Inhalation of neroli essential oil and its anxiolytic effects in animals

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Current studies have shown that vapors of essential oils such as neroli and lavender could help reduce anxiety levels [1]. Inhalation of these essential oils may trigger the limbic system of the brain giving the resulting beneficial effects. However, further investigation of these oils is needed to provide evidence that they relieve anxiety [2]. This study was carried out with gerbils subjected to aromatherapy inhaling neroli. Forced swimming task and locomotor activity were measured to evaluate levels of anxiety [3,4]. Neroli essential oil used in this study was supplied by Australian Botanical Products Ply Ltd. (Hallam Victoria, Australia). 100 µL of neroli was vaporized in a nebulizing diffuser and was inhaled by individual gerbils for 30 min in the behavior box. The neroli-inhaled group received 100 µL neroli essential oil overnight before taking a forced swimming task. During the exercise, a few drops of neroli were mixed in the water for the gerbils to inhale. Locomotor activity was measured by means of a multi-box ActiMot detection system (TSE, Bad Homburg, Germany). Two gerbils were simultaneously placed in two open field boxes for control and neroli-inhaled groups. The boxes were covered with cloth and the room was kept dark and silent to prevent any interference from the outside environment. One minute of habitation was given prior to the 30-minute measurement of activity. Each gerbil was placed on a polystyrene board floating in a Plexiglas cylinder that was 15 cm in diameter, 35 cm in depth, and was filled with warm water (*ca*. 35°C) to a height of 18 cm. Total duration of swimming was measured during the experiment. Gerbils were judged to be immobile when they floated passively with the head above water.

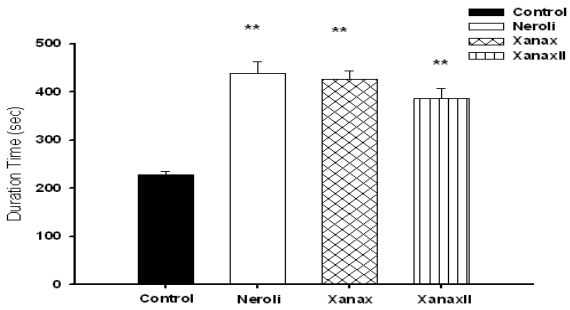

Figure 1. *Comparison of swimming duration time in the control and neroli groups (**p<0.01).*

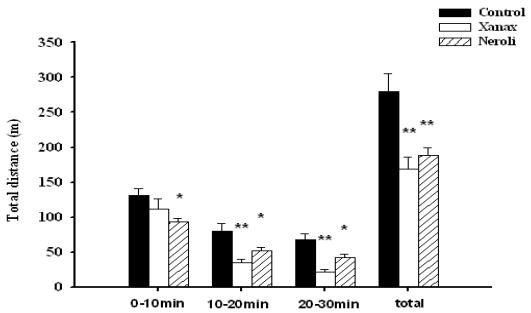

Figure 2. *Comparison of total distance in the control and treatment groups (*p<0.05 and **p<0.01).*

Comparison was made between duration of forced swimming tasks and total distance between the control and neroli-inhaled groups. In addition, the treatment of Xanax®, an anxiolytic drug, was used as a positive control. The average duration times for swimming were 228±7.0, 439±23, 386±21, and 427±18 seconds in the control, neroli-inhaled, and two Xanax-treated groups, respectively (see Figure 1). These treatments were significantly increased by 65-91% of basal in all groups ($p<0.01$) when compared with the control. The total distance traveled during 30 min were 280.3±25.4 m, 189.0±10.7 m and 168.6±17.6 m in the control, neroli-inhaled, and Xanax group, respectively (see Figure 2).

The forced swimming task was designed to screen anxiolytics and antidepressants. Immobility observed during the task was described as a lower state of mood in animals. This passive behavior caused by stress is seen as an adaptive response in an inescapable situation. In the present animal study, swimming times were increased significantly (65% and 82% of the basal in Xanax and XanaxII groups, respectively). Xanax® is a short-acting drug of the benzodiazepine class used to treat anxiety disorders, panic attacks and nervous tension, different types of phobias, depression, insomnia and others. It works by slowing down the nervous system and controlling chemicals in the brain. From these results we concluded that Xanax® could act as a positive control in gerbils subjected to a forced swimming task. It was also observed that swimming times were increased by 91% of the basal using neroli when compared with the control. These effects of neroli are comparable to both Xanax and control groups in our results. Previous studies have shown that inhalation of essential oil caused a decrease of immobility in mice using essential oils. The present study showed that inhalation of neroli vapor may induce anti-anxiety effects. Side effects of Xanax® are most likely an extension of the pharmacological activity of alprazolam including sleepiness, memory problems and blurred vision in patients. In addition, Xanax® has been known to be habit-forming. Withdrawal symptoms may occur if treatment is discontinued abruptly. On the contrary, the essential oil has reduced anxiety in mice without generating side effects in previous reports.

According to results of the forced swimming task, significant increases in duration time were observed in the neroli-inhaled group and a reduction of immobility in gerbils was shown to confirm the anxiolytic effects of neroli. To identify the possible neural or hormonal mechanisms in this essential oil, a specifically designed study can be planned. Both gerbils treated with neroli and Xanax® displayed anxiolytic effects by the major decreases in total distances comparing with the control. Aromatherapy for anti- anxiety has been developed based on conventional trials of essential oils, including neroli, by scientists. In general, they found aromatherapy "comforting" or "relaxing and enjoyable". However, the elucidation of anxiolytic effects and the quantitative information for these essential oils have been limited. To date there have been few

studies addressing the effects of aromatherapy or massage on anxiety. The present data provides an additional evidence for neroli in the potential treatment of anxiety. Improvements of effectiveness were shown in the inhalation of neroli and Xanax® in both behavior tests. However, the mechanisms of anxiolytic effect responsesfor neroli and Xanax® might be different. This study provides an evidence based information on aromatherapy in the treatment of anxiety.

References

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