

LEAD EXPOSURE DURING GESTATION AND LACTATION TRIGGERS BIOCHEMICAL DAMAGE IN MULTIPLE CENTRAL NERVOUS SYSTEM REGIONS OF RAT OFFSPRING

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INTRODUCTION: Lead (Pb) is a pervasive environmental pollutant and a major concern in occupational toxicology. Exposure to Pb from polluted water, food, paint, and industrial residues, particularly in developing organisms. During critical windows of neurodevelopment, such as gestation and lactation, Pb exposure can result in profound and lasting alterations, with potential repercussions in adulthood. **OBJECTIVES:** This study aimed to investigate the effects of Pb exposure during neurodevelopment, specifically throughout gestation and lactation, on oxidative biochemistry in central nervous system (CNS) regions associated with motor and cognitive functions, including the motor cortex, hippocampus, cerebellum, and spinal cord. **MATERIALS AND METHODS:** Pregnant Wistar rats were randomly divided into two groups: Control (n=3) and Pb-exposed (n=3). The Pb-exposed group received cookies contaminated with lead acetate (50 mg/kg/day), while the control group received identical cookies without contaminants. Exposure began upon pregnancy confirmation and continued until weaning. After birth, eight pups per dam (n=48) were monitored until postnatal day 21, when euthanasia was performed. Blood and CNS tissues were collected for Pb quantification and evaluation of oxidative stress markers: reduced glutathione (GSH), Trolox-equivalent antioxidant capacity (TEAC), lipid peroxidation (LPO), carbonylated proteins (CP), and nitrite levels. Statistical analysis was performed using Student's t-test ($p < 0.05$). **RESULTS:** Blood Pb concentrations were significantly higher in the exposed group compared to controls, confirming effective systemic absorption of the metal. TEAC levels were reduced in all CNS regions of Pb-exposed animals. GSH levels were significantly lower in the hippocampus and spinal cord. LPO and CP levels were elevated in all analyzed tissues, while nitrite concentrations increased in the hippocampus, cerebellum, and spinal cord. **CONCLUSIONS:** These findings indicate that perinatal Pb exposure induces widespread oxidative stress, compromising antioxidant systems and enhancing cellular damage in CNS regions essential for motor and cognitive functions. The data highlight the neurodevelopmental impact of Pb via oxidative biochemical disruption, underscoring the need for further research into long-term morphological and functional outcomes.

Keywords: Neurotoxicology; neurodevelopment; oxidative stress