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## Medicinal plants with anticancer effects available in Bangladesh: A review

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**Abstract**

Cancer is one of the most death causing diseases and the number of cases rising around the world. So, there is a developing demand to get a durable cure to treat this awful disease. Currently, conventional techniques such as chemotherapy are not suitable for their destructive post-treatment outcomes and sometimes it is not a budget-friendly option to every person. Various medicinal plant acquired metabolites have become the core of interest due to their fewer side effects and variable application in averting cancer. Bangladesh is an agricultural country, and a remarkable variety of medicinal plants is available here with significant anticancer properties. Numerous natural products and their analogs have been recognized as potent anticancer agents. This review has been plotted to explore diverse medicinal plants of Bangladesh with anticancer activity and their effectual compounds to treat cancer. Based on the results of the various articles indexed in Google Scholar, PubMed, Scopus etc. a number of plants have been reported to be used in the treatment and prevention of different kinds of cancer disorders. The plants include *Phyllanthus emblica*, *Terminalia chebula*, *Withania somnifera*, *Azadirachta indica*, *Zingiber officinale*, *Allium sativum*, *Cinnamomum verum*, *Nigella sativa*, *Catharanthus roseus*, *Cannabis sativa*, *Camellia sinensis*, *Hibiscus rosa-sinensis*, *Solanum lycopersicum* etc. Different anticancer metabolites found in these plants has potential to treat different cancer. Phytochemical investigations have scrutinized the therapeutic effects of medicinal plants constructive on numerous cancers and their possible mechanisms of action and clinical effects.

**Keywords:** Cancer, medicinal plants, metabolites, anticancer drug, natural products

**Introduction**

Cancer is characterized by abnormal cell growth also known as a fatal disease that is caused by diverse changes in gene expression leading to cell proliferation and cell death. It is one of the major public health burdens around the world. In Bangladesh, cancer is the 6th leading cause of death and accounts for 10% of all mortality. Cancer cells usually attack and destroy normal cells as they are born due to disproportion in the body and spread throughout the body via blood vessels and lymphatic systems to metastasize [1]. Every year, millions of people all over the world are diagnosed with cancer, leading to death. Including immunotherapy, hormone therapy, surgery, chemotherapy, radiation therapy, and various therapeutic approaches available to treat cancer. But medicinal plants are being utilized as indigenous medicines from the very start of the appearance of life on earth. In the world still, 80% of total peoples especially those in the rural area are directly dependent on the medicinal plants due to their beneficial effects, less toxicity, and less expensiveness than conventional diseases [2]. As medicinal plants derived natural metabolites or subtly modified metabolites exhibit anticancer property which provides a positive indication of the effective use of these plants in therapeutic purposes [3]. The National Cancer Institute pulled together 35,000 plant samples from 20 countries and has masked around 114,000 extracts for anticancer activity [4]. More than seven hundred medicinal plants are grown in Bangladesh and about seventy species among them have been exhibited to have anticancer peculiarity by laboratory phytochemical screening [5]. In most of the cases, we have inadequate idea how plants tightly synchronize their cell cycle machineries endogenously even after expansive exposure to unsafe components. Till date, several plant-derived compounds such as vinblastine, vincristine, gallic acid, gingerol-6 etc. and many more have been used as anticancer drugs successfully in clinical studies. In this study comprises 34 medicinal plants with anticancer properties from Bangladesh and their effective compound against cancer cells which hopefully will raise the researchers' interest in an *in-vitro* study.

## Methods

This article has been patterned by a substantial review of the scientific ethnobotanical composition of the most recent time by the authors. We have developed some protocols in this systematic review, to collect data, different combinations of keywords medicinal plants, anticancer, cell line, cytotoxicity and phytochemical compounds are entered into databases of Google Scholar, Scopus, PubMed, etc. By collecting some data from different papers and presented in the table form. Here, fourteen Bangladeshi medicinal plants are described briefly which already showed potential anticancer effects. Another twenty more medicinal plants included in a table. The articles only in the English language published between 1981 and 2019 were selected for writing the review. ChemDraw software has been used to draw the chemical metabolites found in different anticancer plants.

## Medicinal Plants As Anticancer Agents

Several medicinal plants are mentioned below which possess anticancer agents.

### 1. *Phyllanthus emblica*

*Phyllanthus emblica* is commonly known as ‘amloki’ or ‘amla’ in Bangladesh. It is a medium-sized tree with long compound leaves, bunches of small pale green flowers, and astringent round “small green” or “yellow fruits” in the axils. It grows naturally and is planted in many areas of our country. Chemically, it contains ellagic acid, tannins, gallic acid, lipids, emblicol etc. The *Phyllanthus emblica* has been substantially used, both as edible plants and for its therapeutic potentials, for example fruit extract from this plant is utilized in traditional medicine for generations to treat indications differing from constipation to the treatment of tumors [6]. However, the prospective of *Phyllanthus emblica* extracts to be employed as an anticancer agent has been studied availing of contemporary medical approaches over the past two decades. Both *in vitro* and *in vivo* methods, these plant extracts have been dominated malignancy oppressive properties against some cancer forms for example, simple aqueous extracts of *Phyllanthus emblica* have been exhibited cytotoxic activity against ovarian and cervical malignant cells [7]. Besides, the flavonoid quercetin has been indicated to depress tumor growth in numerous animal models. Drew on the comprehensible mechanism of action and upholding data using murine models, quercetin was processed in a phase I clinical trial where it exhibited antityrosine kinase activity *in vivo* [8]. Analogues of quercetin outlined as more specific PI3K inhibitors also demonstrate potent anticancer activities. It becomes relevant clinically imperative for *Phyllanthus emblica* that molecules mediating the antitumor effects of these plants are being identified and potent, patentable derivatives also synthesized.

### 2. *Terminalia chebula*

*Terminalia chebula* is frequently known as ‘hartaki’ or ‘haritaki’ in Bangladesh. It belongs to the white flowers in terminal spikes, and small 5-ridged fruits. It grows in Dhaka, Mymensingh, Tangail, and Chattogram districts. This plant consists of significant biochemicals as amino acids, flavonoids, glycosides, resins, minerals, reducing sugars, tannins, steroidal triterpenoids etc. *Terminalia chebula* is a source of hydrolyzable tannins that possess anti-mutagenic activity in *Salmonella typhimurium* [7]. From acetone extract of bark of *Terminalia chebula*, promising anti-mutagenic and anti-carcinogenic activity has been reported [9]. This flora also

uses in the treatment of indigestion, constipation, dysentery, jaundice, etc. Alcoholic extract of *Terminalia chebula* fruit is being reported to be effective in human (MCF7) and mouse (S115) breast cancer cell lines as well as in Ehrlich Ascites Carcinoma induced in breast cancer model in mice [10].

### 3. *Withania somnifera*

*Withania somnifera* is usually recognized as ‘ashwagandha’ and found to grow wild in the northern districts in Bangladesh. It derives from the family Solanaceae. This plant is very rich in tropane alkaloids, steroidal lactones, and withanolides. This plant is mostly recognized in ayurvedic for treating cancer. It is made using of a traditional remedy for combating cancer-like conditions [11, 12]. The roots of this plant contain tropine, pseudotropine, tigloyloxytropine, choline, anaferine, somniferine, somniferinine, etc. Withanolides from these plants lessened the progress of cancer cells in human lung, breast and colon cancer cell lines similar to doxorubicin that used as a standard drug *in-vitro* study [13]. Research on animal cell cultures has shown that the herb decreases the levels of the nuclear factor kappa B, suppresses the intracellular tumor necrosis factor, and potentiates apoptotic signaling in cancerous cell lines [14]. The leaves of *Withania somnifera* have also been shown to inhibit the growth of human cancer cell lines equivalent to that produced by adriamycin. The leaf extract produced anti-cancer activity on NCI-H460 (lung), HCT-116 (colon), SF-268 (central nervous system) and MCF-7 (breast) human tumor cell lines [15]. These are some indicative observations of the protective effect of *Withania somnifera* is a cancer-causing agent.

### 4. *Azadirachta indica*

*Azadirachta indica* is commonly known as ‘neem’ in Bangladesh. This plant belongs to the Meliaceae family. Every part of this plant is used medicinally important. It composes of biologically active compounds as nimbin, nimbidin, nimbidol, nimbolide, etc. All of those compounds engage in cancer development and management through anticancer activity [16, 17], antioxidant activity, and the inhibitory effect exerted on the incident of malignant cells by modulation of cellular proliferation, tumor suppressor genes and apoptosis [18]. Besides, gedunin is a tetranortriterpenoid isolated from neem seed oil with a D lactone ring, this also demonstrated its anticancer activity as a preventive and therapeutic agent in breast cancer. This bioactive molecule exerts its function through inhibition of tumoral cells, modulating several heat shock proteins [19, 20]. Another study made *in vitro* regarding anticancer activity of ethanolic neem leaves extract on HeLa viability [21]. After treatment with ethanolic neem leaf extract on normal and HeLa cells, cellular growth was differentially suppressed by apoptosis. The mechanism through which ethanolic neem leaf extract induced cell apoptosis was represented by the modulation of bax, cyclin D1 and cytochrome P450 monooxygenases expression. The prospective anticancer competence of this plant has been shown against tumor cells in the colon, prostate and ovaries through regulation of cardinal signaling pathways in recent investigations [22]. These plant extracts are convenient as chemo preventive agents but their effects merged with calibrating cytotoxic therapies also dominant to illuminate.

### 5. *Zingiber officinale*

*Zingiber officinale* is frequently known as ‘ada’ in Bangladesh. It is widely used all over the world as a spice and

condiment for food. *Zingiber officinale* contains gingerol-6, an active phenolic compound among various composites that are considered superior in combating cancer. Gingerol-6 has two modes of anticancer activities that suppress the cancer cell growth progression and block the supply of nutrients to the cancer cells by maturation [23]. The laboratory experiment with the leaf extract from these plant shows that it is effective in reducing the cell viability in human colorectal cells. Other hands, the ginger extract may have a chemotherapeutic effect in the treatment of liver cancer cell as NF- $\kappa$ B is activated and that blocking NF- $\kappa$ B activation with ginger resulted in suppressed production of NF- $\kappa$ B and TNF- $\alpha$ . This is in line with findings that many of the pathways that mediate adaptive survival strategies in cancer cells are under the transcriptional control of NF- $\kappa$ B [24].

### 6. *Allium sativum*

*Allium sativum* belongs to the family Liliaceae, various chemical compounds also contain by the plant. This is commonly known as 'Rashun' in Bangladesh. They are used in various types of cancer treatment and prevention. Allicin is possessing anticancer activities that are isolated from *Allium sativum*. The penetrating ability of Allicin is very rapid into different cell compartments and in the liver, it is completely metabolized. An essential prerequisite of *in vitro* studies on cancer cell lines is to any experimental drug before it can be used on clinical samples. KB cell line is now known to be a subline of the pervasive KERATIN-forming tumor cell line HeLa [25]. Various experimental observations provide evidence such that organic allyl sulfur components of garlic are effective in tumor development inhibition [26].

### 7. *Cinnamomum verum*

*Cinnamomum Verum* is commonly known as 'Daru chini' in Bangladesh. It belongs to the family Lauraceae. It is a moderate-sized plant with thin fragrant bark. This plant is occasionally planted in gardens in different places of the country. But the bark, which is the actual drug, is readily available as a commercial commodity or flavoring spice everywhere in the country. The bark contains mainly an essential oil, the chief constituent of which is cinnamaldehyde and eugenol. It also contains phellandrene, alpha-pinene, linalool, caryophyllene and tannin etc. Strong antiproliferative activities of cinnamon have been shown against different cancer cells. Anticancer agents have been identified from natural resources, a bark constituent of these plant 2-methoxycinnamaldehyde (2-MCA) discovered and have growth inhibitory effect in the cell line of human lung adenocarcinoma A549, both *in vivo* and *in vitro* trail [27]. In the anticancer study, CA was active against human liver, lung, and leukemia cancer cells. CA has been shown to possess antitumor activity through inducing cell apoptosis and inhibiting cell proliferation. Its inhibitory effect on cell cycle development was demonstrated through its potentiality to induce S-phase arrest in human PLC/PRF/5 cells [28]. In the future cinnamon will be introduced and initiated further analytical investigations for the development of a novel anticancer drug.

### 8. *Nigella sativa*

*Nigella sativa* (black cumin) seed is under the Ranunculaceae family locally known as 'kalojiraa' is cultivated in Bangladesh as a spice for a long time [29]. Carvacrol, thymoquinone, thymohydroquinone, dithymoquinone, nigellimine-N-oxide, nigellicine, nigellidine, thymol, and

alpha-hederin are the active components of *Nigella sativa*. [30]. *N. Sativa* seed, active compounds, especially TQ and  $\alpha$ -hederin, have been shown significant anti-cancer effects on a variety of neoplasms [31]. Thymoquinone (TQ) anti-cancer mechanism; inhibits the growth of colon cancer cells, affects morphological changes, and increased cancer cells apoptosis. *In vitro* experiments utilized two mouse tumor cell lines and non-cancerous fibroblasts, Hodgkin's lymphoma (L428) and colon carcinoma (MC38). The essential oil and the ethyl acetate extract of *N. sativa* had shown more cytotoxic effect than the butanol extracts against the murine mastocytoma cell line (P815), a result similar to that for the kidney carcinoma cell line of monkeys (Vero). The effect of each extract depended on the tumor cell type. Another study showed that an aqueous extract of *N. sativa* significantly enhanced natural killer cytotoxic activity against mouse lymphoma cells (YAC-1) [32]. By induces apoptosis it increases the expression of the target gene mRNAs of P53 and p21WAF1 after all inhibition of anti-apoptotic proteins (BCL-2) [33].

### 9. *Catharanthus roseus*

*Catharanthus roseus* is a flowering plant under the Apocynaceae family and commonly known as 'nayantara' in Bangladesh. *Catharanthus roseus* contains carbohydrates, alkaloids, flavonoids, tannin, glycosides, saponins, amino acids, fats, and oils [34]. Among these phytochemicals the principal component is vindoline. Other phytochemicals are vinblastine, vincristine, reserpine, vincamine, alstonine, leurocristine, ajmalicine, alstonine, vinine, vinoxine, vintsine, vinomine, leurosine [35]. *In vitro* screening, it was discovered that *Catharanthus* extracts were antineoplastic, due to vinblastine and vincristine alkaloids. Besides, it is also synthetic analogs, show highly toxic chemotherapy drugs. The antitumor activity showed *in vivo* of EECR was carried out by using Ehrlich ascites carcinoma. This study demonstrates an increase in life span, decrease in tumor volume and cancer cell count was observed with groups treated with EECR (Group VIII and Group IX) when compared to tumor control animals. Emigrate tumor cells such as EAC are rapidly growing cancer cells with aggressive behavior [36]. Vinblastine and vincristine are methanolic crude extracts and the absolute levels of these crude drugs are considered far too low to explain the activity [37, 38]. Vinblastine is sold as Velban or Vincristine as oncovin as a chemotherapy medication [39].

### 10. *Cannabis sativa*

The common name of *Cannabis sativa* is 'gaja' or 'ganja' which belongs to the family Cannabaceae. Specific studies like *in-vitro* indicate that marijuana components are the potential in breast cancer inhibition and responsible for producing tumor eradication in human beings. An experiment shows that marijuana causing malignant brain-tumor but nowadays it found that animal surviving was significantly increased. Cannabinoids are the *Cannabis sativa*'s main active components. Cell growth of lung adenocarcinoma is inhibited by Cannabis compound. It also inhibits tumor size and decreases cell growth. *In vivo* antitumor activity of cannabinoids, nbl tumors were induced in the nonobese diabetic immunodeficient animal by subcutaneous injection. Briefly,  $1 \times 10^7$  SK-N-SH cells suspended in 100  $\mu$ L serum-free medium and Cultrex (1:1) were injected subcutaneously into the rear flank of 5- to 8-week-old nod/scid mice. [40]. Palliative effects are exerted by the cannabinoids and their derivatives in cancer patients by

stimulating appetite, pain, nausea, vomiting are preventing by these effects [41]. The anti-tumor dynamism has been exhibited in cell culture for these compounds and it also has displayed the same activity in various animal models by the modulation of cell-signaling pathways [42].

### 11. *Camellia sinensis*

*Camellia sinensis* (tea) is a small tree in the flowering plant family. Theaceae which yields a non-alcoholic healthy beverage is being cultivated in Bangladesh since 1854 [43]. *Camellia sinensis* contains polyphenolic compounds such as epigallocatechin, gallate, epicatechin-3-, epicatechin, epigallocatechin-3-gallate which is responsible for anti-cancerous and anti-mutagenic activities. It also contains flavanols and glycosides like chlorogenic acid, carotenoids, trigalloyl glucose, quinicacids, lignin, protein, chlorophyll, caffeine, and a very small quantity of methylxanthines [44]. An *In vitro* rat studies observed that EGCC, other catechins and theaflavins are help to prevent hyperglycemia which influence insulin activity and possibly to preventing damage of  $\beta$ -cells [45]. A Clinical study of *Camellia sinensis* was showed that an effective result in treatment with polyphenol catechin at prostate cancer patients also prevents tumor growth [46].

### 12. *Hibiscus rosa-sinensis*

*Hibiscus rosa-sinensis* is an ornamental plant family Malvaceae native to Asia grown as an evergreen herbaceous plant. It contains alkaloids, tannins, flavonoids, saponins, terpenoids, saponins, essential oils, polyphenolic compounds, etc [47]. Hibiscus extract (HE) has noticeable hypolipidemic and antioxidant effects [48]. *In vitro* study, it was shown that aqueous Hibiscus extract (HE) can increase apoptosis in the breast cancer cells. Hibiscus extract has efficacy against breast cancer by measure the toxicity of HE Treatment on human triple-negative cancer. It has also estrogen-receptor-positive (ER+) on breast cancer cells [49]. A clinical study of hibiscus flower extract showed that different triterpenoids were able to prevent triple-negative breast cancer cells which

showed that small toxicity on normal cells [50].

### 13. *Momordica charantia*

*Momordica charantia* (bitter melon) is a bitter fruit plant from Cucurbitaceae family widely cultivated in Asia [51]. *Momordica charantia* contains biologically active phytochemicals compounds include momordin, charantin, steroids, triterpenes, alkaloids, proteins, saponins, flavonoids, fatty acids, vitamins such as A, E, C, B12, and folic acid [52]. Water and methanol extract of bitter melon plant leaf showed significant cytotoxic effects on human lung cells A549. Dose-dependent studies show normal human lung WI-38 cells and embryonic kidney HEK293 cells are less susceptible in human lung adenocarcinoma cells CL1. [53, 54]. In a study human primary human mammary epithelial cells, breast cancer cells, MCF-7 were used as an *in vitro* model to assess BM extract act as an anticancer agent. It significantly decrease cell proliferation and increase apoptotic cell death. It is held by induced poly (ADP-ribose) polymerase cleavage and caspase activation [55].

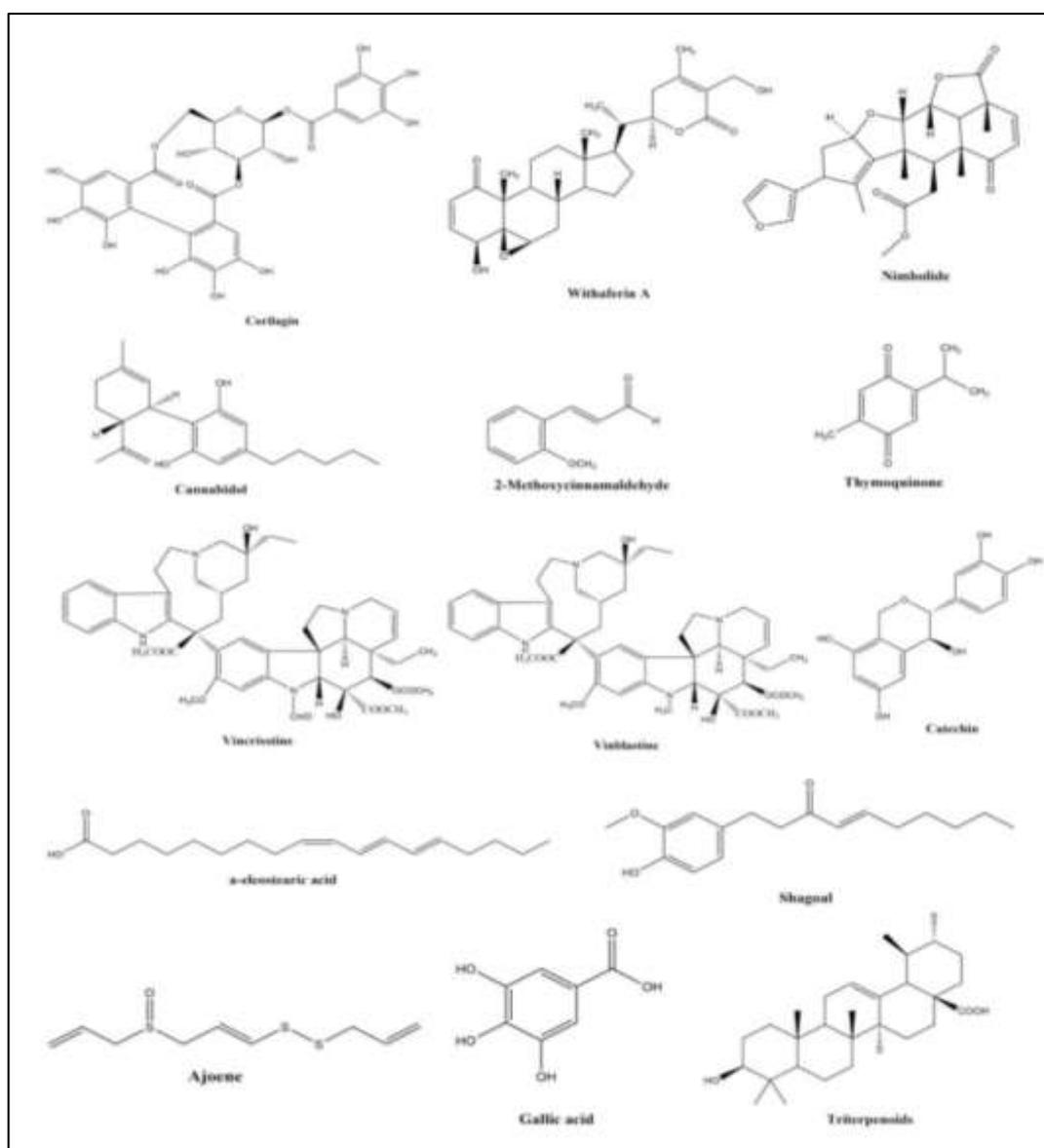
### 14. *Solanum lycopersicum*

*Solanum lycopersicum* (tomato) is a red berry fruit under the family of Solanaceae [56]. The major chemical constituents of tomatoes are carbohydrates, vitamins (vitamin C, thiamin, and nicotinic acid), minerals such as potassium and magnesium. It also contains carotenoids such as lycopene, flavonoids, and polyphenols (naringenin and quercetin) [57, 58]. In clinical studies, lycopene has been seen to inhibit the proliferation of different types of cancer as well as breast, lung, prostate, and endometrium cancer cells [59]. *In vivo* study showed that lycopene induced cell proliferation and progression of colorectal cancer cells by interact with cellular signaling pathways such as NF- $\kappa$ B and JNK [60]. In gastric carcinoma, LYC (lycopene) administration induced rats up-regulated immune activities, redox status which useful in reducing gastric cancer [61].

**Table 1:** A list of efficient medicinal plants for anticancer treatment

Sl No.	Plant Name	Parts	Chemical Compound	Target Organ	Mechanism of Action	References
01.	<i>Asparagus racemosus</i>	Root	Steroidal saponins	Lung	Asparagus racemosus root extracts can cause cytotoxic effects, change the morphology and induce growth inhibition in A549 cells.	[62]
02.	<i>Averrhoa carambola</i>	Fruit	Flavonoid-AC1	Prostate	ACE treatment brings out a significant reduction in lipid peroxidation.	[63]
03.	<i>Azadirachta indica</i>	Leaf	Azadirachtin, Gedunin, Nimbin, Nimbidin, Beta-sitosterol	Breast	Modulation of cellular proliferation, differentiation, apoptosis, angiogenesis, and metastasis processes.	[64]
04.	<i>Brassica oleracea</i>	Cabbage leaves	Sulforaphane	Prostate	Cell cycle arrest cell Cycle Inhibition; Sensitize resistant tumor cells to chemotherapy; tumor growth inhibition via CSCs self-renewal regulation.	[65]
05.	<i>Cinnamomum tamala</i>	Leaf	Bornyl acetate, Caryophyllene oxide	Colon	DNA damage, Reduced prostatic enlargement and improved hyperplastic change.	[66]
06.	<i>Curcuma longa</i>	Rhizome	Curcumin (diferuloylmethane)	Cervical	Anti-neoplastic activity, the ability of curcumin to activate protein kinase D1 (PKD1), leading to attenuation of the oncogenic signaling by $\beta$ -catenin and MAPK [100] and consequent inhibition of prostate cancer.	[67, 68]
07.	<i>Datura metel</i>	Leaf, Stem and Other parts	Steroidal lactones-withonilides	Breast	Tumor cell apoptosis, The ethanol extract of the leaves had high anticancer activity than the stem extract on both Vero and MCF-7 cell lines as they had low IC50 values compared to the latter.	[69]
08.	<i>Hibiscus rosa-sinensis</i>	Leaf	Riboflavin, Niacin, Margoric acid, Lauric acid etc.	Leukemia	Inhibit cell growth, <i>Hibiscus</i> extract was able to selectively induce apoptosis in both triple-negative and estrogen-receptor positive breast cancer cells in a dosage-dependent manner.	[70]
09.	<i>Hyptis suaveolens</i>	Leaf	Sabinene, Beta-caryophyllene, Spatulanol etc.	Prostate, Cervical	Cell cycle arrest.	[71]
10.	<i>Mangifera indica</i>	Leaf	Mangiferin	Colon	The intrinsic pathway generally involves increased permeability of the mitochondrial membrane and the release of cytochrome C to activate initiator procaspase-9, while the extrinsic pathway involves Fas Associated Death Domain (FADD) and procaspase-8.	[72]
11.	<i>Nelumbo</i>	NA	Liensinine, Nuciferine	Colon	Induction of apoptosis. Inhibit Cell cycle G1 induction dependent	[73]

	<i>nucifera</i>				p21(WAF1/CIP1).	
12.	<i>Psidium guajava</i>	Leaf, fruit	Ascorbic acid, Apigenin, Lycopene, Rhamnoallosan	Prostate	Induction of apoptosis, suppress Ribosomal p70 S6 Kinase (S6K1) and Mitogen-Activated Protein Kinase.	[74, 75]
13.	<i>Punica granatum</i>	Fruit	Punicalagin, Pomegranate tannin, Ellagitannins, Urolithins	Prostate	Antagonistic effect, Pomegranate Inhibits CYP activity or expression provides procarcinogens.	[76]
14.	<i>Rauvolfia serpentina</i>	NA	Reserpine	Breast	Inhibit the hepato carcinogenesis.	[77]
15.	<i>Senna occidentalis</i>	Leaf	Tannins	Blood cell	Induction of apoptosis.	[78]
16.	<i>Solanum lycopersicum</i>	Fruit	Lycopene	N/A	Cell cycle arrest, both <i>in vitro</i> and <i>in vivo</i> experiments showing that lycopene not only enhances the antioxidant response of prostate cells, but that it is even able to inhibit proliferation, induce apoptosis and decrease the metastatic capacity of prostate cancer cells.	[79]
17.	<i>Syzygium aromaticum</i>	Flower bud	Betulinic acid and other triterpenes	Blood cells	Antiproliferative effect. Suppress malignant melanoma WM1205Lu of in anchorage dependent and independent growth.	[80, 81]
18.	<i>Tagetes erecta</i>	Flower	Quercetagenin, Patuletin	Breast	Mitochondrial apoptosis inhibiting thymidylate synthase causing DNA and RNA damage, hence resulting in cell death.	[82]
19.	<i>Tamarindus indica</i>	Seed kernel	Polysaccharide PST001	Blood cells	Induction of apoptosis. <i>In vitro</i> effects of seeds methanolic extract on two cancer cell lines, as- Rhabdomyosarcoma cancer (RD) and Human Lymphoma cell line (SR).	[83]
20.	<i>Withania somnifera</i>	Leaf, root	Withaferin A, Withanolides	Lung	Antagonistic effect	[84]



**Fig 1:** Some medicinal plant metabolites having anti-cancer properties

## Discussion

Like Bangladesh, there are lots of medicinal plants available that manifest significant anti-cancer properties. Because of the

several problems of anticancer drugs and chemotherapy such as nausea, weakness, hair loss, fatigue, diarrhea, neuropathy etc. and high cost of procedures with combating cancer

therapies, many people today incline to use herbal products. Different plants exert their anticancer properties by different mechanisms, and they are effective against different cancer cell lines. The curative effects of many medicinal plants in different cancers have been shown in (Table-1) among which *Cinnamomum tamala*, *Mangifera indica*, *Nelumbo nucifera* etc. have the substantial impact on colon diseases, *Rauvolfia serpentina*, *Azadirachta indica*, *Datur amemel* etc. have the prominent results on breast cancer. Herbal compounds have demonstrated properties to inhibit cancer cell activity as inhibiting proliferation of cancer cells and inducing apoptotic cell death. This review points up some medicinal plants that have anticancer effect. The present study looks for introducing the mechanism and the effect of some common plant derived herbal products so that they can be utilized as preventive and helpful drug complements in cancer disorders. Well-described research or modification of the natural compounds may be required to find out the best possible treatment of cancer.

#### Plant-derivative anti-cancer agents for future advancement

Various species of bio-active compounds have been extracted from plant sources. Currently, numerous compounds are conducted in clinical trials or preclinical trials or undergoing further inspection. For example, betulinic acid, a common type of secondary metabolite of *Betula* species plants which belongs to the family Betulaceae<sup>[85]</sup>. This acid has been demonstrated selective cytotoxicity on human melanoma cell lines<sup>[86]</sup>. The evolution of systemic and topical formulations of the agent for possible clinical trials by the NCI is on-going. Additionally, silvestrol was isolated from the fruits of *Aglaila sylvestre*<sup>[87]</sup>, that manifested cytotoxic effects on lung and breast cancer cell lines<sup>[88]</sup>. Mechanism(s) of action of silvestrolis are determined by the ongoing biological studies. Other hands, schischkinnin, and montamine, these two novel alkaloids have been isolated from the seeds of *Centaureaschischkinii* and *Centaureamontana*<sup>[89]</sup>, that also exhibit significant anti-cancer activity against human colon cancer cell lines. However, advance explorations are imperative for their use as anti-cancer agents.

#### Conclusion

Medicinal plants serve as important therapeutic agents as well as important raw materials for the manufacture of traditional and modern medicines. Herbal products play an essential role in the treatment of cancerous disease. Bangladesh is a rural country and enormous diversity of medicinal plant is accessible here with notable anti-cancer property. Furthermore, experimental studies require to be managed on these medicinal plants towards disclosure of lead compounds that can take part in the formulation of new drugs for the anticipation and guidance of malignant tumor disorders with having minor or no undesirable effects. One day probably the plant-derived metabolites will be the permanent medication for cancer to be eradicated.

#### Conflicts of Interest

We do not have conflicts of interest with publication of this manuscript.

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