Effect of chemical stimulation of the lateral hypothalamus on formalin-induced orofacial pain: role of D1- and D2-like receptors in the nucleus accumbens

Principle Investigator: Abbas Haghparast
Neuroscience Research Center, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

ABSTRACT: The role of dopaminergic system in modulation of formalin-induced orofacial nociception has been established. The present study aims to investigate the role of dopaminergic receptors in the nucleus accumbens (NAc) in modulation of nociceptive responses induced by formalin injection in the orofacial region. One hundred and six male Wistar rats were unilaterally implanted with two cannulae into the lateral hypothalamus (LH) and NAc. Intra-LH microinjection of carbachol, a cholinergic receptor agonist, was done 5min after intra-accumbal administration of different doses of SCH23390 (D1-like receptor antagonist) or sulpiride (D2-like receptor antagonist). After 5min, 50μl of 1% formalin was subcutaneously injected into the upper lip for inducing the orofacial pain. Carbachol alone dose-dependently reduced both phases of the formalin-induced orofacial pain. Intra-accumbal administration of SCH23390 (0.25, 1 and 4μg/0.5μl saline) or sulpiride (0.25, 1 and 4μg/0.5μl DMSO) before LH stimulation by carbachol (250nM/0.5μl saline) antagonized the antinociceptive responses during both phases of orofacial formalin test. The effects of D1- and D2-like receptor antagonism on the LH stimulation-induced antinociception were almost similar during the early phase. However, compared to D1-like receptor antagonism, D2-like receptor antagonism was a little more effective but not significant, at blocking the LH stimulation-induced antinociception during the late phase of formalin test. The findings revealed that there is a direct or indirect neural pathway from the LH to the NAc which is at least partially contributed to the modulation of formalin-induced orofacial nociception through recruitment of both dopaminergic receptors in this region.