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Hypoglycemic Property of *Satureja khuzestanica* in Human Still in Doubt

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Many scientific evidences are available on the potential of *Satureja khuzestanica* as a source for the development of antiseptic, carminative, analgesic, antimicrobial, antiparacitical, antidiabetic and antioxidant products (Tavafi *et al*., 2011; Kheirandish *et al*., 2011). For example *Satureja khuzestanica* essential oil (SKEO) has been shown an inhibitory activity against gram-negative and gram-positive bacteria and against the fungi *Candida albicans* and *A. niger* (Sadeghi-Nejad *et al*., 2010). Abdollahi *et al*. (2003) indicated the safety and stimulatory effect of SKEO on reproduction along with its hypoglycemic and triglyceride-lowering effects in rats (Haeri *et al*., 2006). Moreover, the positive effect of *S. khuzestanica* is thought to be coming mainly from its ability to inhibit lipid peroxidation, chelate active redox metals or scavenge reactive oxygen species (Ghazanfari *et al*., 2006). Carvacrol, one of the main components of the wild SKEO and the phenolic and flavonoid compounds have been found responsible for many effects like antioxidant and antimicrobial activities of *S. khuzestanica* (Momtaz and Abdollahi, 2010). The latest clinical study has indicated anti-ulcerative colitis activity of powder of *S. khuzestanica* (Rastegarpanah *et al*., 2011).

In a double-blinded randomized controlled trial reported by Vosough-Ghanbari *et al*. (2010), the anti-oxidant, anti-diabetic and anti-lipidemic efficacy of the *S. khuzestanica* in humans with type 2 diabetes was tested. They prescribed 250 mg powder leaves of *S. khuzestanica* per day was given for 2 months and showed a marked reduction in total cholesterol and LDL-cholesterol while HDL-cholesterol and total antioxidant power increased. Meanwhile, they did not find any effect on blood glucose. The first major concern about the study of Vosough-Ghanbari *et al*. (2010) is the unmentioned reason to the dose of powder leaves of *S. khuzestanica*. As they only used dried leaves of *S. khuzestanica* especially in powder form not extract or oil, one of the possible explanations is that the amount of effective compounds in leaf powder may not be enough for this clinical effect. In addition, the most reported pharmacological effects of this herb seems due to the whole aerial parts including stems, flowers and leaves, while Vosough-Ghanbari *et al*. (2010) prepared tablets from the leaves. As different parts of plants may contain different concentrations of active ingredients, possibly it may cause varying therapeutic actions. In order to insure reliable results, this powder should have been standardized to contain a consistent level of the major known active constituents before testing. Another possible explanation may be that the patients had a low exposure to the drug due to its low bioavailability. As various physiological factors such as formulation, incomplete or food delaying absorption, first-pass metabolism and drug interactions reduce the availability of oral drugs (Heaney, 2001), it is unknown how much of the effective compounds actually absorbed. The next major concern to the work of Vosough-Ghanbari *et al*. (2010) is that some patients in both *S. khuzestanica* and placebo groups had a mean hemoglobin A_{1c} or Fasting Plasma Glucose (FPG) more than glycemic level goals (HbA_{1c} <7% and FPG 70-130 mg dL^{-1}) recommended by American Diabetes Association (2011). In addition, on the basis of ADA criteria (2011), treatment goal for LDL cholesterol level is less than 100 mg dL^{-1} while in this trial the mean level of LDL cholesterol in patients was 120-123 mg dL^{-1}. Therefore, diabetic patients of this study were in borderline state. Although this clinical trial did not find beneficial effect of *S. khuzestanica* on blood glucose, it gives important data about usefulness of this herbal medicine in management of hyper-lipidemic type-2 diabetic patients through antioxidant effects. Because the hypoglycemic properties of *S. khuzestanica* is still questionable, as mentioned previously (Sarkhail, 2011), performing of a similar trial with higher sample size and a more frequent and prolonged dose of *S. khuzestanica* is recommended.

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