













**Figure 5:** Neuroprotective effect of alkaloid neferine on inducible nitric oxide synthase, cyclooxygenase-2 and TH protein expression in the substantia nigra tissue of Parkinson's disease-induced mice. The mice were subjected to Parkinson's disease induction with 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine with 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (30 mg/kg bw) intraperitoneally for 5 consecutive days, neferine (20 mg/kg bw) intraperitoneal injection was given from day 10 to 14 of treatment period to Parkinson's disease-induced mice and neferine (20 mg/kg bw) intraperitoneal injection alone was administered for 14 days. 24 h after the treatment period the mice were euthanized and the substantia nigra was isolated from dissected brain of control and experimental mice. The tissue was lysed with RIPA buffer, centrifuged at 1200 rpm for 15 min and the supernatant was subjected to protein estimation. 40  $\mu$ g of total protein from control and experimental mice samples were subjected to electrophoresis and immunoblotting analysis with specific proteins inducible nitric oxide synthase, cyclooxygenase-2 and TH protein. The protein bands were visualized using enzyme chemiluminescence kit and representative image were depicted

which is evidenced with rota rod test performance. Thus neferine, eventually inhibited the neuroinflammation induced by MPTP and protected the mice from locomotor impairment.

## CONCLUSION

We assessed the neuroprotective effect of alkaloid neferine present in the Chinese herbal medicinal plant *Nelumbo nucifera* on Parkinson induced mice. Our results confirmed the induction of PD through MPTP treatment and neferine significantly protect the PD-induced mice via increasing the levels of dopamine and tyrosine hydroxylase protein expression. It also decreased the levels of proinflammatory cytokines TNF- $\alpha$ , IL-1 $\beta$ , IL-6, iNOS and COX-2 expression in substantia nigra of PD-induced mice. The behavioural analysis with grid test, stride length and rota rod authentically confirms the neuroprotective effect of neferine against MPTP treatment. Overall our findings proves that neferine, a potent phytochemical can be prescribed as drug to treat PD.

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## Conflicts of interest

There are no conflicts of interest.

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