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Intrauterine growth restriction: Causes and consequences

Узроци и последице интраутериног умањеног раста

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Intrauterine growth restriction: Causes and consequences

Узроци и последице интраутериног умањеног раста

The prenatal period of growth and development represents a very delicate phase of life exposed to a numerous of probably negative effects. One of them is an intrauterine growth restriction (IUGR), also known as fetal growth restriction, i.e. birth with body weight below 10th percentile in relation to the corresponding gestational age and sex [1]. The importance of adequate prenatal nutrition and according to this optimal early development program was first pointed out by the English epidemiologist David Barker, less than three decades ago [2]. Namely, he noted the high association of IUGR with the occurrence of abdominal (visceral) obesity and metabolic syndrome in adulthood, i. e. insulin resistance, type II diabetes mellitus, and atherosclerosis and its consequences. Subsequently, only the confirmation of the "Barker hypothesis" in the narrow sense was followed by numerous evidence regarding the extremely high importance of early development programming and other aspects of human health [3-7]. The consequences of IUGR, as well as numerous other negative phenomena, are based on specific epigenetic mechanisms, such as DNA methylation, histone modification, and others, which by modifying gene expression result in a less functionally valuable and vulnerable phenotype [3, 6].

According to literature data, IUGR globally occurs with a prevalence of 3-10% [8]. The causes of this pathological phenomenon are numerous, such as placental abruption or abnormal insertion, maternal undernutrition, cigarette smoking, arterial hypertension, renal disease, anti-phospholipid syndrome, vitamin D deficiency and drug abuse, then fetal chromosomal/structural anomalies or chronic intrauterine infection, and others [9-13].

In addition to the negative effects that occur in the adult age, IUGR complicates more frequent early postnatally problems such as asphyxia, hypothermia, hypoglycaemia, polycythaemia, and many more when compared to their corresponding for gestational age counterpart [5, 6, 8, 14]. Also, children who are born small for gestational age (SGA) have a predisposition to accumulation of fat mass, especially intra-abdominal [8]. Therefore, rapid weight gain during infancy of these children represents an additional risk factor for the occurrence of metabolic syndrome and its negative consequences in adult age [8].

The above facts point to the importance of IUGR as a worldwide health problem [8]. Although there are conditions where the IUGR is an inevitable phenomenon, in many cases it can be prevented [6]. Although due to catch-up growth, most of the infants born of SGA at the age of 2 years reach their peers in longitudinal growth, about 10% of them continue to fall below the 3rd percentile of height into adulthood [8]. In order to eliminate additional risk factors for the subsequent occurrence of metabolic syndrome, it is important to point out that the nutrition of these infants must be focused on the prevention of obesity according to which they are strongly predisposed [6, 8].

The papers published in this issue of the Serbian Archives of Medicine deal with exclusively latest knowledge and make a significant contribution to clarifying these disorders, their early detection and treatment [15-19].

REFERENCES:

1. American College of Obstetricians and Gynecologists. ACOG Practice bulletin no. 134: fetal growth restriction. *Obstet Gynecol.* 2013; 121(5): 1122–33.
2. Barker DJ. The fetal and infant origins of adult disease. *BMJ.* 1990; 301(6761): 1111.
3. Fall CH. Fetal programming and the risk of noncommunicable disease. *Indian J Pediatr.* 2013; 80 Suppl 1: S13–20.
4. Nardoza LM, Caetano AC, Zamarian AC, Mazzola JB, Silva CP, Marçal VM, et al. Fetal growth restriction: current knowledge. *Arch Gynecol Obstet.* 2017; 295(5): 1061–77.
5. Sharma D, Farahbakhsh N, Shastri S, Sharma P. Intrauterine growth restriction - part 2. *J Matern Fetal Neonatal Med.* 2016; 29(24): 4037–48.
6. Sharma D, Shastri S, Sharma P. Intrauterine growth restriction: Antenatal and postnatal aspects. *Clin Med Insights Pediatr.* 2016; 10: 67–83.
7. Vayssière C, Sentilhes L, Ego A, Bernard C, Cambourieu D, Flamant C, et al. Fetal growth restriction and intra-uterine growth restriction: guidelines for clinical practice from the French College of Gynaecologists and Obstetricians. *Eur J Obstet Gynecol Reprod Biol.* 2015; 193:10–8.
8. Cho WK, Suh BK. Catch-up growth and catch-up fat in children born small for gestational age. *Korean J Pediatr.* 2016; 59(1): 1–7.
9. Das JK, Salam RA, Imdad A, Bhutta ZA. Infant and Young Child Growth. Chapter 12. In: Black RE, Laxminarayan R, Temmerman M, Walker, editors. *Reproductive, Maternal, Newborn, and Child Health: Disease Control Priorities. 3rd Edition (Volume 2).* Washington (DC): The International Bank for Reconstruction and Development / The World Bank; [Accessed: 2016 Apr.] Available from: <https://openknowledge.worldbank.org/bitstream/handle/10986/23833/9781464803482.pdf?sequence>
10. Sheridan C. Intrauterine growth restriction—diagnosis and management. *Aust Fam Physician.* 2005; 34(9): 717–23.
11. McCowan L, Horgan RP. Risk factors for small for gestational age infants. *Best Pract Res Clin Obstet Gynaecol.* 2009; 23(6): 779–93.
12. Bodnar LM, Catov JM, Zmuda JM, Cooper ME, Parrott MS, Roberts JM, et al. Maternal serum 25-hydroxyvitamin D concentrations are associated with small-for-gestational age births in white women. *J Nutr.* 2010; 140(5): 999–1006.
13. Sharma D, Sharma P, Shastri S. Genetic, metabolic and endocrine aspect of intrauterine growth restriction: an update. *J Matern Fetal Neonatal Med.* 2016; 26: 1–13.
14. Sharma D, Farahbakhsh N, Shastri S, Sharma P. Intrauterine growth restriction - part 2. *J Matern Fetal Neonatal Med.* 2016; 29(24): 4037–48.
15. Marinković V, Božinović-Prekajski N, Ranković-Janevski M, Jelić Z, Hajdarpašić V, Radlović N. Effect of Early Introduction of Minimal Enteral Feeding on Growth and Rate of Achieving Optimal Nutritive Intake in Very Low Birthweight Preterm Infants. *Srp Arh Celok Lek.* 2017; OnLine-First: February 21, 2107; (00): 24–24. [DOI: <https://doi.org/10.2298/SARH160205024M>]
16. Todorović D, Stojanović V, Doronjski A. The Serum Chloride and Sodium Concentration as a Predictor of Acute Kidney Injury in Premature Newborns.. *Srp Arh Celok Lek.* 2017; OnLine-First: March 28, 2107; (00): 90–90. [DOI: <https://doi.org/10.2298/SARH161124090T>]
17. Xu A, Yang P, Cui W, Li L, Yu H, Wang H, et al. Causes and short-term outcomes of preterm infants. *Srp Arh Celok Lek.* 2017; OnLine-First: May 9, 2107; (00): 108–108. [DOI: <https://doi.org/10.2298/SARH160818108X>]
18. Pejčić L, Mileusnić-Milenović R, Ratković-Janković M, Nikolić I. Spontaneous closure of muscular ventricular septal defects. *Srp Arh Celok Lek.* 2017; OnLine-First: March 28, 2107; (00): 88–88. [DOI: <https://doi.org/10.2298/SARH170301088P>]
19. Pejčić L, Mileusnić-Milenović R, Ratković-Janković M. Echogenic cardiac mass in the left atrium and associated supraventricular tachycardia in a neonate. *Srp Arh Celok Lek.* 2017; OnLine-First: March 17, 2107; (00): 73–73. [DOI: <https://doi.org/10.2298/SARH170220073P>]