**Assessment of protective potential of Nigella sativa oil against carbendazim- and/or mancozeb-induced hematotoxicity, hepatotoxicity, and genotoxicity**

Nigella sativa oil (NSO) possesses antioxidant activity. However, its protective role against the hazards of fungicides has been poorly studied. Therefore, the present work aimed at determining the ameliorative potential of NSO against hepatotoxicity induced by carbendazim (CBZ) and/or mancozeb (MNZ) in female rats. In the present study, about 120 adult female Sprague-Dawley rats were randomly divided into eight equal groups. One group of animals was kept as a negative control (Gp. 1); groups 2, 3 and 4 orally received CBZ (200 mg/kg body wt) and/or MNZ (300 mg/kg body wt) daily for 2 weeks (positive groups). In order to assess the hepatoprotective potential of NSO, in comparison with NSO-treated rats (Gp. 5), groups 6, 7 and 8 were CBZ- and/or MNZ-exposed groups pre-treated orally with NSO (2 ml/kg body wt) daily for 2 weeks (prophylactic groups). All groups were kept further for 15 days without medications to observe the withdrawal effect. At the end of exposure and withdrawal periods, the body weight of all experimental rats was recorded and blood samples were collected for hematological, clinico-biochemical, and micronucleus assays. The animals were then sacrificed, and the liver and bone marrow were harvested for oxidative stress bioassay, chromosomal aberrations, DNA fragmentation, and histopathological examinations. The results suggested that pre-treatment with NSO remarkably diminished CBZ- and MNZ-induced macrocytic hypochromic anemia, leukocytosis, lymphocytosis, eosinophilia, and neutropenia. Besides, it also minimized the elevated liver enzymes, lipid peroxidation, micronucleus incidence, DNA damage, and chromosomal aberration frequency. Conversely, NSO significantly stimulated the CBZ- and/or MNZ-induced antioxidant system suppression. The NSO also normalized the hepatic structural architecture. As far as withdrawal effect is concerned, there was almost disappearance of the bad effects of these fungicides and the values were close to the normal range especially with the use of NSO. Ultimately, the results revealed that N. sativa oil is an effective hepatoprotective agent due to its genoprotective and free radical scavenging activities.