Useful Anti-Cancerous & Anti-tumorous Asian medicinal Plants
(*Taxus baccata* L. or *Taxus baccata* Thunb., *Catharanthus roseus*(L.) G. Don, *Annona muricata* L.)

Pawan Kumar Sagar∗1, R P Meena4, Mohd Washim Ahmad3, Kunal Sajwan4

∗1,2,3 Drug Standardization Research Institute, (CCRUM., Ministry of AYUSH.), PLIM., Campus, Kamlanehru nagar, Ghaziabad, U.P. ,India; 4. Central Council for Research of Unani Medicine, Ministry of AYUSH., Janakpuri, D-Block, New Delhi, India

**ABSTRACT**

Cancer is one of the harmful leading causes of death worldwide. Several synthetic agents have been used to cure the disease but they have their adverse side effects, low-hilling potential and toxicity. Present Article reviewed three important medicinal plants i.e.- *Taxus baccata* L. Or *Taxus baccata* Thunb., *Catharanthus roseus* (L.) G. Don and *Annona muricata* L. which traditionally used since ancient time for the treatment and prevention of Cancer and Tumor in Southern, Northern-east and Himalayan region of India. Having active phytochemical constituents Taxanes- Alkaloids*(Taxol and Taxotere)*, Larotaxel,nab-Paclitaxel present in *T. baccata* L. Or *T.baccata* Thunb. and Vinca-Alkaloid as Vinblastine, Vincristine, Vinorelbine, Vinflunine, catharanthine and vindoline alkaloids in *Catharanthus roseus*(L.) G.Don, as well as Muricin J, Muricin K, Muricin L, Cinnamic acid derivative, Coumaric acid hexose, Annonuricin A, Annonuricin B, Annonuricin C, Annonuricin E, Annomatucin, Annhexocin, Muricatocin A, Muricatocin B, Muricatocin C, Giganletrenonin, Annonacin A, Annopentocin A, Annopentocin B, Annopentocin C etc. present in *A muricata* L. This report also revealed the ethno-botanically and biological activities of active principles of these plants that will help in noval drug discovery, noval new active phytochemical constituents of anti-cancer and anti-tumor formulations and development of pharmacopial standards.

**Keywords:** Anti-cancerous, Anti-tumorous, medicinal plants, bio-actives constituents, bio available, ethno-botany.
Introduction:
Cancer is one of the deadly diseases which are characterized by irregular cell proliferation. The most common cause behind the cancer is lifestyle changes. According to World Health Organization, more than 14 million people diagnosed with cancer and 9 million died in 2013. (www.who.int) (Ray et al., 2017 and WHO.2017) High mortality rate makes it an important public health and economic issue which requires an effective prevention. Medicinal plants have various advantages over chemical products, because plants derived compounds are more tolerable and less toxic to the normal human cells. Already available conventional therapies for the treatment of cancer are radiotherapy and chemotherapy which have various toxicity, serious side effects and thus affecting the health of the persons. Therefore, an alternative method is required that include less toxic and more potent anticancer drug as compare to the drugs available in the market. Recently there has been an increased scientific interest in the study of material from plant source as an anticancer compound. Several studies have found the role of medicinal plants in prevention and treatment of cancer. (Greenwell et al., 2015) Since Epithelial cells cover the skin, lining of the respiratory and alimentary tracts, and metabolize ingested carcinogens, it is not surprising that over 90% of cancer occur in epithelial tissues (Kainsa et al., 2012). Plants are an important source of synthetic and herbal agents used in several pharmaceutical industries. Some of the prominent plant derived compound have a major role in the development of several clinically useful anticancer agents such as Vinblastine, Vincristine, teniposide and etoposide derivative, topotecan, paclitaxel (Taxol) etc. (Singh et al., 2013). Taxol and Camptothecin were among the most important anti-cancer compound derived from plants available today. (Bist et al., 2011; Suhas et al., 2007) Because the genuine region of the serious side effects of synthetic chemo-preventive agents, the research is going on to investigate the plant derived chemotherapeutic agents without toxicity. Bio-prospective for plants important with anti-cancer activity has been a major focus in the search for plant. (Bhist et al., 2011; Raskin et al., 2002) Anti-neoplasm activity is defined as effect of natural, synthetic or biological chemical agents used to reverse, suppress or prevent carcinogenic progression (Madhuri and Pandey, 2009). Chemically synthesized agents have their toxicity and DNA damage induction potential which limits their uses. (Bist et al., 2011; Sasaki et al., 2002) Himalayan plants grown in high altitude are the rich source of various secondary metabolites such as anthraquinones, flavonoids, tannins, alkaloids and a wide range of secondary metabolites which include flavonoids, flavones, anthocyanins, lignans, coumarins, isocatechins and catechins etc. (Roy et al., 2017; Singh et al., 2013; Sumer J. 2000). National Cancer Institute has approximately screened 35,000 plant species for their potential anticancer activities and they have found that among them about 3,000 plant species have shown reproducible anticancer activity. (Sumner J. 2000) India has a rich history of using plants for health care in general (Misra et al., 2008) and treatment of cancer in particular with out causing toxicity (Madhuri and Pandey, 2009). Cancer has become an important Public Health Problem with over 900,000 new cases occurring every year and is one of the ten leading causes of death in India (Misra et al., 2008; Devi, 2009). The beneficial medicinal effects of plant materials typically result from the combination of these secondary products (Dai et al., 2010; Tonthubthim thong et al., 2001). In 1985 Farnsworth et al. identified 119 secondary plant metabolites which were used as drugs. Out of 255 drugs which are considered as basic and essential by the World Health Organization (WHO), 11% are obtained from plants and a number of synthetic drugs are also obtained from natural precursors. Herbal plants based extract medicines worldwide use in Asia,
Europe, China, Japan, Korea, Malaysia, Canada for cure of human being since ancient time and has provides to them a miraculous powerful sprite or fight again several harmful disease with contain highly safe and efficacious higher yielding, standard quality formulated products without any adverse and side effect.

**Methods:** The sources of scientific literature were accessed from various electronic databases such as PubMed, Google Scholar, Science Direct, and library search, studies drugs samples authenticated and confirmed of these botanical, scientific indentification by our Experts botanist, pharmacognosist Scientist and Researchers of Council research Institutes CRIUM, Hyderabad, T.S., India & RRIUM, Chennai, T.N., India as well as DSRI, Ghaziabad, U.P., India - SMPU. &DSRU. Units under Ministry of AYUSH., Govt. of India, INMAS, (DRDO.), under ministry of AYUSH., Govt. of India, Scientist and researchers.

1. **Talispatr, Telis Patta / Zarnab / Taxus** *(Taxus baccata L. or Taxus baccata Thunb.)*:

*Taxus baccata* is a conifer native to western, central and southern Europe, northwest Africa, northern Iran and southwest Asia. It is found in India northern Himalaya region, it is commonly known as Himalayan yew. It is used in the treatment of many diseases including cystitis, eruptions, headaches, heart and kidney problems, rheumatism etc. All parts of the plant, except the flesh of the fruit, are highly poisonous, having a paralyzing affect on the heart.

![Taxus baccata](image)

**Fig.1:** *Taxus baccata*: a. Branches b. Leaves and seed c. Leaves with seeds cones

**Language Common name**

**Urdu**: Zarnab

**Cashmerian**: Taxus

**Arabic**: Talisfar

**Bengali**: Birmi, Talish Patra, Bhada Getela

**Chinese**: Tzu shan

**English**: Yew, Common Yew, Chinwood

**French**: Ifcommun

**German**: Eibe, Eife, Ibenbaum, Kantelbaum, Taxbaum, Ybe

**Gujarati**: Gethela Barmi

**Hindi**: Talispatr, Talis Patta

**Kannada**: Sthauneyak

**Marathi**: Sthauney Barmi

**Persian**: Zarnab

**Punjabi**: Birmi

**Sanskrit**: Mandhuparni, Talispatra, Sukapuspa

**Habitat**: Woods and scrub, usually on limestone. It sometimes forms pure stands in sheltered sites on chalk in the south-east and on limestone in the north-west. Seed can be very slow to germinate, often taking 2 or more years. It is best sown as soon as it is ripe in the autumn when it should germinate 18 months later. Stored seed may take 2 years or more to germinate. 4 months warm followed by 4 months cold stratification may help reduce the germination time.

**Description**: it is a small to medium-sized evergreen tree, growing 10-20 meters (33-66-
ft) (exceptionally up to 28 meters (92 ft) tall, with a trunk up to 2 meters (6 ft 7 in) (exceptionally 4 meters (13 ft) diameter. The bark is thin, scaly brown, coming off in small flakes aligned with the stem. The leaves are flat, dark green, 1-4 centimeters (0.39-1.57) in long and 2-3 millimeters (0.079-0.118 in) broad, arranged spirally on the stem, but with the leaf bases twisted to align the leaves in two flat rows either side of the stem, except on erect leading shoots where the spiral arrangement is more obvious. The leaves are poisonous. The seed cones are modified, each cone containing a single seed, which is 4-7 millimetres (0.16-0.28 in) long, and partly surrounded by a fleshy scale which develops into a soft, bright red berry-like structure called an aril. In Taxus baccata reported and present Taxanes-Alkaloids (Taxol and Taxotere), Larotaxel, nab-Paclitaxeleetc. active phytochemical constituents marker compounds as well as these shown and confirmed Anti-Tumor, Anti-Cancer (Bladder and pancreatic, Ovarian and breast cancer) and Anti-Carcinogenic activities In-vitro, In-vivo various cells lines, Animal clinical trail studies. (detail shown in Fig.: -1.a,b,c, and Table-1,2 &3, Sr.N0.-1)

2. Sadabahar (Catharanthus roseus(L.) G. Don):

It is commonly known as the Madagascar periwinkle, rose periwinkle, or rosy periwinkle, is a species of flowering plant in the dogbane family Apocynaceae. It is native and endemic to Madagascar, but grown elsewhere as an ornamental and medicinal plant, a source of the drugs vincristine and vinblastine, used to treat cancer.

**Language Common name**

English: Cayenne jasmine, old maid, periwinkle

Hindi: Sada bahar, sadabahar

Kannada: Batla hoo, bil kaasi kanigalu, ganeshana hoo, kempu kaasi kanigalu, kempu kaayi kanagilu, sadaa mallige, thuruku mallige

Malayalam: Banappuvu, nityakalyani, savanari, usamalari

Marathi: Sadaphool, sadaphuli

Sanskrit: Nityakalyani, sadapushpi

Tamil : Nithyakalyani, sudukattu mallikai

Telugu: Billagannenu

Habitat: In the wild, it is an endangered plant; the main cause of decline is habitat destruction by slash and burn agriculture. It is also however widely cultivated and is naturalized in subtropical and tropical areas of the world. It is so well adapted to growth in Australia, that it is listed as a noxious weed in Western Australia and the Australian Capital Territory, and also in parts of eastern Queensland and also found in Asia region, in India southern region, northern domestic and forest region

Description: It is an evergreen subshrub or herbaceous plant growing 1 m tall. The leaves are oval to oblong, 2.5-9 cm long and 1-3.5 cm broad, glossy green, hairless, with a pale midrib and a short petiole 1-1.8 cm long; they are...
arranged in opposite pairs. The flowers are white to dark pink with a darker red centre, with a basal tube 2.5-3 cm long and a corolla 2-5 cm diameter with five petal-like lobes. The fruit is a pair of follicles 2-4 cm long and 3 mm broad.

In *Catharanthus roseus* reported and present Vinca-Alkaid as Vinblastine, Vincristine, Vinorelbine, Vinflunine, catharanthine and vindoline alkaloids, Steroids, Saponin, Cynogenic glycosides, Cardiac glycoside, Flavonoids and Phenols etc. Active phytochemical constituents marker compounds as well as these shown and confirmed Anti-Tumors (Breast, Colon, Cervical, neck and Head, Anti-Cancers (Leukemias, testicular, Breast, ovary, cervix, lung, rectum and testis cancer and Colon Cancers) Anti-Carcinogenic activities *In-vitro*, *In-vivo* various cells lines, Animal clinical trail studies. (detail shown in Fig.-2.a,b,c and Table-1,2 & 3, Sr.N0.-2)

3. **Laxmanphal / Graviola (*Annona muricata* L.):**

*Annona muricata*, a broad leaf, flowering, evergreen tree. The exact origin is unknown; it is native to the tropical regions of the Americas and is widely propagated. It is in the same genus, Annona, as cherimoya and is in the Annonaceae family. The soursop is adapted to areas of high humidity and relatively warm winters; temperatures below 5 °C (41 °F) will cause damage to leaves and small branches, and temperatures below 3 °C (37 °F) can be fatal. The fruit becomes dry and is no longer good for concentrate.

![Soursop Plant and Fruits](image)

**Language**

**Common name**

<table>
<thead>
<tr>
<th>English</th>
<th>Graviola, guanabana, soursop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hindi</td>
<td>Laxmanphal</td>
</tr>
<tr>
<td>Kannada</td>
<td>Mullu raama phala, mullu raama phala, mullu ramaphala</td>
</tr>
<tr>
<td>Malayalam</td>
<td>Mullancakka, mullanchukka, vilattinuna</td>
</tr>
<tr>
<td>Marathi</td>
<td>Mamaphal, manphal</td>
</tr>
<tr>
<td>Tamil</td>
<td>Mulcita, mullu citta, mulluccita, mulluccitta, mutcita, mutcitatamaram, pulippala</td>
</tr>
<tr>
<td>Telugu</td>
<td>Lakshmana phalamu</td>
</tr>
</tbody>
</table>

**Habitat:** *Annona muricata* is native to South America, cultivated and naturalized widely. In Indonesia, the Caribbean islands and South Pacific countries, it is known as soursop and an evergreen plant mostly distributed in tropical and subtropical region of the world including India, Malaysia and Nigeria, Australia, Africa, the leaves are used in bath to treat skin ailments, while in Mauritius, New Guinea and Ecuador the application of leaves is local on the pain site. It is adapted to warm, humid tropical climate, and can tolerate both drought conditions and partial shade. This fruit crop grows in any kind of soil but prefers loose, fairly rich, deep loam and well-drained soil with pH ranging from 6.1 to 6.5. It thrives well from sea level up to 300 meters above sea level although it is known to grow up to 1000 m.
Description: Annona muricata is a shrub or small tree 3-10 meters in height. It is adapted to warm, humid tropical climate, and can tolerate both drought conditions and partial shade. It grows up to 25-30 ft. Young branchlets are rusty-hairy. The leaves, normally evergreen, are alternate, smooth, glossy, dark green on the upper surface, lighter beneath, oblong, elliptic or narrow-ovate, pointed at ends, 6-20 cm long and 2.5-6 cm wide. The flowers, borne singly, may emerge anywhere on the trunk, branches or twigs. The fruit is more or less oval or heart-shaped, sometimes irregular, lopsided or curved, due to improper carpel development or insect injury. The size ranges from 10-30 cm long and up to 15 cm in width and the weight may be up to 4.5-6.8 kg. (Minarni et al., 2017; Patel et al., 2016; Adewole et al., 2006)

In *Annona muricata* reported and present Muricin J, Muricin K, Muricin L, Cinnamic acid derivative, Coumaric acid hexose, 5-Caffeoylquinic acid, Annomuricin A, Annomuricin B, Annomuricin C, Annomuricin E, Annonutacin, Annhexocin, Muricapentocin, (2-4-cis)-isoannonacin,(2,4-trans)-isoannonacin, Muricatocin A, Muricatocin B, Muricatocin C, Giganletronenin, Annonacin A, Annopentocin A, Annopentocin B, Annopentocin C etc. active phytochemical constituents marker compounds as well as these shown and confirmed Anti-Tumor, Anti-Cancers (Prostate, Breast, Liver, Lung, Colon Cancers), Anti-Carcinogenic activities *in-vitro, in-vivo* various cells lines, Animal clinical trail studies. (detail shown in Fig.: -3.a,b,c and Table-1,2 &3, Sr. N0.-3)

### Table-1 : Botanical / Scientific and Local / ASU Name of study plants

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Botanical and Scientific Name</th>
<th>Local or ASU Name</th>
<th>Reported References</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td><em>Taxus baccata</em> L. or <em>Taxus baccata</em> Thunb.</td>
<td>Talispatr, Talis Patta / Zarnab / Taxus</td>
<td>Shakya, 2016; Singh et al., 2013; Kainsaet et al., 2012; Bishht et al., 2011; Sakarkaret et al., 2011; Reddy et al., 2009; Shoeb, 2006; Hojjat et al., 2003; Rates, 2001</td>
</tr>
<tr>
<td>02</td>
<td><em>Catharanthus roseus</em> (L.) G. Don</td>
<td>Sadabahar</td>
<td>Roy et al., 2017; Shakya, 2016; Singh et al., 2013; Priyadarshini, 2012; Bishht et al., 2011; Huang et al., 2004; Noble, 1990</td>
</tr>
<tr>
<td>03</td>
<td><em>Annona muricata</em> L.</td>
<td>Graviola or Laxmanphal</td>
<td>Gavamukulya et al., 2017; Abdullah et al., 2017; Minami et al., 2017; Faruq et al., 2016; Patel et al., 2016; Rosdi et al., 2015</td>
</tr>
</tbody>
</table>

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Table-2: Medicinal and Therapeutic potential, uses of studied medicinal plants:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Medicinal plant</th>
<th>Part used</th>
<th>Active phytochemical constituents</th>
<th>Medicinal, therapeutic potential and uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td><em>Taxus baccata</em> Linn or <em>Taxus baccata</em> Var.</td>
<td>Arial or Leaves and Bark</td>
<td>Taxanes-Alkaloids (Taxol and Taxotere), Larotaxol, nab-Paclitaxol</td>
<td><em>In-vitro</em> cell lines and <em>In-vivo</em> and pharmacological reported confirmation, Anti-Tumor, Anti-Cancer (Bladder, pancreatic, Ovarian and breast cancer) and Anti-Carcinogenic</td>
</tr>
<tr>
<td>02</td>
<td><em>Catharanthus roseus</em> (L.) G. Don</td>
<td>Arial or Flower</td>
<td>Vinca-Alkaloid as Vinblastine, Vincristine, Vinorelbine, Vinflunine, catharanthine and vindoline alkaloids, Steroids, Saponin, Cynogenic glycosides, Cardiac glycoside, Flavonoids and Phenols</td>
<td><em>In-vitro</em> cell lines and <em>In-vivo</em> and pharmacological reported confirmation, Anti-Tumor (Breast, Colon, Cervical, neck and Head, Anti-Cancer (Leukemias, testicular, Breast, ovary, cervix, lung, rectum, testis cancer and Colon Cancers) Anti-Carcinogenic</td>
</tr>
<tr>
<td>03</td>
<td><em>Annona muricata</em> L.</td>
<td>Fruits and Leaves</td>
<td>Muricin J, Muricin K, Muricin L, Cinnamic acid derivative, Coumaric acid hexose, 5-Caffeoylquinic acid, Annomuricin A, Annomuricin B, Annomuricin C, Annomuricin E, Annomutacin, Annhexocin, Muricapentocin, (2-4-cis)-isoannonacin, (2,4-trans)-isoannonacin, Muricatocin A, Muricatocin B, Muricatocin C, Giganletronenin, Annnonacinc A, Annnopentocin A, Annnopentocin B, Annnopentocin C etc.</td>
<td><em>In-vitro</em> cell lines and <em>In-vivo</em> and pharmacological reported confirmation, Anti-Tumor, Anti-Cancers (Prostate, Breast, Liver, Lung, Colon Cancers)</td>
</tr>
</tbody>
</table>
### Table - 3: In-vivo and In-vitro Anticancer and Anti tumor studies selective medicinal plants

<table>
<thead>
<tr>
<th>Plant Part</th>
<th>Subject of Study</th>
<th>Effect</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl alcohol leaves extracts</td>
<td>Carcinogenic toxicity of Wister rats, guineapigs and albino rats</td>
<td>Inhibit of changes behavioral and autonomic profiles and any sign of toxicity or mortality up to max. concentration dose</td>
<td>Patel et al., 2011</td>
</tr>
<tr>
<td>Young steam and female gametophyte extracts</td>
<td>Different callus cancer cells</td>
<td>Prevention of induced Callus culture of Taxus baccata and Taxus x media</td>
<td>Golenianski ME,2000</td>
</tr>
<tr>
<td>Aqueous extract of arial and leaves parts</td>
<td>Liver and Kidney tissues of mice</td>
<td>Prevention of Carcinogenicity induced by DEN in TB alone and TB + CUD</td>
<td>Joshi et al., 2014</td>
</tr>
<tr>
<td>Aqueous and hydro-alcoholic extracts of arial and leaves parts contain Taxanes- (Taxoland Taxotere)</td>
<td>Different cancer cells</td>
<td>Treatment and prevention of leukaemia and breast, ovary, colon and lung cancer tissues growth</td>
<td>Bisht et al., 2011 and Skarkar and Deshmukh, 2011</td>
</tr>
<tr>
<td>Hydro-alcoholic extracts of fruits or bark parts</td>
<td>Cytotoxic effects of human tumor cells</td>
<td>Prevention and Inhibitory activities of MDA-MB-468 cells, KB cells and Hela cell</td>
<td>Kainsa et al., 2012 and Hojjat et al., 2003</td>
</tr>
<tr>
<td>Extract and isolated (natural occurring 2-DAT-J)bark part</td>
<td>Breast cancer cell (MCF-7 and MDA-MB-231) and normal Human Kidney epithelial (HEK-231) cells</td>
<td>Prevention of Breast cancer, structurally observed cinnamoyl C-5 and acetyl C-10 groups prevent and control cancer growth activity</td>
<td>Kainsa et al., 2012 and Shoeb M, 2006</td>
</tr>
<tr>
<td>Extract and isolated (natural occurring 2-DAT-J)bark part</td>
<td>Brain tumors of DMBA-induced rats</td>
<td>Prevention, regression and control of Brain mammary tumors</td>
<td>Kainsa et al., 2012 and Reddy et al., 2009</td>
</tr>
</tbody>
</table>

#### 02. Catharanthus roseus(L.)G.Don:

| Methanol leaves extract | ATStrain-ATSI0105, AtAc0114, AtTA0112, Tumor cells | Inhibited and reduction of max. concentration in Tumor cells | Sayeed et al., 2014 and Rasheed 2014 |
| Methanol extract of Arial part | HCT-116 Cancer cells, Applied MTT assay | Bioassay guided isolation of active compounds catharanthine and vinodaline and its apoptosis inducing effect, IC50 value was foundas in most promising cytotoxicity activity in its applied concentration | Siddiqui et al., 2010 |
| Aqueous and methanol leaves, steam extracts | MCF-7 Breast cancer cells, Applied MTT assay | Inhibited of Cancer cells and stabilization of disease | Sudevan et al., 2017 |
| Arial part extract | Human Tumor cells, by NF-Kb/IkB pathway | Vinca alkaloids inhibited of various Tumor cells and stabilization of disease | Bisht et al., 2011 and Huang et al., 2004 |

#### 03. Annona muricataL.:

| Ethyl acetate extract of endophytic fungi isolated from plant leaves | MCF-7 Breast cancer cells, Applied MTT assay | Bioassay showed isolate Sir-G5, Its apoptosis inducing effect, IC50 value was found as in most promising cytotoxicity activity in its applied concentration | Minarni et al., 2017 |
| Leaf aqueous extract | MCF-7, MDA-MB-231 and 4T1 Breast Cancer cells, Applied MTT assay | Prevented and revealed a varied potency IC50 from the anti-proferative assay and investigated, promoted anti-cancer effects. | Syed Nejmuddin et al., 2016 |
Conclusion:
In Asian country enclosing India, several herbs, medicinal plants were traditionally used for preventing since ancient time, cure the health and treatment of several ailments including cancers and tumors without any adverse effect and toxicity. These plants possess various bioactive marker compounds having rich source of medicinal potential anti-cancers, anti-tumors activities. The selective medicinal plants presented in this article have versatile maracules remedial, medicinal herbs properties against cancers and tumors which still require a detailed research in concern of In-vivo cancer cells line, animal, human clinical trial models, research and development, drug designing of novel bioactive marker compounds and can be develop synthetically in large scale of these medicinaly potent and effective compounds. Thus there is a great need in searching and manufacturing newer noble herbal extract based drugs from medicinal plants which possess remarkable medicinal potential based anticancerous and antitumors activities for surviving a novel anticancers and antitumors herbal drugs assure complete prevention and curing of very dangerous and painful diseases of cancers and tumors to world public health. This review had given some of the plants possessing authentical database anticancer and antitumor investigated and reported In-vitro and In-vivo activities. This article can help and provide referencial supporting avidence research data’s others to explore herbs to future extent and its use in develop noble anticancers and antitumors herbal drugs, various other disease, toxicity along with advance pharmacological clinical trial research studies.

References:


