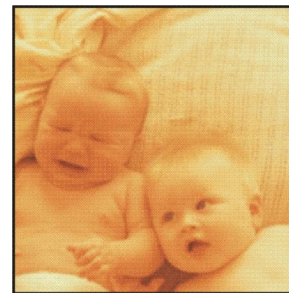


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PROF-956

# SMALL BABIES; RELATIONSHIP OF MATERNAL SERUM ZINC LEVELS TO THE BIRTH WEIGHT OF THE INFANTS



**DR. MUHAMMAD ASHRAF, MBBS, M.Phil**

Associate Professor Biochemistry,  
Punjab Medical College Faisalabad.

*Dr. Zamir Ahmad, MBBS, M.Phil*

Prof. of Biochemistry,  
PGMI, Lahore.

**DR. MUHAMMAD NASARULLAH KHAN,  
MBBS, M.Phil**

Assistant Professor Biochemistry,  
K E Medical College Lahore,

*Dr. Tariq Ferroz Khawaja, MBBS, M.Phil*

Associate Professor Biochemistry,  
PGMI, Lahore.

**DR. MUHAMMAD AYUB KHAN, MBBS, M.Phil**

Assistant Professor Pathology,  
Quaid-e-Azam Medical College, Bahawalpur.

*Prof. (Retd) Abdul Salam, Ph.D*

Professor Biochemistry,  
K E Medical College Lahore.

**ABSTRACT ...** [ashrafbio@paknet.com](mailto:ashrafbio@paknet.com) Zinc is an essential trace mineral. It is considered a growth factor as it is the metallic component of enzymes DNA polymerase, DNA dependent RNA polymerase and thymidine kinase. **Objective:** To find out the relationship of maternal serum zinc levels with birth weight of the babies. **Period:** January 1989 to May, 1991. **Setting:** Lady Wellington Hospital Lahore, King Edward College, Lahore and Metallurgy Department PCSIR Laboratories, Lahore. **Design:** Prospective study **Patients & methods:** Among the 216 registered pregnant women 46 subjects had no fetomaternal complications during pregnancy and they delivered babies having birth weight adequate for Gestational Age (AGA). Thirteen women gave birth to babies Small for Gestational Age (SGA). Blood samples were taken at the end of each trimester and serum zinc was measured by atomic absorption spectrophotometer. **Results:** Serum zinc levels were significantly low ( $P < 0.001$ ) throughout pregnancy in women giving birth to SGA babies. **Conclusion:** Serum zinc levels throughout the course of pregnancy are associated with intra-uterine growth of the babies.

## INTRODUCTION

Zinc, an essential trace mineral is related to growth and reproduction<sup>1</sup>. It is the cofactor of various known enzymes in animal kingdom<sup>2</sup>. In zinc deficiency, most profound effects are seen on rapidly proliferating tissues such as embryo, gonads, skin and gastrointestinal

tract<sup>3,4</sup>. Fetal growth retardation has been observed in experimental animals as a consequence of zinc deprivation<sup>5,6</sup>. In human studied low birth weight of infants was reported among pregnant alcoholics<sup>7,8</sup>. The relationship of zinc deficiency to chronic alcoholism has already proved and massive zincuria in alcoholics lead to

low plasma zinc levels<sup>9</sup>. Similarly high incidence of low birth weight babies is seen in pregnant smokers. Cigarette smoking increase the body cadmium levels which competitively inhibit the placental transport of zinc to the fetus and probably results in growth retardation of the developing babies<sup>10</sup>. This follow up serum zinc to birth weight of the babies and other fetomaternal complications.

## MATERIAL AND METHODS

In this prospective study 216 pregnant women between 20-30 years of age were registered at the end of 1<sup>st</sup> trimester and were followed up till delivery. During the last week of each trimester blood samples were drawn for analysis of serum zinc. Among these registered subjects 46 women had no fetomaternal complications during pregnancy and labour and they delivered normal babies (AGA) by spontaneous vaginal delivery. These were considered as control subjects. Thirteen pregnant women gave birth to babies (SGA) small for gestational age and the were considered as study subjects.

Using a disposal syringe 5ml of blood was drawn from

each subject during the last week of each trimester. Serum was separated after clotting of blood by configuration for 5 minutes at 3000 rpm. Serum zinc was measured by atomic absorption spectrophotometer<sup>11</sup> model 88 make Hitachi at PCSIR laboratories Lahore.

## RESULTS

Mean serum zinc levels among control and study subjects during each trimester are shown in Table I.

Trimester	Serum zinc ( $\bar{x} \pm$ SD) in mothers of AGA babies	Serum zinc ( $\bar{x} \pm$ SD) in mothers of SGA babies
1 <sup>st</sup>	76.57 $\pm$ 10.76 $\mu$ g/dl	63.69 ( $\bar{x} \pm$ SD) 6.43 $\mu$ g/dl
2 <sup>nd</sup>	61.68 $\pm$ 7.97 $\mu$ g/dl	48.85 $\pm$ 4.86 $\mu$ g/dl
3 <sup>rd</sup>	51.17 $\pm$ 8.61 $\mu$ g/dl	39.54 $\pm$ 4.25 $\mu$ g/dl

Trimester	$\bar{x}1 - \bar{x}2$	S.E. Diff:	T. Value	P. Value	Significance
1 <sup>st</sup>	12.88	3.15	4.09	P<0.001	HS
2 <sup>nd</sup>	13.13	2.34	5.61	P<0.001	HS
3 <sup>rd</sup>	11.63	2.68	4.69	P<0.001	HS

*H.S: Highly significant*

$\bar{x}1 - SD$	$\bar{x}2 \pm SD$	S.E. Diff:	T. Value	P. Value	Significance
3.08 $\pm$ 0.58 (Kg)	2.05 $\pm$ 0.04 (kg)	1.03	6.00	P<0.001	HS

*H.S: Highly significant*

Comparison of the two means was statistically evaluated by student 't' test calculating the standard error of the difference<sup>14</sup>. This comparison is shown in Table-II.

## DISCUSSIONS

Zinc deficiency is common during pregnancy and result in poor outcome and increase incidence of fetomaternal

complications<sup>12,13</sup>. In present study significantly low levels of serum zinc were found in mothers giving birth to growth retarded babies. Hypozincemia induced in pregnant animals cause intrauterine growth retardation and other fetal Abnormalities<sup>14</sup>. The human studies regarding the relationship of birth weight to maternal serum zinc concentration had shown conflicting results. Some workers showed no association<sup>15</sup> while others showed a positive association between maternal serum zinc and birth weight of the babies<sup>16,17</sup>. The design and conditions of different studies were different. Maternal serum zinc concentration varies with the gestational age<sup>18</sup>. From women to women, there are considerable variations in the rate of decrease in plasma zinc during pregnancy due to difference in the rate of plasma expansion<sup>19</sup>. The results of Mameesh et al and Yasmin et al tally with the results of present study. The reason of similar results among these studies may be due to the fact that the mean gestational ages at the time of zinc determination were similar in all these studies.

Recent studies have reported SGA babies delivered by mothers having low serum zinc levels<sup>20</sup>. Zinc is required for DNA synthesis, protein synthesis and cell replication. This effect is due to zinc containing nucleoproteins involved in gene expression<sup>21</sup>.

Recently many eukaryotic DNA binding proteins are discovered which contain zinc fingers. These zinc fingers containing DNA binding proteins take part in the regulation of gene transcription<sup>22</sup>. Hence maternal zinc deficiency results in decrease activity of zinc dependent enzymes and DNA binding proteins involved in DNA replication and transcription. In developing fetus especially during the 3<sup>rd</sup> trimester there is rapid proliferation of the tissues. Zinc deprivation may affect all these processes and result in intrauterine growth retardation.

## CONCLUSION

Maternal hypozincemia which reflects low maternal zinc status may have definite association with the low birth weight of the babies.

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**If you wish to win;  
win hearts**

**Shuja Tahir**