ABSTRACT

In the present study toxic, genotoxic and cytotoxic potential of Basic Violet-1 [BV-1, CI: 42535: Trade name- Methyl Violet-2B] was evaluated in Labeo rohita, an important food fish of India. Fish were given 96h and 150 days exposures to BV-1, after each exposure fish were kept for 60 days to recover from the stress of the dye. Multi tissue analysis has been done with an aim of finding out the most sensitive tissue that can act as a biomarker for the stress of very low doses of cationic dyes. The 96h LC$_{50}$ at 0.45 mg/L dye shows that BV-1 is highly toxic to the test fish. On exposure to the dye, color of the body and gills of fish turned violet in a dose and duration dependent manner. The dye induced nucleo-cellular abnormalities, Comets and alterations in the ultramorphology and ultrastructure in various tissues. There was a dose and duration dependent increase in the abnormalities in various tissues of the exposed fish. During the recovery period a continuous increase was observed in the damaged cell frequency. Loosening of the scales and appearance of scaleless patches were observed on the body of exposed fish. SEM exhibited breakage and disorganization of lepidonts of the scales, gall like structures on the gill surface, reduction or complete loss of micro ridges, degeneration of gill lamellae and alteration in the ultra morphology of erythrocytes. TEM exhibited proliferation of SER, loss of ribosomes from the RER, destruction of RER, an increase in the frequency of lysosomes and macrophages, presence of lipid droplets, mitochondrial swelling and loss of mitochondrial cristae in the dye exposed fish. Loss of brush borders lining the tubules, chromatin condensation, nuclear degeneration and vacuolation, presence of myelin figures in the tubular epithelium were also observed to increase in a dose and duration dependent manner during the exposure as well as the recovery period. Out of all the tissues gill has been observed to be most sensitive to the stress of the present dye. The results clearly show that BV-1 is mutagenic, carcinogenic as well as cytotoxic in nature and this effect becomes prominent even at 0.0225 mg/L dye with the passage of time. This dye has been observed to show prolonged effects as the fish could not recover even 60 days after the exposure. Results clearly show that genotoxicity assays and electron microscopic studies in more than one tissue will provide us early indicators of the stress of very minute doses of cationic dyes like BV-1.