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Review On Ginseng: A Potential Crude Drugs

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ABSTRACT

Plants have been an exemplary source of medicine. Ayurveda, traditional medicine, tribal medicine and other literatures mention the use of plants in the treatment of various human ailments. Researches conducted in the last few decades on exploring crude drugs mentioned in ancient literature or used traditionally for treating diseases is increasing. The term ginseng refers to the species within Panax, a genus of 11 species of slow growing perennial plants with fleshy roots, in the family Araliaceae. These plants grown in eastern Asia, typically in cooler climates. The two major species are American ginseng (grown in the Midwest of America and exported to China) and Asian ginseng. Ginseng is known to be an adaptogen – adaptogens are substances that help the body to restore itself to health and to work without side effects. The present paper summarizes the traditional uses and pharmacological actions of the roots and rhizomes of ginseng.

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INTRODUCTION

Panax ginseng C.A. Meyer [family; Araliaceae] commonly known as Korean ginseng, Chinese ginseng, oriental ginseng. Korean ginseng is a small perennial herb plant that originally grows wild in the damp woodlands of northern China, Manchuria and Korea. Wild ginseng is now extensively rare. However, ginseng is a widely cultivated plant especially in Korea and also in Russia, China and Japan. In addition to *Panax ginseng* C.A. Meyer, some of the other closely related species are *Panax quinquefolium* [American ginseng], *Panax japonicus* C.A. Meyer [Japanese ginseng], *Panax pseudo-ginseng* [Himalayan ginseng], *Panax trifolium*. *Panax ginseng* C.A. Meyer is the most widely used and most extensively studied species. Fully mature Korean ginseng is an herbaceous plant with a taproot, five lobed palmate leaves and greenish white flowers. Ginseng is often processed in two forms, white and red. White ginseng is the dried root whose peripheral skin is frequently peeled off, red ginseng is the steamed root which has a caramel-like colour. Perhaps the most medicinal plants of China, ginseng has been generally used alone or in combination with other herbs to restore the 'yang' quality. It has also been used as a tonic for its revitalizing properties, especially after a long illness. It has been used as an alterative, anodyne, aperitif, aphrodisiac, gonodotrophic, carminative, emetic, estrogenic, expectorant, nervine, sedative, stimulant, sialogogue and tranquilizer. Since 1950, a great amount of research has been conducted world-wide to determine whether the therapeutic properties attributed to ginseng, but unfortunately, inconsistent results [due mostly to different procedures in the preparation of extracts, use of non-official parts of the plant, use of adulterants and lack of quality control in the ginseng used] have made determination of ginseng's true properties difficult. Over the years, ginseng has been reported to have numerous pharmacological effects in human and laboratory animals. [Joseph E et al 2013]¹

PHARMACOLOGICAL ACTION

Analgesic activity

Four glycoproteins were obtained. The glycoproteins with the highest protein content (73.04%) displayed a dose-dependent analgesic effect. In the writhing test, the glycoproteins significantly inhibited writhes ($P < 0.001$) at a dose of 20 mg/kg by intraperitoneal injection. In the hot-plate test, only at a dose of 20 mg/kg was the hot-plate latency prolonged ($P < 0.05$, at 30 min). In the locomotor activity test, the glycoproteins showed a significant decrease in motility counts at doses of 20 and 40 mg/kg. [Jilin Academy of Chinese Medicine and Material Medica Science 2013]²

Anti-fatigue activity

Anti-fatigue activity of panax ginseng was assessed using the forced swim test (FST) and serum biochemical parameters were determined by auto analyzer and commercially available kits. While all compounds were found to reduce immobility in the FST, the effect of WGPA was demonstrated in lower doses compared with WGP and WGP. Moreover, the FST-induced reduction in glucose (GLU) and glutathione peroxidase (GPx) and increase in creatine phosphokinase (CK), lactic dehydrogenase (LDH) and malondialdehyde (MDA) levels, all indicators of fatigue, were inhibited by the corresponding doses of WGP, WGP and WGPA. Ginseng polysaccharides have anti-fatigue activity, also reflected in the effects on the physiological markers for fatigue. The acidic polysaccharide is more potent than the neutral polysaccharide. [Jia Wang et al 2010]³

Anti inflammatory activity

KRG-WE reduced the production of nitric oxide (NO), protected cells against NO-induced apoptosis, suppressed mRNA levels of inducible NO synthase (iNOS), cyclooxygenase (COX)-2, and interferon (IFN)- β , ameliorated EtOH/HCl-induced gastritis, and down regulated peritoneal exudate-derived NO production from lipopolysaccharide (LPS)-injected mice. The inhibition of these inflammatory responses by KRG-WE was regulated through the suppression of p38, c-Jun N-terminal kinase (JNK), and TANK-binding kinase 1 (TBK1) and by subsequent inhibition of activating transcription factor (ATF)-2, *cAMP response element-binding* protein (CREB), and IRF-3 activation. Of ginsenosides included in this extract, interestingly, G-Rc showed the highest inhibitory potency on IRF-3-mediated luciferase activity. [YanvanYang et al 2014]⁴

Antioxidant

Chemical and biological activity tests have elucidated the scientific evidence underlying the therapeutic potential of HPG with respect to oxidative tissue damage. Free radical-scavenging active components such as less-polar ginsenosides and maltol in *Panax ginseng* significantly increased depending on the temperature of heat-processing. Based on animal experiments related to oxidative tissue damage, HPG displayed hepatoprotective action by reducing the elevated TBA-RS level, and NF- κ B and iNOS protein expression, while increasing HO-1 in LPStreated rat livers, and HPG also displayed renal protective action by ameliorating physiological abnormalities and reducing elevated TBA-RS, AGEs, NF- κ B, COX-2, iNOS, 3-nitrotyrosine, CML, and RAGE protein expression in the diabetic rat kidney. Therefore, HPG clearly has a therapeutic potential with respect to oxidative tissue damage

by inhibiting protein expression related to oxidative stress and AGEs. Thus, further investigations with active compounds are underway. This investigation of specified bioactive constituents is

important for the development of scientific ginseng-derived drugs as part of ethnomedicine. [Takako Yokozawa *et al* 2007]⁵

Post prandial insulinemia

The insulin sensitizing effects of KRG-30% and AG-50% extracts suggest that other root parts, including other ginsenosides not typically measured, may influence PPG and insulin parameters. There is potential for AG and KRG extracts to modulate IS, an independent predictor of type 2 diabetes [De Souza LR *et al* 2015]⁶

Hepatoprotective activity

TCMGARs extracts remarkably prevented the elevation of ALT, AST, ALP and liver peroxides in CCl₄-treated rats. Hepatic glutathione levels were significantly increased by the treatment with the extracts in experimental groups. [Tissue culture raised mountain ginseng adventitious root] [Hosakatte Niranjana Murthy *et al* 2014]⁷

Anticancer activity

Ginseng extracts and ginsenosides have been reported to have anti-inflammatory properties.²⁴ Ginseng can modulate the generation of inflammatory mediators (such as NO, synthesized by the activity of NOSs²⁵) and the phagocytic activity of macrophages .[Te-Hsin chao *et al* 2014]⁸

Immunomodulatory activity

Thousands of literatures have described the diverse role of ginseng in physiological processes such as cancer, neurodegenerative disorders, insulin resistance, and hypertension. In particular, ginseng has been extensively reported to maintain homeostasis of the immune system and to enhance resistance to illness or microbial attacks through the regulation of immune system. Immune system comprises of different types of cells fulfilling their own specialized functions, and each type of the immune cells is differentially influenced and may be simultaneously controlled by ginseng treatment. This review summarizes the current knowledge on the effects of ginseng on immune system. We discuss how ginseng regulates each type of immune cells including macrophages, natural killer cells, dendritic cells, T cells, and B cells. We also describe how ginseng exhibits beneficial effects on controlling inflammatory diseases and microbial infections. [Kang, Soo-Won *et al* 2012]⁹

Comparison of ginseng on modern pharmacological experiments and clinical trials

Panax ginseng C.A. Meyer is a well-known medicinal herb native to China and Korea, and has been used as a herbal remedy in eastern Asia for thousands of years. However, there is different evidence of ginseng efficacy between traditional Chinese medicine (TCM), modern pharmacological experiments and clinical trials. In TCM, ginseng is a highly valued herb and has

been applied to a variety of pathological conditions and illnesses such as hypodynamia, anorexia, shortness of breath, palpitation, insomnia, impotence, hemorrhage and diabetes. Modern pharmacological experiments have proved that ginseng possesses multiple constituents (ginsenosides, polysaccharides, peptides, polyacetylenic alcohols, etc.) and actions (central nervous system effects, neuroprotective effect, immunomodulation, anticancer, etc.), ginsenosides as the active ingredients, especially, having antioxidant, anti-inflammatory, antiapoptotic and immunostimulant properties. Recently, ginseng has been studied in a number of randomized controlled trials investigating its effect mainly on physical and psychomotor performance, cognitive function, immunomodulation, diabetes mellitus, cardiovascular risk factors, quality of life, as well as adverse effects. Equivocal results have been demonstrated for many of these indications. Because of the poor quality of most clinical trials on ginseng, reliable clinical data in humans are still lacking. Therefore, a broader understanding of medical knowledge and reasoning on ginseng is necessary.¹⁰

CONCLUSION

Ginseng. is a crude drug used as phyto-medicine to treat traditionally a wide range of health complications. This rhizomes can be explored further as per its diversity of traditional uses and on the basis of wide range of chemical compounds reported to be present in various parts of the plant. In the present investigation, Pharmacology and traditional uses of *ginseng* has been reviewed. Furthermore, the undocumented knowledge on this plant species has to recorded and should be explored widely so that it could serve the Humanity.

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