Abstract

The naked mole-rat (Heterocephalus glaber) is a promising animal model for the study of pain mechanisms, therefore a thorough characterization of this species is essential. The aim of the present study was to establish the naked mole-rat as a model for studying the cholinergic receptor system in antinociception by investigating the involvement of muscarinic, nicotinic and opioid receptors in nociceptive tests in this species. The effects of systemic administration of the muscarinic receptor agonist oxotremorine and the nicotinic receptor agonist epibatidine were investigated in the tail-flick, the hot-plate, and the formalin tests. The effects of co-administration of the muscarinic receptor antagonist atropine, the nicotinic receptor antagonist mecamylamine, and the opioid receptor antagonist naloxone were also investigated. Oxotremorine and epibatidine induced a significant, dose-dependent antinociceptive effect in the tail-flick, hot-plate, and formalin tests, respectively. The effects of oxotremorine and epibatidine were blocked by atropine and mecamylamine, respectively. In all three nociceptive tests, naloxone in combination with oxotremorine or epibatidine enhanced the antinociceptive effects of the drugs. The present study demonstrated that stimulation of muscarinic and nicotinic receptors produces antinociceptive effects in the naked-mole rat. The reversal effect of atropine and mecamylamine suggests that this effect is mediated by cholinergic receptors. As naloxone increases the antinociceptive effects of cholinergic agonists, it is suggested that the cholinergic antinociception acts via a gateway facilitated by opioid receptor blockage; however, the precise interaction between these receptor systems needs further investigation.