Small babies according to the gestational week: Is it necessary to review the definition of SGA?

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Introduction:

The babies which are classified as small for gestational age (SGA) or large for gestational age (LGA) according to their gestational week should be monitored after birth due to excess postnatal energy requirement. Carnitine is an essential cofactor for fatty acid (FA) metabolism which has a role in energy balance. The aim of this research is the evaluation of the relationship between postnatal carnitine level and intrauterine growth.

Methods:

For this research the records of 4481 babies who were born at Acıbadem University Atakent Hospital between 2015-2019 are evaluated. The babies who have one of following criteria are excluded from the research:

- GW (gestation week) under 37,
- hospitalization immediately after birth
- multiple pregnancies
- birth anomalies

The profile results of carnitine/acyl carnitine that are taken before discharge and are analyzed by tandem mass spectrometry are recorded.

The results indicate that in total there were 11 babies who had anomalies. 6 of these babies' propionyl carnitine/free carnitine ratio is high. While for the remaining 5, one for each baby following abnormalities were detected: the high ratio of propionyl carnitine, C6 carnitine, C5OH carnitine and C18:1 carnitine and also decreased ratio of free carnitine. During the follow up of these 11 babies, no permanent metabolic disorders were found. These babies were also excluded from the research. 3520 babies which are included in the research are divided into three groups (SGA (n=80), AGA (n=3061) and LGA (n=379)) according to their gestational week and birth weights (Fenton, 2013).

Findings:

No differences were detected between groups according to GW and gender ($p>0,05$). In SGA, AGA and LGA babies, free carnitine levels were (average+-SD) 29,9+-12,05; 22,6+-8,32 and 23,1 +- 7,72 mol/L respectively. In the SGA group, free carnitine levels were found to be notably high ($p<0,001$). A negative correlation was determined between birth weight standard deviation score and free carnitine ($r=-0,179$; $p=0,01$).

Conclusion:

In conclusion, our study revealed no significant differences between groups concerning gestational week and gender ($p > 0.05$). However, when comparing free carnitine levels among Small for Gestational Age (SGA), Appropriate for Gestational Age (AGA), and Large for Gestational Age (LGA) infants, distinct patterns emerged. The mean free carnitine concentrations were 29.9 ± 12.05 mol/L in SGA infants, 22.6 ± 8.32 mol/L in AGA infants, and 23.1 ± 7.72 mol/L in LGA infants. Notably, the SGA group exhibited significantly higher free carnitine levels ($p < 0.001$). Furthermore, our findings demonstrated a negative correlation between birth weight standard deviation score and free carnitine levels ($r = -0.179$; $p = 0.01$). These observations suggest a potential association between free carnitine levels and fetal growth, particularly in the context of small-for-gestational-age infants. Further research is warranted to elucidate the underlying mechanisms and clinical implications of these correlations.

Discussion: *(this section is optional and not mandatory for all abstracts.)*

The maternal-fetal carnitine passage is important for the neonatal energy homeostasis due to the fact that the fetus isn't able to synthesize carnitine. In this research it is indicated that the free carnitine level is higher in the SGA babies who were born without any fatty acid oxidation disorder. It is thought that in the babies with intrauterine energy disorders, the placental carnitine passage shows a compensatory increase.

References:

Fenton, T. R., & Kim, J. H. (2013). A systematic review and meta-analysis to revise the Fenton growth chart for preterm infants. BMC Pediatrics, 13(1), 59. https://doi.org/10.1186/1471-2431-13-59

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