A STUDY OF SERUM AND LEUCOCYTE ZINC LEVELS IN PREGNANCY ASSOCIATED WITH ANAEMIA AND IUGR

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SUMMARY

In an attempt to determine the importance of trace element such as zinc in association with anaemia and IUGR among the pregnant women, the present study was undertaken. Simultaneous analysis of the blood samples from the mother and child in cas of IUGR and maternal samples in the cases of anaemic women revealed significantly low serum zinc levels in the maternal blood samples as compared to the level in the normal controls. Similarly the mean leucocyte zinc level at delivery in 28 mothers with IUGR was significantly lower than that of 35 mothers with normal babies, whereas mean plasma zinc level in them was similar to that of control group. However mean leucocyte zinc content in 12 mothers with preterm but average for date infant was not significantly different from that of controls and so was their plasma zinc content too.

Introduction

Iron deficiency anaemia is directly related to zinc. Iron and zinc levels have been reported to decrease with progress of pregnancy. However the severity of anaemia does not correlate with the levels of red blood cell zinc. Zinc deficiency throughout pregnancy is embryotoxic and results in small fetuses, fetal death, malformation and biochemical abnormalities.

During the first six months after birth, small babies show increased growth velocity and requirement for zinc suggesting that intrauterine growth may have been limited by supply of zinc. The bioavailability of zinc in breast milk is greater than that in formula feed, but if maternal zinc depletion has already caused neonatal deprivation of this element then it is unlikely that the mother's milk will be adequate to correct the imbalance.

The present study has been undertaken to find out the role of zinc in pregnancy associated with anaemia and IUGR.

Material and Methods

This study was carried out on hundred and thirty pregnant women. Out of these 55 pregnant women were those who clinically required an iron and folic acid preparation for the correction of their anaemia and the rest 75 pregnant women were with IUGR.

These were selected out of the women attending the outpatient clinic at M.L.N. Medical College, Allahabad.

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In the present study we studied the results of maternal and fetal serum and leucocyte zinc concentration of normal, anaemic pregnant women and growth retarded babies to determine whether there is a relation between maternal zinc level and anaemia and between maternal and fetal zinc and IUGR.

Seventy five mother child pairs were studied. Simultaneous samples of 10 ml of venous maternal blood and clamped umbilical cord blood were taken in heparinised syringes. Blood was centrifuged at 3000 r.p.m. for five minutes to separate the plasma and cell fraction. The top layer of packed cells is often colourless because of predominence of leucocytes. Erythrocyte settle in the bottom owing to their weight. The top layer was separated and disolved in W.B.C. diluting fluid (B.D.H. make). Leucocytes are separated by centrifugation. Accuracy of this method was 76% the separation of leucocyte by single step centrifugation method using per cell and Ficoll Hipage was also done, the accuracy was more or less same. Isolated leucocytes were dried to constant weight. The zinc was extracted by I.O.M. Hydrochloric acid and measured by Atomic absorption spectrophotometry (AAS).

The blood of anaemic mothers was also analysed for serum zinc levels by atomic absorption spectrophotometer and these levels were compared with those of the control group.

Observation

The mean leucocytes zinc level at delivery in 28 mothers with intrauterine growth retarded babies was significantly lower than that of 35 mothers with normal babies, whereas the mean plasma zinc level in them was similar to that of control group. However mean leucocyte zinc content for 12 mothers with preterm but average for date infants was not significantly different from that of controls and so was their plasma zinc content too.

In a comparison of fetal plasma and fetal leucocyte zinc concentration in these groups, the mean leucocyte zinc content of babies with IUGR was appreciably reduced compared with that of the normal babies.

Preterm babies were not leucocyte zinc depleted as is evident from Table III.

TABLE I
Case Distribution

Groups	No. of cases	Percentage
Control	35	46.66
IUGR	28	37.33
Preterm	12	16.00
Anaemic	55	42.30
Total	130	

Serum zinc level estimation in the anaemic pregnant women showed a significant reduction in the level as compared to that of normal control group as seen in Table II. Similarly the leucocyte zinc content of

TABLE II
Serum and leucocyte zinc level in controls and anaemic pregnant women

	Controls	Mild anaemic	Moderate anaemic	Severe anaemic
Serum zinc ug/100 ml	109.7 ± 1.3	73.77 ± 0.92	73.25 ± 0.98	69.66 ± 0.98
Leucocyte zinc ng/mg	47.08	42.60	40.60	34.80

TABLE III
Comparison of maternal and fetal leucocyte zinc

Group	Maternal leucocytic zinc ng/mg dry wt.	Fetal leucocyte zinc ng/mg.
Control	47.08	49.98
IUGR	42.48	45.10
Preterm	49.50	50.91
Anaemia	42.60	40.90

TABLE IV
Comparison of maternal and fetal plasma zinc

Group	Maternal plasma zinc (ug/100 ml)	Fetal plasma zinc (ug/100 ml)
Control	59.97	99.98
IUGR	60.18	90.14
Preterm	59.41	93.41
Anaemia	45.37	83.42

the fetus of the anaemic mothers was markedly lower than that of the normal control group Table III. However there was no relationship between zinc levels and severity of anaemia. However zinc level does show a relationship with weeks of gestation a decline of zinc level is observed towards the later half of pregnancy.

Discussion

The present study reveals a fall in maternal serum and leucocyte zinc as well as fetal leucocyte zinc levels during pregnancy associated with anaemic as also reported earlier by others. It is well known that anaemia is a result of reduced number of haemaglobin content of red blood cells and consequently leads to a fall of serum zinc.

The present study has also shown that both maternal and fetal leucocyte zinc depletion is strongly associated with IUGR. While preterm babies and their mothers have normal values. We have in addition shown a positive correlation between maternal and fetal leucocyte zinc values.

However no correlation was found between maternal and fetal serum zinc values. The mechanism whereby maternal zinc depletion causes depletion of leucocyte zinc in fetus is unknown. The zinc deprived mothers may be unable to provide sufficient zinc. Even in normal pregnancy the serum and leucocyte zinc pools fall throughout. While zinc deprived mothers may even remove zinc from the fetus.

Zinc is a component of enzymes such as DNA and RNA polymerase that are fundamental for growth. So although fetal zinc depletion may slow growth this will in turn reduce the zinc requirement of fetus.

Even though zinc depletion is established as one of the factor for intrauterine growth retardation it is difficult to investigate all pregnant women from this point of view because this needs modern sophisticated instruments such as ASS. Thus by providing liberal facilities for intensive antenatal supervision, one can reduce the number of intrauterine growth retarded babies being born.

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