

## Silymarin in Dermatology: A Brief Review

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### Abstract

**Background:** Silymarin, a flavonoid with antioxidant activities and extracted from milk thistle (*Silybum marianum*), previously used for its liver protection activity has been recently tested for dermatologic disorders

**Objectives:** Our purpose was to summarize all the dermatologic oriented in vitro and in vivo experiments and clinical trials on silymarin.

**Methods:** A systematic review of the literature was conducted to investigate all the available data and summarize all the clinical trials, case reports and original articles on silymarin. Two major databases (PubMed and Google Scholar) were searched.

**Results:** We have gone over about 26 articles. Silymarin, has been shown to have anticarcinogenic effects against ultraviolet radiation which makes it an ideal agent for supplementing sunscreens protection. Silymarin has also been effective in overcoming rosacea, melasma, vitiligo and psoriasis.

**Conclusions:** Even though there are some promising results with silymarin in dermatologic conditions but its human efficacy is not sufficiently explored as yet.

**Keywords:** Silymarin; Review; Skin

### Introduction

Silymarin is a flavonoid extracted from the seeds of milk thistle (*Silybum marianum*) or artichoke and is made up of three primary flavonolignans; silybin (silibinin), silydianin and silychristin [1-3]. Silibinin is the chief constituent of silymarin as it is the most active biological agent of the three; however, studies have revealed that silymarin and silibinin act quite the same as chemopreventive and biological agents with the slightest difference [3]. Silymarin has been used for liver protection for centuries [4]. Regarding the anti-oxidant and anti-inflammatory activities proposed for silymarin, it has recently been widely put to the test to be assessed as a photoprotective agent against the deleterious effects of the solar ultraviolet radiation which has been assumed to be the major cause of melanoma and non-melanoma skin cancers via production of reactive oxygen species [5,6]. There are also studies which suggest that silymarin may be effective in prevention of prostate and breast cancers [7, 8]. In this review article we aim to discuss all the dermatological features tested and proposed for silymarin.

### Silymarin and UV protection

There are many studies regarding the photoprotection of silymarin in literature. In a study on epidermal cell it has been shown that the apoptosis and DNA damage caused by ultraviolet radiation was markedly decreased by silymarin via the nucleotide excision repair mechanism which makes silymarin an excellent option for prophylaxis of skin cancers [9]. Also, another investigation conducted by Meeran

SM et al. indicated the same results regarding the inhibitory effects of silymarin on photocarcinogenesis by means of downregulation of the immunosuppressive cytokine, interleukin-10, and upregulation of the immunostimulator cytokine, interleukin-12 [10]. Another study on mice demonstrated that skin sampling of the mice treated with silymarin either before or after UV exposure illustrated diminished infiltration of leukocytes especially, CD11b+ and also decreased number of cells producing H<sub>2</sub>O<sub>2</sub> and nitric oxide suggesting silymarin to be an anticarcinogenic and anti-inflammatory agent [11,12]. Vaid M et al. proved silymarin to be effective in inhibiting the immunosuppression caused by ultraviolet radiation by means of dendritic cells & T cells [13].

### Anti-melanoma and skin cancer

In a study on SENCAR mice, silymarin indicated high efficacy in preventing tumor advancement, i.e. tumor incidence, multiplicity & volume, more profoundly evident in stage I tumors, which can be attributable to preventing 12-O-tetradecanoylphorbol 13-acetate (TPA) from giving rise to edema, hyperplasia, DNA synthesis and peroxidation [14]. In another study, Vaid M et al. showed silymarin to be effective in preventing not only skin cancers but also melanoma cell migration via the B-catenin signaling pathway [15]. Anticancer effects of silymarin is through deactivating the tyrosine kinase signaling pathway and reducing the tyrosine phosphorylation mediated by the Epidermal Growth Factor Receptor (EGFR) and SHC (with no change in their protein levels) which leads to disturbance in the cell cycle progression, G1 arrest and therefore preventing malignant cells to grow [16]. In another study Katiyar et al. illustrated that treatment

with silymarin to be of benefit in preventing various stages of ultraviolet B-induced nonmelanoma skin cancer in mice, with its utmost effect in UVB-induced complete carcinogenesis, UVB-induced tumor promotion and UVB-induced tumor initiation, respectively [17]. Applying sunscreens containing silymarin as a component to the skin of mice showed promising results in inhibition of development of nonmelanoma skin cancers via blocking the production of pyrimidine dimers which are DNA lesions formed as a result of ultraviolet radiation exposure [18]. The 12-O-tetradecanoylphorbol-13-acetate (TPA) induced epidermal activity of ornithine decarboxylase (ODC), a notorious tumor promoter, was evaluated in SENCAR mice following the administration of silymarin as a cancer chemopreventive agent which was substantially decreased in a dose- and time-dependent manner [2].

### Silymarin and Rosacea

In a study on Forty-six patients affected by stage I-III rosacea Berardesca et al. demonstrated that combination therapy of silymarin and methylsulfonylmethane can be useful in the treatment of rosacea skin, especially in the rosacea subtype 1 erythematotelangiectatic phase. It was effective on skin erythema, pruritus, papules and skin color [19].

### Silymarin and Melasma

Silymarin was also beneficial in treating UVA-induced skin damage in a dose-dependent manner [20,21]. Moreover, treatment of melasma with silymarin indicated substantial improvement from the first week of therapy [22].

### Silymarin and Vitiligo

Both combination therapy with trioxsalen and silymarin suspension and silymarin alone has been used in the treatment of vitiligo [23]. In another hypothetical paper, Feily and Namazi in 2011 demonstrated several mechanisms of silymarin in the treatment of vitiligo but it has not been yet studied and needs more attention [24].

### Silymarin and Psoriasis

There are anecdotal reports of efficacy of Silymarin in the treatment of psoriasis [25, 26].

### Discussion

A systematic review of the literature was conducted to investigate all the available data and summarize all the clinical trials, case reports and original articles on silymarin. Two major databases (PubMed and Google Scholar) were searched. We have gone over about 26 articles. Silymarin, a flavonoid extracted from the seeds of milk thistle (*Silybum marianum*), used previously for liver protection and possibly effective in the prevention of breast and prostate cancers [4,7,8], has been shown to have anticarcinogenic effects against ultraviolet radiation via different mechanisms, e.g. decreasing apoptosis and DNA damage, downregulation of the immunosuppressive cytokine, interleukin-10, and upregulation of the immunostimulator cytokine, interleukin-12 [9,10], reducing infiltration of leukocytes especially, CD11b+ and also decreasing the number of cells producing H<sub>2</sub>O<sub>2</sub> and nitric oxide, which makes it an ideal agent for supplementing sunscreens protection [11,12]. Silymarin has also been effective in prevention of skin cancers, rosacea, melasma. There is one hypothesis regarding the

efficacy of silymarin on vitiligo and anecdotal reports in the treatment of psoriasis but they have not been yet studied and needs more attention. Even though there are some promising results with silymarin in dermatologic conditions but its human efficacy is not sufficiently explored as yet.

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