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Docosahexaenoic and eicosapentaenoic acid supplementation could attenuate negative effects of maternal metabolic syndrome on male and female offspring lipid metabolism

Abstract: Docosahexaenoic acid and eicosapentaenoic acid could influence the development of metabolic syndrome caused by the Western diet. Therefore, we wanted to investigate whether DHA and EPA could prevent disorders of lipid metabolism in the offspring caused by maternal metabolic syndrome. A rat model of maternal metabolic syndrome was created in which a high-fructose diet (15% fructose in drinking water for six months) was used. The females in the control group received normal water. The females with metabolic syndrome were further divided into the HF group, which received only fructose in the drinking water, and the DHA/EPA-HF group, which received fructose in the water and increased amounts of DHA and EPA in the diet (2.5% fish oil in the diet). The metabolic syndrome of the mothers altered the liver fatty acid profile of the offspring, with the most significant changes in delta-9 desaturation. Supplementation with DHA and EPA partially normalised the fatty acid composition in the female offspring: 18:1n9, 22:4n6 and total monounsaturated fatty acid levels decreased to control levels and 18:2n6 levels increased to control levels. A similar pattern was also observed in the male offspring, but without a complete return to control levels. Increased delta-9 desaturation was also confirmed by quantitative PCR, and it was observed that the addition of DHA/EPA significantly decreased expression in female and male offspring. In contrast, betacellulin levels were back to normal only in the female offspring. Liver levels of DHA and EPA were significantly increased in both male and female offspring. The changes observed in this study suggest that DHA/EPA supplementation may modulate the effects of maternal programming on lipid metabolism disorders in the offspring.

Keywords: maternal programming, metabolic syndrome, offspring, lipid metabolism, betacellulin

Biography: Associate Professor Kristina Starčević has been working in the field of chemistry and biochemistry at the Faculty of Veterinary Medicine Zagreb, Croatia, for 13 years. Her main scientific interest is lipid metabolism in metabolic diseases and the influence of maternal nutrition on lipid metabolism disorders in offspring.

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