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Full Length Research Paper

Effect of *Viola tricolor* on pentobarbital-induced sleep in mice

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Traditionally, *Viola tricolor* has been recommended for its sedative property. However, no pharmacological studies have yet evaluated the effect of this plant on sleep. The hydro-alcoholic extract (HAE) was prepared by the extraction of the aerial parts of *V. tricolor* in 70% ethanol using a Soxhalet apparatus. Also, with solvent-solvent extraction, the HAE was further fractionated to water fraction (WF), ethyl acetate fraction (EAF) and N-butanol fraction (NBF). The extract (50, 75, 100, 150, 200, 300 mg/kg, ip) and its fractions (200 mg/kg, ip) were administrated to mice, 30 min before pentobarbital (30 mg/kg, ip) injection. Furthermore, the possible neurotoxicity of the plant was assessed using PC12 neuron cell line. The HAE, at 300 mg/kg, significantly prolonged (34%) duration of pentobarbital-induced sleep. Similarly, the EAF significantly increased (51%) the sleep duration. None of the HAE doses or the fractions could significantly change the sleep latency time. The sedative effect of *V. tricolor* accompanied with no neuron toxicity, except for very high concentrations of EAF. The results suggest that *V. tricolor* potentiates pentobarbital hypnosis and the main component(s) responsible for this effect is most likely found in EAF. Isolation and purification of the active compound(s) may yield novel sleep-prolonging agents.

Key words: *Viola*, sleep, pentobarbital, mice.

INTRODUCTION

Sleep dissatisfaction and insomnia have a relatively high prevalence in the world (Roth, 2005). Chronic sleep disorders give rise to some health problems such as emotional disturbances, slower reactions and poor memorizing (Orzel-Gryglewska, 2010; Zaharna and Guilleminault, 2010). Despite its high prevalence, insomnia has not received sufficient clinical attention. Currently, benzodiazepines are the most widely used medications. However, the clinical uses of benzodiazepines are accompanied with unpleasant side effects such as drug dependence, tolerance, rebound insomnia, amnesia, psychomotor impairment and potentiating of other central depressant drugs (Uzun et al., 2010). Therefore, the search for new hypnotic agents with lesser side effects remains an attractive subject.

Over the last years, the reputation of medicinal plants has increased due to their therapeutic efficacy and lesser side effects and many traditional medicinal plants have been tested for their hypnotic potential in the experimental animals (Hossain et al., 2009; Ngo Bum et al., 2008). *Viola tricolor*, the subject of this study, is a common horticultural plant in Iran. It has been reported to have a number of medicinal attributes including anti-inflammatory (Toiu et al., 2007), antimicrobial (Witkowska-Banaszczak et al., 2005), antioxidant (Vukics et al., 2008) and diuretic (Toiu et al., 2009) activity. Traditionally, *V. tricolor* has been suggested to have sedative-hypnotic property (Duke et al., 2002). However, no pharmacological studies have been undertaken so far

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