

Review: Cosmeceutical Potential of Chinese Skullcap (*Scutellaria Baicalensis*)

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ABSTRACT

Scutellaria baicalensis, also known as Chinese skullcap is a plant belonging to lamiaceae family (mint) and is one of the widely used herbs in Chinese and Oriental medicines. It has been used traditionally for several health conditions including microbial infections, inflammation, and cholesterol management, anti tumor, antioxidant activity and several other health benefits. The herb has been well studied for its phytochemical constituents, which include several unique flavonoids. In this review we look at the Cosmeceutical benefits of this unique traditional herb.

KEYWORDS : Chinese skullcap, skin barrier, Antioxidant, photo aging

INTRODUCTION

Traditional Chinese medicines or TCM is regarded as one of the oldest medicinal system in the world apart from Ayurveda. It is believed to be over 5000 years old medicinal system dating back to period of the Huang Ti or Yellow Emperor, which was golden period in ancient Chinese history of innovation and development (Chang KC 1983). Chinese medicine believe in holistic healing of the body and treats the human body as a whole, as it believes that disease is not a problem or a particular organ but manifestation of the imbalance of the whole body with its environment (Sun D et al 2013). In this holistic approach, Chinese medicine system for treating internal or external imbalances uses variety of preparations, which originate from plants, animals and even human tissues such as placenta. In recent times this holistic approach through the plant originated products has also caught interest in western world for beauty and skin care (Qiu-JW et al 2011). In this review we will be looking at one such traditional Chinese herb, *Scutellaria baicalensis*, which has shown versatile benefits for both skin and hair, care applications.

ETHNOBOTANY AND PHYTOCHEMISTRY OF SCUTELLARIA BAICALENSIS

Scutellaria baicalensis also known as Huang Qin or Chinese Skullcap belongs to family lamiaceae, it is considered as one of 50 fundamental herbs in Chinese medicine (Zhang XW et al 2011). *Scutellaria baicalensis* is a herbaceous plant native to China and is also grown in eastern Asian countries like Korea, Japan and India and it is also found in Far East Russia, Siberia and Mongolia. Genus *Scutellaria* has over 350 species, which are present worldwide; some of them, such as *Scutellaria laterifolia* or *S. floridana* are native to USA (Cole IB et al 2008). Chinese Skullcap is the common name of *Scutellaria baicalensis*.

Scutellaria genera has a very interesting phytochemical profile; In fact the similar morphological characteristic of the different species make it difficult to distinguish between members of species such as *S. galericulata*, *S. baicalensis* and *S. laterifolia*. Hyphenated chromatographic techniques such as HPLC and LC-Mass Spectroscopy have revealed presence of flavonoids in the roots of Chinese skullcap plant. The Chinese skullcap is rich source of flavonoids such as baicalin, baicalein, Oroxylin A, wogonin, liquiritigenin and isoliquiritigenin. (Hee SS et al 2014). Structure of some of the important flavonoids as given below (fig 1)

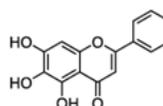
FIGURES

Fig 1(a) Baicalein

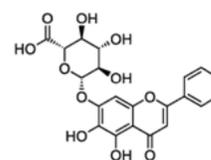


Fig 1(b) Baicalin

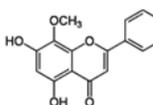


Fig 1(c) Wogonin

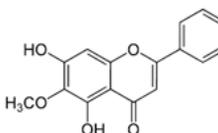


Fig 1(d) Oroxylin A

Cosmeceutical potential of *Scutellaria baicalensis*

While the *Scutellaria baicalensis* and its extracts are well known for their use in the traditional herbal medicines in Chinese traditional medicine, their application in the skin and hair care is relatively not well known. In this review we look at some of the potential application of *Scutellaria* root extract for skin care.

1. UV protectant activity

The flavonoids present in the *Scutellaria* roots possess anti allergic and anti-inflammatory activity, the roots have been used as a traditional remedy for the skin inflammation in China. In an animal model study, skullcap flavonoids were isolated and evaluated for their anti-inflammatory activity on UVB irradiation induced skin damage in hairless mice. The results showed that *Scutellaria* flavonoids were able to reduce the increase in skin thickness and also the MMP-2 and 9 enzymes in the skin, which are inflammatory enzymes, induced by UVB exposure. (Kimura Y & Sumiyoshi M, 2011)

The isolated compound Baicalin from the *Scutellaria baicalensis* was also found to be effective against the UVA induced photo-aging. In a study with cultured human skin fibroblast cells, Baicalin treatment

at concentration of 50microgm/ml, 24 hours prior to UVA exposure led to protection against UVA induced aging responses from the skin such as reduction in telomere length, increased MDA (Malonyldialdehyde) formation and expression of MMP-1 (matrix metalloproteinase -1) enzymes in the skin. These results show the UV protective activity of *Scutellaria baicalensis* root extract polyphenols. (Min W, 2014)

2. Skin Barrier function

Skin barrier function is important for healthy skin and damage to this function can lead to loss of moisture and other related side effects including xerosis. Skin Xerosis is infact widely observed skin problem in modern times, ceramides are typically used to retain the moisture in the skin, and however they provide only temporary relief. In a recent study done by a Korean group, *Scutellaria baicalensis* root extract was found to be promoting the skin cells- keratinocyte differentiation and help in restoring the skin barrier function. It was observed that this effect may be related to PPAR (Peroxisome proliferator-activated receptors)- Alpha activator effect of *Scutellaria baicalensis*. It was observed that PPAR –Alpha activators could alter expression of cornified envelope associated proteins, which play important role in the skin barrier function. (Bora K et al 2014)

3. Antioxidant Activity

Chinese skullcap is rich in unique flavonoids such as baicalin, wogonin, Oroxylin A and baicalein, which are potent free radical scavengers. These components as part of *S. baicalensis* root extract have been studied by various researchers for antioxidant activity of various flavonoids present in the extract (5Cole IB 2008,10Dorota W, Andrej D and Adam M 2014,Wang MH et al 2014). One particular study which evaluated its antioxidant activity in relation to its benefits against lipid peroxidation caused by sun light radiation was done by a Polish research group. In this study, root extract of *Scutellaria baicalensis* and its unique flavonoids such as wogonin, baicalin and baicalein were also studied for their inhibitory effect on the photoinduced lipid peroxidation in phosphatidylcholine liposome membrane. The results showed that lipid peroxidation inhibitory activity of both *Scutellaria* root extract and baicalin were greater than the butylated hydroxyl toluene (BHT), which was used as standard. These results suggest possible role of *Scutellaria baicalensis* in preventing the photoinduced sun damage due to its antioxidant activity. (Janina G, Jan O, Romuald Z and Malgorzata K, 1997)

4. Anti-inflammatory activity

Traditional application of *Scutellaria baicalensis* root in traditional chinese medicine suggest its use as anti allergic and anti-inflammatory agent. These activities were later also studied in animal models to understand the mechanism of action. In one such study on Sprague dawley rats, *Scutellaria* extract was found to inhibit the passive cutaneous anaphylaxis reaction caused by intradermal injection of Anti-DNP IgE. Further rat peritoneal cells in same study were used to evaluate the effect of *Scutellaria baicalensis* root extract on histamine release. The results showed that pretreatment with *Scutellaria* extract reduced the histamine release. In Human mast cells, *Scutellaria* extract was able to reduce the expression of TNF-alpha and IL-8, thus showing potential use of *Scutellaria* extract as antiallergic and anti-inflammatory for skin care. (Jung HS et al 2012). Anther recent study suggest the role of wogonin, a flavonoid present in the *Scutellaria* root extract as therapeutic agent for IgE and IL-5 mediated allergic disorders such as atopic dermatitis. (Hee SS, et al 2014).

Dermal safety of *Scutellaria baicalensis*

While *Scutellaria baicalensis* root extract has shown tremendously good potential for use in skin care application, literature on its dermal safety was not sufficient until recently. In a recently published study, acute dermal irritation test and skin sensitization test was carried out on the *Scutellaria baicalensis* aqueous extract on NZ white rabbits and Hartley guinea pigs respectively. The studies showed that the *Scutellaria baicalensis* extract did not produce any dermal irritation or sensitization. These studies were helpful in route of introducing the *Scutellaria* extract in the dermal formulations. (Kim TW et al 2013)

Topical applications of *Scutellaria baicalensis*

Studies mentioned above emphasize the potential role of *Scutellaria baicalensis* on the dermal use for variety of application. *Scutellaria baicalensis* extract can be used in skin anti-aging applications for its role as anti-inflammatory agent, and may help to slow down the aging process due to its antioxidant activity. Its UVA and UVB protectant activity make *Scutellaria* extract a strong candidate for use in the sun protection formulations to reduce the photo-aging effects of sun. It will also help to retain the moisture in the skin by retaining the skin barrier function.

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