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Phytopharmacological Significance of *Salacia chinensis*

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Abstract

Salacia chinenesis is one of the versatile, less exploited inhabitants of wild forests predominantly used in Ayurveda for curing variety of ailments, specifically to cure obesity and diabetes. Apart from antidiabetic activity, several species of the genus Salacia are known to possess anti-inflammatory, antilipidemic, antiperoxidative, antimicrobial, antileukemic, astringent and antimalarial activities. *Salacia species* contains abundant range of phytochemicals (secondary metabolites) like salacinol, katnanol, mangiferin, poly phenolics, tannins and many more. In addition, triterpenes, sesquiterpenes, lignans, xanthones, flavanols, flavonoids, and proanthocyanidins have been reported in *S chinensis* extracts, which are attributed to other important medicinal properties. The present study is focussed on reviewing the phytopharmaceutical relevance of this medicinal species to create a better understanding on its potential as an anti-diabetic medicine.

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Keywords

Antidiabetic, Antiobesity, Mangiferin, Salacinol

Introduction

Diabetes mellitus is a major cause of morbidity and mortality worldwide with an increasing prevalence. The prevalence is expected to double by 2030; and the greater proportion of this increase would be in the low to middle income countries of Asia, Africa and South America. Studies have been consistent in showing that diabetic patient adherence to modern medical system are poor. Complex treatment regimes, hypoglycaemia, patient beliefs and side effects of medications have been compelling reasons that limited patient compliance with allopathic system. Asia has been home for ancient healing systems and traditional healing practices that use herbal remedies and *Salacia* species has been used widely for the treatment of diabetes and obesity. *Salacia chinensis* is a large straggling shrub or woody climber (Figure 1) that belongs to family Celastraceae (Hippocrateacae). It is commonly known as 'Saptarangi' and 'Saptachakra' in Ayurvedic medicine, and 'Ponkoranti' in Tamil have been used to treat variety of ailments such as diabetes, obesity, liver disorder, inflammation, useful as astringent, abortifacient, blood purifier, cardio-tonic, arthritis, rheumatism, fever, bronchitis skin, venereal diseases etc. The fruits (berries) are round or ovate; ripened fruits are red in colour. The sweet, translucent, and jelly-like pulp surrounding the seeds of the fruit is edible. Ripened fruits are a rich source of minerals and vitamins and are eaten by rural populations. Clinical studies have already indicated the efficiency of Salacia extracts without any toxic effects. In this chapter, we have explicated on the phyto-constituent aspects of *S. chinensis* and its potential pharmaceutical applications.

Phytochemical Constituents

The roots contains the phyto constituents like alkaloids, glycosides, polyphenols, flavanoids, coumarins, proteins, carbohydrates, gums and mucilage, fixed

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Figure 1: Different parts of *Salacia chinensis* (a) growing shrub in wild, (b) twigs with fruits, and (c) flower

oil and volatile oil. Triterpenoids like lupanes, hopanes, friedelanes are abundant in root and stem of plant. Novel thiosugar sulfonium sulphate salts like salacinol, kotalanol, ponkoranol, and salaprinol are the major phyto-constituents of Salacia having antidiabetic activity (Morikawa *et al.*, 2015). Although subsequent studies have reported their de-O-sulfonates, viz., neosalacinol, neokotalanol, neoponkaranol, and neosalaprinol, respectively (Figure 2), these are minor components in most Salacia extracts.

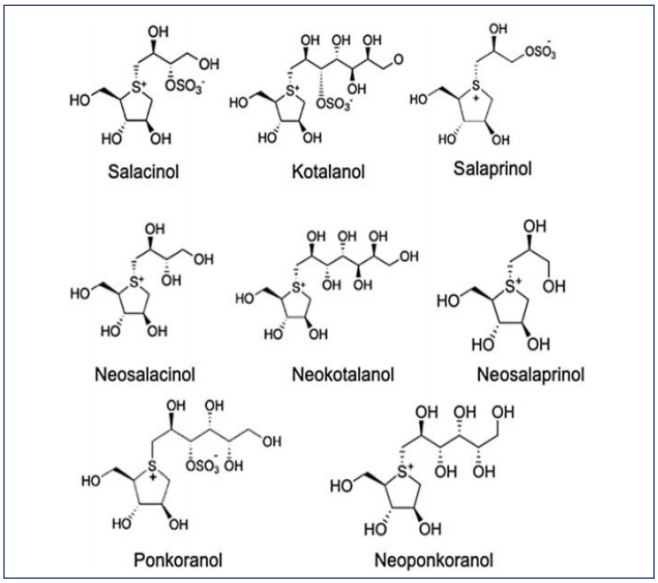

Figure 2: Representative novel biochemical compounds isolated from *Salacia chinensis*

Another potent antidiabetic phytochemical mangiferin, an inhibitor of sucrase, aldose reductase, and isomaltase, has been found in the extracts of *S. chinensis* and other related species. Polyphenols and flavonoids, isolated recently, are found abundantly in root and stem than that of fruits and seeds. Gallic acid, catechol, ferulic acid, and salicylic acid are the major polyphenols in the roots, whereas catechol was abundant in the fruits of *S. chinensis*. Various flavanols such as epigallocatechin, epicatechin and epiafzelechin have been isolated from the extracts which have exhibited antioxidant activity. Lignins, norfriedelane-type triterpene, and catechin constituents from *S. chinensis* stem were found to have free radical scavenging properties. Triterpenoids such as friedelanes, lupanes, hopanes, and foliasalacins are some of the abundant phyto-constituents in root and stem (Chavan, 2015).

Pharmacognosy

Salacia chinensis extracts that contain thio sugar sulfonium salts act as inhibitors of α glucosidase and thus induce antidiabetic and antihyperglycemic activities which is as effective as that of acarbose and voglibose, which are commonly used in the clinical studies. Recent studies have demonstrated that Salacia roots are very useful in type 2 diabetes and obesity-associated hyperglycemia, dyslipidemia and related cardiovascular complications and it may be due to the fact that it modulate multiple targets (Yuhao *et al.*, 2008) like peroxisome proliferator-activated receptor-alpha mediated lipogenic gene transcription, angiotensin II/ angiotensin II type 1 receptor, alpha-glucosidase, aldose reductase and pancreatic lipase. Other medicinal properties of *S. chinensis* include anti-obesity, hepato-protective, immune-modulatory, nephro-protective, anticancer, and antioxidant properties. Many other phyto-constituents isolated from *S. chinensis* have not yet been tested for their medicinal or nutraceutical applications.

Conclusion

Salacia chinenesis is slowly gaining popularity around the world for its phytopharmaceutical significance. Traditionally, *S. chinensis* root extracts and decoctions have been used in treatment of type 2 diabetes and many other human ailments and disorders. The roots contain considerably higher amounts of salacinol and related compounds as compared to other plant parts which have lead to ruthless harvesting from the wild thereby pushing the taxa into endangered position. Thus there is an urgent need to conserve this wonder plant through biotechnological approaches, such as tissue culture, metabolic engineering, and other modern methods to study potentiality to produce desired metabolites and also for identifying novel chemo-types.

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