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Study of cord blood zinc level in term AGA & term SGA newborns

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Abstract
Introduction: In India, the incidence of low birth weight babies is around 28%. About two third of the low birth weight babies are term-small for gestational age babies and one third are preterm babies. Low birth weight babies might have low nutritional reserve, especially the micronutrients, out of which zinc is an important one. This study is done to find if there is any association between cord blood zinc level and birth weight in term SGA and AGA babies.
Materials & Methods: This is a Prospective cross sectional study which was done in 100 newborns, in which 50 were term SGA and 50 were term AGA newborns. The period of the study was one year. Our study included term SGA as cases and term AGA as controls. After obtaining informed consent from the parents, cord blood sample for serum zinc was collected from term-SGA and term-AGA babies for serum zinc level estimation and sent to our central laboratory.
Result: The mean cord blood zinc level in AGA was 97.15 and 90.89 in SGA and there is statistical significance in the cord blood zinc level between AGA and SGA groups.
Conclusion: The study concludes that there is a significant correlation in the cord blood zinc level between the term AGA and term SGA neonates.

Keywords: cord blood zinc, AGA, SGA, new borns

Introduction
Birth weight is the vital factor of perinatal and neonatal outcome. A new born baby weighing less than 2.5 kg at birth irrespective of the gestational age is termed as a low birth weight baby. Low birth weight babies can be term SGA or preterm babies. In India, the incidence of low birth weight babies is around 28% [1]. About two third of the low birth weight babies are term-small for gestational age babies and one third is preterm babies. Most of the low birth weight babies weigh between '2kg to 2.49kg' [2]. These low birth weight neonates are at an increased risk of morbidity and mortality. Low birth weight babies might have low nutritional reserve, especially the micronutrients, out of which zinc is an important one. Zinc is an important component of cell function and architecture. It has an important role in gene transcription. Zinc plays the main role in protein-DNA or protein –RNA interactions [3]. It is required for process of growth. This study is done to find if there is any association between cord blood zinc level and birth weight in term SGA and AGA babies.

Materials & Methods
This is a Prospective cross sectional study which was done in 100 newborns, in which 50 were term SGA and 50 were term AGA newborns. The period of the study was one year. Our study included term SGA as cases and term AGA as controls. The exclusion criteria of our study was Neonates born to multiple gestation, Neonates with features of chromosomal abnormalities, intrauterine infection or with congenital malformations and Intra uterine growth restriction, Neonates of mothers with severe malnutrition (body mass index<18.5), severe anemia, diabetes mellitus, gestational diabetes, pregnancy induced hypertension, chronic illness, teratogenic drugs, placental abnormalities and neonates requiring admission to Neonatal intensive care unit. Detailed maternal history was taken and thorough physical examination of the neonate was done. Birth weight was plotted against gestational age in Lubchenco growth charts to assess if they are small for gestational age or appropriate for gestational age. After obtaining informed consent from the parents, cord blood sample for serum zinc was collected from term-SGA and term-AGA babies for serum zinc level estimation and sent to our central laboratory. Serum zinc levels were estimated by end point nitro PAPS dye binding colorimetric method. The principle of the method is, nitro-PAPS reacts with zinc in alkaline solution to form a purple coloured complex, the absorbance of

which is measured at 575nm (interference from copper and iron are virtually eliminated by ph and chelating additives). Reference value of serum zinc is 70-150 micrograms/ decilitre. The linearity can go upto 1000micrograms/ decilitre. The sensitivity of detection is 5micrograms/ decilitre. The data collected was analyzed using SPSS 21 version. Qualitative data like maternal age, parity, mode of delivery, sex of the baby were analysed by Pearson chi square.

Results

A prospective cross sectional study was done on 50 term SGA neonates and 50 term AGA neonates for a period of 1 year. The male babies were 52% and 50% in AGA and SGA newborns. The female babies were 48% and 50% in AGA and SGA newborns (table 1) which shows there is no statistical significance in the sex of the baby between AGA and SGA groups. The mean cord blood zinc level in AGA was 97.15 and 90.89 in SGA and there is statistical significance in the cord blood zinc level between AGA and SGA groups (Table 2).

Table 1: Sex of the baby AGA Vs SGA

	AGA	SGA	Total
Male	26 (52%)	25 (50%)	51
Female	24 (48%)	25 (50%)	49
Total	50 (100%)	50 (100%)	100

P Value = 0.84

Table 2: Cord Blood Zinc- Term AGA Vs Term SGA

	AGA	SGA
Mean	97.15	90.89
SD	8.26	17.62
Minimum	85.3	57.9
Maximum	140.1	140.4

P = 0.025

Discussion

Infant mortality rate of India is 41 per 1000 live births according to NFHS 4 (2015-2016) which is mainly contributed by the high neonatal mortality rate of 32 per 1000 live births. India contributes around 25% of world's neonatal deaths [4]. One fourth of the world's total death occurs in India. Long term effects of birth weight affects not only the perinatal period but also childhood and adulthood [5]. While lot of importance is being given to protein and energy deficits, micronutrients other than iron are often forgotten. It has been argued that micronutrient deficiency during pregnancy can lead to LBW [6]. In particular zinc deficiency is associated with abnormal conditions during pregnancy including congenital malformation (anencephaly) and abortion. Among several micronutrients, iron stands first whose importance have been extensively studied and practised. Next lies zinc whose importance is slowly brought into light by several research trials and studies.

In our study, the mean cord blood zinc level in term AGA babies was 97.15 micrograms/decilitre and the mean cord blood zinc level in term SGA babies was 90.89 micrograms/decilitre. There was statistical significant difference in zinc level between both the groups. In a study conducted by Abass *et al*. [7]. The mean cord zinc level was 92.2 mcg/dl in term-AGA babies and 87.1mcg/dl in term SGA babies. Thus in our study the mean zinc level in both term SGA and term AGA babies were higher than this study. Similarly in a study by Elizabeth *et al*. [8], the mean zinc level was 70.25±24.59 mcg/dl in term AGA neontaes and 78.09±18.39 mcg/dl in SGA babies which showed that the mean zinc level of our study were higher than their study. However mean zinc value in AGA babies in our study was lower when compared to study done by Ofakunrin *et al*. [9] and Awadallah *et al*. [10] with the zinc level of 114±23 mcg/dl.

Conclusion

The study concludes that there is a significant correlation in the cord blood zinc level between the term AGA and term SGA neonates. Zinc defiency can also be one of the reasons for low birth weight babies and providing zinc supplementation to the pregnant mothers can be recommended.

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