

Insight into the possible mechanism(s) involved in the antinociceptive and antineuropathic activity of *Descurainia sophia* L. Webb ex Prantl essential oil

ABSTRACT

Ethnopharmacological relevance: *Descurainia sophia* (L.) Brassicaceae, popularly known as "Khaksheer", is a native species widely distributed in Iran. The seeds and essential oil has been used in local traditional medicine (Persian folk ethnomedicine) to treat fever, inflammation, back pain, and headache. Aim of the study: To investigate in vitro anti-nociceptive and antineuropathic activities of *Descurainia sophia* seeds essential oil (DSEO) in rats and to determine the possible mechanism(s) involved. Materials and methods: The antinociceptive activity of DSEO or Linolenic acid (LA) was evaluated using the formalin induced paw licking test followed by determination on the role of NO-cGMP-K⁺ channel pathway as well as a number of non-opioid receptor systems (vanilloid, dopamine, cannabinoid, serotonin, peroxisome proliferator activated, and adrenergic receptors) in the modulation of DSEO-induced antinociceptive activity. Additionally, the cervical spinal cord contusion (CCS) model was used to study antineuropathic potential of DSEO or LA. Results: DSEO exerted significant ($p < 0.05$) antinociceptive activity in formalin test (both phases) and altered mechanical allodynia and hyperalgesia observed in the CCS model. Pretreatment with glibenclamide, N ω -nitro-L-arginine methyl ester, tranilast, methylene blue, SCH23390, SR141716A and SR144528 restored DSEO-induced antinociceptive activity observed in the formalin test. Furthermore, LA also reduced nociceptive responses induced in the formalin and CCS models. Conclusion: DSEO inhibits inflammatory mediated nociceptive response partly via the modulation of NO-cGMP-K⁺ channels pathway well as the activation of vanilloid, dopamine, and cannabinoid receptors, and exerts antineuropathic activity possibly via the modulation of inflammatory mediated activity. Thus, these findings confirm the Persian ethno-medicine claim on the efficacy of *D. Sophia*.