Abstract

The increasing application of gamma radiation for medical and industrial purposes augments the incidents of hazardous impacts on human beings. Therefore, it is necessary to find a potent radioprotector. Several synthetic radioprotectors like lipoic acid, cysteine, WR-2721, amifostine are available but their high systemic toxicity at optimum protective dose limited their practical application. These consequences further emphasize the search for less or nontoxic compounds from biological origin. Therefore this study was aimed to evaluate the radioprotective effect of *Moringa oleifera* leaf extract and its active components. Aqueous ethanolic extract of *Moringa oleifera* leaf (MoLE) was prepared. Swiss albino male mice were treated with MoLE (350 mg/kg body wt) for fifteen consecutive days before 5 Gy $^{60}$Co-gamma irradiation. Protective effects of MoLE were determined against radiation mediated molecular and physiological alterations. Quercetin and epicatechin were identified in MoLE by HPLC study. Mice were treated with quercetin and epicatechin at the dose of 100 mg/kg body wt for three consecutive days before 5 Gy gamma irradiation. Radioprotective effects of these two phytocompounds at cellular, molecular and physiological level were studied using biochemical analyses, flow cytometry, AFM (atomic force microscopy), histopathology, immuno-fluorescence and immunoblotting studies. It was observed that irradiation damaged two important units of the cell i.e. cell membrane and nucleus. RBC and WBC counts were decreased due to irradiation. Irradiation also damaged two important organ of the body i.e. testes and liver. It was observed that testicular LPO and ACP activities increased and ALP activity decreased significantly (p<0.05) after irradiation. Alteration in testicular architecture and cell populations due to irradiation were observed. It was evident that irradiation exerted hepatic oxidative stress as LPO level increased and antioxidant status depleted significantly (p<0.05). The immunoblotting and immunofluorescence studies showed that irradiation enhanced the nuclear translocation of NF-κB level which leads to hepatic inflammation. MoLE, quercetin and epicatechin pre-treatment significantly ameliorated these radiation mediated alterations. Therefore, MoLE, quercetin and epicatechin may be considered as promising radioprotective agents, especially for nuclear workers and defence personnel assuming the possibility of radiation exposure. However, more concerted efforts through coordinated research can make a significant difference to human health in this regard.