TERATOGENIC AND GENOTOXIC EFFECTS OF PERFLUORO-ALKYL ACIDS ON EMBRYONIC AND NEONATE MICE

Mahmoud A.A. Moussa, Doha Y.A. Ahmed, Manal A. Abdel Mohsen

Abstract:

1. Introduction Perfluorinated compounds (PFCs) have emerged as a new class of global environmental pollutants. Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) comprises a class of environmentally persistent chemicals have industrial applications.

2. Animals, Materials and Methods In this study 160 pregnant dams were divided into two equal groups, PFOS and PFOA groups. Each of them was subdivided into two groups, treated group of 60 dams and control group of 20 dams. Treated group was re-subdivided into three equal groups. Dams in PFOS group were treated with concentrations of 1, 10 and 20 mg/kg b.w., while dams in PFOA group were treated with concentrations of 1, 5 and 10 mg/kg b.w. Ten dams of each group were treated from gestation day 0 (GD0) till gestation day 17 (GD17). At GD18 dams were euthanized under anesthesia. The gravid uterus were removed and examined for prenatal evaluation of fetuses. The liver of the fetuses were dissected and used immediately for comet assay. Individual live fetuses were prepared for teratological evaluation. While the other ten dams were treated from GD0 till GD18 and then allowed to give birth. The neonates of 5 dams were monitored for 4 days for postnatal survival. Neonates of the remaining 5 dams were kept in the fixative till histopathological examination. Control group were received an equivalent volume of deionized water.

3. Results PFOS caused DNA damage in fetal liver at 10 and 20 mg/kg. It reduces the number of live fetuses and increased fetal resorption. PFOS reduces fetal body weight in a dose dependent manner, while PFOA reduces the fetal body weight at dose of 5 and 10 mg/kg. Gross examination of the fetuses at GD18 showed presence of abnormal swelling in the back of the neck in fetuses of 20 mg/kg group. Teratological evaluation revealed the presence of several skeletal abnormalities in PFOS and few abnormalities in PFOA groups. Neonates borne with reduction in body weight and showed the presence of the bilateral swelling and accompanied by neonatal death. Histopathological examination of both, bilateral swelling and lung revealed dilatation of the blood vessels between cranial bone area and brain, and slight to sever atelectasis, respectively.

4. Conclusions The study concluded that both PFOS and PFOA were toxic to neonates with different degrees and PFOS recorded the most toxic one and the embryo may die from the lesion formed over the brain.

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