

Medicinal utilities of Milk thistle (*Silybum marianum*): A short Review

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Abstract

Milk thistle (*Silybum marianum* (L.) Gaertner) belong to family Asteraceae is widespread throughout the world. Milk thistle's common name comes from the white markings on the leaves and its milky white sap used traditionally by nursing mothers to increase milk. Milk thistle appears to be safe and have multiple health benefits on against various cancer diseases viz; breast cancer & prostate cancer. Primary chemical constituents of Milk Thistle include flavolignans (silymarin), tyramine, histamine, gamma linoleic acid, essential oil, mucilage, and bitter principle. Available evidence is not sufficient to suggest whether milk thistle may be more effective for some cancerous diseases than others or if effectiveness might be related to duration of therapy or chronicity and severity of liver disease. The seeds have many healing benefits, likely because of their rich antioxidant content that help fight the damaging effects of free radicals in the body. Milk thistle appears to be safe and have multiple health benefits on various liver conditions viz; liver cirrhosis, alcoholic hepatitis, alcoholic fatty liver, liver poisoning, and viral hepatitis.

Key Words: Milk thistle, cancer diseases, medicinal plant, Liver disease, Silymarin, Tyramine, Hiatamine

Introduction

Silybum marianum (L.) Gaertner (Milk thistle) is a flowering plant native to Europe and some areas of the Middle East. The plant is a member of the daisy family, and its seeds are often harvested and used for medicinal purposes. *Silybum marianum* (L.) Gaertner grows as annual or biennial plants. The stem is erect, tall, branched and furrowed but not spiny. The large, alternate leaves are waxy-lobed, toothed and thorny. The lower leaves are cauline (attached to the stem without petiole). The upper leaves have a clasping base with large, disc-shaped pink-to-purple, rarely white, solitary flower heads at the end of the stem. The flowers consist of tubular florets. The phyllaries under the flowers occur in many rows, with the outer row with spine-tipped lobes and apical spines. The fruit is a black achene with a white pappus of milk thistle. Milk thistle is distributed in Uttar Pradesh, Punjab, Haryana, Rajasthan & Madhya Pradesh and mostly cultivated in Uttar Pradesh. Milk thistle prefers in subtropical climate, its needs cool and humid climate.

Places which received with 50-75 mm rainfall are suitable for the better growth. Milk thistle grows successfully in all type of soils, mostly alkaline soil require for this plant. No weeding required for this crop. No major pest and diseases having seen in this crop.¹⁹ (Fig)

Active Ingredient

The active compound in Milk thistle is silymarin, a mixture of at least 4 closely related flavonolignans, 60% to 70% of which is a mixture of 2 diastereomers of silybin. Silymarin is typically administered in amount ranging from 200-500mg per day. Traditional milk thistle extract is made from the seeds and is composed of 65-80% silymarin and 20-35% fatty acids, including linoleic acid. Silymarin is a complex mixture of polyphenol molecules, primarily flavono-lignans and flavonoids. The three principle components of silymarin are the flavanolignans silybin, silychristin, and silidianin⁵. Silymarin is used to regenerate liver cells damaged by alcohol or drugs, decongest the liver. Increase the survival rate of patients with cirrhosis², complement the treatment of viral hepatitis³, protect against industrial poisons, such as carbon tetrachloride (a colorless gas that leaks into air, water and soil near manufacturing and waste sites)⁴, and protect the liver against pharmaceuticals that stress the liver, such as acetaminophen and tetracycline¹.

Anti carcinogenic effect

Preliminary laboratory studies also suggest that active substances in milk thistle may have anticancer effects. One active substance known as silymarin has strong antioxidant properties and has been shown to inhibit the growth of human prostate, breast, and cervical cancer cells in test tubes. Further studies are needed to determine whether milk thistle is safe or effective for people with these forms of cancer⁶. Oxidative stress is one of the key players in skin carcinogenesis, and therefore identifying nontoxic strong antioxidants to prevent skin cancer is an important area of research^{7,18}. In both animal and cell culture studies, it has been shown that silymarin, a polyphenolic flavonoid antioxidant, exhibits preventive and anticancer effects against skin cancer. It was also found that this effect of silymarin is by inhibiting endogenous tumor promoter tumor necrosis factor alpha in mouse skin, a central mediator in skin tumor promotion. In mechanistic studies, silymarin inhibits mitogenic and cell survival signaling and induces apoptosis. Furthermore, silymarin effectively modulates cell-cycle regulators and check points toward inhibition of proliferation, and growth arrest in G₀-G₁ and G₂-M phases

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of the cell cycle. Thus, due to its mechanism-based chemopreventive and anticancer effects in experimental models, silymarin is important for the prevention and/or therapy of skin cancer, as well as other cancers of epithelial origin in humans¹⁰.



Figs: a. Habitat of Milk thistle b. Flowering C. Head Inflorescence d. Dehiscence in flowers e. Dehisced flower f. Blackish brown seeds (medicinal used parts) Breast Cancer

An in vitro study has suggested a possible synergism between milk thistle silibinin and conventional cytotoxic agents for breast cancer treatment¹². Milk thistle extract may exert a strong anti-carcinogenic effect against breast cancer involving inhibition of the threshold kinase activities of cyclin-dependent kinases and associated cyclins, leading to a G₁ arrest in cell cycle progression¹³.

Prostate Cancer

Extracts of Milk Thistle possess anti-cancer activities on human prostate carcinoma. In prostate cancer, milk thistle silibinin exerts its anti-cancer effect probably via epidermal growth factor receptor, insulin-like growth factor receptor type I and nuclear factor kappa B signaling¹⁴. Isosilybin A and B might be the most effective suppressors of prostate-specific antigen secretion by androgen-dependent LN CaP cells. Researchers suggested that milk thistle extracts enriched for isosilybin A or B might possess improved potency in prostate cancer prevention and treatment¹⁵. Finally, milk thistle silibinin was found to be able to down-regulate 5 α -dihydrotestosterone, thus, milk thistle may be beneficial to prostate¹⁶. A research work on silymarin's effects on prostate cancer concluded that silymarin has a huge potential to interfere with many molecular events involved in cancer cell growth, progression, and angiogenesis. Silymarin may inhibit metastasis in prostate cancer and strong efficacy of silymarin in prostate cancer

prevention and intervention, as reported in previous studies.^{12,13}

Medicinal Properties

Milk thistles have protective effects on the liver diseases and to greatly improve its function. It is typically used to treat liver cirrhosis, chronic hepatitis (liver inflammation), and gall bladder disorders. Whether or not these dosages are optimal is not known; no scientific data on which to base effective dosage level guidelines is available. In 1968, a group of German scientists discovered the active flavonoid complex silymarin, which provides milk thistle's medicinal benefits.¹⁷ Milk thistle is believed to give some remedy for liver diseases (e.g. viral hepatitis) and the extract, silymarin, is used in medicine. The adverse effect of the medicinal use of milk thistle is loose stools, as silymarin has a laxative effect. Milk thistle seeds are effective in lowering cholesterol levels, reducing insulin resistance in people with type 2 diabetes who also have cirrhosis, reducing the growth of cancer cells in breast, cervical, and prostate cancers. Used in many products claiming to reduce the effects of a hangover. Milk thistle silibinin modulates cyclin-dependent kinase inhibitors - cyclin-dependent kinases - cyclin cascade and activates caspase 3 causing growth inhibition and apoptotic death of human bladder transitional cell carcinoma cells¹¹. Silymarin is used as an antidote and to prevent poisoning from the death cap mushroom, *Amanita phalloides*.^{5,8,9}

A study of silymarin and liver disease which are available on the web shows an interesting pattern in that studies which tested low dosages of silymarin concluded that silymarin was ineffective²², while studies which used significantly larger doses concluded that silymarin was biologically active and had therapeutic effects²³.

The efficacy of silymarin in preventing drug-induced liver damage in patients taking psychotropic drugs long-term²⁰ and research suggests that extracts of milk thistle prevent and repair damage to the liver from toxic chemicals and medications.²¹

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