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Review Article

A Review on Herbal Power Bamboo, Papaya, Ginger and *Plectranthus* in Cancer, Bugs and Oxidant Combat

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ABSTRACT

This thorough analysis of the article describes the therapeutic potential of herbal treatments, such as ginger, papaya, bamboo shoots, and *Plectranthus* species, in addressing the complex issues of oxidative stress, microbial infections, and cancer. Innovative and comprehensive approaches to disease management are desperately needed in light of rising cancer rates and the advent of microbial resistance to traditional treatments. While papaya leaves contain a multitude of bioactive constituents, such as papain, chymopapain, and flavonoids, with demonstrated anticancer and antimicrobial effects, bamboo shoots, rich in bioactive compounds, such as flavonoids, polyphenols, and alkaloids, demonstrate antioxidant, anti-inflammatory, and anti-cancer properties. Because of its bioactive ingredients, such as gingerol and shogaol, ginger, a popular culinary and medicinal herb, has anti-inflammatory, antioxidant, and anticancer potential. Meanwhile, *Plectranthus* species possess antibacterial, anti-inflammatory, and antioxidant properties linked to substances like carvacrol and thymol. The combination of these herbal substances exhibits synergistic effects that offer potential routes for targeting many disease pathways, such as immune response modulation, tumour growth suppression, and oxidative damage mitigation. To further understand their modes of action, adjust dosage schedules, and assess their efficacy and safety in clinical settings, more study is necessary. Herbal medicines have great promise for enhancing health outcomes and reducing the worldwide burden of cancer, microbial resistance, and oxidative stress. They provide a natural and possibly beneficial supplement to conventional treatments.

Keywords: Herbal remedies, Cancer, Microbial resistance, Bamboo shoots, Papaya, Ginger, *Plectranthus*, Antioxidant, Anticancer, Antimicrobial, Bioactive compounds.

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INTRODUCTION

The Global Impact of Cancer and Microbial Resistance

In recent decades, cancer and microbial resistance have emerged as two formidable challenges with profound global impacts. While cancer continues to exact a heavy toll on human health and well-being, microbial resistance threatens the effectiveness of antibiotics and other essential treatments, jeopardizing our ability to combat infectious diseases. This introduction aims to explore the intricate interplay between cancer and microbial resistance, shedding light on their shared challenges, underlying mechanisms, and the urgent need for innovative strategies to address these pressing issues.[1]

Cancer: A Persistent Global Burden

Cancer remains one of the most significant public health challenges worldwide, exerting a profound impact on individuals, families, and healthcare systems. According to the World Health Organization (WHO), cancer is a leading cause of morbidity and mortality globally, with an estimated 10 million deaths attributed to the disease each year (WHO, 2020).[1]

The burden of cancer extends beyond the realm of human suffering, encompassing economic implications as well. The costs associated with cancer care, including treatment expenses, lost productivity, and caregiver burden, place a substantial strain on healthcare systems and national economies.[2] Moreover, the

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growing incidence of cancer, driven by factors such as aging populations, lifestyle changes, and environmental exposures, further exacerbates the socioeconomic impact of the disease.[3]

Despite significant advances in cancer research and treatment modalities, including surgery, chemotherapy, radiation therapy, and targeted therapies, challenges persist in achieving optimal outcomes for all patients. Treatment resistance, disease recurrence, and disparities in access to care represent ongoing barriers to effectively managing cancer on a global scale.[4] Additionally, the heterogeneity of cancer subtypes, coupled with the intricate molecular mechanisms driving tumorigenesis and progression, complicate efforts to develop universally effective therapies.[5]

Microbial Resistance: An Escalating Threat to Global Health

In tandem with the challenge of cancer, microbial resistance poses a formidable threat to public health and healthcare delivery systems worldwide. Antimicrobial Resistance (AMR), characterized by the ability of microorganisms to withstand the effects of antimicrobial agents, including antibiotics, antivirals, and antifungals, undermines our ability to treat infectious diseases effectively (WHO, 2020).[6] The emergence and spread of resistant pathogens not only increase the morbidity and mortality associated with infections but also contribute to prolonged illness, treatment failures, and healthcare costs.[7]

The roots of microbial resistance are multifaceted, stemming from a combination of factors such as overuse and misuse of antibiotics in human and animal health, inadequate infection prevention and control measures, and limited access to clean water, sanitation, and hygiene facilities.[8] Moreover, the globalization of travel and trade facilitates the rapid dissemination of resistant microorganisms across geographical borders, exacerbating the challenge of containment and control.[9]

The consequences of microbial resistance extend beyond the realm of infectious diseases, intersecting with other areas of healthcare, including cancer treatment. Immunocompromised cancer patients, undergoing chemotherapy or stem cell transplantation, are particularly vulnerable to healthcare-associated infections, often caused by multidrug-resistant pathogens.[10] The emergence of antimicrobial-resistant infections in this population not only complicates clinical management but also compromises treatment outcomes and survival rates.[11]

Natural Products in Cancer and Microbes research

In recent years, there has been growing interest in the potential therapeutic effects of herbal remedies derived from natural sources in combating cancer, microbial infections, and oxidative stress. Among these, herbal powers containing ingredients such as bamboo shoot, papaya, ginger, and *Plectranthus* species have garnered attention for their purported health benefits. This section explores the scientific evidence supporting the use of these herbal ingredients and their combination in the management of cancer, microbial infections and oxidative stress.

Bamboo shoot (*Bambusa* spp.) has been traditionally used in various cuisines and folk medicine practices due to its rich nutritional content and potential medicinal properties. Studies have shown that bamboo shoot extracts contain bioactive compounds with antioxidant, anti-inflammatory, and anticancer properties. For example, a study published in the Journal of Food Science demonstrated the antioxidant and antiproliferative activities of bamboo shoot extracts against cancer cell lines, suggesting its potential role in cancer prevention and treatment.[12] Furthermore, bamboo shoot extracts have been reported to exhibit antimicrobial activity against a wide range of pathogens, including bacteria and fungi.[13]

The papaya leaves are widely used and distributed over tropic area and accepted as a food or quasi drug. These leaves have many biologically active componenets which increases the total antioxidant concentration in blood and reduce lipid peroxidation levels such as chymopapain, papain, ascorbic acid, cystatin, flavonoids, glucosinolates and cyanogenic glucosides. People living in gold coast of Australia used this *Carica papaya* leaf juice for its anticancer activity. Papaya leaf extracts are using from long time for various disorders, including cancer and infectious diseases. Using this leaf extract various methods and assays are followed such as Cell lines, cell viability, determination of cytokine production, determination of cytotoxic activities, caspase assay, microarray analysis, quantification of m-RNA by real time PCR. [14]

Ginger (*Zingiber officinale*) is a widely used culinary and medicinal herb known for its distinct flavor and aroma, as well as its diverse pharmacological properties. Numerous studies have reported the antioxidant, anti-inflammatory, and anticancer effects of ginger and its bioactive constituents. For instance, a systematic review published in the Journal of Ethnopharmacology summarized the anticancer activities of ginger extracts against various cancer types, highlighting its potential as a complementary therapy in cancer management.[15] Moreover, ginger extracts have demonstrated broad-spectrum antimicrobial activity against both Gram-positive and Gram-negative bacteria, as well as fungi and viruses.[16]

Plectranthus species, including *Plectranthus amboinicus* (Indian borage) and *Plectranthus barbatus* (*Coleus forskohlii*), have been used in traditional medicine systems for their medicinal properties. These plants contain bioactive compounds such as diterpenoids, flavonoids, and phenolic acids, which contribute to their antioxidant, anti-inflammatory, and antimicrobial activities. A study published in BMC Complementary Medicine and Therapies evaluated the antimicrobial potential of *Plectranthus amboinicus* extracts against clinical isolates of multidrug-resistant bacteria, demonstrating promising inhibitory effects.[17]

Additionally, *Plectranthus* species have been investigated for their anticancer properties, with preliminary studies suggesting cytotoxic effects against cancer cell lines.[18]

Combining herbal ingredients such as bamboo shoot, papaya, ginger, and *Plectranthus* species into a powder formulation offers the potential for synergistic effects in combating cancer, microbial infections, and oxidative stress. The diverse array of bioactive compounds present in these herbs may act through complementary mechanisms to target multiple pathways involved in disease pathogenesis. For example, antioxidants present in these herbs may help neutralize Reactive Oxygen Species (ROS) and reduce oxidative damage to cells, thereby mitigating the risk of cancer development and progression.[19] Furthermore, antimicrobial compounds present in the herbal mixture may inhibit the growth of pathogenic microorganisms, reducing the incidence of infections and associated complications in cancer patients undergoing treatment.[20]

Moreover, the use of herbal remedies offers potential advantages such as affordability, accessibility, and reduced toxicity compared to conventional therapies. However, further research is warranted to elucidate the mechanisms of action, optimize dosing regimens, and evaluate the safety and efficacy of this herbal mixture in preclinical and clinical settings.

The herbal medicine with conventional approaches holds promise for addressing the complex challenges of cancer, microbial resistance, and oxidative stress. The herbal power mixture comprising bamboo shoot, papaya, ginger, and *Plectranthus* represents a novel therapeutic strategy that warrants further investigation for its potential in improving health outcomes and mitigating the burden of these interconnected health concerns.

BAMBOO SHOOTS: A NATURAL FIBER

Overview and Traditional Uses

Bamboo shoots (Figure 1), the edible sprouts of the bamboo plant, boast a wealth of Fiber and are typically harvested within two weeks, when they are abundant in vitamins, cellulose, and amino acids. With low fat content and high nutritional value, bamboo shoots offer a beneficial addition to one's diet.[21] Bamboo shoots are not only tender and delicious but also packed with protein, minerals, vitamins, and dietary Fiber. These nutritional powerhouses can play a significant role in preventing cardiovascular diseases, diabetes, and other chronic illnesses. Moreover, bamboo shoots represent a relatively recent discovery in terms of dietary Fiber resources, showcasing considerable potential for further development.[22]

Figure 1: Bamboo shoots.

Scientific research has confirmed that bamboo shoots contain various phytochemicals with potent anti-cancer properties, particularly in species such as Giant Timber Bamboo Shoots (*Phyllostachys bamboos* ides) and Henon Bamboo Shoots (*Phyllostachys nigra* var henonis). These shoots exhibit remarkable antioxidant activity and have demonstrated effectiveness in inhibiting tumour growth, particularly in prostate cancer cell models.[23] In many countries, the utilization of bamboo shoots follows a pattern where they are consumed raw, dried, canned, boiled, fermented, or for medicinal purposes. However, this consumption is traditional, non-standardized, and specific to particular regions, with minimal value addition. Bamboo shoots are seasonal, perishable, short-lived, and typically not preserved. The leaves enveloping the shoots vary in colour, ranging from black, brown, yellow, to purple, depending on the species, and may have fine hairs. Resembling coiled springs, bamboo shoots possess a slightly bitter taste. They are often enclosed in specialized coverings known as culm sheaths, which are frequently multi-coloured when the shoots are young. Once the culm sheath is peeled off, the revealed white meat turns yellowish when cooked, offering a very sweet flavour if prepared on the day of harvest.[24]

Bamboo's versatile properties have led to varied names for it across different international locations. In China, it's referred to as "people's friends," reflecting its close relationship with humanity and its numerous practical uses. Vietnamese culture affectionately calls bamboo "my brother," emphasizing its familial significance and deep connection with daily life. In India, bamboo earns the title of "green gold," highlighting its economic importance and environmental value, akin to a precious resource. These diverse names showcase the universal admiration and esteem for bamboo in various cultures worldwide.[25] Bamboo shoots are abundant in Nutrients commonly Carbohydrates, proteins, minerals and having a less fat content. It also contains the phytosterols which having the Carcinogenic activity, Lowering cholesterol and high amount of fiber.[26]

Anti-bacterial and Anti-Cancer Properties of Bamboo shoot

Modern research has uncovered numerous medicinal benefits of bamboo shoots, ranging from cancer prevention and weight loss to enhancing appetite and digestion. Notably low in sugar, bamboo shoots can aid in treating conditions such as hypertension, hyperlipidaemia, and hyperglycaemia. Furthermore, they contribute to cholesterol control, bolster the immune system, and

Table 1: Demonstrates the authors and their review of Bamboo shoot for anticancer activities.

Author	Year	Extraction procedure	Potential activities	Results	Conclusion
Nirmala C[26] *et al.*,	2011	Canning, fermentation and Dried extract.	Bamboo shoots are rich in nutrient components, mainly proteins, carbohydrates, vitamins and minerals, and are low in fat and sugar, in addition to that they also contain phytosterols and a high amount of fiber. Function as nutraceuticals, Anti-cancer, anti-bacterial and anti-viral.	It inhibits the growth of carcinogens, cancer cell growth, metastasis and apoptosis. The shoots having the phenolic groups and acts as a antioxidant and widely used.	Bamboo shoot significantly shows the anti-cancer properties.
Akinobu[27] *et al.*,	2013	Dichloromethane soluble of the methanol extract.	Antioxidant, anticancer, and antibacterial properties.	Active constituents stigmasterol and dihydrobrassicasterol compounds inhibited the growth of *S. aureus* and *Escherichia coli.* Extracts of bamboo shoot skins as well as its active compounds in the skins are potentially useful as antibacterial materials.	Extracts of bamboo skin and its constituents are useful as Antibacterial materials.
Sarojini[21] *et al.*,	2015	-	Presence of phytosterols and phytonutrients in bamboo shoots helps to improve appetite and digestion, weight loss, cardiovascular diseases. Fights cancer, it has anti-inflammatory, antiviral, and antibacterial properties.	Leaves of bamboos consist of phytosterols such as flavones, amylase and chlorophyll. Out of these, chlorophyll showed properties of controlling mutations and cancer. The vitamins, minerals and antioxidants present in bamboo shoots are essential in strengthening the body from the inside and shows antiviral, and antibacterial properties.	Cultivating the bamboo incorporates economics, ecological and social benefits to day-to-day human life.

Author	Year	Extraction procedure	Potential activities	Results	Conclusion
Anusriti[29] *et al.*,	2017	Methanolic-Ethanolic extract.	Bamboo shoots are rich in minerals and nutrient components such as carbohydrates, proteins, fiber and are low in fat and sugar which could be helpful in mitigating the problem of malnutrition. Also showed the health benefits of for the treatment of cancer and cardiovascular diseases, weight loss and to improve digestion. Due to the presence of lignins which are an important component of fiber, the shoots of the bamboo are reported to have anticancer, antiviral and antibacterial activity.	Bamboo shoots scavenges the Free radicals producing destructive carcinogens due to its anti-carcinogenic Agents.	Bamboo shoots plays crucial role in the treatment of cancers and other disease conditions.

Figure 2: Leaf of Carica Papaya.

serve as a valuable source of dietary Fiber. Additionally, bamboo shoots exhibit anti-inflammatory properties and have been found to combat cancer due to their content of phytosterols like flavones, amylase, and chlorophyll. Particularly, chlorophyll has shown promise in controlling mutations and fighting cancerous cells.[21]

Table 1 shows the review of anticancer, antiviral and antibacterial activities of Bamboo shoots. Research on specific types of bamboo shoots, such as *Dendrocalamus asper* and *Phyllostachys heterocycle* var. pubescent, has revealed their potential breast anticancer activity. These studies have identified various activities within these bamboo species, including antiproliferative, proapoptotic, and proinflammatory effects, particularly in the MCF-7 breast cancer cell line. Such findings indicate promising avenues for the development of bamboo shoot-derived treatments or supplements targeting breast cancer.[23] Bamboo leaves exhibit antioxidant, anticancer, and antibiotic properties. Research indicates that the dichloromethane-soluble portion of methanol extract from bamboo shoot skin, specifically from Phyllostachys pubescents, has shown inhibition of *Staphylococcus aureus* growth. Further analysis revealed stigmasterol and dihydrobrassicasterol as active constituents through NMR and mass spectrometry. These compounds exhibited inhibitory effects on both *Staphylococcus aureus* and *Escherichia coli* growth. These findings suggest that extracts derived from bamboo shoot skins, along with their active compounds, hold potential as antibacterial agents.[27]

Fresh juvenile bamboo shoots have been utilized for centuries both as food and medicine, and today they are increasingly recognized for their functional benefits. These include serving as a food antioxidant, a cosmetic ingredient, and a nutraceutical component for disease prevention. Modern scientific research has corroborated many of the medicinal properties attributed to bamboo, including its antioxidant, anti-diabetic, antimicrobial, anti-tumour, and preventive effects against cardiovascular and neurological disorders, among others. This growing body of scientific evidence underscores the diverse health-promoting potential of bamboo across various applications.[28]

Bamboo shoots offer numerous health benefits to humans by promoting intestinal motion and peristalsis, aiding digestion, and potentially preventing and treating Cardiovascular Diseases (CVDs) and cancers. They achieve this by reducing the presence of free radicals that can lead to the formation of harmful carcinogens. Additionally, bamboo shoots may contribute to weight loss and help lower cholesterol levels. These effects are believed to be facilitated by the antioxidant properties of bamboo shoots, which also provide anti-inflammatory effects. Overall, the consumption of bamboo shoots can contribute positively to human health by supporting various bodily functions and potentially mitigating the risk of certain diseases.[29]

PAPAYA: NATURE'S HEALING FRUIT

Botanical Insights and Folk Uses

The top part of Papaya bears a large crown petiolate, deeply lobed leaves (Figure 2). These varieties of papaya can be distinguished based on their stomatal shape, leaf structure and number of central leaf veins, wax coating on the leaf surface and petiole colour. The fresh green papaya leaves are used as antiseptic, whereas brown leaves are good for tonic and blood purifying activity. The Leaf

extract plays a dominant role in managing various diseases in human when compared to important products and compounds obtained from other parts of the plant. Extract of Papaya leaf having many biological active components which have high nutritional, medicinal Properties and therapeutic importance against a variety of human diseases includes lethal virus which is a global threat to human beings.[30]

Many methods have been developed for extraction of Papaya leaf including ethanol, water, methanol and freeze-dried papaya leaf juice. The leaf extracts show therapeutic properties due to the presence of glycosides, alkaloids, saponins, tannins, steroids and flavonoids. It shows synergetic effect on spleen and liver management and may treat the hair dandruff condition and also removes venom from snake bites. These leaves are exceptionally rich in iron and when used in combination therapy it regulates the proliferation of malignant cells. *In vitro* studies says that leaf extract decreases the cancer cell proliferation. Methanolic extract of papaya leaf has significant larva and purple mortality rate.[30]

PLE (Papaya Leaf Extract) contains minerals, carbohydrates, lipids, proteins hence it is used as a nutritional supplement. Leaf extract exhibit the therapeutic effect to prevent dengue virus. Studies shows that the effect of PLE on growth of tumour cells showed that increased secretion of T_H1 type cytokines from human lymphocytes. These papaya leaf extracts contain papain and also used for the treatment of breast cancer, hepatocellular carcinoma, osteosarcoma, pancreatic epithelioid carcinoma, cervical carcinoma and lung adenocarcinoma. The targeted actions of anticancer activity prevention involve in suppression of the activity of DNA topoisomerase I/II, signalling pathways, upregulating gene expressions of Bax, Bak, Caspase 3 and increasing the expression of p53.[31]

In the Traditional medicine administration of papain extracted from the leaves of papaya showed greater effective against the nematodes as papain cause damage to the cuticles of nematodes. Papain it is cysteine-protease enzyme and having a high proteolytic activity and it contains three disulfide bridges. Papain can be stabilized by certain chemicals such as Cysteine, EDTA and dimercaptoproponol. The papaya leaves are dried for 5-7 days and perform the proteolytic assay of papain using the Substrate as casein. Various methods are used to extract the papain from the Leaves including enzyme-assisted, blending homogenization and ultra sonification. The concentration of Mg^{2+} significantly increase the activity of papain enzyme. Papain is the most common used in cell inhibition and having less damaging nature. This inhibits the immune-mediated destruction of platelets.[32]

Table 2 shows the review of anticancer, antifungal, anti-inflammatory and antibaterial activities of carica papaya leaves. The chemical Constituents present in papaya leaves are carpain, Alkaloids, pseudocarpain, dyhydrocarpain, Vitamin C and E. Various pharmacological activities are identified with Leaf extracts of papaya one among them is Anti-inflammatory. Studies reveal that Ethanolic extract of *C. papaya* leaf using cotton pallet granuloma and formaldehyde induced arthritis models in rats significantly shows anti-inflammatory properties. Aqueous extract at different concentrations showed anti-microbial activity.[33]

Anti-bacterial and Anticancer Properties

Papaya plant possess the medicinal properties one among them is nutraceutical and helps in management of neurological illness and helps in strengthen the immune system and reduce the viral load in HIV patients, making in the treatment for the AIDS virus. *Carica papaya* has long history of treating digestive and gastrointestinal diseases. Papaya contains Anti-tumor properties and extracts of papaya have components of tocopherol, lycopene and flavonoids in the tumor destruction activity. It also inhibits the proliferation of tumor cell lines. The extract decreases the production of IL-2, IL- and PBMC while increasing the IL-12p40, IFN-gamma and TNF-alpha without inhibiting the growth.[34]

Thrombocytopenia is one of the major symptoms for Dengue fever where the Papaya leaf extract is revealed to increase the platelet count by decreasing the clotting time. It has the properties of anti-malarial and anti-dengue by inhibit the immune-mediated destructions of platelets by suppressing the bone marrow caused by the virus.[32] The ripe fruit Papaya extracts have ethanol which is used as anti-hypertensive activity. The aqueous leaf extract of papaya shows 77% reducing the wound and had a potent wound healing. Dried extract of papaya showing the significant hepatoprotection by lowering the biochemical parameters such as SGOT, SGPT, Alkaline Phosphatase and Serum Bilirubin. Different extractions of Papaya leaf and roots at concentrations of 25, 50, 100, 200 mg/mL showed anti-microbial activity. Crude extract of bark shows the loss of fertility by decline the motility of sperm and altering the morphology.[35]

The Enzymes found in papaya leaf tea have cancer fighting properties against of broad spectrum of Tumors. The leaf extract of papaya used as a tonic for heart, analgesic for Stomach ache. Aqueous extract of *Carica papaya* on alcohol-induced acute gastric damage and immediate blood oxidative stress and the extract reduced the gastric ulcer index in rats.[36]

GINGER: SPICE WITH HEALTH BENEFITS

Botanical Basics and Traditional Applications

Ginger (Figure 3) is a member of *Zingiberaceae* and officially called as *Zingiber officinale* is a popular spice used especially in Asian countries. Analysis says that ginger contains 400 different compounds. Major constituents as Carbohydrates (50-70%), terpenes, lipids (8-9%) and phenolic compounds present in ginger rhizomes. Since ancient times ginger is used as spice as well as medicine in China and India. Americans have used wild ginger rhizome to control menstruation and heart beats. Ginger

Table 2: Demonstrates the authors and their review of Papaya for anticancer activities.

Author	Year	Extraction procedure	Potential activities	Results	Conclusion
Aravind G[34] *et al.*,	2013	-	Antiviral, anti- fungal, anticancer (Cell lines of colon), anti-bacterial (*Klebsiella pseudomonas, bacillus subtilis, E. coli, S. aureus*).	Bind colon cancer causing toxins and protects the colon cells. Inhibits the signaling molecules called TH1-type cytokines. Scavenges free radicals and promotes anti-oxidant activity. Bactericidal against *E. coli, Bacillus aeruginosa*.	It is a nutraceutical plant having the wide range of pharmacological effects.
Vij T[33] *et al.*,	2015	-	Antimicrobial (using agar diffusion method), anticancer (cell lines of MCF-7, Hela, HepG2, H2452).	It inhibits the proliferative solid tumor cells derived from Cervical carcinoma, breast adenocarcinoma, hepatocellular carcinoma. And aqueous extract shows anti-microbial activity.	By the traditional claims papaya has wide range of pharmacological properties.
Kumar NS[36] *et al.*	2017	-	Anti-cancer (Acute promeolytic leukemia HL-60 cells), anti-bacterial (Organism such as *Salmonella typhi, staphylococcus* and *E. coli*).	Bactericidal against *Salmonella, Staphylococcus, E. coli* and other bacterial infections. Anticancer such as prevention of cell migration, proliferation apoptosis, carcinogen elimination and angiogenesis. It breaks downs the fibrin coat cancer cell wall.	Enzymes present in papaya are capable of inhibiting both formation and development of cancer cells.
Singh SP[31] *et al.*,	2020	Aqueous extract methanol extract and ethanol extract.	Anticancer (cancer cells of stomach, colon, ovarian, breast and prostate carcinoma) antibacterial, antiviral and anti-inflammatory.	Leaf extract decreased the cell proliferation and suppressed DNA Synthesis. it is bactericidal against *E. coli, pseudomonas aeruginosa, S. aureus*.	Papaya leaf extracts shows therapeutic medicinal potential in various diseases.
Bhupendra koul[30] *et al.*,	2022	Aqueous, Ethanol, methanol and freeze-dried extract of leaf.	Anticancer (cancer cells of stomach, pancreas, lymphoma, breast and prostate), antibacterial (*micrococcus luteus, s. aureus, bacillus subtilis*).	Inhibitory and cytotoxic effects on prostate cell lines (RWPE-2, HPR-1, BHP_1 etc.,) inhibits the growth of S. aureus, *E. coli, bacillus subtills* and *Klebsiella pneumonia*.	Papaya fruit, leaf having phytochemicals are widely used in traditional medicine in treating the various disease conditions.

Author	Year	Extraction procedure	Potential activities	Results	Conclusion
Babalola BA[32] *et al.*,	2023	Papain extracted from leaf, latex.	Research indicates papaya's potential in managing neurological illness. It strengthens the immune system, reducing viral load in HIV patients, making it promising for AIDS treatment. Fermented papaya preparations exhibit antioxidant, anti-inflammatory, and immunostimulatory properties, combating oxidative stress and age-related diseases like Alzheimer's and cancer.	PLE proliferates the tumor cell lines and decrease the production of IL-2 and IL-4 and increasing the TNF-alpha, IFN-Gamma. PLE also increase the platelet count for malaria.	Importance of *Carica papaya* and its enzyme papain in both traditional and modern medicine.

Figure 3: Rhizome of Ginger.

can be used for nausea during pregnancy and also used to treat various GI problems such as motion sickness, gas, bloating, loss of appetite, diarrhea, and also it enhances the digestion of food according to Indian Ayurveda medicinal system. It also acts as a flavoring agent in foods and beverages. Ginger having the properties of antiviral for treatment of cold and flu.[37]

Table 3 shows the review of anticancer, anti-inflammatory and antibaterial activities of Ginger rhizome. Ginger having the active compounds such as 6-gingerol and 6-shogaol has shown the hepatoprotective, anti-inflammation, antioxidation and anticancer activities. 6-10 Gingerols are having a role of Cervical cancer treatment. Alone 6-Gingerol had inhibited cell proliferation, apoptosis and blocked G1 cell-cycle in human colorectal cancer cells.[38] Ginger is a natural product and complex spice composed of carbohydrates, water, lipids, proteins, fiber and essential oils. Biologically Gingerols, shogaols are possess antimicrobial, anticancer, anti-oxidant, anti-inflammatory and anti-allergic properties.

Ginger is used in the treatment of breast cancer, and in Singapore the rhizome is cooked and used it for prevention of cancer and infusion of rhizome is used for breast cancer. In the treatment of cancer decoction of root is prepared with mixture of root, honey and turmeric and o daily basis two doses are ingested.[39]

Some of the important applications of ginger as a tonic for memory and digestive system, hepatic obstruction opener, expelling compact wing from stomach and intestine. Ginger Phytochemicals vary depending on their growing places, freshness and dryness of it. Ginger having the pungent taste due to Gingerols compounds. Phyto therapists from the ancient times believed that activities of ginger with its dry and hot nature on body system is based on the structures dominant elements.[40] Major extracts of ginger having the compounds of Gingerols shows the properties of inhibition of angiogenesis in the human endothelial cells and also down regulates the cyclin D1 and cause cell arrest in the G1 phase.[41]

There are numerous active ingredients are present in ginger including terpenes and oleoresin which called ginger oil. Ginger also constitutes volatile oils approximately 1% to 3% and non-volatile pungent components oleoresin. The major identified components from terpene are sesquiterpene hydrocarbons and phenolic compounds which are Gingerols and shogaols and lipophilic rhizome extracts.[42]

Anticancer and Antibacterial Effects

Ginger constituents and its extracts possess comprehensive and antineoplastic properties in gastric cancer. 6-Gingerols will induce a cell apoptosis of cancer cells and also facilitates the TRIAL (TNF-related apoptosis induced ligand) apoptosis by increasing the caspase 3/7 activation. 6-shogoal reduced the

viability of cancer cells by damaging the microtubules. Ginger Extracts acts as a ulcer healing and promotes ulcer healing and prevents gastric damage. Both *in vitro* and *in vivo* these extracts exhibit chemosenstizing effects in certain neoplastic cells. Ginger also acting as antiemetic for cancer chemotherapy. Ginger and its constituents are also effective against pancreatic cancer6-gingerol inhibited the production of Cyclin A and Cyclin dependent kinase (Cdk), which was followed by a decrease in the phosphorylation of Retinoblastoma (Rb) and a blockage of S phase entrance.[37]

The breast cancer cell line demonstrated a time-dependent cytotoxic impact of a ginger methanolic solution. 6-shogaol was discovered to activate the peroxisomal proliferator activated receptor γ (PPARγ), which inhibits the proliferation of cancer cells in the colon and breast. Additionally, it was shown that 10-gingerol, one of the active chemicals in ginger, decreased the viability of many prostate cancer cell lines, including DU145, LNCaP, C4-2, C4-2B, and PC-3. 6-Gingerol also caused LNCaP human prostate cancer cells to undergo dose- and time-dependent apoptosis, mostly through the production of caspase-3, which led to the destruction of PARP. When 6-shogaol was tested against human lung cancer cells, it was likewise shown to trigger autophagy via blocking the AKT/mTOR pathway. It has been discovered that the elevated activity of TNF-α and NFκB in rats with liver cancer can be reduced by ginger extract.[39]

Ginger in Nausea and Vomiting Induced by Antineoplastic Drugs. The two most common and annoying side effects that cancer patients experiencing chemotherapy encounter are nausea and vomiting. Ginger has an antagonistic activity by attaching to a different location on 5HT-3 receptors than antiemetic medications (e.g., ondansetron) bind to. When used in conjunction with 5HT-3 receptor antagonists, ginger may thus have a synergistic inhibitory effect. Ginger's renowned antioxidant, anti-inflammatory, and ant apoptotic qualities may not be the only mechanisms driving its neuroprotective effects on these chronic, incurable illnesses. Ginger has antiviral, antifungal, and antibacterial properties along with its bioactive components. According to reports, its active ingredients are effective against fungus, drug-resistant bacteria, *Salmonella typhi, Staphylococcus aureus, Pseudomonas aeruginosa,* and *Escherichia coli*.[43]

PLECTRANTHUS AMBOINICUS: HERB WITH A PUNCH

Introduction and Historical Use

Plectranthus is a native Indian plant and its leaves are used traditionally for various medicinal preparations (Figure 4). Most widely used for sore throat, nasal congestion and cough also used to treat infections, flatulence and Rheumatoid. *Plectranthus* promotes liver health. In Indonesia it also stimulates lactation following childbirth. Thy hydroalcoholic extracts of Leaves and found to be having anti-inflammatory, anti-cancer and anti-immunogenic properties.[44] *Plectranthus* plants consists major phytoconstituents such as glycosides, Phenols, flavonoids and steroids having various pharmacological Properties.

This plant contains volatile oils such as Thymol and calvacrol plays a crucial role in treating of respiratory diseases.[45] This plant derived from the family lamiaceae. It is cultivated thought the India and Malaysia. It can be also called as Cuban oregano, Mexican thyme or mint, Indian borage and Spanish thyme. It is a herb and aged about 3-10 years old and height about 1-m height and its leaves are thick, light bladed and fat green opposite arrangement of leaves. This herb used in the treatment of diseases such as Cephalgia, anorexia, bloating, dyspepsia, cholera, chronic bronchitis, hepatopathy and Fever.[46] This herb has therapeutic and nutritional properties and constituents of phytochemical compounds and are highly valuable in pharmaceutical industry. It also has horticulture properties of essential oil producing capability and Aromatic nature.[47]

Anticancer and Antibacterial Properties

The essential oils of *Plectranthus* constituents of Camphor, Calvacrol and Alpha-Tepinene. These essential oils exhibit Antibacterial activity on staphylococcus aureus and Escherichia coli and the inhibition concentration was 0.2% and 0.1%. This plant extracts shows anti-inflammatory activity which prevents in vitro denaturation. Traditionally leaves are used for the treatment for nasal congestion, asthma, bronchitis, cold and cough. As it shows anti-inflammatory which are capable reducing swelling, irritation, itching and redness in less time. High content of zinc is present in this herb which promote the healing of wounds and also anti-bacterial properties.

Table 4 shows the review of antimicrobial, antiasthmatic, antiepileptic, antitumorigenic, inflammatory, antioxidant, analgesic, antiurolithiatic, anticancer, antiviral activities of *Plectranthus Ambionicus*. The herbal medicine plays a crucial role significantly in prevention of cancer. The ethanolic extracts of leaves contains flavonoids compound to demonstrates potent anti-cancer and antioxidant activities. The leaves exhibit dose-dependent, notable, cytotoxicity and remarkable anticancer activities against the tested cells lines.[48] The leaves processes wide range of anti-microbial properties against bacterial, mould and yeast based on the quality and quantity of bioactive constituents. Essential oil of *P. amboinicus* shown anticancer activities on B16F -10 Melanoma cell and it exhibits potent chemotherapeutic effect over the lung metastasis. It also shows anti-viral activities against Herpes-Simplex Virus-I and HIV. This herb also shows various medicinal properties such as Antimicrobial, antibacterial, antiviral, anti-tumorigenic, anti-inflammatory, antioxidant, Radio protective activity, antiplatelet aggression, ant biofilm, wound healing, analgesic, anxiolytic and anti-rheumatoid effect.[45]

Table 3: Demonstrates the authors and their review of Ginger for anticancer activities.

Author	Year	Extraction procedure	Potential activities	Results	Conclusion
Rahmani AH[42] *et al.*,	2014	Ethanolic Extract.	Anticancer (Endometrial cancer cell lines), anti-microbial (*Candida albicans, E. coli, salmonella, Bacillus subtills* and anti-bacterial (*Helicobacter pylori*).	Anti-tumor activity via induction of apoptosis by activation of p53, modulation of genetic and other biological activity. Control of tumor through up regulation of tumor suppression gene. Inhibition of H. pylori CagA$^+$ strains.	Ginger shows suppression effect on NFκB, COX2 and LOX, induction of apoptosis and tumor suppression genes.
Khodaie L[40] *et al.*,	2015	-	Antibacterial. Anti-inflammatory.	Modern phytotherapy confirmed some of the properties of ginger.	Ginger shows Pharmacological effects to treat various disease conditions.
Prasad S[37] *et al.*,	2015	-	Anticancer (cell lines used HepG2, PaCa, JB6, Caco-2, KIM-1).	Ginger effective against GI cancers like duodenal, esophageal, anal and pancreas. Also, against various diseases in human.	Ginger and its active Components effective against GI cancer.
Pashaei-Asl R[41] *et al.*,	2017	Cell culture, cell proliferation assay, RNA Extraction and c-DNA synthesis.	Anticancer (SKOV-3), antioxidant and anti-inflammatory.	The ginger extract significantly inhibits cancer growth in ovarian cell. Inhibited the cell growth and cell proliferation was decreased by 50%.	Ginger extract has anticancer properties through P53 pathway to induce apoptosis.
Mahomoodally MF[39] *et al.*,	2019	Methanol Extract.	Anticancer (cancer cell lines like MDA-MB-231, Hela, DU145, NFkB, HL-60, and HCT-15,16).	Shows high inhibition in cancer cell growth, raised activity of TNF-alpha, apoptosis, eIF2alpha dephosphorylation caspase activation, inhibition of AKT/mTOR Pathway.	Ginger shows cytotoxic effect on various cancer types such as, Breast, cervical, colorectal, lungs etc.,
Nachvak SM[38] *et al.*,	2022	-	Anticancer (U87MG human cell, A549, SKOV-3, MGF-7, HGS, AGS and Hella Cancer cell lines).	Ginger increased the anticancer markers by inhibits the cell proliferation, NF-K9 signaling pathways, decrease CDKs.	Ginger shows beneficial effects on treatment and prevention of cancer cells.
Ozkur M[43] *et al.*,	2022	Sun drying, over drying and freezing drying methods, H2AX assay.	Anticancer (Cervical cancer cells, chronic myeloid leukemia, murine sarcoma cells, colorectal, gastric cancer cell) antimicrobial (*E. coli, salmonella typhi, mycobacterium tuberculosis* and *Enterococcus faecalis*) and anti- inflammatory.	Inhibits cell proliferation, DNA damage cell cycle associated apoptosis, generation of intercellular ROS, p53 activation, G2/M Cell cycle arrest, cell proliferation inhibition and increased cell radio sensitization. Bactericidal against *E. coli, salmonella typhi, mycobacterium tuberculosis* and *Enterococcus faecalis*.	Ginger pocess anti-oxidant, anti-inflammatory, anticancer and antimicrobial properties.

Figure 4: Leaf of *Plectranthus*.

UNDERSTANDINGS ANTICANCER MECHANISMS AND *IN VITRO* AND *EX VIVO* ACTIVITIES

Common Targets and synergies

Cancer is the one of the most serious complications globally suffering by a human being. Nearly 19.3 million new cases emerged and for a long period Herbal medicine has been used as an anticancer drug also displayed as anti-inflammatory properties which pocesses many anti-cancer agents targeted cancer cells directly imparts cytotoxic effect and indirect regulation in cancer immunity, Tumor micro environment and progress chemotherapy. Herbal products or medicine displayed shikonin induced synergetic on anticancer drugs.

Herbal Plants and their derivates of phytochemicals are capable of enhancing therapeutic efficacy in Cancer patients by reducing side effects. The mechanisms that are followed by phytochemicals such as Carcinogen inactivation, inhibiting proliferation, augmenting antioxidant status, inhibition of cell cycle arrest and apoptosis and regulation of the immune system. Constantly increasing the supplementing, the cancer treatments with Nutritional ingredients of herbal treatments to improve the Quality of life in patients throughout cancer chemotherapy. In *in vitro* these herbal medicines with nutritional supports are influencing the immune system to defend against many circumstances.[49]

There are many Phytochemicals are extracted from the Herbs which inhibits the progression of development of cancer and there are approximately 250000 plant species among them only 10% were used for the Treatment of cancers. Analogues Derived from the different plants such as flower, pericarp, fruits, seeds, bark, roots, stem and rhizome. The phytochemicals which derived are flavonoids, alkaloids, terpenes, vitamins, minerals, gums, oils, primary and secondary metabolites which plays a significant role in cell proliferation inhibiting cancer cell activating proteins, enzymes and other signaling pathways (CDK2, CDK4 kinase, COX-2 Inhibitors, MAP/ERK. TNK and MMP) by activating the DNA repair mechanism and stimulating the formation of protective enzymes and inducing antioxidant actions.[50]

All these phytochemicals have synergetic action against chemotherapeutic drugs and with the chemotherapy many people have faced many Side effects and thus relying in Complementary and alternative medicine compromised modalities such as herbal medicine. These phytochemicals act as a Potent anticancer agent and targeting the cell signaling pathways by inducing apoptosis, cell cycle arrest, prevention of epigenetic changes and DNA Damage. The phytochemical is tended to block one or more signaling transduction pathways or increasing the therapeutic effect of other anti-cancer drugs or stabilizing the other drugs.

Herbs when introduced with the chemotherapeutic drugs, Herbs increase the Efficacy of the treatment or showing the synergic actions. Most common among them are with Kidney cancer cisplatin induced nephrotoxicity is prevented along with the decreased levels of creatinine and BUN. Another scenario with lung adenocarcinoma herbs enhanced the effect of chemotherapeutic response by reducing the side effects Liver toxicity and Leukopenia. The effect of herbal medicine on breast cancer increases the production of bone marrow and quality of life in patients.[51]

Comparative analysis of anticancer mechanisms and *in vitro* and *ex vivo* activities

Bamboo shoot

Sarojini Padhan Says that Bamboo shoot is the edible and are of several species such *Phyllostachys edulis, Phyllostachys bambusoides*, etc., and used as a medicine. There are many health enhancing properties such as Rich in nutrients, Functional as Nutraceuticals, high fiber, low fat and appetizers. Bamboo shoot consists of phytosterols such as flavones, chlorophyll and amylase. Chlorophyll fights cancer by controlling the mutations and cell growth.[21]

Sachchan TK *et al.*, detailed about the bamboo shoot which contains phytosterols which inhibits the growth of cancer cells, cell invasion, metastasis and production of carcinogens.[24]

Chongtham N *et al.*, says that bamboo shoot having bioactive compounds such as Phytosterols and phenols. Mainly derived form fresh and fermented shoots. They affect the host system enabling more antitumor responses including boosting of immune recognition of cancer influencing the hormone-dependent growth of endocrine tumors. They directly inhibit the cancer cell growth by slowing cell growth progression and inducing apoptosis.[26]

Carica papaya

Surya P Singh *et al.*, Papaya leaf extracts actively targets the suppression of DNA topoisomerase activity I/II, alteration of signaling pathways, downregulating the gene expression Bcl-XL and Bcl-2 and decreases the production of TNFs and ILs and prevents the cancer.[31]

Babalola *et al.*, Said that papaya leaf extract contains phytochemicals and B Vitamins and constantly reported to treat arthritis and colon cancer.[32] Tarun Vij *et al.* said that *Carica papaya* aqueous extract exhibits anti-tumor activity. It significantly inhibits the proliferative responses tumor cells lines

Table 4: Demonstrates the authors and their review of *Plectranthus* for anticancer activities.

Author	Year	Extraction procedure	Potential activities	Results	Conclusion
Gupta SK[44] et al.,	2013	Aqueous, ethyl, acetone and phenolic extract, hydroalcoholic extract.	Anticancer (HCT-15, Cao-2 and MCF-7), antibacterial (*B. cereus, Y. enterocolitica, E. coli, Erythrina caffra, B. subtilis* and *S. aureus*).	Gram negative with anti-bacterial activity of B. cereus < *E. coli* < *S. aureus*. Gram negative against flavonoids *K. pneumonia* < *E. coli* < *B. Subtilis* < *S. aureus*. This has cytotoxic effect on all 3 cancer cell lines.	Both the extracts show the inhibitory effect on cancer cells lines HCT-15 and MCF-7.
Arumugam G[47] *et al.*,	2016	Hydro distillation method.	Antimicrobial (bacteria, yeast and mould), anti-bacterial (*Staphylococcus, Mycobacterium tubercoli, Lactobacillus plantarum, P. mirabilis, E. coli*) anticancer (180 & Ehrlich ascite carcinoma, A549) and antiviral.	Inhibited the growth of sarcoma 180 & Ehrlich ascite carcinoma, Control the growth of methicillin-resistant *Staphylococcus aureus,* inhibits growth of *Escherichia coli*, *Salmonella typhimurium* & *Mycobacterium tuberculosis*.	Phytochemicals present in herb exhibits anticancer, viral and bacterial properties.
Punet[46] *et al.*,	2020	Hydro-distillation, ethanol extract.	Antibacterial (*Streptococcus mutants*), antimicrobial (*E. coli* and *S. aureus*), anti-cancer (B16F-10 Melanoma cell, C57BL/6).	Potent chemotherapeutic effect over lung metastasis. Inhibition of growth of *E. coli* and *S. aureus*) and effective against *S. mutants*.	Due to more flavonoid present in this herb is widely useful in treating the various disease conditions.
Murali V[42] *et al.*,	2020	Aqueous extract.	Presence of various phytoconstituents like flavonoids, glycosides, phenols, tannins and steroids identified in it are responsible for its pharmacological properties like antimicrobial, antiasthmatic, antiepileptic, antitumorigenic, inflammatory, antioxidant, analgesic, antiurolithiatic, anticancer, antiviral.	Both *in vivo* and *in vitro Plectranthus* has multipotential properties.	Therapeutically it can be used for treating various disease conditions.
Jithesh[48] *et al.*,	2023	Methanol extract.	The ethanolic extract of *Plectranthus amboinicus* leaves contains flavonoid compounds that showed exceptionally potent anti-cancer and antioxidant activities.	This plant showed 4.2, 12.3 and 30.4% cytotoxicity in 50, 100, 200 µg/mL.	This herb exhibits phytochemicals and direct impact on cancer cells at specific concentration.

derived from cervical carcinoma, hepatocellular carcinoma and lung adenocarcinoma.[33]

Aravind G *et al.*, said that Papaya leaf tea extract exhibit the properties of cancer cell growth inhibition and boost the production of key signaling called Th1-type cytokines which regulates the immune system.[34]

Ginger

Prasad S *et al.*, said that Active constituents of ginger suppress the growth and induced apoptosis of variety of cancer types including ovarian, skin, colon (Inhibit Cytochrome P450 enzymes), breast, oral, renal, gastric (Inhibit the growth of all *H. pylori* strains), prostate, liver (induce apoptosis by activation of caspase-3) and brain cancer.[37]

Nachvak SM *et al.*, said that Ginger and its active constituents (6-gingerol, 6-shogol) has an ability to induce apoptosis and 6-gingerol and 10-gingerol have beneficial role in treatment of Cervical cancer. *In vitro* studies ginger stops their cell growth and cause cell death.[38]

Mahamoodally *et al.*, said that ginger extracts having the cytotoxic effects in treating in breast (activating PPAR which hinder the growth of cancer cell), breast, cervical, liver. Lung, prostate and blood cancers.[39]

Plectranthus

P G Scholar *et al.*, said that the ethanol extract of *Plectranthus amboinicus* significantly showed anti-cancer activity through inducing apoptosis in the lung cancer. Both *in vivo* and *in vitro* studies that the extract of *P. amboinicus* had multiple, medicinal properties such as anti-microbial, anti-tumorigenic, anti-inflammatory, anti-oxidant, radio protective, wound healing and anxiolytic.[45]

Punet Kumar *et al.*, proved that *Plectranthus amboinicus* oil extract exhibited the potent chemotherapeutic effect over lung cancer metastasis that developed when C57BL/6 mice injected with oil extracts of *P. amboinicus* over melanoma cell line.[46]

Greetha Arumugam *et al.*, detailed that hydro alcohol extract of *Plectranthus* leaf extract shows anti-tumor activity and it contains flavone and flavonoids as an active component that inhibit the growth of sarcoma 180, showed significant anticancer activity through inducing apoptosis in A59 (lung cancer) cell line.[47]

Jithesh Krishnan *et al.*, stating that upon Extract with ethanolic *Plectranthus* leaving having flavonoids exhibit the anticancer and antioxidant activities.[49]

Clinical Perspectives and Future pathways

Clinical Trials and Prospects

There are many clinical studies conducted across globe to for using herbal medicines for the treatment of various cancers. Extraction of Biological compounds from the Plants through ethanol's, phenols, hexanes, mixtures, form the seed, bark, fruit, leaf, root, rhizomes, stem etc.,[51]

Ethanolic extract is done by cleaning the plants under tap water and then chopped into small pieces then dried over 50°C until the weight stability is observed. Then grounded by electric grinding. The ratio of these were chosen to maximize the potential therapeutic benefits of the extract. Dried powder mixed with 500 mL of water to make it as a solvent and then separated and filtered the same. Herbs are more potent when mixed with alcohol than water. Mainly effective in certain plan species such as ginger to dissolve the components such as alkaloids, tannins, saponins and flavonoids.

In vitro studies conducted such as DPPH assay (Antioxidant activity), ABTS assay (Antioxidant capacity), Inhibition NO (nitric oxide) production, human cell maintenance, and cytotoxic and antiproliferative activities.[51]

With leaf extract of plants exhibit the significant levels of Flavonoids, antioxidant and anticancer activity, these antioxidant properties differ from the chemical composition and can be good source for the prevention of diseases associated with Oxidative stress. Eg: Carcinomas, Diabetes mellitus and neurodegenerative diseases. Phenolic compounds of plants prevent oxidative stress, exhibit inhibition of free radicals and peroxidase decomposition. Many studies shown that leafy vegetables containing flavonoids and phenols with potent antioxidant activity associated with lowering of caner incidences, CVS diseases and neurodegenerative disorders. Earlier studies were demonstrated that S. officinale anticancer activity is against the breast cancer at a concentration of 100 µL. this shows the promising effects of plant in treatment of cancers.[52]

Future Research Directions

Bamboo is lucrative crop and contains the necessary vitamins, minerals, low fat, dietary fiber and helps in controlling blood sugar and fights against cancer.[25] Worldwide using of bamboo shoots are increasing in the market due to their beneficials to Human health. Researchers and food scientists should focus on hunger, food insecurity and malnutrition which are global challenges. There are many other species of plant which are underutilized one among them is Bamboo that have great economic value and can also improve the food Security and health. Many researchers are exploring the various ways to use bamboo, especially shoots to create a healthy food products and supplements.[28]

Despite India having abundant bamboo genetic resources the edible bamboo is limited in areas. Bamboo shoots growing rapidly and should be well established and farmers can earn good profit. It is a fast-growing plant and significant increase the source of phytosterols and adding plat sterol to food become an important food policy.[29]

There are many potential Benefits with papaya leaf extract for various diseases. Phytochemicals are expected in the cancer prevention and treatment and it is a good alternative for conventional drugs. There should be in depth research and clinical trials should be performed of biochemical, cell culture animal and human studies to fully understand the potential role.[31]

In the current market trend Papain is highly beneficial product derived from papaya fruit. It is grown abundantly in tropical and subtropical regions worldwide. Despite papain is highly demand globally and used as a food ingredient. This Harvest yields a significant amount of papain due to its numerous benefits it is crucial in various industries. Papain extracted from the papaya latex and leaves holds a significance medicinal property in treating a conditions like malaria, asthma and cancer.[32]

Through *in vivo* studies molecular biology studies can be conducted on ginger for anti-tumor activities for validating and promising advancing understanding its potential in cancer Treatment regimens. With the advance drug delivery system can increase the efficacy of ginger by producing more active ingredients in future and promising the safe and effective to treat various cancer in clinical settings using the Herbal medicine.[49]

The active components in ginger are 6-shagol and 6-gingerol has demonstrated the anticancer effects across various studies. Current trends and research focused on anti- cancer mechanisms and signaling pathways. 6-shagol exhibit potent anti-cancer and anti-inflammatory than other biological components. In future should involve the structural metabolites to these components to enhance the anti-cancer activity.[50]

CONCLUSION

Young Bamboo Shoots, Papaya leaf, Ginger rhizome and *Plectranthus* leaf when extracted exhibits potential therapeutic and pharmacological effects that prevents the various cancers across the world. These plants inherit the Herbal power which has abundant medical properties to treat cancer diseases, neurodegenerative diseases, cardiovascular diseases, diabetes, oxidative stress and shows anti-malarial, anti- inflammatory, anti-bacterial properties.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

5HT-3: 5-hydroxytryptamine 3 receptor antagonist; **AGS:** Aicardi-Goutières syndrome; **BHP-1:** Grade-1 benign prostate hyperplasia; **BMC:** Biomed Central; **BUN:** Blood Urea Nitrogen; **COX-2:** Cyclooxygenase-2; **DNA:** Deoxiribonucleic acid; **DPPH:** 2,2-Diphenyl-1-picrylhydrazyle; **EDTA:** Ethylenediamine tetraacetic acid; **G1 phase:** Anaphase; **H2AX:** H2A histone family member X; **HepG2:** Grade-1 benign prostate hyperplasia; **HGS:** Hand grip strength; **HL-60:** Human leukemia cells; **HPR-1:** Heparanase-1; **IFN-gamma:** Interferon-γ; **IL:** Interleukins; **KIM-1:** Kidney injury molecule-1; **Lncap:** Lymph Node Carcinoma of the Prostate; **MCF-7 cell:** Michigan Cancer foundation-7; **m-RNA:** Messenger RNA; **NfKB:** Nuclear factor kappa B; **NMR:** Nuclear Magnetic Resonance; **PaCa:** Pancreatic cancer; **Parp:** Poly(ADP-ribose) polymerase; **PBMC:** Peripheral blood mononuclear cell; **PCR:** Polemerase chain reaction; **PLE:** Papaya Leaf Extract; **RWPE:** Androgen responsive adult human prostatic epithelial cell lines; **SGOT:** Serum Glutamic Oxaloacetic Transaminase; **SGPT:** Serum Glutamic Pyruvic Transaminase; **SKOV-3:** Ovarian cancer cell line; **TH1:** Type-1 Helper; **TNF-alpha:** Tumor necrosing factor.

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