



A SYSTEMATIC REVIEW OF ANTICANCEROUS PROPERTIES OF WITHANIA SOMNIFERA, TINOSPORACARDIFOLIA, CURCUMA LONGA, OCIMUM SANCTUM

Review article

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ABSTRACT

Cancer is one of the life-threatening diseases, which create major significant problems in both the developing and developed countries. Worldwide Cancer is a leading cause of death and observed for 15% of all deaths in year 2007-2008. The number of cancer deaths worldwide will expect to increase by 45% from 2007 to 2030. Normal cells multiply when the body need and die when the body doesn't need it but when cells start uncontrolled division it is called cancer. In cancer number of treatments are available such as Radiotherapy, Chemotherapy, Immune-therapy & Surgery with consequent side effects can be seen in patient. Because of serious side effects of chemotherapy and radiation therapy many cancer patients seek integrative complimentary methods of treatment. There are many drugs available in Ayurveda for cancer some of them in the process of trials. There is a need to develop more effective and less toxic drugs which combat the side effects of modern technologies through the heritage of Ayurveda. Plants have always been a basis for the traditional Ayurvedic medicine systems along with animal products, metals, minerals and they have provided continuous remedies to the mankind for thousands of years. Ayurvedic herbs show potential role against cancer treatment.

Key Words: *Ashwgandha* (*Withaniasomnifera*), anti-cancerous herbs, cancer, *Guduchi* (*Tinosporacardifolia*), *Haridra* (*Curcuma longa*), *Tulasi* (*Ocimum sanctum*).

INTRODUCTION: Ayurveda is a medical system of Indian medicine that deals with both perspective of life the mind and spirit. Ayurveda means the science of long life which is 5,000 years old (1500-1000_{BC})¹. In the present time, with lifestyle changes, many kinds of the disorder can be seen. There is Rig Veda which is of 4500-1600BC old Indian text where the earliest mention of medicinal plants². *Guduchi*, *Ashwgandha*, *Haridra*, and *Tulasi* these are herbs whose popularity is increasing among people of India as well as pharmaceutical industries all over the world³. Plant-based anti-cancer agents includes vincristine

taxol, vinblastine, stigmasterol, camptothecin, resveratrol, etc⁴., the herbs like *Guduchi* (*Tinosporacardifolia*), *Ashwgandha* (*Withaniasomnifera*), *Haridra* (*Curcuma longa*), *Tulasi* (*Ocimum sanctum*) are very helpful and useful in cancer because of anti-carcinogenic properties.

Guduchi (*T. cardifolia*) It is known as 'Giloya' in Hindi, 'Guduchi' in Sanskrit and heartleaf moonseed plant in English. The stem of *Tinosporacardifolia* is commonly used for the treatment of fever, skin and urinary disease dyspepsia, jaundice. In vitro study shows *Tinospora cordifolia* is able to kill HeLa cells; this shows the po-

tential of this plant as an anti-cancerous agent⁵.

Ashwagandha (*Withaniasomnifera*) potential role in integrative oncology” found that it can reduce tumour cell proliferation while increasing a person’s survival. It is also effective in radiotherapy. It reduces unwanted side effects of radiotherapy.

Curcumin stems have the potential for anticancer activity which suppresses the proliferation of various types of tumour cells at different level of it’s as initiation, progression and metastasis.

METHODS: In this review study, all data have been carefully collected from Pubmed and Google Scholar. We have reviewed many research papers on *Guduchi* (*tinoporacardifolia*), *Ashwagandha* (*withaniasomnifera*), *Tulasi* (*Ocimum sanctum*), *Haridra*(*Curcuma longa*), anti-cancerous anti-oxidant, immunomodulator, and radioprotective herbs chemical composition of the given herbs were the keywords. Total 55 articles were collected and after study, around 35 articles were reviewed here.

IMMUNE-MODULATOR HERBS:

***Guduchi* (*tinoporacardifolia*)**

Guduchi is called nectar of God that is one of three Amrita Plants and its Sanskrit name is ‘*Amritavalli*’ and *Giloy* in Hindi. Each and every part of this plan like fruits, stem, roots, and leaves being used in traditional Indian medicine science in ancient time it is rich in nutraceuticals⁶.

The bitter starch of *Guduchi* is called *Guduchisatva* which is highly nutritive and digestive and used to treat many diseases and can be used for humans as well as animals also⁷.

It is also rich in nutrients like protein, fats, dietary fibres, and calcium which will help cancer patients as supplement nutrients⁸.

Generally, it is used for fever, digestive problems jaundice, dyspepsia skin problems and urinary diseases but in vitro study, it is found that it is able to kill HeLa cells and that’s why its use as anti-cancer agents⁹.

The recent research findings give valuable information that some herbs such as *Haridra* (*Curcuma longa*), *Ashwagandha* (*Withaniasomnifera*), and *Guduchi* (*Tinoporacardifolia*) are possessed anti-carcinogenic and immunomodulator properties and are useful at various levels to cure Post Radio and Chemotherapy side effects¹⁰. Vijay K. et al reported that the immunomodulator and antioxidant properties of *Guduchi* (*tinoporacardifolia*) improve the strength and immunity of tissues, this also justifies the increased body strength¹¹. Saiee P Joshi et al. reported that mostly, chemotherapeutic agents experience poisonous opposite results and the outcome of *Guduchi* (*tinoporacardifolia*) extracts was more beneficial than doxorubicin therapy¹².

***Ashwagandha* (*withani asomnifera*)**

Withania somnifera (*Ashwagandha*) also known as winter cherry, is small, erect, evergreen woody shrub which belonging to family *Solanaceae* is used as medicine, has played as an important role in Ayurvedic medicine for more than 3,000years¹³. In traditional medicine it is used as liver tonic, anti-inflammatory agent, astringent and mainly as an aphrodisiac¹⁴. In Hindi it is known as *Aswagandha*, in Gujarati Ghondha, in Telugu Vajigandha, and Pulivendram in Tamil. This plant can be seen widely in all drier parts of subtropical India i.e. Uttar Pradesh, Madhya Pradesh, Gujarat, Punjab, Rajasthan, and also found in some other countries such as Pakistan, Afgani-

stan, Egypt, South Africa, Morocco, etc¹⁵. It is recognized as the most important herb in Ayurveda, which has been used since ancient times in Indian traditional medicine in the management of stress, energy elevation and improving cognitive health¹⁶. Also for lower inflammation, blood sugar levels, cortisol, anxiety and depression¹⁷. This is an evergreen shrub with long tuberous root, short stems, ovate and petiolate leaves, and axillary bisexual flowers, which have a high amount of medicinal value such as anti-inflammatory, anti-arthritic, anti-coagulant, anti-oxidant, antipyretic, anti-diabetic, rejuvenating, etc¹⁸. Its roots are mainly used as therapeutic agents. *W.somnifera* is also known as an adaptogen which is a non-poisonous herb that works on a nonspecific basis to normalize physiological function, working on the HPA axis and the neuro endocrine system¹⁹. Recently its use has been seen in various respiratory diseases such as asthma, bronchitis, ulcers, insomnia and senile dementia. And further research and clinical trials show the result that *ashwagandha* has anti-aging, anti depressive, Hemopoietic, rejuvenating properties, chemopreventive, immunomodulatory and other therapeutic effects²⁰. *Ashwagandha* (*Withaniasomnifera*) is the multilateral plant used in the traditional Indian medicine system (Ayurveda). It contains active ingredients such as alkaloids and steroidal lactones which are known as 'withanolides' and also have flavonoids. There are many phytoconstituents like alkaloids, steroids, flavonoids, phenolics, nitrogen-containing compounds, and trace elements²¹. Withanolides are the major steroidal alkaloids due to its highly oxygenated nature which render its anti-cancer potential²².

Ashwagandha has many properties such as rejuvenating properties anti-inflammatory, antioxidant, immunomodulatory, antitumour, antistress, and hemopoietic, and It is also appears to exert a positive influence on the endocrine, cardiopulmonary, and central nervous systems. Only the mechanisms of action for these properties are not fully understood²³. *Ashwagandha* is a safe compound there no toxicity founded in studies²⁴.

There is research on *W. somnifera* and its potential role in integrative oncology" found that it can reduce tumour cell proliferation while increasing a person's survival²⁵. It is also effective in radiotherapy. Reducing unwanted side effects of radiotherapy it has been shown to increase the effectiveness of radiation therapy along with chemotherapeutic agents such as cyclophosphamide and paclitaxel without any interlope with tumour-decreasing action of drugs. These effects were demonstrated in vitro on human cell lines and animals only not tried on human. *Withaniasomnifera* is supplementary therapy for integrative cancer care²⁶.

As we all know *W. somnifera* has the most active component withanolides and withaferins along with a few other metabolites including withanone and withanosides are so effective against different types of cancer cell lines²⁷. *Withaniasomnifera* is plant-based medicine that has many components to treat complications of post-chemotherapy and radio therapy and also effective to reduce tumour cell proliferation.

RADIOPROTECTIVE HERBS:

Tulasi (ocimum sanctum):

Tulsi (Ocimum sanctum L.) holy basil in English commonly known as holy basil.

This plant is known as *Tulasi* in most Indian languages which means “incomparable one”. It is believed that *Tulasi* originated in India and found broadly two types of *Tulasi* one is darker purplish in colour referred as “*ShyamaTulasi*” second one is light green variety is known as “*Rama Tulasi* or *lakshmiTulasi*”²⁸.

It belongs to the family *Lamiaceae* and is indigenous to the Indian subcontinent with exceptionally adored culinary and restorative fragrant and has been utilized inside Ayurvedic medication for over 3000 years²⁹.

The *Tulsi* plant has many medicinal properties. It is used for fever malaria cough-cold and flu reduces cholesterol levels and blood pressure, very beneficial for stomach disorders, inflammation, heart disease skin related problems etc³⁰.

Tulasi (OS) has anti-cancer properties also able to prevent cancer in humans³¹. This plant contains several phytochemicals like eugenol, rosmarinic acid, apigenin, retinal, luteolin, and carnosic acid to mediate these effects by some changes such as through increasing antioxidant activity, modification in gene expression, induced apoptosis and angiogenesis, and metastasis in chemically induced skin, lung, liver and mouth cancers Baliga MS et al., 2013³².

According to Mondal S et al., 2011 *Tulsi* leaf (*O. sanctum* L.) on empty stomach increases immunity. Alcoholic leaf extract shows an immunomodulatory effect³³. *Tulsi* has good Immunomodulatory, Anti-stress, Anti-arthritis, Anti-inflammatory, Anti-microbial, Radioprotective effect, Analgesic effect.

According to Baliga MS et al., 2013 It is proven that the *Tulasi* can treat and prevent cancer because it has radio and chemopreventing-properties³⁴.

According to Nangia-Makker P et al., 2013(OS) is a nutritious plant known for its many beneficial medicinal properties, including its anticarcinogenic potential³⁵. It has been demonstrated that the aqueous extract of *Tulsi* and its bio-organic constituents, flavonoids, orientin and vicenin, protect rats from radiation sickness and reduce mortality. It protects healthy tissues and only cures radiation's tumour-improving effects. It is also noticed that many important phytochemicals such as rosmarinic acid, eugenol, apigenin and carnosic acid protects DNA against radiation induced damage³⁶.

There is a study performed before two decades conclude that *Tulasi* and its phytochemical such as eugenol, orientin, and vicenin have radioprotective effects³⁷.

ANTI-TUMOUR OR ANTI MUTAGENIC HERBS:

Haridra (curcuma longa):

Curcuma Longa (turmeric) belongs to the ginger family (*Zingiberaceae*). And it is one of the oldest spice plants grown in the world mostly in south-east Asian countries. It is most popular in India from Kashmir to Kanyakumari commonly known as Haldi, and used in cooking and textile dying purpose. Curcumin is a substance called polyphenol which derived from the plant *Curcuma longa* commonly known as turmeric. It is golden drug in Ayurveda³⁸.

Haridra is known by different names in different regions across India. In Hindi, it is known as Haldi or Hardi, in Gujarat Haldar, in Karnataka Arishina, in Maharashtra Halad, in Tamilnadu Manjal or Manchal, in Andhra Pradesh Pasupu, and there are many synonyms in the Sanskrit language (which is Dev bhasha language of God) like *Haridra*, *Kanchani*, *Pita*,

Nisha, Baravanini, Lakshmi, Gauri, Hattavilashini & Yoshitpriya, etc³⁹. It is also referred as 'Indian saffron'⁴⁰. Originated in India and became popular all through the world. *Curcuma longa* Linn (*haldi*) is an herb cultivated throughout tropical and other regions in India. Haldi is being used as medicinal plant day to day practice in Indian home for several ailments⁴¹.

Curcumin (*Diferuloylmethane*) is a polyphenol that is derived from the plant *Curcuma longa*, generally known as turmeric. Research over the last 50 years has shown that this polyphenol of the turmeric plant (*C. longa*) *Haridra* can prevent and treat cancer⁴².

Curcumin has anti-cancerous effects, antioxidant, and anti-inflammatory effects⁴³. It is cultivated in India also exported in other countries. Multiple studies of *Haridra* found that its major active element curcumin has anti-oxidant properties same as vitamins C, E, and Beta-Carotene because of these qualities, it is well known among consumers of cancer prevention it is also good for liver protection as well as anti-aging (*rasayana*)⁴⁴.

Curcumin stems have the potential for anticancer activity which suppress the proliferation of various type of tumour cells at different level of its such as initiation, progression, and metastasis. It has the best antiproliferative agent for breast cancer cells⁴⁵.

In Ayurveda, with a range of beneficial properties of *C. longa*, including anti-inflammatory, antioxidant, anti-septic, chemo-preventive, and chemotherapeutic activity it can be used⁴⁶.

Use of *Haridra* extracts in *Arbuda* (cancer) has been described in Brihatrayi which are the very revered textbooks or Samhitas in Ayurveda which is written by three rishis

Charak, sushrut and Vagbhat. Cancer (*Arbuda*) has been described⁴⁷.

Vritam Sthiram Mandrujam Mahantamanantamoolam Chiravidhayapakam. Kurvanti Mansochhayamtyagadhan Tadarbudam Shastravido Vadanti. (S.N.)

Gland dyspepsia tumour goiter diagnosis /13⁴⁸.

Meaning- A rounded, static, painless, deep-rooted, which is growing steadily, and non-suppurative inflammation, which destroys into muscle with extensive destruction, is called *Arbuda* by experts of Ayurved. In this form Cancer (*Arbuda*) is described by experts of Ayurveda.

It shows anti-proliferating activity in many several of cancer also depresses large number of growth factors and another molecules which are involve in tumour cell growth⁴⁹.

It is a good antioxidant that's why it protects against free radical damage. Many researchers have found that turmeric is antimutagenic, as it helps to prevent new cancers caused by Chemotherapy and Radiation-therapy during cancer treatment. Metastasis (uncontrolled spread) of melanoma (skin cancer) cells can be inhibited by turmeric⁵⁰.

According to CCRAS 'The Central Council for Research in Ayurvedic Sciences', *Curcuma longa* (*Haridra*): The major chemical constituents are curcuminoids approximately 6%, essential oil 2-7%, yellow coloring constituents 50 to 60% and the minor component such as desmethoxycurcumin, bidesmethoxycurcumin, dihydrocurcumin, phytosterols, fatty acid, polysaccharides.

OBSERVATION AND RESULTS

After review, this is observed that herbs such as *Ashwagandha* (*Withania somnifera*), *Guduchi* (*Tinospo-*

racardifolia), *Haridra* (*Curcuma longa*), *Tulasi* (*Ocimum sanctum*) have the potential to fight with diseases like cancer, heart disease, diabetes skin problems, respiratory diseases, wound healing, gastrointestinal diseases, etc. These herbs are antioxidant, immunomodulatory, antitumour, anti-stress, anti-inflammatory, antimutagenic, etc. *Tulasi* has been recognized as a radioprotective herb, *Ashwagandha*, *Guduchi*, and *Haridra* are good immunomodulators and have medicinal properties to kill cancerous cells. These herbs are easily available treasure in India and furthermore, research should be done to open hidden gems of medicinal plants properties in the world against fight of cancer.

DISCUSSION

In the present scenario, being fit has become a challenge, and use of allopathic drugs to enhance immunity has become fashion, although it can sometimes be damning. Increasing expense of drugs and their adverse effects has become a significant public health concern in developing nations⁵¹.

All these incidences encourage the use of traditional medicines and have provided new ways for pharmacological research. That is why there is no restrictions for anyone to go with natural product (like herbs), which will not only be beneficial to health of person but also economically and can reduce mortality. There are several plants in the world with medicinal properties, but few particular herbs are found best medicine in research to cure diseases, one of those is *Tulasi* (*O. sanctum*) which has maintained the title of “Queen of the Herb” for generations due to the superior therapeutic potential it possesses. Recent studies have shown that *Tulsi* and its phy-

tochemicals orientin, vicenin and eugenol have radioprotective effects⁵². There many important phytochemicals such as rosmarinic acid, eugenol, apigenin and carnosic acid protects DNA against radiation induced damage. Thus *Tulasi* is a beneficial radio protective herb. *Tulasi* may be more useful for future in diseases like cancer or other ills⁵³.

Curcumin (*diferuloilmethane*), the active form of *Haridra* (turmeric) possesses significant anti-oxidative, anti-inflammatory and anti-cancer properties⁵⁴. In vitro & vivo researches shown curcumin can also suppress the activity of transcription factors, various enzymes (such as protein kinases) thus can modulate the inflammation process, gene expression and potentially control the effectiveness of curcumin treatment of many organ disorders, probably diabetes mellitus and its complications too⁵⁵.

In the roots of *Guduchi* (*Tinosporacardifolia*) the chemical constituents are found such as Jatrorrhizine, Magnoflorine, Choline, Tembetarine, Tinosporin, Isocolumbin, Palmatine, Tetrahydropalmatine contain an anti-oxidant action⁵⁶.

It is also useful in brain function and manages stress level and. It is capable to kill HeLa cells, this is shown in the in-vitro study and this plant is a potential anticancer agent and its extract shows dose-dependent cell death⁵⁷.

The plant *Ashwagandha* (*Withania somnifera*) have various use in pharmacology industries because of its activities such as antioxidant, memory enhancing, anti-inflammatory, antitumour etc. several other effects are there like hypolipidemic, antibacterial, cardiovascular diseases, sexual behaviour etc⁵⁸.

CONCLUSION:

It is difficult to treat cancer or prevent its occurrence entirely but one can attempt by modulating the immune system using immunomodulator drugs in day-to-day life to combat the risk factors. The herbs *Ashwagandha Guduchi* and *Haridra* have immense potential as immunomodulator action on body. *Tulasi* is good radio protective herb. For good Immunity *Ashwagandha* can be taken in powder form *Guduchi* in fresh form and *haridra* also in powder form. These medicines have been successfully used for centuries, more clinical trials should be held on to enhance and support therapeutic use. It is also important that these plants may be effective when a combination of other drugs use.

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Source of support: Nil Conflict of interest: None Declared

Cite this Article as : [Mishra Satakshi et al : A Systematic Review of Anticancerous Properties of *Withania Somnifera*, *Tinosporacardifolia*, *Curcuma Longa*, *Ocimum Sanctum*] www.ijaar.in : IJAAR VOL VI ISSUE I MARCH-APRIL 2023 Page:01-10