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[Comparative Study](#) [Behav Brain Res.](#) 2006 Sep 25;172(2):240-9.

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Lemon oil vapor causes an anti-stress effect via modulating the 5-HT and DA activities in mice

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Abstract

We examined the anti-stress action of the essential oils of lavender, rose, and lemon using an elevated plus-maze task (EPM), a forced swimming task (FST), and an open field task (OFT) in mice. Lemon oil had the strongest anti-stress effect in all three behavioral tasks. We further investigated a regulatory mechanism of the lemon oil by pre-treatments with agonists or antagonists to benzodiazepine, 5-HT, DA, and adrenaline receptors by the EPM and the FST. The anti-stress effect of lemon oil was significantly blocked by pre-treatment with flumazenil, benzodiazepine receptor antagonist, or apomorphine, a nonselective DA receptor agonist. In contrast, agonists or antagonists to the 5-HT receptor and the alpha-2 adrenaline receptor did not affect the anti-stress effect of lemon oil. Buspirone, DOI, and mianserine blocked the antidepressant-like effect of lemon oil in the FST, but WAY100,635 did not. These findings suggest that the antidepressant-like effect of lemon oil is closely related with the 5-HTnergic pathway, especially via 5-HT(1A) receptor. Moreover, the lemon oil significantly accelerated the metabolic turnover of DA in the hippocampus and of 5-HT in the prefrontal cortex and striatum. These results suggest that lemon oil possesses anxiolytic, antidepressant-like effects via the suppression of DA activity related to enhanced 5-HTnergic neurons.

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