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Effects of fish oil supplementation against formaldehyde-induced congenital skeletal anomalies in Wistar rats

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Abstract

It has been shown that formaldehyde (FA) as a common organic compound causes developmental anomalies and fetal defects. Fish oil is recommended for the normal growth and development of the fetus due to its fatty acid docosahexaenoic acid. The aim of this study was to investigate the potential of FO in protecting fetal growth and preventing skeletal anomalies caused by treatment of pregnant rats with FA. For this thirty pregnant Wistar rats were randomly categorized into five groups of control, sham (Normal saline; Orally and intraperitoneally), fish oil (0.5 mg/kg/bw; Orally), formaldehyde (10 mg/kg/bw; intraperitoneally), formaldehyde + fish oil. The treatment period was from day 0 to 20 of pregnancy. On the 20th day of gestation, the animals underwent anesthesia, and followed by a laparotomy to determine the weight and crown-rump length (CRL) of the fetuses. Skeletal stereomicroscopic assessments were conducted on the fetuses using the alizarin red / alcian blue staining method. Additionally, the expression of Runx2 and BMP4 was assessed through qPCR. The findings indicated that exposure to formaldehyde (FA) during prenatal development significantly reduced fetal weight and CRL, as well as the expression of Runx2 and BMP4 genes. Furthermore, FA heightened the occurrence of congenital skeletal abnormalities, including cleft palate, spina bifida, and non-ossification of fetal bones. Nevertheless, co-administration of fish oil (FO) with FA injection in pregnant rats improved fetal bone growth and mitigated skeletal anomalies. Fish oil demonstrated the potential to alleviate the teratogenic effects of exposure to formaldehyde by enhancing the expression of genes related to osteogenesis.

Key words: Congenital skeletal anomalies, Formaldehyde, Fish oil, Fetus, Rat

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