The aphrodisiac and adaptogenic properties of ginseng

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Abstract

Ginseng is the root of the perennial herbs of Panax quinquefolium and Panax ginseng
which contain a series of tetracyclic triterpenoid saponins (ginsenosides) as active ingredi-
ents. It is considered a tonic or adaptogenic that enhances physical performance (including
sexual), promotes vitality and increases resistance to stress and ageing. The adaptogenic
properties of ginseng are believed to be due to its effects on hypothalamic–pituitary–adrenal
axis, resulting in elevated plasma corticotropin and corticosteroids levels. When used
appropriately, ginseng appears to be safe. Nevertheless, documented side effects include
hypertension, diarrhoea, restlessness, mastalgia and vaginal bleeding. © 2000 Elsevier
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1. Introduction

Ginseng has been used in eastern Asia for more than 500 years as a tonic and
restorative, promoting health and longevity. Traditionally, ginseng use has been
divided into two categories: short-term, to improve stamina, concentration, healing
process, stress resistance, vigilance and work efficiency in healthy individuals and
long-term, to improve well-being in debilitated and degenerative conditions espe-
cially those associated with old age [1]. Actually ginseng is one of the most popular
and expensive herbs in the world. At least 6 million Americans use the root of this
slow-growing perennial [2]. The drug is generally administered as a powder, extract
or tea [3]. Although ginseng possesses several pharmacological actions and potential therapeutic applications, this review will focus on the adaptogenic and aphrodisiac properties of ginseng.

2. Botanical and chemical constituents

Ginseng is the root of the perennial herbs of *Panax quinquefolium* L., which grows in the United States and Canada and *Panax ginseng* C.A. Meyer (Araliaceae). The former is known as American ginseng and the latter, designated Korean or Chinese ginseng, is indigenous to the mountainous forests of eastern Asia. The roots, harvested when the plant is 3–6 years old, are carefully cleaned and dried [3]. Two varieties are commercially available: white ginseng is produced by air-drying the root, while red ginseng is produced by steaming the root followed by the drying. These two varieties have somewhat different compositions of the active chemical constituents [4]. The genus name of *Panax ginseng* was coined by the Russian botanist, C.A. Meyer, and is derived from the Greek terms ‘pan’, meaning all and ‘axos’ meaning cure. The species name was derived from the Chinese word ‘jen-sheng’, implying the herb whose roots resemble the human body. Thus, *Panax ginseng* means ‘the all-healing man herb’ [5]. Ginseng is often confused with *Eleuthreococcus senticosus* Maxim (Araliaceae), Siberian ginseng also known as eleuthero, whose roots are used to help fatigue and stress and to improve endurance [6].

Ginseng contains a series of tetracyclic triterpenoid saponins, ginsenosides Rg1–Rg4, Rb1–Rb2 are derivatives of 20(S)-protopanaxadiol, and Rb3–Rb4 are derivatives of 20(S)-protopanaxatriol [7]. The ginsenosides differ in the location and nature of the sugar moieties. At least 13 ginsenosides have been isolated but many of them occur only in small amounts. The saponin content varies between different *Panax* species.

3. Adaptogenic properties

Brekhman, a pioneer in the experimental studies of ginseng, used the term adaptogen to describe the ability of ginseng to increase resistance to physical, chemical and biological stress and to build up general vitality [8]. This effect sets in slowly and several weeks treatment are needed to obtain the full benefit of the drug. The effect of adaptogenic drugs, like ginseng, is particularly evident ‘when the resistance of the organism is diminished or... is taxed with extra demands’ [8]. Experimental studies have confirmed the adaptogenic properties of ginseng and the effects are apparently a function of the ginsenoside saponin glycosides contained in the root. Indeed, ginseng enhances resistance to X-irradiation, viral and tumour load, temperature stress, hyperbaric hyperoxia, and physical exercise [8,9], augments work capacity in rats [10] and increases swimming time in rats [11]. Many of these activities have been attributed to a corticosteroid-like action and endo-
crinological studies have suggested that ginsenosides may augment adrenal steroidogenesis via an indirect action on the pituitary gland [12]. The cortico-steroid-like action of ginseng is strongly suspected to be responsible of the adaptogenic properties of ginseng as hormones produced by the adrenal gland are known to play a significant role in the adaptation capabilities of the body [10]. Fig. 1 shows the possible mechanism of the adaptogenic action of ginseng.

Ginseng has been used by athletes as an ergogenic aid for many years [13,14]. Pieralisi et al. [14] showed that ginseng preparation was effective in increasing the work capacity, by improving oxygen utilisation, in 50 male sport teachers (21–47 years old).

4. Effects on learning and memory

Experiments with animals have demonstrated the psychomotor effects of ginseng. Petkov et al. [15] showed that oral administered ginseng, at a dose of 20 mg/kg for 3 days, improved learning and memory in rats performing a maze task. Likewise, it has been also shown that oral doses of ginseng improved learning and memory in rats performing shuttle box active avoidance test. The results of this investigation also indicated that high doses of ginseng can impair conditioned-reflex rather than improve it. The positive effect of ginseng on learning and memory could involve an action on serotoninergic transmission [15]. Consistently with these experimental results, D’Angelo et al. [16] showed a favourable effect on various
tests of psychomotor performance (attention, processing, auditory reaction time) in healthy individuals receiving a ginseng extract (200 mg daily for 12 weeks).

5. Aphrodisiac properties

Ginseng is an essential constituent in traditional Chinese medicine for the treatment of sexual impotence. It is likely that this effect reflects the tonic, restorative and adaptogenic properties above reported. However, experimental studies have indicated a specific action for such an effect. Chen et al. [17] have shown that ginsenosides relax rabbit corpus cavernosum and this effect is mediated by nitric oxide, released from endothelial or neural cells. These endothelial and/or neurogenic effects of ginsenosides in inducing relaxation of the corpus cavernosum may account for the aphrodisiac effect of Panax ginseng. Consistently with this nitric oxide-linked mechanism, several recent studies have suggested that the antioxidant and organ-protective actions of ginseng, including cardiovascular protection, are related to enhanced nitric oxide synthesis [18,19]. A clinical study has confirmed the positive effects of ginseng on sexual impotence; Choi et al. [20] reported the clinical efficacy of Korean red ginseng for erectile dysfunction (changes in penile rigidity and girth, libido and patients satisfaction) in 30 patients.

6. Other pharmacological properties

A number of pharmacological properties have been reported for ginseng or individual ginsenosides. Ginseng possesses hypoglycaemic activity (increase in insulin release and in the number of insulin receptors) [21,22], has a potent tumour therapeutic activity and improves the cell immune system [23], has antinociceptive (formalin test) [24], hepatoprotective [25,26] and antiviral activity [27] and induces diuretic resistance [28]. Cardiovascular effects of ginseng or ginsenosides have been extensively studied. Many reports describe transient vasodilator actions, in some cases followed by vasoconstriction and increase in blood pressure [19].

7. Side effects, toxicity, and contra-indications

When used appropriately, ginseng appears to be relatively safe. It is considered a food supplement, not a drug, in many countries and most documented side effects are associated with inappropriate use [13]. Nevertheless, the documented symptoms include hypertension, diarrhoea, sleeplessness, mastalgia, eruptions and vaginal bleeding. Siegel [29] indicated the long term effects of the use of ginseng (primarily central nervous system excitation and arousal) as ginseng abuse syndrome (GAS). GAS is characterised by hypertension together with nervousness, sleeplessness, skin eruptions, oedema and diarrhoea. There is also evidence that ginseng could cause Stevens–Johnson syndrome [30,31].
In general, ginseng should be avoided by individuals who are energetic, nervous, tense, hysteric, manic or schizophrenic, and it should not be taken with central stimulants, antipsychotic drugs or during treatment with hormones [1]. By inhibiting the uptake of various neurotransmitters, ginseng may potentiate the effect of MAO inhibitors.

References