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Sedative effects of the jasmine tea odor and (*R*)-(-)-linalool, one of its major odor components, on autonomic nerve activity and mood states

Accepted: 9 December 2004 / Published online: 23 June 2005
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Abstract We investigated the effects of the odor of jasmine tea on autonomic nerve activity and mood states in a total of 24 healthy volunteers. We used the odor of jasmine tea at the lowest concentration that could be detected by each subject but that did not elicit any psychological effects. R–R intervals and the POMS test were measured before and after inhalation of the odors for 5 min. Both jasmine tea and lavender odors at perceived similar intensity caused significant decreases in heart rate and significant increases in spectral integrated values at high-frequency component in comparison with the control ($P < 0.05$). In the POMS tests, these odors produced calm and vigorous mood states. We also examined the effects of (*R*)-(-)-linalool, one of its major odor components, at the same concentration as in the tea, and (*S*)-(+)-linalool. Only (*R*)-(-)-linalool elicited a significant decrease in heart rate ($P < 0.05$) and an increase in high-frequency component in comparison with the controls, and produced calm and vigorous mood states. Thus, the low intensity of jasmine tea odor has sedative effects on both autonomic nerve activity and mood states, and (*R*)-(-)-linalool, one of its components, can mimic these effects.

Keywords Jasmine tea · (*R*)-(-)-linalool · Odor · Autonomic nervous activity · Mood states

Introduction

Tea is one of the most popular beverages, and it is consumed in various ways in more than 300 forms. The pharmacological and therapeutic effects of teas have been reported since the 1970s (Chen 1992). It has been observed that tea extracts have anti-carcinogenic (Wang et al. 1988), antimutagenic (Kada et al. 1985), antioxidative (Ho et al. 1992; Yoshino et al. 1994) and hypocholesterolemic effects (Yang and Koo 1997). Jasmine tea, one of the most popular forms drunk in China, has been reported to share some of these effects (Yang and Koo 1997; Zhang et al. 1997). People not only consume jasmine tea but also enjoy its characteristic odor.

Some of the odors of essential oils are used in the treatment of depression, anxiety and some types of cognitive disorders in aromatherapy (Buchbauer and Jirovetz 1994; Buchbauer 1996). Moreover, some odors produce physiological changes in parameters such as blood pressure (Nagai et al. 2000; Suzuki and Aoki 1994), muscle tension (Schwartz 1979), blink magnitude (Ehrlichman et al. 1997), skin temperature, skin blood flow, electrodermal activity, heart rate (HR; Alaoui-Ismaili et al. 1997; Brauchli et al. 1995), brain wave pattern (Lorig 1989; Torii et al. 1988; Van Toller et al. 1993) and sleep time (Tsuchiya et al. 1992). The effects of odors on autonomic functions and mood states appear to have two mechanisms. One is pharmacological via direct interactions between odor molecules and receptors or nerve endings, and the other is psychological via the subjective effects of odor perception (Heuberger et al. 2001; Jellinek 1997).

In a previous study, we investigated the effects of the odor of jasmine tea on autonomic nerve activity at high and low concentrations, rated subjectively as high and low intensity (Inoue et al. 2003). Inhalation of this odor at low

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