

## Milk thistle as liver cleanser

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### Abstract

This present review is focused on medicinal importance of milk thistle. It is a gold medicinal herb in traditional folk medicine for treatment of liver diseases and other health benefits. Silymarin is active constituents of milk thistle mainly present seeds which contain three Flavonolignans viz. silychristin, silybinin, and silidianin. Milk thistle seed extract (silymarin) and its constituents (mainly silibinin) act as liver tonic, hepatoprotective, cirrhosis, treating liver poisoning and other health beneficial like in blood disease, mushroom poisoning, lactation etc. Milk thistle seed is very promising herbal drug. More research is warranted to substantiate its broad ranging phytotherapeutic effects.





**Keywords:** Milk thistle; Silymarin; Liver cleanser; Liver detoxification; Liver disease

### 1. Introduction

The European native milk thistle was brought to North America by the first settlers. Asia, Africa, Australia, South America, and the eastern United States are all home to milk thistle plants. The terms "silymarin" and "milk thistle" are frequently used synonymously.

*Silybum marianum (L.) Gaertn.* is a member of the Asteraceae family; it was formerly known as *Carduus marianus*. This herbaceous plant has some unique therapeutic qualities and can serve as a host for certain infections. The white veins on the leaves make it simple to recognize the plant (Figure 1). The purple blossoms are produced at the branch's tip (Figure 2). (Figure 3) show that the seeds are black to dark brown in color and have white, silky pappus on them shown in (figure 4).

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<p><b>Figure 1</b> White veins on leaves</p>	<p><b>Figure 2</b> Flower</p>
	
<p><b>Figure 3</b> Seeds of Milk Thistle</p>	<p><b>Figure 4</b> White silky pappus</p>

The distinctive feature of the milk thistle flower head is the thick, leathery bracts that are  $\frac{3}{4}$  to 2 inches long and have stiff spines at the tips, setting it apart from other thistles. The seeds are round, smooth, shiny, hefty, and  $\frac{1}{4}$  inch long. They have a tuft of minutely barbed bristles that is deciduous and falls off in a ring when the seeds develop. The color of the seeds varies from black to brown mottled.

Milk thistle has long been used by people to treat gallbladder and liver issues. According to experts, silymarin is the herb's main active component. Milk thistle seeds are a source of the antioxidant chemical silymarin. It's occasionally used as a natural cure for conditions like cirrhosis, jaundice, hepatitis, and gallbladder issues, though it's unknown what advantages, if any, it may have in the body.

For thousands of years, people have utilized the seeds of the milk thistle plant as a herbal treatment, primarily for ailments of the liver. The medicinal and health-promoting properties of milk thistle seeds are mediated by multiple molecular pathways. The medicinal and health-promoting properties of milk thistle seeds are mediated by multiple molecular pathways.

## 2. History

The origin of the name "milk thistle" is rooted in the legend of the Virgin Mary, who took refuge behind the prickly leaves of the plant while tending to the infant Jesus. The characteristic white veins on milk thistle leaves are the result of a drop of Mary's milk falling. Dioscorides is credited with the first known usage of milk thistle, when he suggested using the herb to heal snake bites. The plant's juice combined with honey was recommended for "carrying off bile," according to Pliny the Elder. The British herbalist Culpepper utilized milk thistle to treat liver blockages after it was first prized as a

cure for liver poisons in the Middle Ages. The herb was found to be beneficial for "congestion" of the liver, spleen, and kidney by eclectic doctors Felter and Lloyd in 1898.

### 3. Taxonomic hierarchy

- Kingdom - Plantae
- Subkingdom – Viridaeplantae
- Infrakingdom –Streptophyta
- Division – Tracheophyta
- Subdivision – Spermatophytina
- Infradivision – Angiospermae
- Class – Magnoliopsida
- Superorder – Asteranae
- Order – Asterales
- Family – Asteraceae
- Genus – *Silybum*
- Species – *Silybum marianum (L.) Gaertn.*

### 4. Phyto-chemistry

#### 4.1. Flavonoids

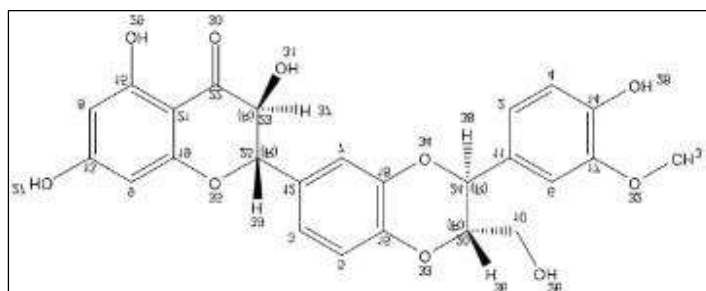
Several flavonolignans, including silybin, dehydrosilybin, isosilybin, silydianin, and silicristin, are combined to form silymarin; silybin has the largest concentration of these substances. Silymarin compounds are commonly referred to as flavonolignans. The compound's molecular structure can be divided into two components based on even its fundamental name: hybrid and non-conventional lignans, which belong to the silymarin compounds group more appropriately. Because flavonolignans' core structure has several symmetrical centers, they are naturally found as stereoisomers. Figure 1 described the chemical structure of milk thistle.

According to scientific literature, taxifolin, silybin A and B, silychristin, isosilychristin, silydianin, and silychristin are the principal silymarin compounds. Iso- and trans-diastereoisomers of silibinin (silybin A and B) and isosilibin (issilybin A and issilybin B) that exist naturally. The different biological components of silymarin are composed of 10% silydianin, 5% isosilybin, and between 10% and 30% of an unknown organic polymer fraction. Other flavanols such kaempferol, quercetin, taxifolin, 2,3-dehydrosilybin (DHSB), and others are also present in trace amounts.

#### 4.2. Oil components

Milk thistle seed oil contains a high concentration of unsaturated fatty acids, particularly oleic and linoleic acid, which are good for human health since they can prevent cancer, diabetes, and arteriosclerosis. A significant percentage of *S. marianum* achenes are made up of oil compounds, perhaps 25% to 30%, of which 46.46% ± 0.26% is made up of linoleic acid.

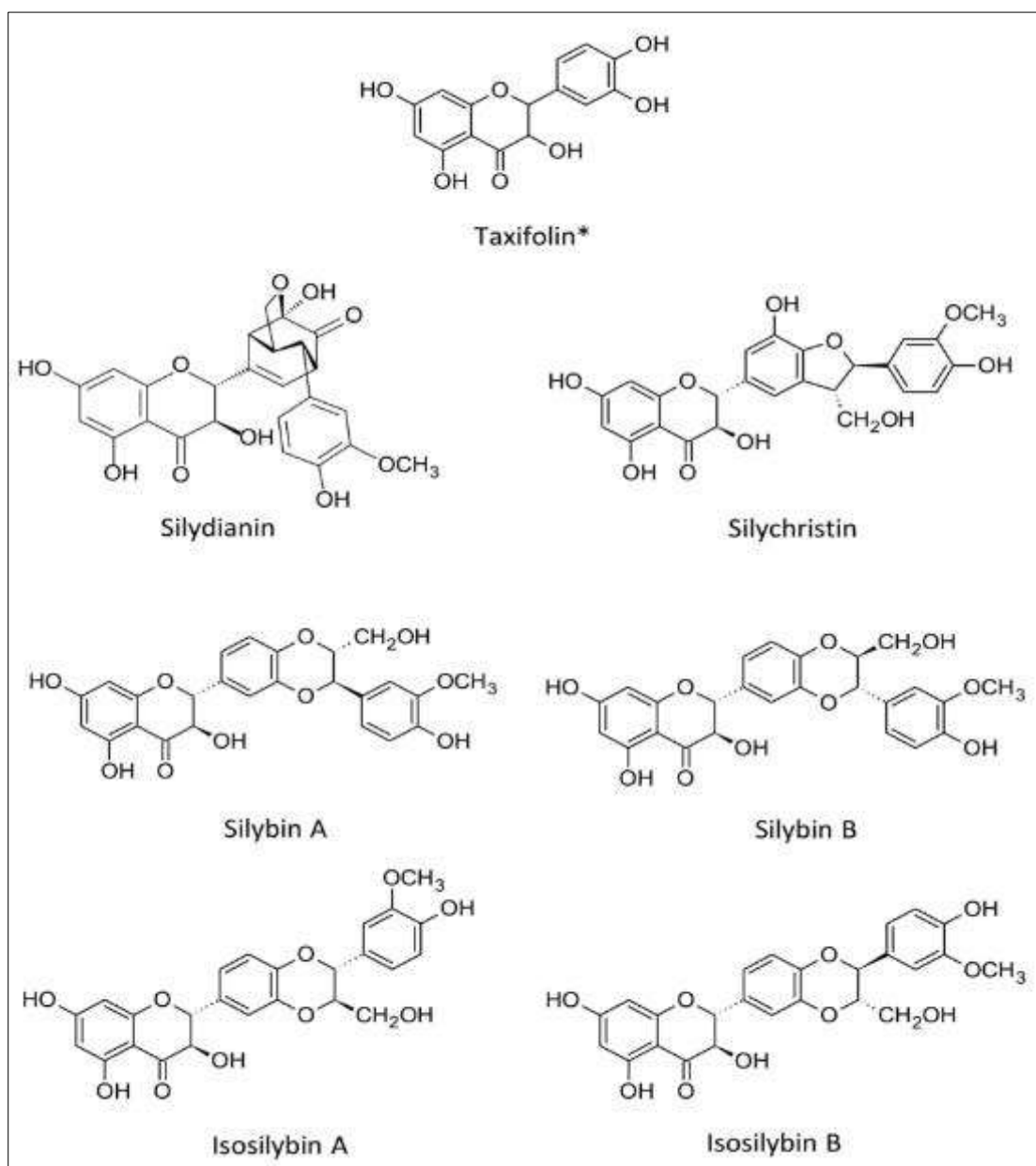
### 5. Silybin chemistry



**Figure 5** Structure of Silymarin

Pelter and Hansel initially determined the chemical structure of silybin in 1968 through a thorough analysis of <sup>1</sup>H-NMR (100 MHz, DMSO-d<sub>6</sub>) and MS spectra; however, in 1975, the same researchers used a degradative approach to identify

the absolute silybin configuration at positions C-2 and C-3. The chemical formula of silybin, also known as flavobin, silliver, silybine, silymarin I, silybina, and silybin, is  $C_{25}H_{22}O_{10}$ ; its CAS number is 22888-70-6. There are two primary components to the silybin structure. The first is based on a flavanonol group found in flavonoids called a taxifolin. Conyferil alcohol is an example of a phenylpropanoid unit, which is the second. An oxeran ring connects these two components to form a single structure.



**Figure 6** Chemical structure of major constituent of silymarin

## 6. Uses of milk thistle

### 6.1. Effect on liver

Milk thistle seeds have been used for liver protection since the first century. One of the crucial elements of hepatoprotection is antioxidant activity. Potential to be antihepatotoxic: Silymarin shields animal and human liver cells from a variety of hepatotoxins. Amanita phalloides, the death cup fungus, and *A. virosa* are among the mushrooms that contain toxins called phalloidine and  $\alpha$ -amanatine. These toxins cause serious damage to the liver and even death by destroying the cell membrane of the hepatocyte and preventing the formation of liver proteins.

For many centuries, milk thistle extracts have been used as "liver tonics". Since the 1970s, research has been done in various nations on the biological activity of silymarin and its potential medical applications; nevertheless, the quality of the research has varied. There are reports that milk thistle protects the liver and significantly enhances its function. Generally speaking, it is used to treat gallbladder issues, liver cirrhosis, chronic hepatitis (liver inflammation), toxin-induced liver damage (particularly preventing severe liver damage from *Amanita phalloides*, or "death cap" mushroom poisoning).

The ability of silymarin to scavenge free radicals and increase cellular glutathione levels is the main source of its hepatoprotective effects. These effects lead to higher membrane stability and the prevention of lipid peroxidation when exposed to xenobiotics. Furthermore, silymarin inhibits the development of stellate hepatocytes into myofibroblasts and regulates nuclear expression, both of which reduce the amount of collagen fibers that are deposited. This gives silymarin steroid-like properties. Furthermore, silymarin and silybinin, the primary constituent, stimulate RNA polymerase I, hence enhancing ribosomal protein production.

**Table 1** Literature evidence on the clinical application of milk thistle in the treatment of different liver disease

<b>Etiology</b>	<b>Liver disease stage</b>
Viral hepatitis	Acute, Chronic, Liver failure, and cirrhosis
Alcoholic liver disease	Acute, Chronic, Liver failure, and cirrhosis
Nonalcoholic liver disease	Acute, Chronic, and cirrhosis
Cholestasis	Pregnancy and nonpregnancy related
Drug and toxin-induced liver disease	Acute, Chronic, liver failure, and cirrhosis
Primary liver malignancy	Hepatocellular carcinoma and cholangiocarcinoma

## 6.2. Effect on liver toxicity

Numerous scientific studies indicate that components of milk thistle, particularly a flavonoid known as silymarin, shield the liver from toxins and medicines like acetaminophen (Tylenol), which when taken in excess can harm the liver. Silymarin contains anti-inflammatory and antioxidant qualities.

## 6.3. Other uses

### 6.3.1. Use in blood disorder

A blood disorder called beta-thalassemia that causes the blood's levels of the protein hemoglobin to drop. Preliminary research on children with this blood condition suggests that using a specific milk thistle extract for six to nine months along with normal medical care may help lower iron levels more effectively than standard care alone.

### 6.3.2. Use in mushroom poisoning

According to preliminary studies, administering the milk thistle compound silibinin may reduce liver damage resulting from poisoning with *Amanita phalloides*, also known as death cap mushrooms. Still, it is difficult to find silibinin in the United States. Hospitals and medical facilities frequently use milk thistle as an antidote for Death Cap mushroom poisoning. It has been demonstrated that intravenous Milk Thistle, administered in a timely manner, will reduce the fatality rate of this fungal infection.

### 6.3.3. Use in lactation

MT has historically been used by nursing mothers to promote the production of milk, and recent research has shown that it also increases lactation in women and cows. The MT mechanism of action hasn't been determined yet, though. The primary lactogenic hormone is prolactin, and MT was found to dramatically raise prolactin levels in the bloodstream of female rats. Dopamine D2 receptors appear to be involved in this impact, at least in part. Based on these findings, MT, also known as silymarin, may be a viable option for treating lactation insufficiency.

#### 6.4. Adverse effect

The following are side effects of ingesting milk thistle orally: digestive issues such as gas, nausea, diarrhea, dyspepsia, bloating, fullness, or pain in the abdomen, anorexia, and changes in bowel patterns. ache.

Skin responses, include eczema, rash, pruritus, and urticaria. occurrences related to neuropsychology, such as malaise, sleeplessness, and asthenia.

Pain in the joints. contact lens irritation. impotence. Anaphylaxis

Still, few of the publications that are currently accessible discuss causality. The incidence of side effects was roughly identical in the control and milk thistle groups for randomized trials that reported them.

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### 7. Conclusion

A useful natural medicine for promoting liver health and cleansing is milk thistle. It is a powerful liver cleaner due to its hepatoprotective qualities, antioxidant activity, and capacity to encourage liver cell regeneration. The benefits of milk thistle as a liver cleanser are well-established, and when used under medical supervision, it can be a helpful supplement to conventional treatments, though additional research is necessary. According to the outlook for the future Research on milk thistle is promising; it is being done to see if it can be fully utilized to treat liver disease and improve general health.

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### Compliance with ethical standards

#### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

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