

## **Original research: The Role of Zinc level of Maternal Blood on the Body Weight of the Newborns**

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### **Abstract**

Serum zinc levels in LBW (low birth weight) and AGA (suitable for gestational age) neonates were compared to their mothers' zinc levels. Between August 2019 and October 2020, a prospective analysis was performed at a pediatric hospital in Babylon, Iraq. The qualified LBW (pre-term and term IUGR) and term AGA safe neonates and their mothers were taken to estimate the Zinc level. Serum samples were obtained. Atomic absorption spectrophotometer was measured for serum zinc. Newborn moms with any medical problem were removed from the sample for any drugs with anemia ( $Hb < 10$  gm/dl). Neonates were also omitted from any perinatal insult. The Results were shown that the case group consisted of 92 newborns with birth weights less than 2.5 kilograms, while the control group consisted of 108 term AGA newborns with birth weights greater than 2.5 kilograms. In contrast to term AGA newborns ( $93.71 \pm 19.22$  g/dl), the mean serum zinc level in LBW neonates ( $82.26 \pm 15.72$  g/dl) was slightly lower (p-value 0.05). Similarly, mothers of LBW babies had lower zinc levels ( $65.03 \pm 15.94$  g/dl) than mothers of term AGA newborns ( $85.60 \pm 17.49$  g/dl) at the p-value 0.05. We can conclude LBW neonates have relatively have Zinc deficiency, which is attributed to zinc deficiency in their mothers.

**Key words:** Low body weight, zinc deficiency, Maternal Blood.

### **Introduction**

Deficiency of zinc is very common during pregnant women. Zinc must be maintained Natural multi-enzyme structure and function, including those involved in fetal development. During embryogenesis and embryo formation, zinc plays a critical role (1) Zinc impairment raises risk of baby born before the age of preterm, low birth weight. It is one of the most famous micronutrient deficiencies, and it is most commonly seen in pregnant women in countries with poor maternal nutrition (2). Zinc is a vital trace element whose importance in human health is becoming increasingly apparent. Any live born baby with a body weight of less than 2.5 kg, regardless of gestational age, is known as low birth weight. Later in life, children have a greater risk of death and complications if they are born with low birth weight. It is understood to be a critical and significant risk factor for infant mortality. Long-term impairment and a number of physical morbidities are more common in infants with LBW (3). Fetal development would be influenced by both genetic growth potential and growing support. Normal body weight and healthy babies

are the product of stable mothers during pregnancy who do not suffer from food deficiencies or chronic disorders in their early years of life, in comparison to mothers who have such issues (4,5). Many human and animal studies have discovered a correlation between low serum zinc levels and low birth weight newborns (6,7). Zinc is an essential component of the living system. It has been discovered that it has an impact on a variety of processes since its discovery as an important micronutrient (8, 9). reduced fetal zinc transport and fetal zinc supply are both expected when the mother is low in zinc. Zinc deficiency in the mother has been linked to poor fetal growth in both animals and humans. According to a recent study, zinc deficiency causes about 0.5 million maternal and infant deaths per year, mainly in developing countries(10).

## Materials and Methods

After receiving approval from the institutional ethics committee, this prospective study was performed in an Iraqi pediatric hospital in Babylon between August 2019 and October 2020. The new mothers as well as legal guardians agreed to it in writing. The monitors were terms AGA newborn “birth weight greater than 2.5 kg” and their mothers, while the exceptions were stable LBW newborns and their mothers. Newborns with any medical problem, who were extremely malnourished, were removed, as well as those who were suffering from eclampsia, diabetes mellitus, hypertension, parathyroid, and thyroid diseases, were also, were excluded from the study. The blood samples (2 ml) were taken from a peripheral vein within 24 hours of birth, and kept in numbered containers and sterile to prevent contamination. The serum was made in a separate polyethylene container and held at -20°C after centrifugation for 20 minutes. The amount of zinc in the blood was measured using an atomic absorption spectrometer.

## Results and discussion

Student T-test was used to assess the statistical effects. Hypotheses were checked at the significance level  $\alpha = 0.05$ , that is, the discrepancies between the samples were considered important at  $p \leq 0.05$ .

Table -1- Demographic profile of study population

	Low body weight N= 92	Acceptable gestational age N=108	Total N=200
Male	50 (54.34%)	68 (62.96%)	118 (59%)
Female	42 (45.65%)	40 (37.03%)	82 (41%)
Total	92	108	200
20-25	40 (43.47%)	52 (48.14%)	92 (46%)
26-30	32 (43.78%)	41 (37.96%)	73 (36.5%)
31-35	13 (14.13%)	10 (9.25%)	23 (11.5%)
≥ 36	7 (7.60%)	5 (4.62%)	12 (6%)

Table- 2- The levels of Zinc in the blood of the study participants

Serum zinc (in $\mu\text{g/dl}$ )	Neonates		Mothers	
	Low body weight N=92	Acceptable gestational age N=108	Low body weight N=92	Acceptable gestational age N=108
Mean $\pm$ S.D	82.26 $\pm$ 15.72	93.71 $\pm$ 19.22	65.03 $\pm$ 15.94	85.60 $\pm$ 17.49
Range	65-136	52- 155	42 114	48 - 142
95% cl	77.51- 87.30	89.23 – 99.00	62.3 – 72.64	79.23 – 89.61
P.Value	0.05		0.05	

Deficiency of zinc has been linked to a number of fetal-maternal complications such as spontaneous abortion, congenital malformation, and preterm delivery(11-13). In this research, found that LBW babies had lower serum zinc levels than term AGA babies. This findings reveal that 92% of low birth weight babies have low zinc levels, while the majority of normal weight babies weighed over 2500 grams at birth had adequate levels (P 0.05). Serum zinc levels in LBW neonates were substantially lower than in normal neonates, according to one report. On the whole, lower zinc levels were found in the mothers of low birth weight infants with preterm LBW babies. Zinc deficiency in mothers has been related to zinc deficiency in LBW babies(14,15). Zinc levels in the serum of SGA neonates are lower than those of adequate weight neonates, according to Gupta. Preterm SGA newborns have been shown to have a higher rate of zinc deficiency. SGA newborn babies are more likely to have a zinc deficiency than AGA newborn babies. Premature and SGA infants have higher levels of zinc deficiency, too .As a result, Taking zinc supplements while pregnant is a safe idea , Preterm and SGA infants, in particular, has been shown to benefit both mother and child(16). Zinc supplemented neonates had a higher birth weight (P = 0.008)(17) .In this study, Newborn LBW children and their mothers have significantly lower zinc levels than Zinc deficiency was shown to be common in these LBW babies and their mothers in another study. Zinc deficiency is common in term babies and their mothers, and it's been linked to LBW neonatal/maternal zinc deficiency (18). Zinc deficiency also increases the risk of developmental problems by the mother's blood limitations zinc transfer to the fetus . Many proteins depend on it for structural and enzymatic functions. Zinc deficiency can cause teratogenic effects in the fetus due to changes in protein activity (19).

### Conclusion:

In this research, we discovered that the prevalence of zinc deficiency in preterm neonates is greater than for full-term newborns. In addition, LBW newborn mothers have lower serum zinc levels that have been positively associated with lower birth weight for maternal serum zinc supplementation of low in the treatment of AGA newborns.

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