A COMPREHENSIVE PHARMACOGNOSTICAL REVIEW ON VARIOUS HERBS USED IN TREATMENT OF NASAL CANCER

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Abstract - Nasal cancer is a rare cancer that affects the nasal cavity (the space behind your nose). Nasal cancer is different from cancer of the area where the nose and throat connect. All 22 studies reported herbs and decoctions, and Radix glycyrrhizae, Salvia miltiorrhiza, Radix ophiopogonis were the herbs most frequently used to treat NPC. Herbal medicines or supplements are natural compounds from plants' leaves, bark, roots, seeds, or flowers that people can use for medicinal purposes. They may offer therapeutic benefits when people use them as complementary medicine. Herbal medicines contain active ingredients from natural plants.

Keywords: Nasopharyngeal cancer, salvianoic acid, radix glycyrrhizae, pharmacological action.

INTRODUCTION:
Nasopharyngeal carcinoma (NPC) is a malignancy arising from the nasopharynx, most commonly the posterolateral nasopharynx, pharyngeal recess, or fossa of Rosenmüller. The most common presentation is a palpable neck lump, with approximately 60% patients seeking medical attention when this occurs. Such lumps develop because of metastatic disease in the cervical lymph nodes. TCM makes use of herbs and herbal formulas to strengthen organ function and support good health. An understanding of the essence of various herbal components gives the TCM practitioner a way to create a healing effect that reaches beyond the chemical composition and physical properties of the herbs. Glycyrrhiza Radix is a commonly used Chinese herbal medicine, derived from the dried roots and rhizomes of Glycyrrhiza glabra. The main bioactive constituents of licorice are triterpene saponins and flavonoid. Salvia miltiorrhiza Bunge, also known as red sage or Danshen (Chinese Pinyin name), is a perennial plant in the genus Salvia of the mint family, Lamiaceae. Salvianolic acid is the active chemical constituent of salvia miltiorrhiza. Mai Men Dong (Radix Ophiopogonis) is from the root tuber of Ophiopogon japonicus, family Liliaceae. The roots are dug and collected in the summer. After the fibrous roots have been removed, it is cleaned, dried and used in its unprocessed form. Category: Tonifying – Yin Tonifying1.

1. RADIX GLYCIRRHIZAE:
Glycyrrhiza glabra (Fig. 1) is one of the useful medicinal plants. Glycyrrhiza is derived from the ancient Greek term glykos, meaning sweet, and rhiza, meaning root. Glycyrrhiza glabra is known as mulethi in north India. Glycyrrhiza glabra, also known as LICORICE and sweet wood, is native to the Mediterranean and certain areas of Asia. A number of traditional healers have claimed the efficacy of Glycyrrhiza species for a variety of pathological conditions as a diuretic, choleretic, used as insecticide, and indicated in traditional medicine for coughs, colds, and painful swellings2.
Order : Rosales S
Family : Leguminosae
Genus. : Glycyrrhiza Species : glabra Linn
Binomial Name: Glycyrrhiza glabra Linn.
Synonyms : Glycyrrhiza glandulifera.

● Origin: The roots are unearthed in the autumn of the fourth season. It is grown in India, Spain, Iran, Russia, China and Italy3.
● Ecology: Glycyrrhiza glabra enjoys fertile, sandy, and clay soil near a river or stream where enough water is available for the plant to flourish in the wild, or under cultivation where it can be irrigated.
● Morphology: Glycyrrhiza glabra is a herbaceous perennial, growing to 1 m in height, with pinnate leaves about 7–15 cm long, with 9–17 leaflets. The flowers are 0.8–1.2 cm long, purple to pale whitish blue, produced in a loose inflorescence. The fruit is an oblong pod, 2–3 cm long, containing several seeds1. The Glycyrrhiza shrub is a member of the pea family and grows in subtropical climates in rich soil. Below ground, the Glycyrrhiza glabra plant has an extensive root system with a main taproot and numerous runners. The main taproot, which is harvested for medicinal use, is soft, fibrous, and has a bright yellow interior4.
● Medicinal Parts Used: Roots and Rhizome (powder, teas, tonic, extracts, tinctures, decoction)5.

Chemical constituent: Glycyrrhiza glabra of the Glycyrrhiza species has triterpene, saponin, polysaccharides, flavonoid, simple sugar, pectin, essential oil, protein, and starch. The taste of Radix Liquiritiae is sweet because of glycyrrhizin, a triterpenoid compound. Glycyrrhizin contains a mixture of potassium, calcium and magnesium salts of glycyrrhizic acid, which varies in the range of 225%. The yellow color of Radix Liquiritiae is due to liquiritin, isoliquiritin, and other flavonoids in its content. Among the isoflavones it contains, glabridin and hispaglabridins A and B which have antioxidant activity. Suzuki F and Maeda H. Suppressor macrophages: A role on the growth of transplanted tumors and regulation by an extract of licorice, glycyrrhizin. The roots of Glycyrrhiza glabra L6. contain Glycyrrhiza, a saponin 60 times sweeter than sugarcane sugar. Rich in flavonoids, its roots include lycocortin, isolikirtin, liquiritigenin and ramnoliquiritin. Recently, glycolykirtine apioside, prenylcoflavone A, shinflavonone, shinpterocarpane and 1-methyl phaseolina have been found from its roots. Glycyrrhizin and glycyrrhetic acid, a saponin compound, are found as calcium and potassium salts in Radix Liquiritiae. In a research conducted on Glycyrrhiza aspera roots in Japan, glycerin K-N have been isolated. The essential oil in Glycyrrhiza glabra leaves contains; benzoic acid, linalool, prasterone, iodoquinol, diethyltoluamide, and benzene. Isoniazid, diethyltoluamide, and benzoic acid are major constituents. While 82 different compounds have been identified in the essential oil of Glycyrrhiza glabra derived from the roots, the main compounds identified from the roots are; hexanoic acid, hexanol, and octanoic acid7.

General mechanism of action: Flavonoid extracted from the roots of licorice also induces apoptosis and suppresses the proliferation of MDA-MB-231 breast cancer cells by increased generation of ROS. The beneficial effects of licorice can be attributed to a number of mechanisms. Glycyrrhizin and glycyrrhizic acid have been shown to inhibit growth and cytopathology of numerous RNA and DNA viruses, including hepatitis A and C 16 herpes zoster, HIV, Herpes simplex 17, 18 and CMV 19. Glycyrrhizin and its metabolites inhibit hepatic metabolism of aldosterone and suppress 5-β-3-reductase, properties responsible for the well-documented pseudoaldosterone syndrome. The similarity in structure of glycyrrhizic acid to the structure of hormones secreted by the adrenal cortex accounts for the mineralocorticoid and gluco-corticoid activity of glycyrrhizic acid8. Licorice constituents also exhibit steroid-like anti-inflammatory activity, similar to the action of hydrocortisone. This is due, in part, to inhibition of phospholipase A2 activity, an enzyme critical to numerous inflammatory processes. In vitro research has also demonstrated glycyrrhizic acid inhibits cyclooxygenase activity and prostaglandin formation as well as indirectly inhibiting platelet aggregation, all factors in the inflammatory process. Licorice constituents possess significant antioxidant and hepatoprotective properties. Glycyrrhizin and 3 glabridin inhibit the generation of reactive oxygen species (ROS) by neutrophils at the site of inflammation 20, 21. In vitro studies have demonstrated licorice isoflavones, hispaglabridin A and B, inhibit [Fe.sup.3]-induced mitochondrial lipid peroxidation in rat liver cells. Other research indicates glycyrrhizin lowers lipid peroxide values in animal models of liver injury caused by ischemia reperfusion 22. Licorice 4 constituents also exhibit hepatoprotective activity by lowering serum liver enzyme levels and improving tissue pathology in hepatitis patients9.

Therapeutic Uses:
● Antitussive Activity
● Antioxidant Activity:
● Antiviral activity
● Immunomodulatory Activity
● Anticarcinogenic and Antimitagenic Activity
● Antidepressant activity:
● Cardiovascular system:
● Side Effects and Toxicity Marketed products
Inlife liquorice root extract(Capsule)
Price: 318rs

Dose: 1 – 4 gm, thrice a day
Route of administration: Oral route

2. SALVIA MILTIORRIZA: Salvia miltiorrhiza, named Danshen in Chinese, is a traditional Chinese medicinal herb. It is a perennial flowering plant in the genus Salvia, highly valued for its roots in traditional Chinese medicine. Native to China and Japan, it grows between 90-1200 m elevation, preferring grassy places in forests, hillsides, and along stream banks in the west and southwest provinces of China. The plant is a deciduous perennial. It grows to between 30-60 cm high. Leaves are simple or divided, depending on their position on the stem. Flower petals are purple or blue held within a dark purple calyx (Figure 4). The specific epithet miltiorrhiza means "red juice extracted from a root" (Clebsch et al., 2003). Danshen is the dried root of S. miltiorrhiza (Labiatae) and is one of the most versatile Chinese herbal drugs, sometimes described as Chinese sage or red sage root (Figure 5). Danshen was used infrequently in ancient Chinese’s medicine, yet it has become an important herb in modern Chinese clinical practice. It has been used clinically to treat and prevent cardio-vascular disease, hyperlipidemia, and cerebrovascular disease throughout the world (Cheng et al., 2007). The transformation of Danshen from a rarely used and minor component of formulas to a key herb is a story that sheds light on the evolution of the Chinese medical tradition. Now, S. miltiorrhiza is often widely used in combination with other herbs.

Kingdom: Plantae
Division: Angiosperms
Class: Eudicots
Order: Lamiales
Family: Lamiaceae
Genus: Salvia
Species: S. miltiorrhiza
Binomial name: Salvia miltiorrhiza.

Chemical constituent: 1. Salvianolic acid (or salvianolic acid B): It inhibits the production of inflammatory cytokines including IL-1β and TNF-α and decreases the levels of fibrosis markers such as α-SMA and collagen. It exerts antifibrotic effects by inhibiting the activation of coagulation factors. 2. Dihydrotanshinone: It has been widely used for treating cardiovascular diseases. Dihydrotanshinone I exhibits entry-blocking effect for MERS-CoV. 3. Miltirone: It is responsible for the reducing effect of its extracts on alcohol intake in different experimental models of excessive alcohol consumption. 4. Tanshinone I: It is flavonoid, helps to reduce the overexpression of proinflammatory
molecules such as NO, TNF-α, IL-1β, and IL-6 and inhibit the activation of NF-κB in LPS-induced BV2 microglia cells. 5. Tanshinone IIA: It has been widely used in clinic due to their proved anti-inflammation, antioxidation, and anti-fibrosis functions.

Mechanism of action: The protective effect of S. miltiorrhiza and its active components relied greatly on the amelioration of oxidative stress, which showed as the increase of antioxidant enzymes, such as superoxide dismutase (SOD), catalase, glutathione system, and a decrease in malondialdehyde – the biomarker of lipid peroxidate.

Therapeutic targets of S. miltiorrhiza in cardiovascular diseases. HIF1α, hypoxia-inducible factor 1α; VEGFA, vascular endothelial growth factor A; NR2C2, nuclear receptor subfamily 2 group C member 2; FATP, fatty acids transport protein; CPT1, carnitine palmitoyltransferase I; PPARα, peroxisome proliferator-activated receptor-α; Cx43, 12 connexin 43; eNOS, endothelial nitric oxide synthase; SOD, superoxide dismutase; TG, triglycerides; TC, total cholesterol; LDL-C, low-density lipoprotein cholesterol; Lp(a), lipoprotein (a); GGT, gammaglutamyl transferase; DBil, direct bilirubin; UA, uric acid; Hey, homocysteine; HDL-C, high-density lipoprotein cholesterol; ApoA, apolipoprotein A; Tbil, total bilirubin; IBil, indirect bilirubin; MMP, matrix metalloproteinase; Bcl-2, B-cell lymphoma 2; PKD1, protein kinase D1 protein; iNOS, inducible nitric oxide synthase; MPO, myeloperoxidase; IL-10, interleukin10; TNF, tumor necrosis factor; IL-1β, interleukin-1β; IL-6, interleukin-6; H3K4me3, H3K4 trimethylation; H3K36me3, H3K36 trimethylation; Col1a1, collagen type I alpha 1, Col3a1, collagen type III alpha 1; Acta2, actin alpha 2.

Toxicity:

At the higher dosage levels, S. miltiorrhiza may on rare occasions cause dry mouth, dizziness, lassitude, numbness, shortness of breath, and other symptoms that will usually disappear spontaneously without interrupting the treatment. Rare Chinese Materia Medica notes that S. miltiorrhiza is not suitable for patients who have deficiency but not stasis, weakness of the heart, or tendency to bleed. S. miltiorrhiza has very low acute toxicity, with an LD50 of 40-80 g/kg31. The Pharmacopoeia of the People's Republic of China indicates a recommended dosage of 9-15 g per daily dose in decoction form. In a few instances, higher doses are administered, up to 20 g per day, in the treatment of inflammatory diseases, including viral hepatitis. According to English-Chinese Rare Chinese Materia Medica, up to 30-60 g can be used in cases of angina and heat-type arthritis. The relatively high dosage of S. miltiorrhiza, compared to most other Chinese herbs may be attributed to the relatively low level of active constituents and their poor anti-inflammatory activity.

**Toxicity:**

- Anti-cancer activity
- Anti-inflammatory activity
- Antimicrobial activity
- Antivirus activity
- Antioxidant activity
solubility in water. It is recommended that S. miltiorrhiza, or its pre-parations used for treatment of poor blood circulation, not be combined with coumadin (Warfarin), as there is a possibility of increasing the anticoagulant effects. Such effects may be rare and are likely to be dose dependent, as the mechanism appears to be a simple additive effect of anticoagulant activity of salvia along with that produced by Warfarin. Therefore, persons using coumadin should either avoid using S. miltiorrhiza, or use it in relatively low dosage while paying attention to blood coagulation tests that are routinely performed for persons taking the drug. The doses are based on scientific research, publications or traditional use. Because most herbs and supplements have not been thoroughly studied or monitored, safety and effectiveness may not be proven. Brands may be made differently, with variable ingredients even within the same brand. Combination products often contain small amounts of each ingredient and may not be effective. The dosing for unproven uses should be approached cautiously, because scientific information is limited in these areas. There are no standard or well-studied doses of S. miltiorrhiza, and many different doses are used traditionally. Further studies through long-term bioassays are required to determine the chronic toxicity of the plant on the body.

Marketed products:

1. **Homeopathic dilution**:
   - Categories: Homoeopathic Medicine, Homoeopathic Dilutions
   - Brands: Bakson's Homoeopathy
   - Pack Size: 30 ml
   - Price: 100 rs.

2. **Tincture**:

   **Route of administration: oral route**

3. **RADIX OPHIOPOGONIS**: Radix Ophiopogonis (Mai Dong ) also known as Dwarf Lilyturf Tuber, Dwarf Lilyturf Root and Ophiopogon Japonicus Root, refers to the tuberous roots of Ophiopogon Japnicus, an evergreen perennial plant that belongs to the Liliaceae family. This plant has long, thin and green leaves, as well as tuberous white roots. These roots are typically harvested in summer, cleansed and dried under the sun for medicinal usage. The name of Ophiopogon comes from the Greek words ‘ophis’ and ‘pogen’, where the former means snake and the latter means beard. Other than being used medicinally, Ophiopogon Japnicus is also grown in ornamental gardens as a ground cover and as a decorative plant for freshwater aquaria. However, as it is not a true aquatic plant, it can only live for a few months underwater before it dies. In Traditional Chinese Medicine (TCM), Mai Dong falls under the category of ‘Tonic herbs for Yin Deficiency’. Such herbs are used for patterns of deficiency to replenish one’s ‘Four Treasures’ (qi, blood, yin, yang). Cool in nature, Mai Dong can help individuals who have too much Heat in their body, such as those experiencing a Yang Excess or a Yin Deficiency, to restore a harmonious yin-yang balance. Bitter and sweet in taste,
Mai Dong can cleanse the body by clearing Heat, drying Dampness and promoting elimination via urination or bowel movements. The herb can also slow down acute reactions, detoxify the body and has a tonic effect on the body by replenishing qi and blood. In particular, Mai DonHeart, the Lungs and the stomach36.

**Kingdom:** Plantae  
**Division:** Angiosperms  
**Class:** Monocots  
**Order:** Asparagales  
**Family:** Asparagaceae  
**Subfamily:** Nolinoideae  
**Genus:** Ophiopogon  
**Species:** O. japonicus  
**Binomial name:** Ophiopogon japonicus  

**Chemical constituents:**  
1. Steroidal saponins: (a) Ophiopogonin: Ophiopogonin D of Ophiopogon japonicus ameliorates renal function by suppressing oxidative stress and inflammatory response in streptozotocin-induced diabetic nephropathy rats - PMC37. (b) Ophiopogonoside: Ophiopogonoside is believed to have various health benefits, such as anti-inflammatory, antioxidant, and neuroprotective effects. It has been used in traditional medicine for conditions like respiratory problems, cardiovascular health, and as a general tonic38.  
2. Polysaccharide: Radix Ophiopogonis polysaccharide (ROP), a highly hydrophilic macromolecule, has a unique anti-ischemic action in the myocardium39.  
3. Homoisoflavonoids: (a) Methylophiopogonanone A: suppresses ischemia/reperfusion-induced myocardial apoptosis in mice via activating PI3K/Akt/eNOS signaling pathway40. (b) Methylophiopogonanone B: It shows antioxidative and anti-tumor properties41.

**Mechanism of action:**

![Figure 12: A systematic workflow of the integrative approach for deciphering the pharmaceutical mechanism of herb Radix ophiopogonis on NPC42](image_url)
Pharmacological action:
1. Anticancer activity
2. Anti-inflammatory activity
3. Anti-microbial activity
4. Anti-oxidants activity
5. Anti-diabetic activity
6. Immunomodulation
7. Cough Relief

Toxicity and side effects:
1. Allergic Reactions: Some individuals may be allergic to Radix Ophiopogonis, which can result in skin rashes, itching, or other allergic symptoms.
2. Gastrointestinal Upset: Excessive use may cause digestive issues like diarrhea or upset stomach.
3. Hypoglycemia: Radix Ophiopogonis can lower blood sugar levels, which may be a concern for individuals with diabetes or those taking medications to regulate blood sugar.
4. Cardiovascular Effects: In some cases, it might affect blood pressure or heart rate, so individuals with heart conditions should use it with caution.
5. Potassium Loss: Long-term or excessive use may lead to potassium loss in the body, potentially causing muscle weakness or irregular heart rhythms.
6. Drug Interactions: Radix Ophiopogonis may interact with certain medications, so it's essential to consult a healthcare professional if you are taking any prescription.

Marketed products: 1. Shri Ram herbal Radix ophiopogonis extract tablets

Product details:
- Item Form: Tablet
- Brand: generic
- Age Range: Adult
- Special Ingredients: Ophiopogonis
- Pack of 180 Tablets (Each Tablets 550mg)

Natural Based Product An Organic Multipurpose Remedy Product

Price: 2,290

Expiry: 2025
2. Zyrex Radix ophiopogonis extract powder
Product details:
Item form - Powder
Brand - Zyrex
Pack size - 300gm
Price - 2,700
Expiry - sep 2025.

Dose: 1 table per day or 3-4 gm powder formulation thrice a day
Route of administration: oral route

Conclusion:
This study emphasizes the importance of recent studies on traditional and ancient medicinal plants for the creation of new traditional medicines. Above drugs pharmacological effects after isolation and assay can be challenging. To isolate, extracts are employed to treat many diseases and metabolites. Many extraction studies have not used experimental research, and few have been in conflict with one another. Different extraction techniques are advantageous in limiting illness. Compared to conventional medicines. At the time of this study, phytochemical concentrations in various plant organs were unknown, making it impossible to predict amounts based on conventional applications. Future research should concentrate on the relationship between various phytochemicals and various illnesses. Additional research and study are needed on the concentration of phytochemicals, extraction yield, and physiological activity, among other things. The knowledge gained from these discoveries will be crucial for developing new drugs or practicing preventative medicine. The Radix glycyrrhizae, Salvia miltiorrhiza, Radix ophiopogonis has a lot of unique traits and is impressive. The botanical, phytochemical, nutritional, and pharmacological potential of this drugs are tremendous. In the review paper, it is briefly addressed how anti-cancer I activities work. There is a lot of room for future research to clarify the mechanism of action of this plant and explore its further pharmacological effects. Future herbal medicine production for the pharmaceutical sector may rely heavily on this therapeutic plant. The plants possesses a variety of pharmacological effects, according to the current review. The biological activities are caused by the phytoconstituents that are present in them. The variety of phytochemicals found in this plant can be used as a drug lead for the creation of new therapeutics.

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Disclosure of conflict of interest
The authors have no conflict of interest to declare.

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