ABSTRACT

The present study has been undertaken to assess the in vivo cytogenotoxic, haemotoxic and histopathological effects of 4-nonylphenol after acute and sub chronic exposure. In both acute (24, 48, 72 and 96 hours) and sub chronic (30, 60 and 90 days) exposure treatment were given with 3 sublethal concentrations decided after LC$_{50}$ determination. Total five groups were studied two control groups (negative and positive) and 3 treated groups during acute as well as sub chronic exposure. After treatment, fish were assessed for micronucleus assay (blood from different sources and cells from different organs), comet assay (blood, gill, liver, kidney and spleen), PCE frequency, haematological parameters (Hb, PCV, RBC count, WBC count, MCV, MCHC, MCH and DLC) and histopathological alterations (liver, gill and kidney). The results of micronucleus assay revealed that gill and liver were the most affected organs. In acute exposure highest effect was seen at 72 hours of exposure followed by drop in value at 96 hours of exposure. While in sub chronic exposure time and dose dependent increase was found. The results of comet assay demonstrated that during acute exposure highest DNA damage was seen at 24 hours of exposure followed by drop in value and in later hours the values of all the parameters again increased. While in sub chronic exposure time and dose dependent increase was found. Gill was found to be most affected organ. Haematological parameters revealed that Hb, PCV, RBC count, MCH and MCV decreased in time and dose dependent manner, on the other hand WBC count and MCHC increased with time and dose in both acute and sub chronic exposures. So 4-NP was found to have immunotoxic effect. Number of histopathological alterations have been found in gill, liver and kidney after acute as well as sub chronic exposure. Congestion, coagulative necrosis, hyperplasia, fusion of secondary lamellae, atrophy and telangectasia were the main alterations observed in gill tissue. Liver exhibited necrosis and fatty changes. Hepatocytes were found to have variable size of fat vacuoles in both acute and sub chronic exposures. While kidney was found to have nephritis, pyknosis, necrosis, atrophy, vacuolar degenerations, severe hemorrhage and fibrosis as main histopathological alterations. 30 days recovery after sub chronic exposure revealed that all the parameters showed significant reduction in the values and in some cases value reached near the control level. Conclusively our results indicated that 4-NP has cytogenotoxic, haemotoxic effects and can also cause histopathological alterations in various tissues of fish. Combination of different biomarkers is found to be useful for toxicity testing in fish. Tissue specific response gives the better perspective about the overall health status of the organism.