A short chemical review on *Salix caprea* commonly Known as Goat willow

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ABSTRACT

*Salix caprea* (Salicaceae) is one of the medicinal plants in Kashmir valley, commonly known as Goat willow. Plants are the natural industry for the production of secondary metabolites. Crude drugs are the natural sources for isolation of natural products which are used as medicines. So the current knowledge of their chemical composition is necessary for research work. In this short chemical review we have summarised the chemical composition or chemical constituents which were earlier isolated from various parts of the *Salix caprea*. This chemical review definitely stimulates the researchers and scientists for further work on *Salix caprea*.

Keywords: *Salix caprea*; Salicaceae; Phenolic compounds; Flavonoids; Goat willow

INTRODUCTION

During the past decade, the indigenous or traditional system has gained importance in the field of medicine. In most of the developing countries, a large number of populations depend upon the traditional practitioners, who are dependent on medicinal plants to meet their primary health care needs. Although, modern medicines are available, herbal medicine retained their image for historical and cultural reasons. Since the usage of these herbal medicines has increased, issues and motto regarding their quality, safety, and efficacy in industrialized and developing countries are cropped up. Increasing interest has forced researcher to screen scientifically various traditional claims (Kumar et al., 2010). The chemical composition of the crude drug is responsible for pharmacological activity and their knowledge is helpful to understand the mechanism of action and mystery behind the activity. *Salix caprea* L. is belonging to family Salicaceae and commonly known as goat willow, Pussy Willow or Great Sallow. *Salix caprea* is a common species of willow native to Europe and Western and Central Asia (Meikle, 1984). *Salix caprea* is a common tree in the agricultural landscape of northern Europe and has been used as a wind shield bush growing in ditches between fields. The economic value of *Salix caprea* is however small. As a fast-growing tree it may be of interest for bioenergy production. Willows are one of the most taxonomically diverse plant genera in the Northern Hemisphere (Argus, 1997). In India it is cultivated mostly in Himalayan regions like Jammu and Kashmir, Hima-

![Salix caprea](image)

There are two varieties

- *Salix caprea* var. *caprea*. Lowland regions throughout the range. Leaves thinly hairy above, densely hairy below, 5-12 cm long; stipules persistent until autumn.
- *Salix caprea* var. *sphacelata* (Sm.) Wahlenb. (syn. *S. caprea* var. *coaetanea* Hartm.; *S. coaetanea* (Hartm.) Floderus). High altitudes in the mountains of central and northern Europe (Alps, Carpathians, Scotland, Scandinavia). Leaves densely silky-hairy on both sides, 3-7 cm long; stipules early deciduous.

*Salix caprea* occurs both in wet environments, such as riverbanks and lake shores, and in drier sites, wherever bare soil becomes available due to ground disturbance (Meikle, 1984). It is an ornamental plant, has been reported to possess strong anti-inflammatory property and is used as astringent, antisepic, eye tonic, antipyretic, analgesic and cardiotonic in Indian System of

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Salix caprea has been reported to exhibit a strong anti-oxidant activity in many in vitro systems (Rohnert et al., 1998). Salix caprea inhibits skin carcinogenesis in murine skin (Sultana and Saleem, 2004). All above activities are due to number of chemical constituents present in the various parts of Salix caprea.

**PHYTOCHEMICALS IN VARIOUS PARTS OF SALIX CAPREA**

**Flower:** The diosmetin, isorhemnetin, and glycosides were isolated from the flowers (Malterud et al., 1985). Aastralgin, quercimeritrin and quercitin-3, 7-di-O-glucoside were found in pollen of Salix caprea (Gorbets et al., 1982), 1, 4-Dimethoxybenzene a floral scent compound present in pollen (Dotterl et al., 2005).

**Leaves:** The luteolin-7-glycoside isolated from leaves (Nasudari et al., 1972). Seven phenolic compounds from aqueous extract of leaves of Salix caprea have been isolated as salicin, saligenin, gallocatechin, and four flavonoids, viz. rutin, quercetin, cyanoside and leuteolin on the basis of spectral and chemical data (Sagareishvili et al., 1990). The presence of (+)-catechin, (+)-gallocatechin, and leucocyanidin in the leaves was also demonstrated by (Jaggi and haslam, 1969). Leaves contained the flavonoids glycosides chrysoeriol-7-(2-alpha-1-arabinofuranoside)-beta-D-glactopyranoside (salicaprene), chrysoeriol-7-beta-D-galactoside (salicapriene), anthocyanidins-delphidinin and cyaniding; piperidine imino acid-pipericolic acid. A new flavone bioside-salicaprene, m.p 245-isolated and characterized as chrysoeriol-7(2-alpha-arabinofuranosyl1)-beta-D-galactopyranoside (Nasudari et al., 1970).

**Stem bark:** Phenol glycosides such as salicin and salicyrtin, which are common in the bark of other Salix species, are absent or present in only low concentration in Salix caprea bark (Jaggi and Haslam, 1969; Theime, 1965). The glycoside is reported to be triandrin, aglcoside of 4-hydroxy cinnamyl alcohol (Theime, 1965). Tannins are present in the bark in an amount of 8-13% (Malterud et al., 1985). Aalto-korte et al. (2005) isolated salicyl alcohol and salicylaldehyde in lower concentration in the bark extracts of Salix caprea.

**Wood and Knot:** Salix caprea stem wood and knots were found to contain the phenolic extracts vanillic acid, 3-p-coumaryl alcohol, coniferyl alcohol, sinapylaldehyde, dihydrokaempferol, catechin, naringenin, gallocatechin, dihydromyrcetin and taxifolin. The knots contained larger quantities of flavonoids than did stem wood of the same tree (Pohjamo et al., 2003).

**DISCUSSION**

Phytochemical investigations of Salix caprea have revealed the presence of many potent anti-oxidants such as luteolin, dihydrokaempferol and quercetin as its principle constituents along with (+)-catechin and isorhamnetin as minor constituents (Nasudari et al., 1972; Malterud et al., 1985; Thapliyal and Bahuguna, 1993). Flavonoids present in Salix caprea wood were reported to have antifungal properties (Malterud et al., 1985). Six identified flavonoids [dihydrokaempferide, narigenin, aromadendrin, taxifolin, prunin and (+)-catechin], narigenin was found to be the most effective one against both fungi and microbes. Narigenin-5-glucoside has been found in the bark of Salix species. Catechin is a common constituent in plants and trees (Rowe, 1989). It has been shown to have antioxidant (Choi et al., 2001) as well as antifungal and antimicrobial effects.

Figure 1. 12. Leucocyanidin. 13 luteotolin-7-glycoside. 14 astragalins. 15 tannic acid. 16 quercitin. 17 isorhamatin. 18 diosmetin.

Crobial properties (Mantani et al., 2001). Astralgin, quercimeritrin and quercitin-3, 7-di-O-glucoside were found in pollen of *Salix caprea* (Gorobets et al., 1982) while salicin, saligenin, gallocatechin, rutin, cynaroside, quercitin and luteolin were found in the leaves (Sagareishvili et al., 1990). The plant contains the important constituents which have the potential to treat the various diseases. Plants are the natural industry for the production of secondary metabolites. Crude drugs are the natural sources for isolation of natural products which are used as medicines. So there is need to isolate and screen the various new molecules which may have the potential to treat various serious diseases.

REFERENCES


