



Medicinal Value and Future Perspective of Some Therapeutically Important Plants from Indian Western Region

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Accepted on: 07-07-2015; Finalized on: 31-08-2015.

ABSTRACT

Indigenous herbal medicines have been popular since time immemorial and recently have also commanded major attention worldwide due to their potential therapeutic values and describe thousands of medicinal plants with their medicinal properties. In recent times, developed countries are turning to the use of traditional medicinal systems because the phytochemicals are potent in different therapeutic applications as they show defensive mechanism of action against a number of chronic diseases including cancer, cardiovascular disease, diabetes, neurodegenerative disease. There are many different ways in which plants have been found useful in medicines. The therapeutic properties of some of these medicinal plants are attributed owing to the presence of active substances such as alkaloids, flavonoids, glycosides, vitamins, tannins, and coumarin. So we have selected four plants that are commonly found in Indian Thar desert and widely used by the local people for medicinal purpose. These four plants are *Balanites aegyptiaca* Del. (Hingot), *Capparis deciduas* Edgew. (Kair), *Ficus glomerata* Linn. (Gular), *Tecomella undulata* D. Don. (Rohida). Each of four plants was briefly studied for the therapeutic purposes, its medicinal values and future perspectives in pathological study. This review paper contains most useful information on selected plants for further research work.

Keywords: therapeutic values, phytochemical, alkaloids, flavonoids, glycosides, vitamins, tannins, Coumarins.

INTRODUCTION

Medicinal plants have been a major source of cure of human diseases since time immemorial. Today, one fourth of the world population depends on traditional medicines. Consequently the demand for the medicinal plants has enormously increased. Many of the drugs sold today are simple synthetic modifications of the natural compounds. The evolving commercial importance of secondary metabolites in recent years has resulted in great interest in secondary metabolism, particularly in the possibility of altering the purification of bioactive plant metabolites.

India has a rich heritage of plants as medicines; Indian systems of medicines utilize 80 percent of the material derived from the plants. Indian western region especially Thar desert is rich repository of traditional and Folk medicines. The diversified climate of Thar region have resulted occurrence of several valuable and economically important medicinal and aromatic plants of great therapeutic value.

The use of plants as sources of medicines are human substance has been in vogue since antiquity. These selected plants have high medicinal value in the form of crude drug or medicine. The some selected plants have been used in variety of folk medicine for therapeutic or prophylactic purposes in India and Asia. The therapeutic properties of selected medicinal plants are attributed owing to the presence of active substances such as alkaloids, flavonoids, glycosides, vitamins, tannins, and coumarin¹. These medicinal plants contain high amount of biologically active phytochemical substances such as

saponins, essential oils, triterpenes and many other secondary metabolite compounds, with preventive and curative properties of traditional methods practiced in ayurveda, unani and siddha in India.

The use of herbs to treat disease is almost universal among non-industrialized societies.

Many of the pharmaceuticals currently available to physicians have a long history of use as herbal remedies, The World Health Organization (WHO) estimates that 80 percent of the population of some Asian and African countries presently uses herbal medicine for some aspect of primary health care. In comparison, herbal medicines can be grown from seed or gathered from nature for little or no cost. All plants produce chemical compounds as part of their normal metabolic activities. These bioactive molecules and phytochemicals are divided into (1) primary metabolites such as sugars and fats, which are found in all plants; and (2) secondary metabolites—compounds which are found in a smaller range of plants, serving a more specific function. For example, some secondary metabolites are toxins used to deter predation and others are pheromones used to attract insects for pollination. These secondary metabolites and pigments that can have therapeutic actions in humans and which can be refined to produce drugs. So these four selected plants are studied for the therapeutic purposes and use of secondary metabolites for the medical purpose.

***Balanites aegyptiaca* (Hingot)**

Balanites aegyptiaca Del., also known as 'Desert date' in English, a member of the family Zygophyllaceae, is one of



the most common but neglected wild plant species of the dry land areas of Africa and South Asia².

This tree is native to much of Africa and parts of the Middle East. In India, it is particularly found in Rajasthan, Gujarat, Madhya Pradesh, and Deccan.

Various part of *Balanites aegyptiaca* have been reported to possess medicinal properties in different ethnobotanical surveys, this plant has been reported to be an antihelminthic, a purgative, emetic and also cure the other type of ailments like skin boil, leucoderma, malaria, colds, syphilis and spleen disorders³.

Plants produce primary and secondary metabolites which encompass a wide array of functions⁴. Plants can manufacture many different types of secondary metabolites which have been subsequently exploited by humans for their beneficial role in a diverse array of applications⁵.

Often plant secondary metabolites may be referred to as plant natural products, in which case they illicit effects on other organisms.

Seed is used as expectorant, antibacterial, and antifungal. Fruit is used in whooping cough, also in leucoderma and other skin diseases. Bark is used as spasmolytic⁶, in the treatment of syphilis, round worm infections, and as a fish poison.

The crude aqueous extract of root bark of *B. aegyptiaca* was showed a dose-dependent inhibition of spontaneous motility (paralysis) in adult earthworms. And also possesses vermifugal activity⁷. The kernels contained 45.0 to 46.1% oil and protein (32.4%), oil contains mainly palmitic, stearic, oleic, and linoleic acids which were the main fatty acids⁸. The aqueous and organic leaves extracts of *B. aegyptiaca* was reported to have antibacterial effect against eight different bacteria when tested individually and in combinations *Salmonella typhi* diarrheagenic bacteria, *Bacillus cereus*, *Staphylococcus aureus*, *Escherichia coli*, *Salmonella enteritidis*, and *Listeria monocytogenes*.

The acetone and methanolic extracts of stem bark of plant has reported an antivenom activity against saw-scaled (*Echis carinatus*) viper venom concentration at lethal dose (0.194 mg/ml), when administered intramuscularly to Wistar albino rats⁹. Both extracts were found to be effective at 75 and 100 mg/ml concentrations. Methanolic and butanol (BE) extracts of *B. aegyptiaca* showed significant anti-inflammatory, anti-nociceptive activity in the carrageenin-induced edema in the rat, and acetic acid-induced writhing test in mice and antioxidant action by using *in vitro*¹⁰, using a method based on the Briggs–Rauscher oscillating reaction. The pure saponin, extracted from the fruit mesocarp, and water extract have been reported as hypoglycemic agent when tested on albino rats in different concentrations dose and Daonil (as a standard medication). It also reported that it inhibit *Escherichia coli* growth in rats.



Figure 1: *Balanites aegyptiaca* (hingot) from western region of India.

Capparis decidua's (Kair)

Capparis decidua is known as kair in local language in Indian and one of the most traditional remedies used for various medicinal treatments in India and other Asian countries. The study reveals that the presence of phytochemicals such as amino acids, fatty acids, tocopherols, sterols, glucosinolate and phenolic content in extracts obtained from different aerial parts of *C. decidua*. All examined extracts were prominently rich in phenolics and glucosinates, and they showed potent antidiabetic and antihemolytic activity. The bark treats inflammation and acute pain, whereas the roots treat fever and the buds used to treat alleviate boils. In Sudan, parts of the shrub used for remedy of jaundice and joint infection¹¹. The stems of kair shrubs have cytotoxic activities, as they markedly inhibit the proliferation of metastatic cancer cells. The plant *Capparis decidua's* Stem, fruits and flowers contains N-triacontanol, water soluble Stachydrine (2- Carboxy-1, 1-dimethyl Pyrrolidine), N-pentacosane, β -Sitosterol and β -Carotene and hydrocarbons Nonacosane and Triacontane. The stem possesses anti helminthic activity, hepatoprotective activity¹², antidiabetic activity, hypolipidemic activity¹³. Flowers and fruits are sedative and anticonvulsant¹⁴. Flowers are anti-atherosclerotic, anti-inflammatory, analgesic¹⁵.

The extract of unripe fruits and shoots of *C. decidua* cause reduction in plasma triglycerides, total lipids and phospholipids; hence used as hypercholesterolemic¹⁶. Capparidisine a new alkaloid from *C. decidua* is reported to have dose dependant depressant effect on heart rate that is also affect the coronary flow. Maximum fall in coronary flow was achieved at 1mg/ml, the contraction and heart rate increased at 2 ng dose and then a dose dependant fall was seen upto 128 and 32 ng, in force of contraction and heart rate respectively¹⁷.

On studying the antibacterial activity of the seeds it was found that glucocapparin had no activity but its isothiocyanate aglycon had good antibacterial activity¹⁸. It was found to inhibit cell cultures of *Vibrio cholerae*, *V. ogava*, *V. inaba* and *V. eltor*¹⁹. *C. decidua* may have potential use as an antidiabetic agent and in lowering

oxidative stress in diabetes^{20,21}. The aqueous and methanolic extracts of *Capparis decidua* stems were screened for their hepatoprotective activity against CCl₄-induced hepatotoxicity in rats. Yet, no systematic studies on its hepatoprotective activity have been reported. One of the study on this plant indicated that aqueous and methanolic extracts of *C. decidua* stems could afford a significant protection against CCl₄-induced hepatotoxicity in rats²².

In the cyclooxygenase assays, ethyl acetate twig extracts of *Capparis decidua*, showed inhibitory effect against prostaglandin synthesis by COX-2 ranging from 58 to 97% and weak (< 50%) or no activity against COX-1 induced prostaglandin production. The *in vitro* anti-inflammatory activity observed in this study support the utilization of the plants in traditional medicine as crude anti-inflammatory agents²³. Extracts of *Capparis decidua* stems and flowers showed insecticidal and oviposition inhibitory activities against *Bruchus chinensis*²⁴.



Figure 2: *Capparis deciduas* (Common name Kair in western India).

***Ficus glomerata* (Gular)**

Ficus glomerata is widely distributed all over India, Northern Australia and other parts of Asia. It has long been used in Indian medicinal practice as astringent, carminative, stomachic, vermicide, etc. It is believed to be a good remedy for visceral obstructions and extract of the **fruit** is used in leprosy, diarrhoea, circulatory and respiratory disorders and menorrhagia^{25,26}.

Roots are used in dysentery, pectoral complaints, diabetes, applied in mumps, other inflammatory glandular enlargements. They act as a powerful tonic. According to Ayurveda, roots are useful in hydrophobia^{27,28}. **Bark** is acrid, cooling, galactagogue and good for gynaecological disorders. The stem bark is used to treat menorrhagia, leucorrhoea, gonorrhoea, urinary diseases, hemorrhage and skin diseases²⁹. Its stem bark has shown anti-diarrhoeal, antidiuretic, antitussive, anti-pyretic and hypoglycemic activities³⁰. The chemomodulatory effect of *F. racemosa* against ferric nitrilotriacetate (Fe-NTA) induced renal carcinogenesis and oxidative damage response in rats was reported recently³¹.

The **latex** (milky juice) is administered in haemorrhoids, boils, alleviates the edema in adenitis, parotitis, orchitis, traumatic swelling, toothache, vaginal disorders, diarrhoea particular in childrens and also aphrodisiac. Latex is applied externally on chronic infected wounds to alleviate edema, pain and to promote the healing. The latex is reportedly used for treating piles³². The **root sap** is used for treating diabetes³³. The Australian aborigines use this plant in the treatment of mumps, smallpox, haematuria, menorrhagia and inflammatory conditions³⁴. In siddha the bark, fruits and latex are used to treat constipation, anaemia and dysentery³⁵.

Alcoholic as well as aqueous extracts caused inhibition of spontaneous motility of whole worm and nerve muscle preparation of *Setaria cervi* characterized by increase in amplitude and tone of contractions. Both extracts caused death of microfilariae *in vitro*³⁶. The hydro alcoholic extract of leaves was found effective against *Actinomyces viscosus*. The minimum inhibitory concentration was found to be 0.08mg/ml³⁷. The plant possesses potent inhibitory activity against six species of fungi, viz. *Trichophyton mentagrophytas*, *Trichophyton rubrum*, *Trichophyton soundanense*, *Candida albicans*, *Candida krusei* and *Torulopsis glabrata*^{38,39}.



Figure 3: *Ficus racemosa* (Common name Gular in western India).

***Tecomella undulata* (Rohida)**

Tecomella undulata (Bignoniaceae) is a locally known as Rohida, found in Thar Desert regions of northwest and Western India and it is also state tree of Rajasthan. *T. undulata* plays an important role in environmental conservation. Leaves and stem bark are traditionally used as a remedy for syphilis, urinary disorders, and enlargement of spleen, gonorrhoea, leucoderma and liver diseases. The bark of *T. undulata* is primarily used in the treatment of syphilis, painful swellings and cancer by traditional healers. Also, it is claimed to be useful in treating urinary discharges, enlargement of spleen, leucorrhoea, leukoderma, tumors, liver disorders, gonorrhoea, gout and promotes wound healing in Indian traditional system of medicine.

Both aqueous and alcoholic leaf and stem extracts of *T. undulata* showed growth inhibition of *Salmonella typhi*,

acausal organism of typhoid fever the antibacterial activity with methanolic and aqueous extracts of *T. undulata* reported. Butanolic extract prepared from the bark of *T. undulata* has significant anti-inflammatory activity against carrageenan induced paw edema and cotton pellet induced granuloma in rat. The activity was similar to that shown by the standard drug indomethacin⁴⁰. Ahmad evaluated the methanolic extract of plant for its anti inflammatory and analgesic potential by using rat paw edema and tail immersion method respectively⁴¹. The extract showed significant analgesic potential with comparison to standard aspirin. Several biochemical parameters like bilirubin, alkaline phosphates, urea etc. showed an interesting sex dependency. All these parameters decreased in male rats but increased significantly in female rats. According to another report by Ullah, they have shown the effect of rohitakarista on lipid profile of albino rats⁴². Oral administration of rohitakarista caused a decrease in triglycerides while a significant increase in the total cholesterol, VLDL (very low density lipoprotein) and HDL (high density lipoprotein) levels was observed. Biochemical analysis indicated that *T. undulata* leaves have oleanolic acid, ursolic acid and betulinic acid compounds that are strong HIV inhibitors. Octadimethyl succinate derivatives of oleanolic acid and, betulinic acid have been reported to be 24 times more active than AZT, a drug that is currently used for checking the spread of AIDS⁴³. Other compounds isolated from the leaves of *T. undulata* are sitosterol, triacontanol, cirsimaritin, cirilineol, pentatriacontanol and 4, 5-dihydroxy-3, 6, 8-trimethoxy flavone. However; further studies are required to establish the underlying mechanism of *T. undulata* in curing.



Figure 4: *Tecomella undulata* (common name Rohida in western India).

CONCLUSION AND FUTURE PROSPECTS

Tribal, rural and primitive societies of India have discovered solution for treatment of disease to almost all their needs and problems from the natural resources around them. Hence, in recent years, ethnomedicinal studies received much attention as this brings to light the numerous little known and unknown medicinal virtues

especially of plant origin which needs evaluation on modern scientific lines such as phytochemical analysis, pharmacological screening and clinical trials.

These all four selected plants are distributed throughout the drier parts of India. It has been used since ages by the tribes of deserts to cure several diseases like whooping cough, sleeping sickness, guinea worm diseases and skin disorders.

Economically also, it is a very significant plant because various parts of these plants contain saponins, alkaloids and diosgenin (secondary metabolites that have high pharmacological importance). The pharmacological studies of *Balanites aegyptiaca* demonstrated insecticidal, antibacterial, antifungal, hepatoprotective, anticancerous, antihelminthic, antiparasitic, antidiabetic and anti-inflammatory activities of the plant. Despite the great importance of these plants as economical, ethnobotanical and medicinally important trees, attempts for its conservation, sustainable utilization and/or genetic improvement, are by and large lacking.

Ficus racemosa possesses various pharmacological activities as discussed in present paper. However, it is imperative that more clinical and pharmacological studies should be conducted to investigate the unexploited potential of this plant. *Capparis deciduas* seems to have tremendous scope to provide different therapeutic compound as analgesic, anti-inflammatory, antimicrobial and biochemicals to treat cardiac, renal, skin and central nervous system. Since this plant has wider application in medicine because of chemical biodiversity, there is a need to tap its multifaceted utility without which it is likely to be threatened in different states of India.

This review article revealed that *Tecomella undulata* is rich in phytochemicals and also used as antimicrobial agents. It is rich in bioactive compounds that are also used as effective bio-medicine for the treatment of scabies in humans and animals, however further biochemical research studies may be needed to further explore the medicinal efficacy of the plant against scabies in more detail.

This review is a meticulous compile of the research data on *Tecomella undulata*, *Capparis deciduas*, *Ficus racemosa* and *Balanites aegyptiaca*, all these plants have great medicinal value and therapeutic potentials. Analysis of literature on these desert plants reveals major lacunae and subsequently opens new avenues for research. They are as follows: 1. Isolation and purification of pure compounds from different part of plant such as stem, bark, leaves or roots. 2.

Therapeutic validation of these pure compounds to validate traditional claims. 3. Translation of these findings into a possible therapeutic alternative for human consumption that is potent with minimal side effects. 4. Preclinical toxicological evaluation of various biologically active plants extracts with different solvents.

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Source of Support: Nil, **Conflict of Interest:** None.

