


RESEARCH ARTICLE

Protective effect of quercetin on fetal development and congenital skeletal anomalies against exposure of pregnant Wistar rats to crude oil vapor

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Abstract

Background: Epidemiological evidence indicates a relationship between maternal exposure to crude oil vapors (COV) during pregnancy and adverse pregnancy outcomes. Quercetin (QUE) is a plant flavonoid with purported antioxidant and anti-inflammatory effects, which has been shown to prevent birth defects. This study was aimed to investigate the protective role of QUE on fetal development and congenital skeletal anomalies caused by exposure of pregnant rats to COV.

Methods: Twenty-four pregnant Wistar rats were randomly categorized into four groups of control, COV, COV + QUE, and QUE (50 mg/kg). The inhalation method was used to expose pregnant rats to COV from day 0 to 20 of pregnancy, and QUE was administered orally during this period. On day 20 of gestation, the animals were anesthetized and a laparotomy was performed, and then the weight and crown rump length (CRL) of the fetuses were determined. Skeletal stereomicroscopic evaluations of fetuses were performed using Alcian blue/Alizarin red staining method, and the expression of osteogenesis-related genes (Runx2 and BMP-4) was evaluated using qPCR.

Results: This study showed that prenatal exposure to COV significantly reduced fetal weight and CRL, and expression of Runx2 and BMP-4 genes. Moreover, COV significantly increased the incidence of congenital skeletal anomalies such as cleft palate, spina bifida and non-ossification of the fetal bones. However, administration of QUE with exposure to COV improved fetal bone development and reduced congenital skeletal anomalies.

Conclusion: QUE can ameliorate the teratogenic effects of prenatal exposure to COV by increasing the expression of osteogenesis-related genes.

KEYWORDS

congenital skeletal anomalies, crude oil, developmental toxicity, fetus, quercetin

1 | INTRODUCTION

Crude oil vapors (COV) refer to the gaseous forms of hydrocarbons and other volatile compounds that are

released from crude oil. Crude oil exposed to certain conditions such as high temperature or contact with air can evaporate and produce vapors. These vapors consist of a complex mixture of organic compounds, including