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Advances on the Pharmacological use of *Teucrium* spp. (Germanders)

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Commentary on
Hasani-Ranjbar *et al*., A Systematic Review of the Efficacy and Safety of Teucrium Species; from Anti-oxidant to Anti-diabetic Effects. Int. J. Pharmacol., 2010; 6(4): 315-325.

Teucrium species, as known Germanders, have been successfully applied for homeostasis glucose and insulin level, pain and spasm relief and treatment of inflammatory disorders, for long years. The most phytochemical analysis of *Teucrium species* confirmed this genus is rich source of neo-clerodanes diterpenoid, considered as chemotaxonomic markers, fallowed by flavonoid and aromatic compounds (Shtukmaster *et al*., 2010).

The paper by Hasani-Ranjbar *et al*. (2010a) that is a systematic collection of information about traditional uses, accomplished pharmacological animal investigations and clinical trials that have been carried out on *Teucrium* spp. show promising hope for *Teucrium* spp. in many diseases. As reported by Hasani-Ranjbar *et al*. (2010b), the most valuable pharmacological effects of *Teucrium* species. include antidiabetic, antispasmodic, anti-inflammatory, anti-oxidant and antiulcer while anti-hyplipedemic and hepatoprotective properties of *Teucrium* remain questionable. According to Hasani-Ranjbar *et al*. (2010a), hepatotoxicity is the most significant side effect caused by furano neoclerodane diterpenoids, mainly teucrin A that are found in *T. viscidum*, *T. chamaedrys*, *T. polium* and *T. capitatum*. Two mechanisms are thought to be involved in hepatitis including transformation of furano ring into toxic reactive epoxides by cytochrome P4503A and secondary immune reactions (Poon *et al*., 2008). Despite of some case reports about hepatitis after consumption of some *Teucrium* species, two recent studies (*in vivo* and *in vitro*) indicated hepatoprotective action of *T. polium*. The mechanism of protection is perhaps caused by increasing intracellular glutathione that inactivates toxic epoxides along with increasing other hepatic antioxidant enzymes and decreasing inflammatory factors (Shtukmaster *et al*., 2010; Amini *et al*., 2010). Also, Shtukmaster *et al*. (2010) showed that at low concentrations (0.01-0.25 mg mL^{-1}), an aqueous extract of *T. polium*, had no effect on cellular integrity while at higher concentrations (0.75-1 mg mL^{-1}) the extract was toxic to HepG2 cells because it inhibited mitochondrial respiration and increased cellular LDH efflux. At concentrations of 0.375 and 0.5 mg mL^{-1}, the extract significantly increased the intracellular glutathione. These findings show that maximal nontoxic concentration of *T. polium* extract of is between 0.25 and 0.5 mg mL^{-1}. Probably, the flavonoid fraction is responsible for anti-oxidant and hepatoprotective effects of this plant. There is evidence that an increase in the ratio of flavonoid/dipertenoid level is affected by different extractions obtained from different locations or season of plant collection (Sghaier *et al*., 2011).

According to the reported data about beneficial and side effects of *Teucrium*, it is concluded that *Teucrium* have a low therapeutic index like cardiac glycosides. Since, some species of *Teucrium* used in some weight loss supplements in combination with other herbal medicine, these products should undergo the safety tests before releasing into market (Herrera and Bruguera, 2008). Interestingly, a new study confirmed anti-colitis effect of *Teucrium* that needs to be followed up in clinic (Abdolghaffari *et al*., 2010). For minimizing any possible danger of *Teucrium* supplements, future research should focus on certification of active component, safe and therapeutic doses, pharmacokinetics and side effects especially in long-term administration. Herbal medicines similar to *Teucrium* species have been successfully entered clinic in the recent years (Hasani-Ranjbar *et al*., 2010b; Momtaz and Abdollahi, 2010). In the next step, more clinical trials with accurate methodology using standardized products and dosages would be helpful to observe the potential of *Teucrium* against diabetes, inflammation, ulcer, liver disease and cancers.

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