

PHCOG MAG.: Short Review

Distribution of Steroid like Compounds in Plant Flora

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ABSTRACT - Medicinal herbs constitute an effective source of traditional (Ayurveda, Unani, Unani, Sidha and Homeopathy) and modern medicine. The plant not only possess chemical compounds, but also a multitude of compounds like glycosides, alkaloids etc. These exert physiological and therapeutic effect. The compounds that are responsible for medicinal property of the drug are usually secondary metabolites. Alkaloids, glycosides, neutral principles, resins, oleoresins, sesquiterpene lactones are some of the common active constituents of medicinal herbs. The article reviews distribution of steroid like compounds and their pharmacological importance.

KEY WORDS: Sterols, medicinal plants, pharmacology

INTRODUCTION

The practice of medicinal herbs for treating the diseases is very well known from ancient times (1). Number of synthetic medicines has been derived from medicinal herbs. Digoxin, aspirin, reserpine, ephedrine, quinine, vincristine, vinblastine, taxol, artemisinin, hypericin and silymarin are some noteworthy examples and their mechanism of action is beyond doubt as far as efficacy is concerned. Numbers of studies are available to show their efficacy of these natural products. These are regarded as active constituents of the herbs and are present in standardized form in the herbal extracts, if not isolated as single entity.

In addition to the alkaloids, glycosides, resins, oleoresins, aromatic and volatile oils, neutral principles etc, a number of other compounds are also known to exist in plant floras which are responsible for curative action of the herbs. Recently the light has been thrown on steroid like compounds present in number of medicinal herbs. Chemically the compounds are known as sterols and are considered to be derivatives of the steroids. They resemble in structure with steroids and modern clinical studies have supported their role as anti-inflammatory and analgesic agents.

Beta-sitosterol is the most commonly studied sterol compound isolated from number of medicinal herbs and it has shown effectiveness in reducing serum cholesterol level (2). Modern studies have indicated the usefulness of beta-sitosterol in benign prostate hypertrophy and the compound has been detected in *Serenoa repens* commonly known as Saw Palmetto (3). *Serenoa repens* has been traditionally used in treating prostate symptoms and clinical trials have shown promise in stages 1 and 2 in reducing difficulties

associated with benign prostate hypertrophy but it has nothing to do with enlarged size of the gland (4). In addition *Serenoa repens* is known to contain sterols including beta sitosterol-3-o-glycosides, beta-sitosterol-3-o-glycosides, beta-sitosterol-fatty acid esters and their glycosides.

Disogenin is another compound present in number of herbs like *Hedichyum spicatum*, *Trigonella foenum graecum*, *Pueraria tuberosa* and *Dioscorea villosa* (5, 6, 7). Oral contraceptives and sex hormones are derived from disogenin. It is extracted from medicinal herbs as well as prepared commercially. Due to the wide distribution of the compound disogenin in above mentioned herbs, they have been used in various types of sexual disorders like impotency. Ruscogenins are other compounds present in *Yucca liliaceae* that are used in treating pain and inflammation of arthritis and rheumatism (8). *Yucca filamentosa* is other known species, which contains ruscogenin as an active principle. Ruscogenins are also present in *Ruscus aculeatus* and in animal tests; there was an increase in venous tone and an electrolyte-like reaction on the cell wall of the capillaries (9, 10).

Smilax officinalis is medicinal herb that is known to contain steroid like compounds-saponin glycosides and according to some researchers the *Smilax officinalis* contains male hormones. It also has been used as herbal medicine as an anti-inflammatory agent in curing arthritis and rheumatism. *Rubus idaeus*, commonly called as raspberry, is also known to contain such type of compounds (11).

Phytoestrogens are group of pharmacologically active compounds present in *Asparagus officinalis* where they are known as asparagosides A, B, D, F, G, H and I (12). Although *Asparagus officinalis* finds application

in female sexual disorders but effectiveness for the claimed application has not been sufficiently documented. In *Asparagus adscendens* active compounds are called shatavarins 1-4 and in clinical studies they shown estrogen like activity (13) According to Mitchell Deborah these phytoestrogens inhibit the conversion of testosterone to dihydrotestosterone, thereby increasing the count of testosterone in the body. Co- incidentally the role of the herb has been described in old texts of Ayurveda as sexual tonic. *Coriander sativum* (commonly known as fennel) also contains phytoestrogens and has shown to be promising in treating premenstrual syndrome. Some glycosides on hydrolysis produce aglycones like gitogenin and tigogenin, which also are being used in steroid synthesis.

Commiphora mukul commonly known as Guggul contains special group of compounds called guggulsterones, which range from E to Z (14). They are known as active principle of the *Commiphora mukul* and accounts for the use of the herb in hyperlipidemia and arthritis (15, 16, 17, 18). *Withania somnifera* commonly known as Ashwagandha contain pharmacologically active compounds called withanolides, which are considered to be responsible for various applications of the herb as adaptogen and immunomodulator. Withaferin-A is the most important group of withanolide and has shown promise as potent anti cancer agent (19). The withanolides are basically steroid lactones and various types have been isolated (20).

A special group of compounds called cardio active steroids (better known as cardiac glycosides) deserves special mention. *Digitalis purpurea*, *Stropanthus gratus* and *Urginea indica* are reputed remedies as cardiac tonics. Clinically they find application in congestive cardiac failure. All of them contain steroid saponins as active constituents. *Calotropis procera* is known to contain cardioactive glycoside calotropine which has shown an antitumor effect *in vitro* on human epidermoid carcinoma cells of the rhinopharynx. Besides it also acts as expectorant and diuretic (21).

In Homeopathic system of medicine, *Convallaria majalis* is a reputed remedy in various heart diseases. It also contains cardio active steroid glycosides, which vary in the herb according to geographical source, and main active constituents are convallaside, convallatoxin and convallatoxol. In clinical studies they have shown positive inotropic effect on the myocardium and lower the elevated left ventricular

pressure and pathologically raised venous pressure (22).

From above, it can be concluded that that sterol compounds are less known for their medicinal importance. Some of them have been isolated and researchers are studying deep to find their exact mode of action. In future, medicinal plants containing steroid like compounds are expected to play key role in healthcare system.

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