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Effect of taxifolin on cisplatin-associated oxidative optic nerve damage in rats

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Abstract

Aim: To investigate the effect of taxifolin on cisplatin-induced oxidative and proinflammatory optic nerve damage in rats.

Methods: A total of 18 albino Wistar male rats were assigned into 3 groups, as follows; Group 1: Control group, Group 2: Only cisplatin administered group for 14 days (Cisplatin group), and Group 3: Taxifolin + cisplatin administered group for 14 days (CIS + TAX group). Serum malondialdehyde (MDA), total Glutathione (tGSH), Nuclear Factor-Kappa B (NF-KB), Total Oxidative Status (TOS) and Total Antioxidant Status (TAS) levels were collected from the left eyes of rats. Rats' right eyes were enucleated for histopathological evaluations of optic nerves.

Results: NF-KB, MDA and TOS levels were statistically significantly higher ($p < 0.001$) in cisplatin group when compared to other 2 groups, the tGSH and TAS levels of which were statistically significantly lower ($p < 0.001$). Regarding these parameters, in cisplatin group NF-KB, MDA and TOS levels were statistically significantly increased with cisplatin administration and giving taxifolin concomitantly with cisplatin prevented this elevation. On the other hand, tGSH and TAS levels were statistically significantly decreased with cisplatin administration and routine simultaneous application of taxifolin with cisplatin prevented this decrease. In histopathological findings, haemorrhage was observed in the perineum of the injured optic nerves in the cisplatin treated group. And also edoema and degeneration in nerve fascicles in damaged optic nerves were seen in the cisplatin group. In the taxifolin treated group histopathological examinations were close to normal appearance, except mild edoema in nerve fascicles.

Conclusion: Cisplatin causes oxidative stress on the rat optic nerves, and these changes lead to significant histopathological damage. Taxifolin, which we used to prevent oxidative damage to the optic nerves caused by cisplatin, has been emphasized as a powerful antioxidant agent in many previous scientific investigations. Concomitant administration of taxifolin may prevent these adverse effects of cisplatin, as well as histopathological damage. Further studies are needed to fully determine the effects of cisplatin and taxifolin on the eye.

Keywords: Taxifolin; cisplatin; optic nerve toxicity; rat.

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