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Ginseng : A Dietary Supplements as a Immune - Booster in Various Diseases

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Abstract: *Ginseng is a perennial plant belonging to the Panax genus of the Araliaceae family, has been used in China, Korea & japan as a traditional herbal medicine for thousands of years .Mechanistic studies suggest that ginseng , as dietary supplements plays a key role in disease prevention by modulating the immune function of human body. The root of Panax ginseng and Panax quinofolius are commonly known as Ginseng. Ginseng species and species and ginsenosides and their intenstinal metabolism & bioavailability are coincisely introduced.Ginseng roots are well known for their high content of saponins, ginsenosides, phenolic compounds, including carbohydrates and carotenoids. .Many active compounds can be found in all parts of plant, including amino acid, alkaloids, phenols, protein, polypeptide & vitamin B1 & B2 .Ginseng has been used to increase physical endurance & lessen fatigue, to improve ability of cope with stress and to improve concentration.*

Keywords: Panax ginseng, American ginseng, Dietary supplement, vaccine Adjuvant, Acquired immunity, cytokine

I. INTRODUCTION

Ginseng is a herb that has a light colored, forked shaped roots , a relatively long stalk , and green leaves in an oval shape .Ginseng is root of plants in genus Panax, such as korean ginseng, south china ginseng & American ginseng. Although ginseng has been used in traditional medicine over centuries, modern clinical research is inconclusive about its medical effectiveness. Ginseng is one of variety of large group of fig trees (ficus retusa). Chemical constituents of ginsneg is protopanaxatrio, Dammarane, protopanaxadio, ginsenosides, panaxatriol , falcariol ,triterpenoid saponin , panaxytriol, Ginsenosides. Ginseng is well known immune modulator, and there is concern that it's immune enhancing effects may negatively affect patients with rheumatoid arthritis by worsening symptoms or increasing the risk of adverse effects from other drugs.

1.1 History

Ginseng has a medical history for thousands of years and become one of most widely used traditional herbal medicine. It belonged to Panax genus of the Araliaceae family .The word Panax means " all heal " in Greak , which is based on the view that ginseng is powerful to heal any kind of disease. Ginseng originated from Chinese words " Jen Sheng " meaning " man - herb " , because a shape in root of plant resembles a humanoid form The most extensively investigated ginseng are Panax ginseng (korean ginseng) Panax quinquefolious L.(American ginseng) , Panax notoginseng (Chinese ginseng) . It has been documented that ginseng and it's constituent exhibit wide variety of beneficial pharmacological effects. Generally, the originating area of ginseng is known to be in shangdang , china . The originating time , which has been estimated according to textual & archeological outcomes is known to be the first century B.C., during the Han Dynasty era , This can be referred to as the "Chinese origin theory of ginseng ".

1.2 Benefits

1.2.1 People have traditionally taken ginseng to help with a range of medical conditions. More research is needed to confirm if it has any benefit as a supplement. Â Western scientists and health professionals often question the medicinal properties of ginseng. Â Ginseng products can vary in their quality and potential medicinal properties.

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1.2.2 Increased Energy

Ginseng may help stimulate physical and mental activity in people who feel weak and tired. In One Â study Â of 21 men and 69 women found that ginseng showed good results in helping Â people Â with Â chronic fatigue. A 2014 study of people receiving cancer treatment found that ginseng helped reduce cancer-related fatigue. Â

1.2.3 Sharper cognitive function

Ginseng may improve thinking processes and cognition. Â A 2018 report examined that, This report concluded that, based on human and animal studies, ginseng components have the potential to treat some cognitive deficits. These studies showed ginseng could reduce oxidative stress, which could lead to enhancement in cognitive function. A 2016 study on the effects of Korean red ginseng on cognitive function in patients with Alzheimerâ€™s disease found promise as well.The study concluded that the Korean red ginseng helped improve frontal brain lobe function.

1.2.4 Anti-inflammatory effects:

Ginseng may reduceÂ inflammation. According to aÂ 2020 study trusted , ginsenosides, the active components of ginseng, may target pathways in the immune system that could reduce inflammation.

1.2.5 Treatment of erectile dysfunction

AÂ systemic review Â tested the effects of red ginseng on erectile dysfunction. The review demonstrated that the number of trials, total sample size, and the quality of the experimental methods were not enough to demonstrate ongoing clinical benefit.

1.2.6 A 2020 study of 119 men with mild-to-moderate erectile dysfunction found that ginseng berry extract improved overall sexual function. The study lasted 8 weeks, during which some of the group received Korean ginseng berry extract, and others received a placebo.

1.2.7 Flu prevention

Research on the effects of ginseng on mice suggests a possible link Trusted Source between ginseng and the treatment and prevention of influenza and respiratory syncytial virus (RSV).

1.2.8 Lowering blood sugar

A 2014 study suggests that ginseng may help lower blood sugar and help treat diabetes. Ginsenosides may affect insulin production in the pancreas and improve insulin resistance using other mechanisms.

1.2.9 Another 2014 study

Trusted Source showed similar benefits of ginseng on lowering blood sugar. Some participants took 2.7 grams of fermented red ginseng each day, while others took a placebo. Researchers found that ginseng was effective in lowering blood sugar and increasing insulin levels after a meal compared to the placebo.

1.2.10 May Have Potential Benefits Against Cancer

Ginseng may be helpful in reducing the risk of certain cancers. The cell cycle is the process by which cells normally grow and divide. Ginsenosides could benefit this cycle by preventing abnormal cell production and growth. Ginsenosides in ginseng seem to regulate inflammation, provide antioxidant protection and maintain the health of cells, which could help decrease the risk of certain kinds of cancer. Nevertheless, more research is needed.

1.2.11 May Fight Tiredness and Increase Energy Levels

Ginseng has been shown to help fight fatigue and promote energy. Ginseng may help fight fatigue and enhance physical activity by lowering oxidative damage and increasing energy production in cells.

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1.2.12 May Boost the Immune System

Ginseng may strengthen the immune system .The study examined the effect of red ginseng extract on immune system markers in people with advanced stomach cancer undergoing post-surgery chemotherapy. After three months, those taking red ginseng extract had better immune system markers than those in the control or placebo group.

1.3 Anti-Microbial Activity of Ginseng

Plants are continuously in contact with different microorganisms such as viruses, bacteria and fungi. The interactions between plants and microbes may be beneficial for the plants, but many plant-associated microbes are pathogens which affect development, reproduction, and growth of the plants. Therefore, plants produce antimicrobial compounds as a defense mechanism against microbial attacks, and these plant-derived compounds have been reported to prevent bacterial or viral infection also in humans. Especially, ginseng is one of the best-known medicinal herbs improving microbial clearance from the body. Total ginseng extracts as well as single or multiple components derived from ginseng have shown anti-microbial activities, and clinical trials have also been performed to evaluate the anti-bacterial or anti-viral activities of ginseng.

1.4 Anti-bacterial activity:

For successful establishment of bacterial infections, it is necessary to have adhesion to host cells, colonization of tissues, and in certain cases, cellular invasion followed by intracellular multiplication, dissemination to other tissues, or persistence. In general, bacterial adhesion is mediated by certain interactions between adhesin from bacteria and carbohydrates on the surface of host cells. Studies have shown that ginseng polysaccharides could interact with microbes, interrupt microbial adhesion to host cells, and block the initiation of infectious disease. For example, PG-F2 and PG-HMW, pectin-type polysaccharides from *P. ginseng*, had anti-adhesive activity against various microbes such as *Porphyromonas gingivalis, Actinobacillus actinomycetemcomitans, Propionibacterium acnes*, and *S. aureus.* These two polysaccharides did not directly affect microbial growth but decreased the percentages of attached microbe, suggesting that ginseng polysaccharides have potential roles in anti-adhesive activity. In addition, polyacetylenes isolated from *P. ginseng* hairy root culture exerts direct bactericidal effects . Four different polyacetylene compounds were treated to various microorganisms such as Gram-positive bacteria (methicillin-resistant *S. aureus* and *Bacillus subtilis*) and Gram-negative bacteria (*Escherichia coli* and *Serratia marcescens*), and their minimum inhibitory concentrations were measured. The results show that polyacetylene compounds were effective against bacterial infections and the level of antibacterial activity was dependent on structural features of the polyacetylene

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1.5 Anti-viral activity

Influenza virus, commonly referred to as the flu, can be influenced by RGE. After intranasal administration of ginseng extract with influenza virus A/PR8, significant increases in IgA as well as total IgG were observed in blood, lung, vaginal lavage, and fecal extract in mice. The increase in total IgG was comparable to that observed in the aluminium hydroxide or cholera toxin-adjuvant group. In addition, all serum IgG subtypes such as IgG_1, IgG_{2a}, IgG_{2b}, and IgG_3 antibodies were all augmented. Simultaneously, virus neutralization activity, cytokine production, body weight changes, and survival rates were all improved by ginseng treatment indicating that ginseng extract well-executes immunoregulatory function as an adjuv

1.6 Ginseng Action on Immune System

Panax ginseng is often referred to as an adaptogen, which suggests it has varied actions and effects on the body that support nonspecific resistance to biochemical and physical stressors, improve vitality and longevity, and enhance mental capacity.47-51 In an attempt to prove ginsengâ€™s effect on the immune system, a 70% ethanolic extract of P. ginseng was subjected to a comprehensive testing battery capable of detecting subtle immune changes in mice, whose immune function was suppressed by cyclophosphamide, a common chemotherapeutic agent. The observation showed that the basal natural killer (NK) cell activity was stimulated, supporting an immunomodulatory property of ginseng.52 Research reviews postulate that extracts of Panax ginseng affect the hypothalamus-pituitary-adrenal axis and the immune system, which could account for many of the documented effects. Animal models and in vitro studies

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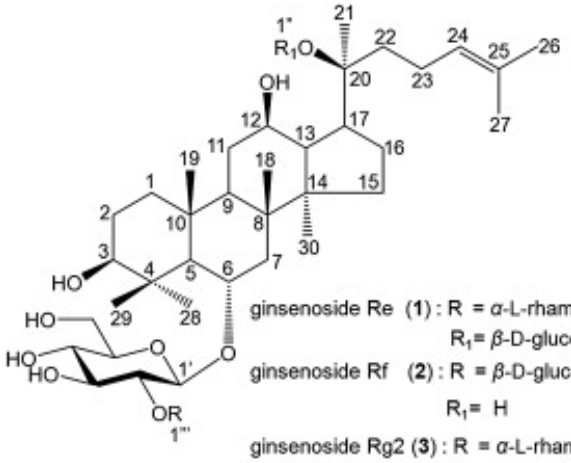
indicate that Panax ginseng enhances phagocytosis, natural killer cell activity, and the production of interferon. A double-blind, placebo-controlled eight-week study examined the immune effects of 100 mg Ginsana[R] (G115), 100 mg liquid ginseng extract, or placebo twice daily in 60 healthy volunteers. Blood samples collected at baseline, week four, and week eight examined polymorphonuclear (PMN) cell chemotaxis, phagocytosis, total lymphocytes, T-helper and T-suppressor cells, and NK-cell activity. The groups receiving ginseng experienced consistent improvement in immune system activity at week four and statistically significant differences at week eight, evidenced by improvements in PMN cell chemotaxis, phagocytosis, and total number of T-helper and T-suppressor cells. The authors concluded ginseng extract stimulates the immune system and the standardized extract is more effective than the liquid ginseng extract.53 Some of the same researchers examined the effects of Panax ginseng extract on the immune response to vaccination. The multicenter, 12-week, double-blind RCT compared immune response in 227 participants, measured as NK-cell activity, at weeks eight and 12, post influenza vaccine given at week four. The treatment group received 100 mg G115 twice daily. NK-cell activity for the ginseng group was double that of the placebo group ($p<0.0001$) at weeks eight and 12. Serum antibody titers were 272 units in the ginseng group compared to 171 units in the placebo group. A significant decrease in the frequency of upper respiratory infections during weeks 4-12 was noted in the treatment group compared to placebo; 15 cases versus 42 cases, respectively. This study supports the role of ginseng in immune system modulation.54 An RCT compared the effects of red Panax ginseng on HIV-1 infected patients (n=61). The purpose of this study was to determine the effects of red ginseng after accounting for HLA type (I or II and class A, B, and C), on CD4 counts, CD8 counts, and the trend toward decreased resistance to antiretroviral drugs. HLA type can be associated with an improved prognosis in HIV patients, based on an algorithm that also predicts risk of disease progression. The treatment group received 5.4 g red Panax ginseng daily. Blood samples were taken from the control group (n=199) and HIV-1 infected patients every six months throughout the study. Data analysis revealed an inverse correlation between the HLA score and the decrease of CD4 T cells over time, a decrease in the decline of CD4 T cells associated with the intake of red Panax ginseng, and a significant ($p<0.05$) decline of CD4 T cells, independent of the HLA class I effects on immune system cells. The authors concluded that red Panax ginseng and HLA type independently affect the slow depletion of CD4 T cells in HIV-infected patients.



1.7 Bioavailability

The oral bioavailability of ginsenosides is very poor. It cannot be easily absorbed by the intestines due to their hydrophilicity. The absorption of ginsenosides in the intestinal mucosa is energy-dependent, and its availability of both intact ginsenosides and/or its metabolites from the intestines are very low. Biotransformation of ginsenosides by microbiota in gut may form the deglycosylated products. The deglycosylated products are more permeable and absorbable

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than ginsenosides . However, the extensive biliary excretion through active transport causes the shortage of its biological half-life to result in a low systemic exposure level. Some studies has been developed to overcome this problem, such as coadministration with adrenalin or using lipid-based formulations and the suppression of p-glycoprotein efflux system that are proven to increase the oral bioavailability of ginsenosides.

1.8 Growing Panax Ginseng

It begins with finding the right farmers and searching for suitable growing fields
Seeds are planted in special nursery beds.
Seedlings are then hand-planted in October/November.
Shredded leaves from harvested plants are used as fertiliser.

1.9 Scope and Approach

The present review report is a structural and functional diversity of ginseng, immunity boosting potential, key bioactive & studies related to cell-mediated and humoral immunity of ginseng. Immunity-boosting power of ginseng against Cancer, autoimmune disease & viral & bacterial infections has been compiled .The Clinical trials carried out and patent portfolio of ginseng against immune disorder is the important of this review.

In recent years, there is a growing interest in the role of ginseng as a neutraceutical or functional Food with increasing market Value. Ginseng-made biopharmaceuticals against immunity-related disorders have begun to blossom as a field in their own right. The immune modulatory role of ginseng can be improved Using nano-technological methods. Ginseng has promising role in boosting host has immunity actively or passively as Vaccine adjuvant against different infections, in autoimmune diseases, osteoporosis & allergies.

1.10 Side effects

- Headaches
- Sleep problems
- Digestive problems.
- Changes to blood pressure and
- Blood sugars
- Diarrhoea.
- Rapid heart beat
- Severe skin reaction.

Women Experience

- Swollen breasts.
- Vaginal bleeding.

Interactions

People may experience a moderate interaction when Using ginseng with a class of antidepressants Called monoamine Oxidase, inhibitors (MAOIS) . Ginseng Can alter the effects of blood pressure, diabetes, and heart medication, including Calcium channel blockers. The herb Can also increase risk of bleeding when taken with blood thinners Such as warfarin aspirin.

II. CONCLUSION

In this study, we reviewed the potentials of ginseng to serve as immune-modulators and functional ingredient for the immune system ginseng against various diseases especially via immune modulation. Ginseng or derived products modulate immune functions of cancer patients both at cellular and humoral level. Ginseng has promising role in boosting host immunity actively or passively as vaccine adjuvant against different infections, in autoimmune diseases, osteoporosis and allergies. The immune modulatory role of ginseng can be improved. using nano-technological methods. Various patents and clinical trials of ginseng with immune modulatory theme have been registered in patent and clinical trials

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databases. Ginseng has good safety profile even the untoward effects reported from clinical trials are mild, reversible and with no special safety concerns, therefore, the safety/risk balance has more inclined towards safety.

III. CONFICTS OF INTEREST

The authors declare no conflict of interest.

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