



## Anticancer and antioxidant activity of herbal drugs found in India belonging to the family *Moraceae*

Haque Mudabbirul<sup>1\*</sup>, Puranik B Sangamesh<sup>2</sup>, Kayande Nandu<sup>3</sup>

<sup>1</sup> Department of Pharmacognosy, OPJS University, Churu, Rajasthan, India

<sup>2</sup> Professor, OPJS University, Churu Rajasthan, India

<sup>3</sup> Professor, Thakur Shivakumar Singh Memorial Pharmacy College, Burhanpur Madhya Pradesh, India

### Abstract

Herbal medicines have a vital role in the prevention and treatment of cancer. A great deal of pharmaceutical research done in technologically advanced countries like USA, Germany, France, Japan and China has considerably improved quality of the herbal medicines used in the treatment of cancer. The plant kingdom produces naturally occurring secondary metabolites which are being investigated for their anticancer, antioxidant activities leading to the development of new clinical drugs. With advanced knowledge of molecular science and refinement in isolation & structure elucidation techniques, we are in a much better position to identify various anticancer, antioxidant herbs and develop the remedy that might cure cancer. In the present review, an attempt has been made to study the cancer, antioxidant activity of herbal drug belonging to family *Moraceae*.

**Keywords:** anticancer, antioxidant activity, herbal drugs, *Moraceae*

### Introduction

Cancer is a broad group of various diseases typified by unregulated cell growth. In cancerous state cells division and growth is uncontrollable resulting in tumors that, if malignant, may metastatic to other parts of the body. These neoplastic cells originate from highly specialized cells through a process of regression to a simpler, more primitive stage and which unlike the normal parent cells; divide continuously. The main properties of neoplastic tissue include; sustained proliferative signaling, evasion of growth suppressors, resistance to cell death, replication, angiogenesis, invasion and metastasis, reprogramming energy metabolism and escaping immune destruction. The

causes of rise in cases of cancer are not known. However, increased cancer risk is known to correlate with tobacco use, certain infections, radiation, and lack of physical activity, age, poor diet, obesity, and environmental pollutants. These factors may damage genes directly or combine with existing genetic faults within cells to cause the disease<sup>[1]</sup>. Cancer is a leading cause of mortality, and it strikes more than one-third of the world's population and it's the cause of more than 20% of all deaths. Among the causes for cancer are tobacco, viral infection, chemicals, radiation, environmental factors, and dietary factors. Commonly cancer types and new, estimate death case<sup>[2]</sup> (Table-01).

**Table 1:** Estimated numbers of new cases and deaths for each common cancer.

Sr. No	Cancer type	Estimated New Cases	Estimated Death Cases
1	Bladder	76,960	16,390
2	Breast (Female- Male)	246,660(F) – 2600 (M)	40450(F) – 440(M)
3	Colon and Rectal (Combined)	134,490	49,190
4	Endometrial	60,050	20,470
5	Kidney (Renal Cell and Renal Pelvis) Cancer	62,700	14,240
6	Leukemia (All Type)	60,140	24,400
7	Lung (Including Bronchus)	224,390	158,080
8	Melanoma	76,380	10,130
9	Non-Hodgkin Lymphoma	72,580	20,150
10	Pancreatic	53,070	41,780
11	Prostate	180,890	26,128
12	Thyroid	64,300	1,980

### Various types of cancer

#### Bladder Cancer

Bladder cancer is the ninth most common cancer worldwide, with an estimated 430000 new cases in 2012. More than 60% of all bladder cancer cases and half of all the 165000 bladder cancer deaths occur in the less developed regions of the world. A strong male predominance is observed with three-quarters of all bladder cancer cases occurring in men.

The relative survival rate of female patients with bladder cancer was 73.1%, with 75.9% in male<sup>[3]</sup>. The relationship between smoking and bladder cancer risk is well documented. Epidemiological studies suggest a three to five-fold increased risk of bladder cancer among smokers a dose-dependent risk increase has been reported among patients with longer smoking duration and higher amount of tobacco exposure<sup>[4]</sup>.

### Breast Cancer

Breast cancer is the leading type of cancer in women according to the estimated number of new cases in 2020. An estimated 276,480 new cases of breast cancer will be diagnosed with an estimated 42,170 breast cancer deaths will occur in women [5]. Although rarely, breast cancer affects men is less than 1 percent. The development of breast cancer involves several types of genes that need to be activated or inactivated in order to promote malignancy. The genetic contribution to breast cancer risk is indicated by the increased incidence of breast cancer among women with a family history of the disease and by the observation of families in which multiple members have breast cancer in a pattern compatible with autosomal dominant inheritance of cancer susceptibility. Three principal syndromes are associated with autosomal dominant inheritance of breast cancer risk: (i) hereditary breast and ovarian cancer due to *BRCA1* or *BRCA2* germline mutations. (ii) Li-Fraumeni syndrome due to germline mutations in the *p53* gene, identified in over 50% of families, with a penetrance of at least 50% by age 50 years, germline mutations in another gene, *hCHK2*, have been implicated in the etiology of classical and variant Li-Fraumeni families, and (iii) Cowden syndrome due to *PTEN* germline mutations. Mutations in each of these genes produce different clinical phenotypes of characteristic malignancies [6].

### Colon and Rectal Cancer

Colorectal cancer (CRC) is the third most common cancer worldwide after lung and breast cancers with two-thirds of all colorectal cancers occurring in the more developed regions of the world [7]. In men it is the third most common cause of cancer while in women is the second common cause of cancer. There are numerous large well-designed prospective studies that have looked into this. One of the earlier meta-analysis of 15 prospective studies reported that high consumption of red meat and of processed meat is associated with an increased risk of colon rectal cancer [8].

### Endometrial Carcinoma

Endometrial carcinoma is the most common gynecologic malignancy and will be encountered by almost every gynecologist. The study suggested that prolonged unopposed estrogen exposure is associated with most type-I endometrial cancers. Estrogen replacement therapy prescribed to control menopausal symptoms increases the risk of developing endometrial cancer by 2 to 20-fold, with an increase the risk correlating with the duration of use. Concomitant administration of progestin continuously or intermittently (10 to 15 days/month) significantly reduce this increase risk of cancer [9].

### Kidney (Renal Cell and Renal Pelvis) Cancer

Renal cell carcinoma (RCC) is a heterogeneous group of cancers arising from renal tubular epithelial cells that encompasses of all primary renal neoplasms. Malignant tumors of the renal pelvis constitute only 5% of urinary tract neoplasms and 90% of pelvic cancer cases are transitional cell carcinoma. Risk factor including tobacco smoking and analgesics abuse, particularly k, papillary necrosis, chronic urinary infections, renal calculi, occupational exposure, Balkan nephropathy, thorium containing radiologic contrast medium and family associated cancer syndromes [10].

### Leukemia (All Type)

The term leukemia is derived from the Greek words “leukos” and “heima,” which refer to excess white blood cells (WBC) in the body. Leukemia, once considered a single disease, was first recognized around the 4th century [11]. Leukemia is a metastatic and malignant disease for blood-making organs which is resulted due to incomplete evolution and problematic proliferation of white blood cells (WBCs) and its substrates in blood and bone marrow.

There are four types of Leukemia – Chronic Lymphocytic Leukemia, Acute Lymphocytic Leukemia, Chronic Myelogenous Leukemia and Acute Myelogenous Leukemia.

#### Chronic Lymphocytic Leukemia

This type of leukemia is most common in adults.

#### Acute Lymphocytic Leukemia

This type of leukemia is most common in children, teenagers and adults those up to 39 years of age.

#### Chronic Myelogenous Leukemia

This leukemia is most common in older adults and men.

#### Acute Myelogenous Leukemia

This is the most common type of acute leukemia. These type of leukemia effects the people with above 65 years.

### Lung Cancer (Including Bronchus)

Lung cancer or lung carcinoma is a malignant lung tumor characterized by uncontrolled cell growth in the lung tissues the highest rates are in North America, Europe, and East Asia, with over a one third of new cases in China. The rates in Africa and South Asia are much lower. Worldwide in 2012, lung cancer occurred in 1.8 million people and resulted in 1.6 million deaths<sup>12</sup>. The two major forms of lung cancer are non-small cell lung cancer (about 85% of all lung cancers) and small-cell lung cancer (about 15%). The Non-small-cell lung cancer can be divided into three major histologic subtypes: squamous-cell carcinoma, adenocarcinoma, and large-cell lung cancer. Smoking causes all types of lung cancer but is most strongly linked with small-cell lung cancer and squamous-cell carcinoma, adenocarcinoma is the most common type in patients who have never smoked [13].

### Melanoma

Melanoma is one of the most aggressive cancers due to its ability to disseminate from a small primary tumor. Over 100 000 cases of melanoma diagnosed in the US in 2020 making it the cancer type with the fifth highest incidence. Melanoma is a highly genetic heterogeneous type of tumor. The most common oncogenic mutation is BRAF (in about 45–50% of melanoma tumors), followed by NRAS (30%) and NF1 (10–15%), all genes involved in the mitogen-activated protein kinase (MAPK) pathway, while the remaining 5–10% of melanoma are considered as triple wild-type tumors (TWT) and are driven by other mutations. In physiological conditions, melanocytes are quiescent cells with a low proliferative rate. Their main role is to produce and transfer melanin to the keratinocytes in order to protect the skin against UV radiations. In healthy tissue, melanocytes rely heavily on oxidative phosphorylation and are able to survive reactive oxygen species (ROS) and UV-

induce damage thanks to melanin and a good antioxidant response [14].

**Non-Hodgkin Lymphoma**

Non-Hodgkin’s Lymphoma (NHL) is a heterogeneous tissue and molecular malignancy that originates from B and T lymphocytes. It is the 10th most common cancer and 11<sup>th</sup> leading cause of cancer deaths in the world. The highest incidence of this type of lymphoma was observed in North America, Europe, the Oceania and some African countries and the lowest incidence was in Southern Asia<sup>15</sup>. Risk factor include, Smoking, drinking, heavy drinkers had a poorer survival rate and higher risk of death.

**Pancreatic Carcinoma**

Pancreatic cancer is one of the most lethal malignancies, accounting for the 7<sup>th</sup> leading cause of cancer-related mortality worldwide. It is estimated that about 458,000 people will be diagnosed with pancreatic cancer worldwide in 2018, and more than 432,000 will die of this disease. Most cases occur in patients between 60 and 80 years of age and rarely before the 4<sup>th</sup> decade. Male versus female ratio is 3:1 and it is most common in black race. 5-year survival in patients with pancreatic cancer is as low as 9% in the USA [16].

**Prostate Cancer**

Prostate cancer is cancer that occurs in the prostate. The prostate is a small walnut-shaped gland in males that produces the seminal fluid that nourishes and transports sperm. Different risk factors are involved in induction or progression of an aggressive or non-aggressive form of prostate cancer. Some factors such as; Age is most important risk factor. Prostate cancer is rare under the age of 40, and its incidence increases exponentially with age, race (American-African), genetics (positive family history), low intake of antioxidant, and high  $\alpha$ -linoleic acid are

significantly associated with the incidence of prostate cancer. In regard with the fatal form of prostate cancer, some factors including smoking, high BMI (body mass index), fattiness,  $\alpha$ -linoleic and calcium are responsible for the increase in risk [17].

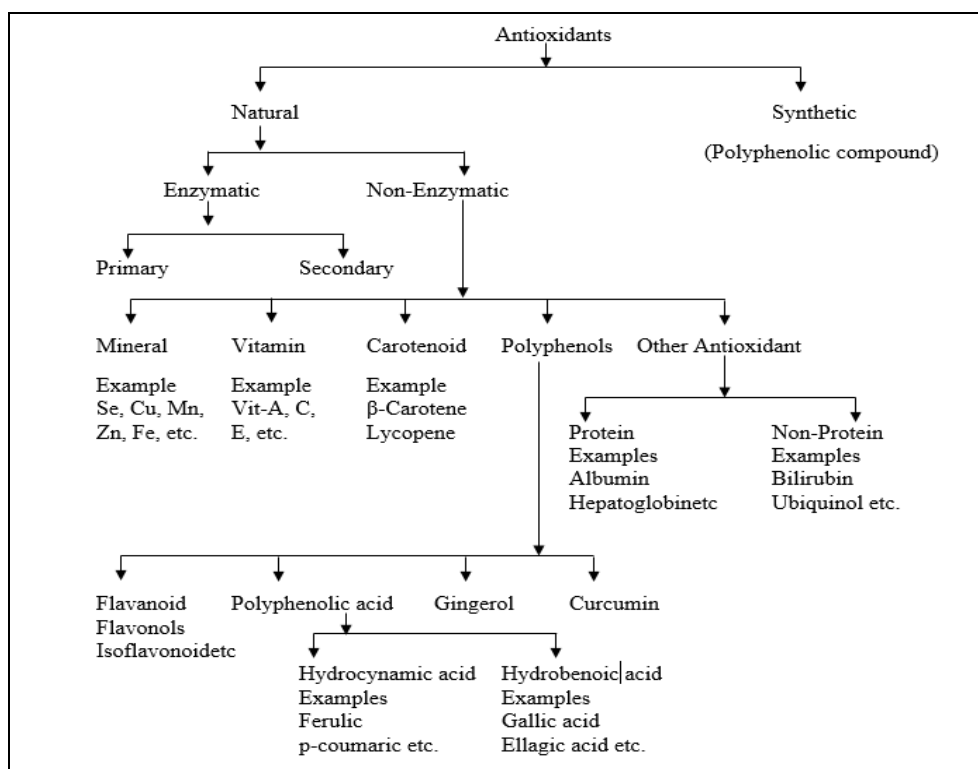
**Thyroid Cancer**

Thyroid cancer is the most frequent endocrine malignancy in humans and accounts for 1% of all cancers in the world. Thyroid cancer begins in the follicular cell of the thyroid gland. There are 2 types of cells located within the thyroid parenchyma: the follicular cells and the supporting cells (also called the C cells) [18].

The risk factors include a personal or family history of thyroid cancer, certain diseases with a genetic predilection towards the development of thyroid cancer, and previous radiation exposure. Most thyroid cancers are idiopathic. However, the thyroid gland is very sensitive to radiation-induced oncogenes is, and radiation is the main environmental cause of thyroid cancer, Personal history of exposure to ionizing radiation represents approximately 9% of all cases of thyroid cancer, and the risk is inversely related to the age at which the exposure was suffered, but directly related to the radiation dose.

**Antioxidant**

Oxidation is a chemical reaction that can produce free radicals, thereby leading to chain reactions that can damage the cells of organisms. An antioxidant can be defined as: “any substance that, when present in low concentrations compared to that of an oxidisable substrate, significantly delays or inhibits the oxidation of that substrate The physiological role of antioxidants, as this definition suggests, is to prevent damage to cellular components arising as a consequence of chemical reactions involving free radicals [19]. Antioxidant are classified as follow (Fig-1).



**Fig 1:** Schematic representation of classification of antioxidants.

### Natural Antioxidants

They are the chain breaking antioxidants which react with lipid radicals and convert them into more stable products. Antioxidants of this group are mainly phenolic in structures and include various co-factor of antioxidants enzymes, their absence will definitely affect the metabolic functions, examples selenium, copper, iron, zinc, manganese, vitamins. The vegetables fruits, grain, seeds, leaves, flower and bark their colors are also rich source of antioxidants, examples catechins, carotenoids, beta carotene, lycopene, etc [20].

### Synthetic Antioxidants

Synthetic antioxidants are phenolic compounds that perform the function of capturing free radicals and stopping the chain reactions. They are compounds produced artificially and added to processed or pre-packaged food to prevent rancidity, browning. The most used synthetic antioxidants include butylated hydroxy anisole (BHA), butylated hydroxy toluene (BHT), tertiary-butyl hydroquinone (TBHQ), nordihydroguaretic acid (NDGA), propyl gallate (PG), octyl gallate, dodecyl gallate and metal chelating agents (ethylene diamine tetra acetic acid, polyphosphatases) [21].

### Some Species of the Moraceae Family with Anticancer/Antioxidant Effects

Natural products especially plants have been used for the treatment of various diseases promisingly from the decades by knowledge of Ayurveda in our country. In developing countries herbal medicine is the source of new discoveries for the new drug leads towards various healthcare issues and synthesis of new formulations. Beneficial effects of crude drugs are believed to be attributed to plant phytochemicals, such as carotenoids, anti-oxidative vitamins, phenolic compounds, terpenoids, steroids, indoles, and fibers, etc. Traditional medicine when compared to other sources of drug discoveries had contributed many novel therapeutic compounds for preventive and curative medicine. Secondary metabolites like polyphenols, terpenes and alkaloids have been reported to possess anti mutagenic and anticancer properties in many studies.

#### *Antiaris toxicaria*

*Antiaris toxicaria* is one of such medicinal plants with a remarkably wide distribution in tropical regions. It is commonly referred to as “bark cloth tree” in English and often described as “false iroko” in Igbo because of its striking morphological resemblance to Iroko tree (*Milicia excelsa*) [22]. *Antiaris toxicaria* (Pers). Lesch belonging to the family *moraceae*, commonly known as, Marauri. *Antiaris toxicaria* is a tall tree recorded from Western Ghats at altitudes of 300m height. Leaves oval, oblong, obtuse or rather acute unequally cordate when young toothlet and hairy on both sides, peduncle simple. Fruit fleshy one seeded drupe. The leaf of *antiaris toxicaria* confirmed the presence of various pharmacologically important plant constituents like triterpenoid, phenol, flavonoid, coumarin, quinine, glycosides, sugars, alkaloids, steroids and saponins. Furan and acids are absent in the extract for instance, the presence of tannins may be responsible for ability of *antiaris toxicaria* to cure diseases like diabetes, diarrhea, sore throat, skin ulcer and dysentery. The presence of flavonoids in *antiaris toxicaria* may be responsible for its uses to cure cancer, inflammations and

allergies. The presence of alkaloids may be useful to cure heart diseases [23].

#### *Ficus Benghalensis* L.

*Ficus benghalensis* family (*Moraceae*) is commonly known as Banyan tree or Vata or Vada tree in Ayurveda as well as other ancient systems of medicine in the world. It is native to a wide area of Asia i.e. India, Burma, Southeast Asia, Southern China, Thailand, and Malaysia. General Phytochemicals such as phytosterols, Lanostadienyl glucosyl cetoleate, bengalensisteroic acid acetate,  $\alpha$ -amyrin acetate, Lupeol. Anthocyanidin derivatives 5,7-dimethylether of leucopelargonidin-3-O- $\alpha$ -L-rhamnoside, 3',5,7-trimethyl ether of delphinidin-3-O- $\alpha$ -L-rhamnoside, 3',5,7-trimethylether of leucocyanidin, 3',5-dimethyl ether of leucocyanidin-3-O- $\beta$ -D-galactosyl cellobioside. Fatty acid Palmitic acid, oleic acid, linoleic acid, linolenic acid, vernolic acid, stearic acid, malvalic acid, sterculic acid, lauric acid, myristic acid. Amino acids, Cysteine, glutamine, methionine, tryptophan, arginine, methionine, citrulline, hydroxyproline. Polysaccharides, D-glucose, D-fructose, D-galactose, D-arabinose, D-xylose. Sterolas,  $\beta$ -sitosterol. Flavonoids, Catechin, genistein. Flavanols, quercetin-3-galactoside, rutin. Leuconanthocyanidins, Leucocyanidin. Triterpene, friedelin, bengalensione, benganoic acid. Meso inositol,  $\beta$ -sitosterol- $\alpha$ -D-glucose, tiglic acid ester of taraxasterol [24].



Fig 2: *Ficus Benghalensis* L.

#### *Ficus benjamina* L.

Weeping fig (*Ficus benjamina* L.) is an annual tree belonging to the family mulberry (*Moraceae*). It has been used for thousands of the year as an ornamental plant and hedge plant. *Ficus benjamina* is known by different names depending on the geographical distribution. The common English names are famously as Benjamin tree, or oval leaf fig, *Benjamina* fig and weeping fig tree. Common vernacular names are 'balete' or 'salisi'. In India specifically, it is best known as 'pukar'. In Chinese it is called '*Chui ye rong*' or '*Cong Mao Chui ye rong*'. The phytochemicals constituent of weeping fig contains fatty acid, oil, phenolic compound, carbohydrates, saponins, flavonoid, alkaloids, proteins and tannins, it additionally contains latex which is 30% caoutchouc, alongside 59% gum. Latex can be applied on the boils as this plant has number of antioxidants. Free

radicals are responsible for the several clinical disorders like cancer, diabetes mellitus, degenerative disease, renal failures because they disturbed the natural defense mechanisms [25].



Fig 3: *Ficus benjamina* L.

### *Ficus carica*

*Ficus carica* Linn. (Syn: *Ficus* synonyms; family: *Moraceae*) is commonly referred as “Fig”. Its fruit, root and leaves are used in the native system of medicine in different disorders such as gastrointestinal (colic, indigestion, loss of appetite and diarrhea), respiratory (sore throats, coughs and bronchial problems), inflammatory and cardiovascular disorders, anticancer etc. This genus is an important genetic resource due to its high economic and nutritional values and also an important part of the biodiversity in the rainforest ecosystem. Phytochemical studies on *F. carica* revealed the presence of numerous bioactive compounds such as phenolic compounds, phytosterols, organic acids, anthocyanin composition, triterpenoids, coumarins, and volatile compounds such as hydrocarbons, aliphatic alcohols, and few other classes of secondary metabolites from different parts of *F. carica*. Phenolic acid such as 3-O- and 5-O-caffeoylquinic acid, ferulic acid, quercetin-3-O-glucoside, quercetin-3-O-rutinoside, psoralen bergapten, and organic acids (oxalic, citric, malic, quinic, shikimic, and fumaric acids) have been isolated from the water extract of the leaves of *F. carica* L. Fruits contained the highest levels of polyphenols, flavonoids, and anthocyanins and exhibited the highest antioxidant capacity. Fig fruits of *F. carica* were analyzed for total flavonoids, antioxidant capacity, and profile of anthocyanins, highest levels of polyphenols; flavonoids and anthocyanins exhibited the highest antioxidant capacity. A mixture of 6-O-acyl- $\beta$ -D-glucosyl- $\beta$ -sitosterols has been isolated as an effective cytotoxic agent Luteolin, Quercetin is a recognized antioxidant and has been studied for its gastro-protective effects, inhibition of carcinogenicity either alone or in combination with chemotherapeutic agents, Biochanin-A is a phytoestrogen that has been shown to have a chemo preventive role in cancer. This role may involve its effect on cell death signaling pathways, which could prevent the proliferation of tumor cells [26].



Fig 4: *Ficus carica*.

### *Ficus curtipes* Corner

*F. curtipes* a typical *ficus* species, *F. curtipes* differs from other *ficus* species in lacking well depended synstigma, the platform formed from stigmas on which oviposition females can walk and oviposit through the tops of the stigmas. Characterization of methanol extracts obtained from the stem bark and leaves allowed the identification and quantitation of 21 phenolic compounds for the first time; the stem bark was predominantly rich in flavan-3-ols and apigenin derivatives, while solely apigenin-di-glycosides have been identified and quantitated on the leaf extract [27].

### *Ficus elastica* Roxb. Ex Hornem

The name *Ficus elastica* first appeared in Hortus Bengalensis by William Roxburgh (1814) but without description. Five years later Hornemann (1819) published the description under the same name. The species was first reported from a locality named “Garrow Hills” of India by Roxburgh (1814), most probably the Garo Hills in Megalaya of India today. *Ficus elastica* Roxb. Ex Hornem belongs to family *moraceae* commonly known as rubber tree, rubber fig, rubber bush, Indian rubber bush, Assam rubber tree native to northeast India and southern Indonesia. The plant is locally known as India rubber tree. *F. elastica* is also a common house plant. These trees can grow up profusely without any agronomic management and survive well under extreme conditions such as limited water supply and high temperature. It is adaptable for annual pollarding with also a potential fiber value and is distributed in Tamil Nadu [28]. *Ficus elastica* possesses antimicrobial activity and the leaves extract is used for the treatment of skin infections and skin allergies, as well as a diuretic agent. In addition, several chemical constituents from *F. elastica* have been investigated. The leaf containing ficuselatic acid, and (1S,6R)-8-O- $\beta$ -D-glucopranosyl abscisate sodium. It was also demonstrated that the latex of *ficus elastica* Roxb. ex Hornem. (*Moraceae*) showed a significant antischistosomal activity, leaf extract is used for treating skin infections and allergies, as well as a diuretic agent, methanolic extract from the bark of aerial roots shown anticancer, Antioxidant and antimicrobial activities [30].

***Ficus Microcarpa* L.f.**

*Ficus microcarpa* L.f. (subgenus *Urostigma*, section *Conosycea*) is an evergreen, monoecious tree native from Sri Lanka through India to southern China, Singapore, Taiwan, Japan, the Ryukyu Islands, northern Australia, New Caledonia, and many Pacific Islands, where it grows from sea level to about 1,800 m elevation [31]. Many triterpenoids (Lupenyl acetate, friedelin, glutinol, epifriedelinol,  $\beta$ -amyirin acetate and  $\beta$ -amyirin), phenolic compounds (protocatechuic acid, marmesin, trans-catechin, 4,5-dihydroblumenol) and isoflavones have been isolated from aerial root, bark, leaves and fruits of *F. microcarpa* and some compounds showed piscicidal, germination inhibitory and antifungal activities. Furthermore, oleanonic acid, acetylbetulonic acid, betulonic acid, acetylursolic acid, ursolic acid, 3-oxofriedelan-28-oic acid and 3 $\beta$ -acetoxy-25-hydroxylanosta-8,23-diene isolate from *F. microcarpa* showed significant cytotoxic activity against human nasopharyngeal carcinoma HONE-1, oral epidermoid carcinoma KB, and colorectal carcinoma HT29 cancer cell lines [32].

***Ficus palmate***

*Ficus palmate* Frossk commonly known as 'Fegadsara Fig' belongs to the family of *Moraceae* or *Urticaceae*. It is found to be growing wild in the Himalayan region, so also named as Wild Himalayan fig and is mainly the native of North-Western India and Rajasthan regions. Fig is delicious, nutritive fruit and has medicinal properties such as reducing risk of cancer and heart disease plants synthesize compounds with biological activity, namely antioxidant, anticancer, anticardiac, as secondary products, which are mainly phenolic compounds serving in plant defence mechanisms to counteract reactive oxygen species (ROS) in order to avoid oxidative damage [33]. The fruits are juicy, containing 45.2% extractable juice and 80.5% moisture. The total content of soluble solids of the juice is 12.1%. The fruit-juice contains about 6% total sugars. The pectin content of the fruit is 0.2%. The fruits are not the richest source of vitamin C and contain only 3.3 mg of vitamin C per 100 g of pulp. The protein content of the fruit is 1.7%, and the ash content is 0.9%. Some of the mineral elements like phosphorus, potassium, calcium, magnesium and iron were found to be 0.034, 0.296, 0.071, 0.076 and 0.004% respectively. The leaves, bark, and heartwood of *F. palmata* contain  $\beta$ -sitosterol and a new tetracyclic triterpene-glaunol acetate. Besides, cerylbehenate, lupeol, and  $\alpha$ -amyirin acetate are reported from the stem bark of *F. palmate* [34]. Bark, root, leaves fruit and latex of this plant are pharmacologically regarded as hypoglycemic, antitumor, anti-ulcer, anti-diabetic, lipid lowering and antifungal and have traditionally been used for the treatment of various ailment e.g. gastrointestinal disorder, diabetes, ulcer, tumour, etc.

***Ficus Racemosa* L.**

*Ficus racemosa* Linn. (Family; *Moraceae*) popularly known as the cluster fig tree or Gular Plant *Ficus racemosa* has various synonyms like Udumbara (Udumbara is considered sacred to God Dattaguru), yajnanga, yajniya, yajnayoga, yajnyasara, gular, Cluster Fig tree is native to Australia, South East Asia and the Indian Subcontinent. The plant grows all over India in many forests and hills. The leaves are dark green, 7.5-10 cm long, ovate or elliptic, in large clusters from old nodes of main trunk. The fruit receptacles

are 2-5 cm in diameter, pyriform, in large clusters, arising from main trunk or large branches. The fruits resemble the figs and are green when raw, turning orange, dull reddish or dark crimson on ripening. The seeds are tiny, innumerable, grain-like. The roots are long and brownish in colour. It's having characteristic odour and slightly bitter in taste. From ancient times all the parts of this plant have been used for their medicinal value. It is basically used for its antidiuretic effect. In the Ayurvedic System of Medicine, the roots are popularly used for the treatment of hydrophobia, whereas, the bark has multiple actions. It is used as a galactagogue and is helpful in gynecological disorders. In Phytochemical screening it shows presence of primary and secondary metabolites which play significant role in prevention of various disorders. Many active constituents that have been isolated from various parts of this plant possess useful pharmacological activities. phytochemicals were get identified from various parts of *Ficus racemosa* such as Bergapten, bergapton, lanosterol,  $\beta$ -Sitosterol, Stigmasterol, lupen-3-one,  $\beta$ -sitosterol-D-glucoside, vitamin k, campesterol, stigmasterol, isofucosterol,  $\alpha$ -amyirin, lupeol, tannic acid, arginine, serine, aspartic acid, glycine, threonine, alanine, proline, tryptophan, tyrosine, methionine, valine, isoleucine, leucine, n-nonacosane, n-hentriacontane, hexa-cosanol, and n-octacosan, Campesterol, hentriacontane, hentriacontanol, kaempferol, stigmasterol, methyl ellagic acid, glauanol, hentriacontane,  $\beta$  sitosterol, glauanolacetate, glucose, tiglic acid, esters of taraxasterol, lupeolacetate, friedelin, higher hydrocarbons and other phytosterol, Leucyanidin-3-O- $\beta$ -glucopyranosides, leucoperalagonidin 3-O- $\alpha$ -L-rhamnopyranoside,  $\beta$ -sitosterol, unidentified long chain ketone, lupeol, its acetate,  $\alpha$  - amyirin acetate. A new tetracyclic triterpene, glauanol acetate which is characterized as 13  $\alpha$ , 14  $\beta$ , 17  $\beta$ H, 20-  $\alpha$  H-lanosta-8, 22-diene 3-  $\beta$  -acetate and racemoseic acid<sup>36</sup>. All parts of this plant (leaves, fruits, bark, latex, and sap of the root) are medicinally significant in a variety of treatments such as diabetes, diarrhoea ulcers, stomachache, piles, skin diseases, dysentery and as carminative etc. Among various pharmacological properties, *Ficus racemosa* Linn imparts vital role as anti-oxidant, anti-cancer, antidiuretic, anti-bacterial, anti-inflammatory, memory enhancing and gastro-protective agent, Anti-microbial etc [36].



**Fig 5:** *Ficus Racemosa* L.

***Ficus Religiosa* L.**

*Ficus religiosa* belonging to family *Moraceae* is a large glabrous tree, found throughout India in the vicinity of temples. It derived its botanical name from two words i.e. 'Ficus' a Latin word for 'fig', and 'Religiosa' refers to 'religion' indicating its importance in Hindu and Buddhist religions the tree is native to India and is believed to originate mainly in Northern and Eastern India. It is also found in its neighboring countries like Bangladesh, Pakistan, Nepal, Sri-Lanka and China. Because of its contribution in historical events it has an important place in medicinal, mythological and religious systems of India and hence this tree is mostly seen near religious places. The aqueous extract of dried bark of *F. religiosa* is stated that they have flavonoids, tannins, phytosterols and bergapten and bergapten (furanocoumarin derivatives). The stem bark of *F. religiosa* is affirmed the phytoconstituents of tannins, phenols, flavonoids, alkaloids and steroids, vitamin K, n-octacosanol, methyl oleanolate, lanosterol,  $\beta$ -sitosteryl-D-glucoside, stigmaterol, lupen-3-one. The root bark of *F. religiosa* has active constituents such as  $\beta$ -sitosteryl-D-glucoside that reveals a hypoglycemic effect in diabetic rats and rabbits. 4.9% of the *Ficus* fruits have protein with the essential amino acids, phenylalanine and isoleucine<sup>38</sup>. Its bark is used to treat gonorrhoea, ulcers and leaves used for skin diseases. Fruit powder is used to treat asthma. The fruit and bark, leaf having hypoglycemic activity, Hypolipidemic activity, methanolic extract of stem-bark shown anti-inflammatory and analgesic effect. The antibacterial effect of the aqueous and ethanolic bark extract of *Ficus religiosa* against *Pseudomonas aeruginosa*, *Pseudomonas testoteroni*, *Proteus mirabilis*, *Proteus vulgaris*, *Enterobacter aerogenes*, *Escherichia coli*, *Citrobacter freundii*, *Staphylococcus epidermidis*, *B. cereus*, *Streptococcus faecalis*, *Streptococcus cremoris* and *Streptococcus agalactiae* [39].



**Fig 6:** *Ficus Religiosa* L.

***Ficus Rumphii* Blume.**

*Ficus rumphii* Blume (Pakar in Hindi, Gajaswat in Begali, Pakri in Assam; family: *Moraceae*) is an interesting group of trees in Nepal and India, not only of their useful value but also of their growth habits and religious significance. It is a moderate deciduous usually epiphytic tree, found in Punjab, Assam, West Bengal, Madhyabharat, West Peninsula,

Northern and Southern India. *Ficus* has long been used in folk medicine for the treatment of various diseases for example the leaves of *Ficus rumphii* have been found to exhibit potent antioxidant activity. Moreover, milky substance from the branches of *F. rumphii* is used as emetic, antitussive and antidiuretic. It has also been reported that the bark of *F. rumphii* is effective in the treatment of hematuria. Earlier phytochemical analysis of *F. rumphii* indicated the presence of flavonoids, tannins and phenolic compounds. Moreover,  $\beta$ -sitosterol and flavonol glycoside have also been isolated from the trunk bark of *F. rumphii* [40].

**Conclusion**

Fig trees of several different species show multiple cancer prevent their bark, roots, leaves, fruits and latex. Evidence of such uses originated in ancient and medieval times, with classical writers of those periods claiming the efficacious use of these parts in carcinomas, antioxidant, inflammatory swellings, "hard swellings," and tumors in general. Although these historical records are frequently difficult to translate into modern diagnostic categories, both the frequency of these citations, and in some cases, their specificity, provides confidence that medicines deriving from *Ficus* trees were well-known for treating both cancers and antioxidant processes, and that in many cases, amelioration of these conditions was subsequently observed. Pharmacological and chemical studies have demonstrated anti-neoplastic or antioxidant activity of both the crude extract and pure compounds of particular promise, due to their potent cytotoxic activity against a number of cancer cell lines, are the phenanthroindolizidine alkaloids and the triterpenoids with a C-18 carboxylic acid functional groups. In fact, these alkaloids, which have also been found in a small number of other plant genera, are currently under active investigation as potential therapeutic leads. In addition to these cytotoxic compounds, several flavonoids, including anthocyanins, as well as other phenolic compounds, demonstrated antioxidant activity. Coumarins, in many cases, are selectively cytotoxic to cancer cells, and also have antioxidant activity and may interfere with formation of the lipoxygenase product 5-HETE to suppress inflammation. Only a small fraction of the known *Ficus* spp. and parts has been evaluated for anticancer and antioxidant activities, figs may constitute a rather large untapped source for new chemical entities with anticancer actions. Finally, in addition to the pharmacological potential for cancer treatment, rich opportunities for *Ficus* spp., especially from the fresh and dried fruits of *Ficus carica*, exist within the arena for functional foods and beverage. These opportunities derive primarily from the extremely benign safety profile of fig fruit products, pleasant taste and its antioxidant constituents. Fig fruits hold potential in functional food approaches aimed at normalizing metabolic syndrome and boosting wellness beyond the widely accepted role of figs in the diet for improving bowel performance, and as a source of naturally sweet, readily available, quick energy.

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## Reference

- Ochwang'I, O Dominic, Kimwele N, Charles, Oduma A, Jemimah *et al.* Stephen. Medicinal plants used in treatment and management of cancer in Kakamega County, Kenya. The Journal of Ethnopharmacology,2013:151(3):1-16.
- Pooja Rani, Rajesh Khathuriya, Ayush Garg. A review on plant origin anticancer drugs. The word journal of pharmaceutical and life sciences,2018:14(4):84-88.
- Liu Shenghua, Yang Tian, Na Rong, Hu Mengbo, Zhang Limin. The impact of female gender on bladder cancer-specific death risk after radical cystectomy: a meta-analysis of 27,912 patients. The Int. Urol Nephrol 2015; DOI 10.1007/s11255-015-0980-6.
- Bostrom J, Peter, Al khateeb Sultan, Trottier Greg, Athanasopoulos Z. Paul *et al.* Sex differences in bladder cancer outcomes among smokers with advanced bladder cancer. The BJU International,2011:190:70-76.
- Khan Muhammad, Zhao Zhihong, Arooj Sumbal, Zheng Tao, Liao Guixiang. Lapatinib plus local radiation therapy fir brain metastases from her's-2 positive breast cancer patients and role of transturumab: a systematic review and meta-analysis. Frontiers in Oncology,2020:(10)576926:1-14.
- Cipollini G, Tommasi S, Paradiso A, Aretini P, Bonatti F, Brunetti M *et al.* The genetic alteration in hereditary breast cancer. The annals of oncology,2004:15(1):7-13.
- Alsumait F, Alanoud, Al-Farsi M, Yahya, Waly I, Mostafa *et al.* Mansour. Hospital prevalence of colorectal cancer among colonoscopy recipients attending a tertiary hospital in oman: a cross-sectional study. Hindawi the scientific world journal,2020:3(70):145-164.
- Taha Mustafa Mohammad Sheik, Malik Vinod. Current Paradigms in rectal cancer. The journal of current medicine research and practice,2017:(7):59-66.
- Burke M. William, Orr James, Leitao Mario, Salom Emery, Gehrig Paola, Olawaiye B. Alexander, Brewer Molly, Boruta Dave, Vilella Jeanine, Herog Tom, Shahin Abu Fadi. Endometrial Cancer: A review and current management strategies: Part I. The Gynecologic Oncology,2014:134:385-392.
- Korkes Fernando, Silveira S Thiago, Castro G Marilia, Cuck Gustavo, Fernandes C Roni, Perez D Marjo *et al.* Carcinoma of the renal pelvis and ureter. International brazjurol,2006:32(6):648-655.
- Blackburn M. Lisa, Bender Sarah, Brown Shelly. Acute Leukemia: Diagnosis and treatment. Seminar in oncology nursing,2019:000(150950):1-7.
- Mustafa Murtaza, Azizi Jamal AR, Illzam El, NazirahA, Shrifia, Abbas SA. Lung cancer: risk factors, management, and prognosis. IOSR journal of dental and medical sciences,2016:15(10):94-101.
- Herbst S Roy, Heymach V, John, Lippman M Scott. Review article molecular origins of cancer lung cancer. The New England journal of medicine,2008:359(13):1367-1380.
- Flerin C Nina, Cappelleso Federica, Pretto Samantha, Mazzone Massimiliano. Metabolic traits ruling the specificity of the immune response in different cancer types. The current opinion in biotechnology,2021:68:124-143.
- Farmanfarma Kalan K, Kiasara Heidarpour S, Hassanipour S, Salehiniya H. Non-Hodgkin's Lymphoma in the world: An epidemiological review. The world cancer research journal,2020:7(e1520):1-7.
- Brunner Maximilan, Wu Zhiyuan, Krautz Christian, Pilarsky Christian, Grutzmann Robert, Weber F. Georg. Current clinical strategies of pancreatic cancer treatment and open molecular questions. International journal molecular sciences,2019:20(4543):1-28.
- Mirahmadi Mahdi, Azimi-Hashemi Shayan, Saburi Ehsan, Kamali Hossein, Pishbin Mandana, Hadizadeh Farzin. Potential inhibitory effect of lycopene on prostate cancer. Biomedicine & pharmacotherapy,2020:129(110459):1-7.
- Shah P. Jatin. Thyroid carcinoma, epidermiology, histology, and diagnosis. The clin Adv hematol oncol,2015:4 (4):3-6.
- Young SI, Woodside VJ. Antioxidants in health and disease. J clin pathol,2001:(54):176-186.
- Hamid AA, Aiyelaagbe OO, Usman LA, Ameen MO, Lawal A. Antioxidants: Its medicinal and pharmacological applications. The African journal of pure and applied chemistry,2010:4(8):142-151.
- Mbah J Chika, Orabueze Ifeoma, Okorie H Ndiamaka. Antioxidants properties of natural and synthetic chemicals compounds: Review article therapeutic effects on biological system. Acta scientific pharmaceutical sciences,2019:3(6):28-42.
- Ugwoke CEC, Anze GPS, Nweze EA, Obisike VC. Pharmacognostic Evaluation of the leaf of *antiaris toxicaria* (Family *Moraceae*) 2017. International journal of pharmaceuticals sciences and research,2017:8(6):2696-2700.
- Porchselvi C, Muthulakshmi S. Pharmacognostic and phytochemical evaluation of *Antiaris toxicaria* (Pers) Lesch. Journal of Medicinal Plants Studies,2018:6(6):217-221.
- Hafiz Abdul Khaliq A review of pharmacognostic physicochemical, phytochemical and pharmacological studies on *Ficus bengalensis* L. The journal of scientific and innovative research,2017:6(4):151-163.
- Mahomoodally Fawzi Mohamad, Asif Farwa, Rahman Rafia, Nisar Shafaq Ishaq Aniq. A review of the pharmacological potential and phytochemical profile of weeping fig-*Ficus benjamina* L. International journal of chemical and biochemical sciences,2019:(16):70-75.
- Badgujar B. Shamkant, Patel V Vainav, Bandivdekar H Atmaram, Mahajan T Raghunath. A review, Traditional uses, phytochemistry and pharmacology of *Ficus carica*. J pharma boil,2014:52(11):1487-1503.
- Andrade Catarina, Ferreres Federico, Gomes Nelson GM, Duangsrissai Sutsawat, Srisombat Nattawut, Vajrodaya Srunya, M. Pereira David *et al.* Phenolic profiling and biological potential of *Ficus curtipes* corner leaves and stem bark: 5-lipoxygenase inhibition and interference with no leaves in lps-stimulated raw 264.7 macrophages. Biomolecules,2019:9(400):1-17.
- Saeed Afifa, Iqbal Zafar, Gulzar Zubia, Akram Mohammad, Liaqat Lubna, Tara Zaheen, Mansha Marvi. *et al.* GC- FID and physicochemical studies of oil from the leaves of *Ficus elastica* Linn,2017:6(8):47-53
- Teinkela Mbosso JE, Noundou Siwe X, Fannang S, Meyer F, Vardamides JC, Mpondo E *et al.* In Vitro

- antimicrobial activity of the methanol extract and compounds from the wood of *Ficus elastic* Roxb. Ex Hornem. aerial roots. South African journal of botany,2017:(111):302-306.
30. Flayyih Abdulridha Zaid Al Hilfi, Nencu Ioana, Costea Teodora, Grid Elena Cerasela, StoicescusiIviacristina, anghel Robert viorel Ancuceanu, Dinu Mihaela, Ionica Elvira Floriana, Seremetcristina Oana, Negres Simona. Chemical Composition and Antioxidant activity of *Ficus elastica* Roxb. Ex Hornem and *Raphanus sativus* L. Selective dry extracts with potential antidiabetic activity. Farmacia,2019:67(5):764-771.
  31. Riefner E. Richard, *Ficus microcarpa* (Moraceae) naturalized in southern California, U.S.A.: Linking plant, pollinator, and suitable microhabitats to document the invasion process. Phytologia,2016:98(1):42-75.
  32. Ao Changwei, Anping Li, A.Abdelnaser, Elzaawely, Xuan D. Tran, Tawata Shinkichi. Evaluation of antioxidant and antibacterial activities of *Ficus microcarpa* L. extract. Food Control,2008:19:940-948.
  33. Dr.Negi Arvind, Dobhal Kiran, Ghildiyal Pallavi. Antioxidant potential and effect of extraction solvent on total phenol content, flavonoids content and tannin content of *Ficus palmata forssk*. Int. J Pharm. Sci. Rev. Res,2018,49(2):19-24.
  34. Joshi Yogesh, Joshi Kumar Amit, Prasad Nondita, Juyal Divya. A review on *Ficus palmata* (Wild Himalayan Fig). The J. of phytopharmacology,2014:3(5):374-377.
  35. Deep Prakarsh, Singh Kr Amrita, Ansari Thair Md, Raghav Prashant. Review pharmacological potentials of *Ficus racemose*. Int. J pharm. sci. rev.res,2013:22(1):29-34.
  36. Kotwal Sachin V, Dhasde Vipul V. A review on phytochemicals and pharmacological potential of *Ficus racemose* Linn. European journal of pharmaceutical and medical research,2019:6(3):443-446.
  37. Bhalerao A Satish, Verma R Deepa, Teli C Nikhil, Didwana S Vinodkumar, Thakur S Saurabh *et al*. A comprehensive *Ficus racemose linn*. Journal of applicable chemistry,2014: 3(4):1423-1431.
  38. Devanesan Beena Enit, Anand Vijaya Arumugan, Kumar Sampath Palanisamy, Vinayagamoorthy Puthamohan, Basavaraju Preethi. Review article phytochemistry and pharmacology of *Ficus religiosa*. Sys rev pharma,2018:9(1):45-48.
  39. Gupta Chitra, Singh Shipra. A review Taxonomy, phytochemical composition and pharmacological prospectus of *Ficus religiosa* Linn (Moraceae). The journal of phytopharmacology,2012:1(1):57-70.
  40. Mehtab Parveena, Ali Mohammed Mallaa, Mahboob Alama, Faheem Ahmada, Pereira Silvab PS, Manuela Ramos Silva. Two new phenolic compounds from *ficus rumphii* and their antiproliferative activity. Natural product research,2014:28(9):646-652.