synthesis of ribonucleic acid and deoxyribonucleic acid. Body's immunity to some extent depends on the trace element zinc. It also contributes to the structure and function of the brain [4]. The deficiency may lead to delayed development of the cognitive and neuropsychological functions. It can also act as an antioxidant. Age is an important factor [5]. Children may be particularly vulnerable to zinc deficiency during periods of rapid growth and development, such as infancy. Infants belonging to low-income groups are found to have low plasma concentration of zinc. Zinc deficiency and associated changes in cognitive and motor functions are very prominent in children who are born prematurely and children who have nutritional problems and diseases that affect the absorption of zinc. Zinc requirement is high during pregnancy. Zinc moves across the placenta to the fetus by passive transport. Normally maternal levels of serum zinc decrease during pregnancy [6].

## Materials and methods

Sixty pregnant women who came from in and around Chidambaram who fulfilled the inclusion criteria during the period from July 2001 to March 2002 were included in this study. Among them, 50 delivered at term (37 to 42 weeks) and

the rest delivered prematurely (< 37 weeks). Serum iron and zinc level were estimated by standardized technique. The results are analyzed accordingly.

**Inclusion criteria**

- Unbooked cases who have not taken iron and zinc during antenatal period who delivered normally.
- Age criteria 18-32 years.
- Parity - to 3rd pregnancy.
- Inter-pregnancy interval of 1-2 years.

**Exclusion criteria**

- Booked cases.
- Mothers who have prenatal iron and zinc supplementation.
- Age criteria <18 years > 32 years.
- Inter-pregnancy levels more than two years

The rest of the blood was transferred to a conical centrifuge tube, allowed to clot, centrifuged at 2000 RPM and serum was removed and preserved at -20°C before the analysis of iron and zinc was made by Svsmexx autoanalyzer.

## Results

The estimated mean iron value for the term babies was found to be 114.34 μg/dl with the standard deviation of 34 μg/dl. In case of preterm babies, the estimated mean value for iron was found to be 97.35 μg/dl with the standard deviation of 46 μg/dl (**Table – 1**).

**Table - 1:** The descriptive statistics of serum iron for term and preterm babies.

| Pregnancy Status | Mean | S.D. | Mini. | Max. | S.E. | t-test values | Significance value |
|---|---|---|---|---|---|---|---|
| Term | 114.33 | 33.86 | 37.00 | 187.00 | 4.79 | 1.35 | NS |
| Pre term | 97.35 | 46.30 | 60.10 | 167.00 | 14.64 | | |

**Table - 2:** The descriptive statistics of zinc for term and preterm babies.

| Pregnancy Status | Mean | S.D. | Mini. | Max. | S.E. | t-test values | Significance value |
|---|---|---|---|---|---|---|---|
| Term | 77.26 | 23.17 | 26.70 | 121.70 | 3.28 | 2.47 | P < 0.05 |
| Pre term | 56.53 | 29.20 | 30.90 | 123.40 | 9.2354 | | |

The mean zinc value of term BABIES was found to be 76.26 μg/dl with the standard deviation of 23 μg/dl. For preterm babies mean zinc value was found to be 56.53 μg/dl with the standard deviation of 29 μg /dl (**Table – 2**).

## Discussion

Haematologic problems are frequently encountered by pediatricians caring for sick newborn infants. Alterations in the hematopoietic system are most often reactive, secondary, and sometimes iatrogenic. Numerous studies have been done to determine the indices of erythropoiesis and stimulation of erythropoiesis, to estimate the iron stores and iron transport in conjunction with the clinic. Thus, has been studied the cord Hb and cord serum ferritin correlated with the neurological development of the child in the first year of life. Low levels of hemoglobin and serum ferritin cord were predictive of anemia of prematurity with neuro-psychomotor immediate and long effects [7]. A comparison of our cases after dividing them into two groups according to whether or not their birth weight exceeds 31 lb. is of some interest. Chaparro CM, et al. have shown in a group of 75 prematurely born infants that the more premature the baby and the less the birth weight the more severe is the physiological anemia [8]. Comparing our two groups we find that although the smaller infants tend to reach a lower hemoglobin level between the eighth and twelfth weeks of life than the larger ones, the individual readings for the two groups are well admixed in

each 10-day period and the difference is not as striking as had been anticipated. Iron deficiency anemia which may appear during the second six months of life did not constitute a problem when this routine was followed [9]. Transfusion would, of course, have been considered in the early months if the hemoglobin concentration had fallen below 8 Hb/100 ml or remained at that level for a week or two. Although these workers report only six non-fatal reactions in over 1,000 transfusions, we still do not think it justifiable to expose a premature baby unnecessarily to the possible hazards of a procedure which may only serve to inhibit erythropoiesis at a time when marrow activity is on the point of revival and which, furthermore, may increase the possibility of transfusion reactions in later life [10].

## Conclusion

Zinc deficiency as it related to the fetal growth and development, a complication of pregnancy, labor and delivery, maternal and infant health. Observational studies in human population had produced a strong association between poor maternal zinc status and various indicators of poor pregnancy outcome. In the developing countries, much attention was given to the risk of mothers and infants from maternal iron deficiency anemia in pregnancy.

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