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Anxiolytic Essential Oils

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According to the World Health Organization [1], approximately 450 million people worldwide have some form of mental or behavioral disorder. One such disorder is anxiety, which is an emotional state that develops in response to real or imaginary threats and accordingly can be realistic or psychological [2]. A psychological crisis negatively affects daily activities and increases the risk for other disorders [3]. Anxiety disorders are among the most common forms of psychopathology worldwide [4], and the prevalence of anxiety as a medical condition has increased in recent years [5]. Since ancient times, essential oils of many plants, such as orange blossom, lemon balm, jasmine, and lavender, have been used in aromatherapy for their calming effects [6]. In recent decades, results of several scientific studies conducted in animals and humans have supported the use of these oils for psychoactive effects [7]. Studies on animal models of anxiety have successfully demonstrated the anxiolytic effects of essential oils, such as lavender [8], rose [9], and orange [10] oils. For example, the correlation between the chemical composition and anxiolytic activity of essential oils obtained from different *Lavandula* species has been established. Recently, it was demonstrated that the monoterpenes linalool and linalyl acetate acted synergistically in various plants of this species [11]. Linalool is the main constituent of the essential oil of *Aniba rosaeodora* Ducke, which has relaxing effects. Furthermore, studies in animals have shown that inhaled linalool has an anxiolytic effect, increases social interaction, and decreases aggressive behavior [12]. In another study, the specific physiological responses induced by linalool inhalation were investigated in human subjects exposed to experimental stress. The relaxing effects of linalool odorants were observed on certain physiological parameters related to stress conditions [13]. Anxiolytic activity of other oxygenated monoterpenes, such as carvone [14], 1,4-cineole [15], carvacrol [16], and isopulegol [17], was also demonstrated. Carvone is one of the constituents of Lippia alba responsible for its action as a tranquilizer [14]. Study of the mechanism of action of carvacrol revealed that this phenol acted via a gamma-aminobutyric acid (GABA)-benzodiazepine receptor complex [16]. In fact, the anxiolytic action of essential oils such as *Cymbopogon citratus* essential oil is mediated by the GABA receptor [18]. In other study, the anxiolytic-like property of *Citrus aurantium* L. essential oil was demonstrated in mice [10]. Limonene, a hydrocarbon monoterpene found in various bioactive essential oils, is the main chemical component (97.66%) of this oil. Anxiolytic activity was also observed for essential oil of another type of orange, *Citrus sinensis*, which contained 54.48% limonene; this oil had psychoactive effects both in animals and in humans [19,20]. Recent studies have shown that inhaled (+)-limonene has an anxiolytic-like effect in animals [21]. Therefore, this chemical constituent should contribute to the anxiolytic activity of the plants of *Citrus* species. Pharmacological studies in animal models of anxiety have demonstrated the therapeutic potential of essential oils. However, for safe and effective therapeutic use of essential oils, more well-documented pre-clinical and clinical trials are necessary for the validation of their pharmacological actions and toxicity. Furthermore, standardization of pharmacological tests is essential to obtain reliable information about the therapeutic efficacy of these natural products as promoters of public health.

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