



Silymarin: A Wonder Drug

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ABSTRACT

Silymarin is an extract derived from the plant, *Silybum marianum*. It is resident plant of tropical countries and is found in nature in India as well. It has been widely used as an herbal product for treatment of various diseases and health conditions such as hepatic diseases, anti-cancer, inflammatory diseases and neural conditions. Present review is an overview of uses of Silymarin in broad disease categories and its benefits with cited experimental trials.

Keywords: Silymarin; Hepatic; Neural; Inflammation; Cancer

INTRODUCTION

Silymarin is a mixture of flavonolignans which are phytochemical compounds that have been extracted from seeds as well as fruits of *Silybum marianum*. The extract contains flavonoids, polyphenols (20%-35%) and unsaturated Fatty acids. Silybin is its proto-isomeric form. Silymarin contains 3 phytochemicals: Silidianin, silicristin and silybin. Silymarin has been used as complementary alternative herbal or medicinal cure [1]. Silybin is most important constituent that is responsible for beneficial effects of silymarin. Silymarin has multiple pharmacological uses like anti-retroviral, anti-oxidant, anti-cancerous immune-modulatory, cardio and hepato-protective along with anti-inflammatory activity [2-4]. Neuroprotective activity of silymarin is caused by its ability to slow down apoptosis and inflammation [5].

Silymarin is complex consisting of polyphenols that include seven flavonolignans:

- Silibin A
- Silibin B
- Isosilibin A
- Isosilibin B
- Silichristin
- Isosilichristin
- Silidianin
- Taxifolin
- Flavonoid

LITERATURE REVIEW

Silymarin has been classified by World Health Organization's Anatomical Therapeutic Chemical classification system as therapy for liver ailments (A05BA03). Indications for its use include toxic inflammatory hepatic diseases though at lower dosages, it is used in dyspepsia [6]. Currently chemical fertilizers which are required to raise crop production levels are too expensive and most smallholder farmers cannot afford them, even not accessible at need time. Nitrogen has been considered one of the best crop input investments that a farmer can make in terms of return on dollars spent; however, N is the most expensive nutrient for growing grain crops. The application of mineral fertilizer as sole soil fertility management method under intensive continuous cropping is also no longer feasible due to scarcity, high cost where available and the numerous side effects on the soil. Reported that continuous use of ammonia fertilizers under intensive agriculture is capable of further acidifying the soil. For agricultural production to keep pace with the growing global population the use of chemical fertilizers will continue and proper management techniques must be designed and implemented against the pollution potential of fertilizers to achieve sustainability. Increasing cost of production, storage and transportation of nitrogen fertilizers have stimulated biological nitrogen fixing system. One possible solution for sustainable crop production that use legume break supplemented with chemical fertilizers because proper interventions in soil fertility management must generate cropping systems that are productive, sustainable and economically attractive for small holder subsistence farmers.

Production of soybean crop is increasingly practiced by smallholder farmers in western part of Ethiopia but its productivity remains low due to soil nutrient depletion and insufficiency of beneficial microorganisms in the soil system. Both productivity and N₂ fixing abilities of legume crops can be enhanced when the Rhizobium population in the soil is at optimum level. Therefore major drawbacks associated with microbial bio fertilizers that need immediate attention through further research as well as proper planning include their plant specificity and continuous refining of the existing rates of

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strains. Thus the experiment was implemented to determine and to refine existing rates of Brady rhizobium strains for nodulation and yield of soybean.

Role of silymarin in preventing side-effects of chemotherapy

The efficacy of topical silymarin administration for preventing of capecitabine-induced hand-foot syndrome has been evaluated in double-blinded, randomized, placebo controlled clinical study trial by (2017). They observed that prophylactic topical usage of silymarin significantly reduced severeness of capecitabine-induced hand foot and mouth syndrome especially in gastrointestinal carcinoma patients [7].

Silymarin inhibited neuropathy secondary to oxaliplatin chemotherapy. The proposed mechanisms include-activity against oxidative stress, decrease in brain-derived neurotrophic factor expression and p38-mediated 'mitogen-activated' protein kinase apoptotic pathway [8].

Platinum-based chemotherapeutic agents result in morphological alterations in DNA resulting in cell body damage, damages to nuclei and nucleoli, neuronal atrophy in dorsal root ganglions and cellular death. Chemotherapy induced neuropathy be the resultant of Reactive Oxygen Species (ROS) produced by chemotherapy drugs such as-derivatives of taxane such as-Paclitaxel. These agents alter mitochondria and subsequently, result in pain due to neurological as well as inflammatory damage via TRPA1 or transient receptors' potential ankyrin 1 channels that leads to synthesis of Interleukin-1b and various other pro-inflammation related cytokines that undergo secretion from microglial cells [9,10].

DISCUSSION

Vinca alkaloids such as vincristine mediate inflammatory reactions in peripheral body tissues that alter spinal afferent nerve fibers. As a result there is an increase in degradation of C type of nerve fiber, modulation of calcium channels and synthesis of free radical(s) which contribute to neuropathic origin [11]. Silymarin helps in modulating immunological system by inhibition of neutrophilic migration along with immobilizing mast cells. It causes inhibition of TNF- α related generation of reactive oxygen species, peroxidation of lipids and also, modulation of T lymphocytic function [12,13].

Silymarin in treatment of hepatic disorders

Both Silymarin as well as Silibone are derived from a plant 'Silybum marianum'. These flavonolignans extracts have anti-oxidant properties, stimulate protein synthesis, act as antidotes against α -amanitine, regulates metabolism of membranous phospholipids and have hepato-protective effects. Silymarin functions by means of 2 mechanisms. According to first mechanism, there is protective influence on cellular membrane due to direct activity on cell and according to 2nd mechanism, it exerts antioxidative role. Hence, cell membrane is primary target of both silymarin as well as silibone. These components prevent absorption of phalloidine and/or α -amanitine by blocking

binding of phalloidine to cell membrane and by suppression of membrane transport [14].

Silibone effects cell membrane as well as nucleus and increases ribosomal protein synthesis by copying polymerase enzymes and RNA transcription. Protein synthesis is an important for repairing of hepatic lesions. It is essential for substituting structural proteins as well as enzymes that get damaged by these toxins. Study found significant improvement in anti-oxidant associated bio-markers-TAC and thiol in patients who had traumatic injury to liver [15]. Orally administered silymarin in dose of 140 mg per day for treating non-alcoholic fatty liver disease and concluded that this agent lowered the increased serum levels of liver enzymes, most specifically Aminotransferases (ALT).

Their study treated non-alcoholic liver disease patients using Silymarin six months and concluded that there was significant improvement in biochemical parameters and decrease in level of transaminase [16]. Used silbin, a flavonolignan Silymarin isomer for treating non-alcoholic liver disease along with vitamin E and phospholipids. They surmised that Silybin underwent conjugation with phospholipids and vitamin E and may have use as complementary treatment in patients suffering from chronic damage to liver. They reported significant therapeutic lowered levels of serum AST, ALP and ALT among trauma cases [17].

CONCLUSION

Silymarin is a traditionally used ayurvedic medicine used for treating variety of conditions such as-inflammatory and toxic conditions of liver, as an anti-inflammatory agent, as anti-carcinogenic compound among varied other uses which are as mild as dyspepsis. There are very few side-effects reported with this herbal extract though in a vast majority of cases the benefits outweigh the disadvantages.

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