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Buspirone improves the anti-cataleptic effect of levodopa in 6-hydroxydopamine-lesioned rats

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Abstract:
In Parkinson's disease (PD), prolonged exposure to L-3,4-dihydroxyphenylalanine (L-DOPA) results in motor fluctuations, such as the on-off phenomenon, and L-DOPA-induced dyskinesia. Previously, we found that activation of 5-HT_{1A} in the substantia nigra pars compacta (SNc) decreased catalepsy in parkinsonian rats. In the current investigation, we attempted to evaluate the effect of buspirone on the anti-cataleptic effect of L-DOPA in 6-hydroxydopamine (6-OHDA)-lesioned male Wistar rats. Catalepsy was induced by the unilateral infusion of 6-OHDA (8 μg/2 μl/rat) into the central region of the SNc. After a 3-week recovery period, rats received L-DOPA intraperitoneally (*ip*; 15 mg/kg) twice daily for 20 days, and the anti-cataleptic effect of L-DOPA was assessed by the bar test at days 5, 10, 15 and 20. The results showed that L-DOPA had an anti-cataleptic effect only until day 15, and its effect was abolished on day 20. On day 21, these rats were co-treated with three different doses of buspirone (0.1, 0.5 and 2.5 mg/kg, *ip*) and L-DOPA (15 mg/kg, *ip*). At a dose of 0.5 mg/kg, buspirone improved the anti-cataleptic effect of L-DOPA. Furthermore, the effect of buspirone (0.5 mg/kg, *ip*) on the anti-cataleptic effect of L-DOPA (15 mg/kg, *ip*) was reversed by 1-(2-methoxyphenyl)-4-(4-phthalimidobutyl)piperazine hydrobromide (NAN-190; 0.5 mg/kg, *ip*), a 5-HT_{1A} receptor antagonist. From these results, it may be concluded that buspirone improves the anti-cataleptic effect of L-DOPA in a 6-OHDA-induced animal model of PD through the activation of 5-HT_{1A} receptors. In this regard, further investigations should be undertaken to clarify the exact mechanism of the interaction between 5-HT_{1A} and dopaminergic neurons.

Key words:
buspirone, 5-HT_{1A} receptor, catalepsy, L-DOPA, rat