EVALUATION OF DNA DAMAGE AND OXIDATIVE STRESS MARKERS IN RATS ACUTELY EXPOSED TO THE ANESTHETIC SEVOFLURANE

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INTRODUCTION: Sevoflurane is a volatile anesthetic widely used. Controversial findings in relation to DNA damage are reported in clinical studies; however, these studies are performed without separating the effects of anesthesia from those related to surgery. Considering that oxidative stress and genotoxicity are linked events, and that no study has evaluated different concentrations of sevoflurane in rats exposed only to sevoflurane in terms of oxidative stress markers, the current study shows originality. **OBJECTIVE:** This study evaluated whether exposure to sevoflurane in monitored rats is associated with DNA damage and oxidative stress markers in a systemic approach. **MATERIALS AND METHODS:** Twenty-four male Wistar rats were distributed into four groups, which included a negative control (unexposed) and three experimental groups, with exposure to low (3.5%), intermediate (4.8%) and high (6.0%) concentrations of sevoflurane. Anesthesia was administered for 2h, using a low-flow digital system, along with 40% oxygen, and vital signs were monitored. Immediately after exposure, the animals were euthanized, and blood samples were collected. DNA damage was assessed in leukocytes by the comet assay, whereas oxidative stress markers were analyzed in plasma. The lipid peroxidation was analyzed via TBARS while protein carbonyl content (PCC) was determined by the biuret method with DNPH for protein oxidative damage, and antioxidant capacity was measured by ferric reducing antioxidant power assay (FRAP); the three markers were analyzed using spectrophotometry. **RESULTS AND CONCLUSION:** The groups exposed to intermediate and high concentrations of sevoflurane showed an increase in FRAP levels ($p=0.01$) in comparison to the control group. There was a decrease in PCC levels in animals exposed to intermediate and high concentrations of sevoflurane when compared to the control group ($p=0.02$ and $p<0.001$, respectively). No significant differences among the groups were observed in terms of TBARS or DNA damage levels. Our findings suggest that higher concentrations of sevoflurane can induce antioxidant responses in animals, which contributed to the lack of genotoxicity observed. In addition, at the lowest concentration, which is similar to those used in clinical practice, sevoflurane was not genotoxic, which is a relevant factor to consider for safety of patients who undergo anesthesia with sevoflurane.

Keywords: anesthetic gas, DNA damage, oxidative stress

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