

*Review Article*

## Bioactive Natural Medicinal Plants in South Indian Western Ghats and Their Pharmacological Importance

M. Jenifer Tamizharasi, R. Rajila, D. Beula Shiny, J. Vijila Jasmin and T. Kumaran\*

PG & Research Department of Zoology, Muslim Arts College, Affiliated to Manonmaniam Sundaranar University, Thiruvithancode, Kanyakumari 629174, Tamilnadu, India.

\*Corresponding Author: [kumaranmac@gmail.com](mailto:kumaranmac@gmail.com)

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**Abstract:** Awareness of traditional knowledge and medicinal plants can play a key role in the utilization and discovery of natural plant resources. Plants became the basis of medicine system throughout the world for thousands of years and continue to provide mankind with new remedies. Researchers generally agree that natural products from plants and other organisms have been the most consistently successful source for ideas for new drugs. The world health organization estimates that 80% of the population living in the developing countries relies exclusively on traditional medicine for their primary health care. More than half of the world's population still relies entirely on plants for medicines, and plants supply the active ingredients of most traditional medical products. The review shows the south Indian medicinal plant products has been used by people to treat various health ailments.

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### INTRODUCTION

India has a rich repository of medicinal plant species (about 8000). More than 80% of the population of our country is dependent on medicinal plants for its primary health care (Ravikumar and Ved, 2000). India ranks second in terms of the volume and value of medicinal plants exported. Of the 960 traded medicinal plant species from India, 178 species are consumed in volumes exceeding 100 MT/yr (Ved, 1997). Less than 10% of the medicinal plants that are traded in the country are cultivated and about 90% are collected from the wild. These are often harvested in a destructive and unsustainable manner (Natesh, 2000). Since time immemorial, various medicinal plants have been employed across the world for the treatment of variety of human ailments including infectious diseases, although there is a lack of proper documentation. Interest in medicinal plants reflects the recognition of the validity of many traditional claims regarding the value of natural products in healthcare (Nair, 2004).

### Natural products as Medicine:

The trend to move towards natural products from medicinal plants have gained increased attention in recent years compared to the use of synthetic drugs as they are free from side effects. The phytochemical constituents of several medicinal plants have been shown to possess novel molecules that have been proved to be effective drug

molecules by rigorous science. Many phytochemicals are known to exert antimicrobial, antioxidant and analgesic property that have been recognized as beneficial to human health and for the prevention of disease (Sukumaran and Raj, 2010).

The increasing prevalence of multidrug resistant strains of microbes and the reduced susceptibility to antibiotics and antifungal drugs available in the market raises the number of untreatable bacterial and fungal infections; hence there is an urgency to search for the new infection-fighting strategies (Alonso *et al.*, 2000 and Sader *et al.*, 2002). In this regard, efforts are being made by systematic screening of the plants to discover novel antimicrobial, antioxidant and analgesic compounds.

### Pharmacological activities of medicinal plants:

A large and increasing number of patients in the world use medicinal plants and herbs for health purpose. Therefore, scientific scrutiny of their therapeutic potential, biological properties, and safety will be useful in making wise decisions about their use (Andrew and Catherine, 1999 and Fikrat, 2002). There are hundreds of significant drugs and biologically active compounds developed from the traditional medicinal plants. Plant showed wide range of pharmacological activities including antimicrobial, antioxidant,

anticancer, hypolipidemic, cardiovascular, central nervous, respiratory, immunological, anti-inflammatory, analgesic antipyretic and many other pharmacological effects (Al-Snafi, 2015).

**Medicinal plants with Pharmacological importance:**

The following are some of the medicinal plants around south India Western Ghats having higher range of pharmacological activities

***Ocimum tenuiflorum***



Common Name: Basil.

It is well known for its medicinal value. Apart from having anti-inflammatory, blood pressure lowering, and nervous system stimulating properties, this popular herb has been found to have chemo protective potential for colon cancer. In fact, a study found that basil played a significant role in reducing colon tumors in experimental animals. However, no human clinical trials have been conducted to confirm this experiment (Umadevi et al., 2013).

***Allium sativum***



Common Name: Garlic

The National Cancer Institute (affiliated to the NIH) recognizes garlic to have potential anticancer properties. The sulphhydryl compounds in garlic have the ability to block the formation of cancer causing substances. Several population studies have shown an association between increased garlic consumption and reduced risk of cancers of the stomach, colon, esophagus, pancreas, and also breast cancer. A study has found that garlic intake of 10 g per day could reduce the risk of prostate cancer by 50 percent (Umadevi et al., 2013).

***Zingiber officinale***



Common Name: Ginger

Gingerols isolated from *Zingiber officinale* inhibit growth & spread of various cancers including that of the ovary, cervix, colon, rectum, liver, urinary bladder, oral cavity, neuroblastoma and leukaemia by inducing apoptosis. It also possesses antioxidant, antimutagenic and anti-inflammatory properties and reduces side effects of chemotherapy & radiotherapy (Umadevi et al., 2013).

***Aloe vera***



Common Name: Aloe vera

Acemannan (a polysaccharide), isolated from *Aloe vera*, stimulates the immune system, accelerates wound healing and possess significant anticancer property. Alexin B isolated from *Aloe vera* possesses strong anticancer activity against leukaemia. Emodin and Lectins isolated from *Aloe vera* exhibit strong anticancer and immunoenhancing activities. *Aloe vera* has an extraordinary antioxidant profile and reduces side effects of chemotherapy & radiotherapy (Umadevi et al., 2013).



***Catharanthus roseus***



Common Name: Madagascar periwinkle

*Catharanthus roseus* (Vinca rosea, Madagascar periwinkle) contains more than 70 alkaloids, known as vinca alkaloids such as Vinblastine, Vincristine and their derivatives. Vinca alkaloids arrest cancer cell proliferation by binding to tubulin in the mitotic spindle. Vinca alkaloids also induce apoptosis (programmed cell death) and inhibit angiogenesis (formation of new blood vessels). Vinca alkaloids inhibit growth & spread of various cancers including that of breast, ovary, cervix, lung, colon, rectum, testis, neuroblastoma, Hodgkin's disease, malignant lymphoma, multiple myeloma, various sarcomas, rhabdomyosarcoma and leukaemia (Jaleel et al, 2008).

***Curcuma longa*:**

Common Name: Turmeric.

Curcumin (Di-feruloyl-methane) and curcuminoids isolated from *Curcuma longa* suppress cancer at every step, i.e. initiation, growth and metastasis. Curcumin inhibits growth & spread of various cancers including that of breast, lung, oesophagus, liver, colon, prostate, head & neck and skin. Curcumin is particularly effective in radiotherapy-resistant prostate cancer. Curcumin is effective even in advanced stages of cancer. Curcumin also protects from stomach cancer and

colon cancer. *Curcuma longa* also possesses antimutagenic, antioxidant, immunostimulant, anti-inflammatory, hepatoprotective and radioprotective properties (Umadevi et al., 2013).

***Emblica officinalis***



Common Name: Amla (Nelli)

*Emblica officinalis* contains ellagic acid, gallic acid, quercetin, kaempferol, emblicanin, flavonoids, glycosides and proanthocyanidins. *Emblica officinalis* valued for its unique tannins and flavanoids, which possess powerful antioxidant and anticancer properties. Quercetin, isolated from *Emblica officinalis* has hepatoprotective effect. Emblicanin A & B (tannins) possess strong antioxidant and anticancer properties.

*Emblica officinalis* inhibits growth & spread of various cancers including that of the breast, uterus, pancreas, stomach, liver and malignant ascites. It is an excellent rejuvenator and antioxidant herb. It is

highly nutritious and an important source of Vitamin C, minerals and amino acids. *Emblica officinalis* protects against much cancer particularly the liver cancer. *Emblica officinalis* reduces side effects of chemotherapy & radiotherapy (Umadevi et al., 2013).

***Solanum nigrum***



Common Name: Manathakkali

Solamargine and solasonine, isolated from *Solanum nigrum* (Lo-ing-kue) inhibit growth & spread of various cancers including that of the breast, liver and lung (Umadevi et al., 2013). It has limited medicinal uses in liniments, poultices and decoctions for external use. It has also been used in folkloric medicine as sedative and anticonvulsant. The berries and leaves are mainly used for medicinal purposes, besides the other parts of the whole plant. Whole plant of *Solanum nigrum* joints to swell and become painful), skin diseases, used in the treatment of anti tuberculosis and are said to produce Diaphoresis. Leaves are also used in dropsy, nausea and nervous disorders. The decoction of the berries and flowers are useful in cough, erysipelas (specific, acute, cutaneous inflammatory disease caused by a haemolytic streptococcus and are characterized by redhot).

***Plumbago zeylanica*:**

Common Name: Ceylon leadwort, doctorbush or wild leadwort

Plumbagin isolated from *Plumbago zeylanica* inhibits growth & spread of breast cancer, liver cancer, fibrosarcoma, malignant ascites and leukaemia by inhibiting cancer cell proliferation. *Plumbago zeylanica* also possesses strong antioxidant, hepatoprotective, neuroprotective and immunoenhancing properties (Umadevi et al., 2013).



***Withania somnifera*:**



Common Name: Ashwagandha

Withanolides isolated from *Withania somnifera*, inhibit growth & spread of various cancers such as cancers of the breast, lung, colon and central nervous system due to their antiproliferative and antiangiogenic properties. Sitoindosides VII-X and Withaferin A have strong antioxidant, antistress, immunomodulatory, anti-inflammatory and antiaging properties. *Withania somnifera* also possesses immunoenhancing, haemopoietic and neuroprotective properties and reduces side effects of radiotherapy & chemotherapy (Padmavathi et al., 2005 and Visavadiya, 2007).

***Azadirachta indica*:**

Common Name: Neem

It belongs to Meliaceae family and strongly acts against the prostate cancer. It also possesses anti-inflammatory, Immunomodulatory, anti-ulcer, anti-malarial, anti-fungal, anti-bacterial, anti-viral, antioxidant, anti-mutagenic and anti- carcinogenic

properties. Neem (*A. indica*) is a divine tree mainly cultivated in Indian subcontinent and it is commonly known as neem. All the parts of *A. indica* tree is commonly used in traditional Indian medicine for household remedy against various human diseases (Botelho et al., 2008).



***Asparagus racemosus:***



Common Name: Shatavari

The second century physician Galen described *Asparagu* as "cleansing and healing". Nutritional studies demonstrated that *Asparagus* is a low-calorie source of folate and potassium. In the first century, Pliny wrote, '*Asparagus*, of all the plants of the garden, receives the most praiseworthy care'. It belongs to Liliaceae family and acts on liver cancer. It is treated against gastric ulcers, dyspepsia, inflammation, liver diseases and possessing anti-oxidant activity (Agarwal et al., 2008, Kamata et al., 2000).

***Solanum torvum:***



Common Name: Turkey berry

The genus *Solanum* was large and complex, made up about 1,700 species worldwide (Wagner et al., 1999). The genus *Solanum* was probably derived from the Latin name of a plant that was used medicinally for treatment of epilepsy. *Solanum torvum* was used in many Ayurvedic treatments; it has seeing diuretic and digestive properties. It used in the treatment for coughs, liver diseases. *Solanum torvum* used to reduce body heat and strengthening the body (Chopra et al., 1996).

Phytochemical screening of sun-dried *S. torvum* fruits gave positive tests for alkaloids, flavonoids, saponins, tannins, glycosides, fixed oil, vitamin B group, vitamin C and iron salts (Sivapriya and Srinivas, 2007). *S. torvum* possesses antifungal (Bari et al., 2010), immunomodulatory and erythropoietic (Israf et al., 2004), antioxidant (Waghulde et al., 2011), analgesic and anti-inflammatory, anti-ulcerogenic (Télesphore et al., 2008), cardioprotective (Kamble et al., 2009), nephroprotective (Pattanayak et al., 2011), antidiabetic (Gandhi et al., 2011), angiotensin and serotonin receptor blocking activities (Jaiswal and Mohan, 2012).

***Adhatoda vasica***

Common Name: Adatodai

*Adhatoda vasica* belonging to family Acanthaceae, commonly known as Adosa, is a small, evergreen shrub found many regions of India and throughout the world, with a multitude of uses in traditional Ayurveda. *Adhatoda vasica* shows an antispasmodic and expectorant effect, and has been used for centuries with much success to treat asthma, chronic bronchitis, and other respiratory conditions. It is used in some parts of India to stimulate uterine contractions, thus speeding childbirth (Claeson et al., 2000). The leaves, flowers, fruit and roots are extensively used for treating cold cough, whooping cough, chronic

bronchitis and asthma, as sedative, expectorant and antispasmodic (Pandita *et al.*, 1983).



*Annona muricata*



Common Name : Soursop

*Annona muricata*, commonly known as soursop, graviola and guanabana, is a member of the Annonaceae family and is mostly distributed in tropical and subtropical regions of the world. Soursop has anticancer, anticonvulsant, anti-arthritic, antiparasitic, antimalarial, hepatoprotective and antidiabetic activities (Banerjee *et al.*, 2018). Leaf extracts of *A. muricata* possess vital antineoplastic potentials in human cancerous cells. Plant phenolics area unit a serious cluster of compounds that act as primary antioxidants or radical scavengers (Polterait, 1997). Fruit extracts show antiviral, antinociceptive, medicament and antihyperglycemic properties. It is conjointly effective against multidrug resistant neoplastic cell line (Oberlies *et al.*, 1997). The leaves of soursop tree act as molluscicidal and Anti-parasitical agents (Luna *et al.*, 2005).

*Annona muricata* used to cure inflammatory conditions like Flu and cough. Soursop tree extract resolution was applied on the body to treat

rheumatism, inflammatory disease and the other pain in joints. Soursop tree oils are often extracted from its leaves. The leaves are often crushed at the side of raw fruit from the plant and mixed with vegetable oil. The oil is often wont to treat numerous skin disorders like rashes, boils and sores (Padma *et al.*, 2001).

*Calotropis gigantea*



Common Name: Giant milk weed

*Calotropis gigantea* L. flowers were widely used as a natural herbal medication (Gururaja and David, 2016). *Calotropis gigantea* (Family: Asclepiadeace) is a common folk medicinal plant commonly known as “giant milk weed”. The plant has been widely studied, for the presence of potential bioactive components like cardenolides. The plant exhibited multiple therapeutic properties such as anti-inflammatory, anticonvulsant, anxiolytic, sedative, anti-diarrheal, hepatoprotective, trauma, larvicidal, antipyretic, anti-diabetic and anti-tumor activity (Rathod *et al.*, 2011).

In addition to this, the flowers are extensively used by ancient medical system for the treatment of diabetes mellitus, bronchial asthma, rheumatoid arthritis, and nervous disorders (Rathod *et al.*, 2011). Furthermore, in-vivo studies have demonstrated that, the flower exhibited analgesic, anti-diabetic and anti-tumor activity (Habib *et al.*, 2013).

## CONCLUSION

Medicinal plants play a useful note in the development of modern therapeutic agents. The medicinal effects of plants are due to secondary metabolite production of the plants. In this regard, efforts are being made by systematic screening of the plants to discover novel antimicrobial, antioxidant and analgesic compounds. Several medicinal plants that are indigenous to Western Ghats region have been in use by the local traditional healers to cure various diseases. Many

food crops have medicinal effects, for example garlic. Studying medicinal plants helps to understand plant toxicity and protect human and animals from natural poisons. Recently many researchers have studied the pharmacological importance of medicinal plants. This is partly due to the fact that these plants have been used for centuries as remedies against different ailments in the traditional medicinal system. But, to elucidate the exact mechanism of this modulatory effect and to examine its potential therapeutic effects further studies are essential.

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