Abstract 1

Neuroprotective effects of pomegranate (Punica granatum L.) juice and seed extract in paraquat-induced mouse model of Parkinson's disease

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Background: Paraquat, (PQ), an herbicide that can induce Parkinsonian-like symptoms in rodents and humans. The consumption of phytochemical-rich plants can reduce the risk of chronic illnesses such as inflammation and neurodegenerative diseases. The present study aimed to investigate the protective effects of pomegranate seed extract (PSE) and juice (PJ) against PQ-induced neurotoxicity in mice.

Methods: Mice were assigned into 4 groups; three groups received PQ (10 mg/kg, i.p.) twice a week for three weeks. Two of the PQ-induced groups pretreated with either PSE or PJ. Detection of phytochemicals, total phenolics, and total flavonoids in PSE and PJ was performed. Tyrosine hydroxylase (TH) level was measured in the substantia nigra (SN) by Western blotting technique. Striatal dopamine (DA) and 3,4-dihydroxyphenylacetic acid (DOPAC) were detected using high-performance liquid chromatography (HPLC). The levels of adenosine triphosphate (ATP), malondialdehyde (MDA), and the activity of the antioxidant enzymes were estimated in the striatum by colorimetric analysis. Striatal pro-inflammatory and anti-inflammatory markers using enzyme-linked immunosorbent assay (ELISA) as well as DNA fragmentation degree by qualitative DNA fragmentation assay, were evaluated. Real-time polymerase chain reaction (qPCR) assay was performed for the detection of nuclear factor kappa B (NF-κB) gene expression. Moreover, Western blotting analysis was used for the estimation of the cluster of differentiation 11b (CD11b), transforming growth factor β (TGF-β), and glial cell-derived neurotrophic factor (GDNF) levels in the striatum**.**

Results: Pretreatment with PSE or PJ increased the levels of TH in the SN as well as DA and its metabolite in the striatum that were reduced by PQ injection. PSE and PJ preadministration improved the PQ-induced oxidative stress via a significant reduction of the MDA level and the augmentation of antioxidant enzyme activities. PSE and PJ also significantly downregulated the striatal NF-κB gene expression, reduced the PQ-enhanced apoptosis, decreased the levels of; pro-inflammatory cytokines, CD11b, and TGF-β coupled with a significant increase of; interleukin-10 (IL-10), GDNF, and ATP levels as compared with PQ-treated mice.

Conclusions: The current study indicated that PSE and PJ consumption may exhibit protective effects against PQ-induced neurotoxicity in mice.

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