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# The role of selected plant families with dietary Ethnomedicinal species used as anticancer.

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The uses of ethnomedicinal plants for human healthcare still remain the most widely used medication system in developing and least developed nation. This article reviews the research on use of ethnomedicinal plants as anticancer. The investigations focused primarily on dietary ethnomedicinal species reported with anticancer bioactive compounds distributed from 24 plant families. Population rise, insufficient supply of drugs, unaffordable cost of treatments, side effects of several allopathic drugs and development of resistance to currently used drugs for diseases have led to increased emphasis on the use of plant materials as a source of medicines for a wide variety of human ailments. As such ethnomedicinal plants have been used to cure cancer since the conventional therapeutic and surgical approaches have not been able to control the incidence of most cancer types. The article unveils the most recent studies on dietary ethnomedicinal species and their families used to treat various types of cancer. The article also reveals the most up to date findings in understanding of biological significance of their bioactive compounds used as anticancer.

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**Keywords:** Anticancer, Dietary medicinal plants, Plant families, Traditional medicine

### 1. Introduction

The uses of plants in the indigenous cultures particularly of developing countries, are numerous and diverse, forming an important socio-economic base including their use as anticancer <sup>[1]</sup>. Medicinal plants therefore have important contribution in the primary healthcare systems of local communities as the main source of medicines for the majority of the rural population <sup>[2, 3]</sup>. The World Health Organisation (WHO) estimates that up to 80% of the world's population in developing countries depend on locally available plant resources for their primary healthcare, since western pharmaceuticals are often expensive or inaccessible <sup>[4]</sup>. Plant based drugs have a long history in both traditional and modern societies. A number of modern drugs have been isolated or derived from natural sources based on their use in traditional medicine as herbal remedies or crude drugs, or as purified compounds approved various regulatory agencies <sup>[5, 6]</sup>.

Cancer is the leading cause of death in economically developed countries and the second leading cause of death in developing countries <sup>[7]</sup>. Cancer is a major public health burden in both developed and developing countries whereas in 2002 there were 10.9 millions new cases, 6.7 million deaths around the world <sup>[8]</sup>. Other studies based on GLOBOCAN 2008 estimates, reported about 12.7 million cancer cases and 7.6 million cancer deaths to have occurred in 2008; of these, 56% of the cases and 64% of the deaths occurred in the economically developing world <sup>[9]</sup>. Since cancer is the most common cause of death in the world population, the possibility that readily available natural substances from plants, vegetables, herbs, and spices may be beneficial in the prevention of cancer warrants closer examination.

Ethnomedicinal plants, vegetables, fruits and herbs used in the folk and traditional medicine are currently considered as one of the main sources

of cancer chemoprevention drug discovery and development. Over 60% of the clinically used anticancer drugs are of natural origin and most of them are derived from higher plants [10]. Important progress has been made in cancer chemotherapy; however, the concept of cancer treatment using chemotherapy in different parts of the world has changed considerably, based on the fact that using chemotherapy for cancer treatment causes major suffering to the patients [8]. In contrast, using whole herbal preparations has produced less effect on the human body because of the synergy of the plants which make up the preparations [11]. Moreover, ethnomedicinal plants used to treat cancer are considerably cheap herbal drug treatment which can be affordable to the rural and poor people to treat effectively the cancers of various types.

The present review article deals with families and their dietary ethnomedicinal species with reported epidemiological studies as anticancer or potentially an overall lower cancer incidence, thus evidences based on their biological contribution in reducing cancer risks are also discussed.

## **2. Selected families with dietary ethnomedicinal plants used as anticancer**

The search for new anti-tumor and anticancer agents from the vast array of medicinal plant resources is increasing because such taxa may hold promise for the finding of novel therapeutic anticancer agents. The present work is not envisioned as an exhaustive enumeration of all types of dietary ethnomedicinal plants possessing anticancer properties, but is a delineation of recent studies on the anticancer activity of selected families with dietary ethnomedicinal plants found in different parts of the world. Nutritional factors are extensively alleged to be critical in carcinogenesis, what you eat can harm you, but it can also help you. People whose diets are rich in dietary ethnomedicinal plants have a lower risk of getting cancers of various types such as the mouth, pharynx, larynx, esophagus, stomach, lung and prostate cancer [12]. Besides

their curative potential, a greater understanding of their anticancer properties might also change our dietary lifestyle as one means for prevention of cancer attack. In this review article, the anticancer data on dietary ethnomedicinal species spanning from 24 botanical families reported from various articles and journals are discussed.

### **2.1 Plant families with anticancer ethnomedicinal species used as staple food**

The family Poaceae contain many cereal grains plant species used as staple food in different parts of the world like *Zea mays* L. (maize), *Sorghum bicolor* (L.) Moench (sorghum), *Oryza sativa* L. (rice) and *Triticum aestivum* L. (wheat). These species contain flavonoids as the most abundant polyphenols in diets. The flavonoids and anthocyanins in these cereals particularly from the whole grain have been reported to have antioxidant and antimutagenic properties [13, 14]. *Oryza sativa* L. (brown rice) and *Oryza sativa* L. *indica* (black rice) have also anticancer effects due to the presence of anthocyanins and certain phenols e.g., tricin which has been reported as potential for breast cancer treatment [15, 16]. Although all types of rice (*Oryza sativa* L.) are a good source of energy, white rice (polished or milled rice) contains phenols at much lower levels than in brown rice. Thus, the consumption of brown rice instead of milled white rice may be beneficial with respect to cancer prevention.

The family Euphorbiaceae contain species *Manihot esculenta* Crantz (cassava) a known staple crop in Africa, Asia, and South America. *M. esculenta* manufacture cyanide by producing a chemical called linamarine which releases hydrogen cyanide when it is broken down by the linamarase enzyme. It has previously been reported that linamarin has an antitumoral action, this ability might be useful as a form of gene therapy where the gene for linamarase could be selectively put into cancer cells [17, 18]. If linamarin were then introduced into the body, cancer cells would break it down and release cyanide only in the area around the cancer cells, killing them. Since normal cells would not have

the linamarase gene and would not be able to convert linamarin into cyanide, they would not be affected. *Ipomoea batatas* (L.) Lam (Sweet potatoes) from Convolvulaceae family is also staple food in different parts of the world contain many anticancer properties, including beta-carotene, which may protect DNA in the cell nucleus from cancer-causing chemicals outside the nuclear membrane [19].

The family Fabaceae contains species such as *Phaseolus vulgaris* L, *Glycine max* L. and *Vigna unguiculata* mostly used in meals which have been reported as useful anticancer agents. Eating *Phaseolus vulgaris* L (beans) has been reported that may significantly lower colon cancer incidence and multiplicity [20]. *Glycine max* L. (Soybean) contain isoflavones which have been identified as dietary components having an important role in reducing the incidence of breast and prostate cancers. Genistein, the predominant isoflavones found in soy has been found to have antioxidant property, and shown to be the most potent inhibitor of growth transplantable human prostate carcinoma and spread of cancerous cells [21, 22]. Epidemiological studies have revealed that Asians, who consume a traditional diet high in soy products, have relatively low incidences of breast and prostate cancers, while the incidences are much higher in the western world [23].

*Vigna unguiculata* (L.) Walp (cowpea) also from the family Fabaceae contain anthocyanins, which belong to the flavonoid group of compounds widely distributed in plants consumed in the human diet such as beans. These anthocyanins are associated with a wide range of biological activities including antioxidant and anticancer [24]. Another biological active compound against cancer from Fabaceae family is Cajanol, an isoflavonoid isolated from roots of *Cajanus cajan* (L.) Millsp (pigeonpea). Cajanol has been reported to show the anticancer activity towards human breast cancer cells [25]. Nuts from the family Fabaceae contain the antioxidants that may suppress the growth of cancers, for example *Arachis hypogaea* L. (Peanuts) are known as a source of  $\beta$ -sitosterol, a sterol with anticancer properties and have been reported to be effective against colon, prostate, and breast cancer [26].

*Arachis hypogaea* also has resveratrol compound which possesses anticancer activity, and studies have indicated that it induces programmed cell death (PCD) in human leukemia [27].

## 2.2 Plant families with anticancer ethnomedicinal species used as vegetables

The family Brassicaceae contain many species known as cruciferous or brassica vegetables. Many commonly consumed anticancer cruciferous vegetables come from the *Brassica* genus which includes species of different variety of cultivars of *Brassica oleracea* L. namely cabbage, broccoli, kale, collard greens, cauliflower, kohlrabi and brussels sprouts. Other *Brassica* species reported to have anticancer activity are *Brassica juncea* (L.) Czern (mustard greens), *Brassica nigra* L. (black mustard), *Brassica rupestris* L. (brown mustard), *Brassica tournefortii* Gouan (Asian mustard), (*Brassica napus* L. (rapeseed), *Brassica* L. var. *perviridis* (mustard spinach), *Brassica rapa* L. var. *rapifera* (turnips), *Brassica rapa* L. var. *chinensis* (bok choy) and *Brassica rapa* L. var. *pekinensis* (Chinese cabbage) [28, 29]. Vegetables are strongly associated with a lower risk of developing numerous cancers due to the presence of phytochemicals which exhibit strong antioxidant activity [30, 31]. Thus, many types of vegetables, cruciferous vegetables are considered as the main anticancer foods because of their abundant antioxidants.

Plant species considered as cruciferous vegetables are also unique due to the presence of rich sources of antioxidants such as isothiocyanates, ascorbic acid, carotenoids and indole-3-carbinol that may act as anticancer. High intake of cruciferous vegetables has been associated with lower risk of lung and colorectal cancer and in some epidemiological studies provides evidence that the consumption of cruciferous vegetables protects against cancer more effectively than the total intake of fruits and other vegetables [32, 33]. Deep-coloured vegetables also are known to be good sources of phenolics, including flavonoid and anthocyanin, and carotenoids which are anticancer [34]. Vegetables

also contain salicylates which play a bigger role in protecting against cancer [35].

The family Apiaceae contains the following reported anticancer species *Daucus carota* L. (carrots), *Apium graveolens* L. (celery), *Coriandrum sativum* L. (coriander), *Foeniculum vulgare* Mill. (fennel), *Pastinaca sativa* L. (parsnips), *Heracleum rigens* Wall. ex DC. and *Levisticum officinale* Koch (lovage) [36, 37, 38, 39].

The high content of phyto-constituent called as coumarins in these plants, have been reported to inhibit the growth of breast cancer, colon cancer, lung cancer and prostate cancer, possess anti-inflammatory properties, the inhibiting of angiogenesis and the direct attack on cancer cells in the body. *D. carota* contains bioactive compounds namely carotenoids (beta-carotene and lutein), polyacetylenes, faltarindiol and faltarindiol-3-acetate which could be effective in the treatment of leukemia and may help reduce a wide range of cancers including lung, mouth, throat, stomach, intestine, bladder, prostate and breast [19, 38]. *Bunium persicum* Boiss (black cumin) also of the family Apiaceae contain essential oil, hydroalcoholic and polyphenolic which have reported to reveal anticancer and anti-inflammatory activities [40].

The family Solanaceae has a genus *Capsicum* with species such as *Capsicum frutescens* L. (Chili pepper) and *Capsicum spp.* (hot pepper) widely used in traditional medicines. The leaves of *Capsicum spp.* are very extensively used as a green vegetable and contain a chemical known as capsaicin, the principal pungent ingredient of hot red and chili peppers which has been linked with anti-inflammatory and anticancer activities by neutralizing certain cancer-causing substances [41, 42]. Capsaicin also produces reactive oxygen species in cells with resultant induction of apoptosis and cell cycle arrest, which is beneficial for cancer chemoprevention and inhibitory effects on cancer development in multiple organs, such as, stomach, lung, and liver [43]. *Solanum aculeastrum* Dunal (goat apple), another species in Solanaceae family is also reported for

possessing anticancer activity [44].

*Solanum lycopersicum* L. (tomatoes) from the family Solanaceae contain lycopene, an antioxidant that attacks roaming oxygen molecules known as free radicals, which are suspected of triggering cancer. An increased intake of lycopene has previously been reported linked to a reduced risk of breast, pancreas and colorectal cancer [45, 46, 47]. Consumption of *S. lycopersicum* products is associated with a decreased risk of developing prostate cancer, and lycopene, the red carotenoid in the tomato is a potent antioxidant that might contribute to this chemoprevention activity [48]. Also *S. lycopersicum* has vitamin C, an antioxidant which can stop cellular damage that leads to cancer. Findings from epidemiologic studies have indicated that consumption of tomatoes at a rate of approximately five to seven servings per week, were associated with a 30% to 40% reduction in prostate cancer risk [49].

Cucurbitaceae family contain species like *Cucurbita maxima* Duchesne (pumpkin), and varieties of squash (*Cucurbita pepo* L.) and *Cucurbita maxima* Duchesne ssp. known to be used as anticancer [50, 51, 52]. Most parts of the *C. maxima* and *C. pepo* are edible, including the fleshy shell, the seeds, the leaves, and even the flowers. These species contain Cucurbitacin, a tetracyclic triterpenoid compound reported to have several biological activities and are predominantly isolated from Cucurbitaceae family. Cucurbitacins are efficient anti-oxidant and this property lies in their ability to scavenge free-radicals such as hydroxyl radical, superoxide anions and singlet oxygen [51, 53]. Another important species of the family Cucurbitaceae with anticancer activity is *Lagenaria siceraria* (Mol.) Standley (Bottle gourd), reported to have effective antioxidant and free radical scavenging activity [54]. The broad spectrum radical-scavenging capacity of cucurbitacin in Cucurbitaceae family surpasses what had been reported for other natural antioxidants such as grape-seed extract, wheat and alfalfa extracts [51].



### 2.3 Plant families with anticancer ethnomedicinal species used as fruits.

The family Rutaceae contain citrus fruits plant species such *Citrus sinensis* L. Osbeck (sweet orange), *Citrus aurantium* L. (bitter orange), *Citrus limon* (L.) Burm.f. (lemon) and *Citrus aurantifolia* (Christm.) Swingle (key lime) which have antioxidants and free radical scavengers reported to prevent oxidative cell damage, have strong anti-cancer activity and protects against all stage of carcinogens [55, 56]. Citrus fruits contain flavonoids and limonene which strongly inhibit the growth of leukemia cells, human gastric cancer and stimulates cancer-killing immune cells that may also break down cancer-causing substances [57, 58, 59]. *Citrus paradise* Macfad (grapefruit) like other citrus fruits contain vitamin C, beta-carotene and citrus limonoids and essential oil which can help prevent cancer by sweeping carcinogens out of the body [60].

*Rubus idaeus* L. (raspberries), *Fragaria ananassa* Duchesne (strawberry) and *Rubus fruticosus* L. (blackberry) fruits from Rosaceae family contain many plant compounds and abundant antioxidants known as anthocyanins that may protect against various cancers [61, 62]. *Rubus idaeus* are rich in antioxidants, thought to have even more cancer-preventing properties than blueberries and strawberries [63]. *Malus domestica* Borkh (Apple) also from Rosaceae family is one of the most widely known fruit for its health effects as it is portrayed by the proverbial saying "An apple a day keeps the doctor away.". Researches have advocated that apples are rich source of other antioxidant compounds that may reduce the risk of colon cancer, prostate cancer and lung cancer [64, 65]. Apple's antioxidant property prevents the damage to cells and tissues. The fiber content, while less than in most other fruits, helps regulate bowel movements and may thus reduce the risk of colon cancer.

*Vitis vinifera* L. (grapes) from Vitaceae family contain bioflavonoids, powerful antioxidants that work as cancer preventives and it has previously been reported for anti-cancer effects against breast cancer [66]. Grapes are also a rich source of resveratrol, which inhibits the enzymes that can stimulate cancer-cell growth and suppress

immune response [67, 68]. *Persea americana* Mill. (Avocados) of the family Lauraceae are rich in glutathione, a powerful antioxidant that attacks free radicals in the body by blocking intestinal absorption of certain fats. They also supply even more potassium than bananas and are a strong source of beta-carotene. A number of studies have indicated that extracts obtained from avocado meat contain phytochemicals that have the ability to selectively inhibit cancerous cell growth [58, 69, 70].

The family Myrtaceae contain (*Psidium guajava* L. (guava) a tropical fruit, widely consumed fresh and also processed. Curative properties of *P. guajava* as a medicinal plant have often been indicated by epidemiological studies on its anti-cancer potential [71, 72]. The studies have indicated that *P. guajava* pulp, peel and seeds were the relevant component for causing cell cycle arrest and apoptosis due to the presence of antioxidants and hypoglycemic agents. Studies also have shown that *P. guajava* budding leaves possess anti-prostate cancer activity. *Syzygium cumini* L. (Java plum) is another species from the family Myrtaceae with biological active compounds from its fruit in which studies have reported to reveal strong antioxidant, anti-leukemia activities and free radical-scavenging ability [73, 74].

From Caricaceae family, various parts of *Carica papaya* L. (papaya) have been traditionally used as ethnomedicine for a number of disorders, including cancer [75, 76]. Papaya contains folacin (also known as folic acid), which has been shown to minimize cervical dysplasia and certain cancers. There have been anecdotes of patients with advanced cancers achieving remission following consumption of tea extract made from papaya leaves [75]. The leaves of papaya have been shown to contain many active components that can increase the total antioxidant power in blood and reduce lipid peroxidation level. In the leaves of *Carica papaya*, components previously reported to potentially have anti-tumor activity include flavonoid and benzylisothiocyanate [77, 78]. *Mangifera indica* L. (mango) varieties of the family Anacardiaceae also have been reported to show anticancer effects and chemopreventive activity due to the presence of polyphenolics

compounds contained in mango fruits with anticancer activity [79]. Other fruits species like *Garcinia mangostana* L. (mangosteen) from Clusiaceae family contain a variety of secondary metabolites, such as oxygenated and prenylated xanthenes which exhibit a variety of biological activities containing anti-inflammatory, anti-bacterial, and anti-cancer effects [80].

#### 2.4 Plant families with spice and flavoring anticancer plant species

The family Myrtaceae possesses one of the most widely used species as spice and food flavoring agent, one of such typical example is *Syzygium aromaticum* L. (clove). The sun-dried unopened flower buds from the plant *S. aromaticum* is a commonly used spice and food flavor are rich in health-promoting phytochemicals such as essential oils (eugenol, caryophyllene, acetyl eugenol, naphthalene) which have received much attention for its apoptogenic and anti-proliferative properties and as a possible source of cancer chemopreventive compounds [81, 82]. Anticancer activities of *S. aromaticum* has been revealed on esophageal squamous cell carcinoma [83].

*Allium sativum* L. (garlic) from the Alliaceae family has been used throughout the centuries as an effective remedy for tumours [84]. Heated and crushed garlic produce a one of the main compounds formed from garlic known as ajoene which possesses a broad spectrum of biological activities that include anticancer [85, 86]. *Allium sativum* and *Tulbaghia violaceae* Harv. (wild garlic) have other several compounds including allicin and its corresponding sulfide inhibit the proliferation and induce apoptosis of several human non-leukaemia malignant cells including breast, bladder, colorectal, hepatic, prostate cancer, lymphoma and skin tumour cell lines [87, 88]. *Allium sativum* contains oil-soluble sulfur compounds which are responsible for anticancer effects exerted through multiple mechanisms such as inhibition of metabolic carcinogenic activation, arrest of cell cycle, antioxidant and pro-apoptotic action [86]. People who consume raw or cooked garlic regularly face about half the

risk of stomach cancer and two-thirds the risk of colorectal cancer as people who eat little or none. Other allium vegetables species e.g. *Allium cepa* L. (onions) are reported as the richest source of flavonoids and organosulphur compounds such as diallyl trisulfide which studies have shown that can offer protection against cancer through alteration in carcinogen-metabolizing enzymes, cell cycle arrest, induction of apoptotic cell death, suppression of oncogenic signal transduction pathways, and inhibition of neoangiogenesis [89]. From the family Piperaceae, *Piper nigrum* L. (blackpepper) also used as spice is known to exert immunomodulatory roles and antitumor activities, consequently can be used as potential therapeutic tools to regulate inflammatory responses and prevent carcinogenesis [90, 91]. The seeds of *Nigella sativa* L. of the family Ranunculaceae, commonly known as black seed or black cumin are another important spice used in folk (herbal) medicine all over the world for the treatment and prevention of a number of diseases and conditions that include cancer. Some studies have shown that the antioxidant role of crude oil and thymoquinone (TQ) extracted from *Nigella sativa* seeds and oil are effective against cancer in blood system, lung, kidney, liver, prostate, breast, cervix and skin cancer with much safety [92]. *Xylopiya aethiopica* (Dunal) A. Rich (African pepper) is a species from the family Annonaceae also used as spice. The species has been reported to have antioxidant properties with cytotoxic effects on a wide range of cancer cell lines such as pancreatic and leukemia cells [93, 94]. The family Lauraceae contain cinnamon species (*Cinnamomum aromaticum* Nees, *Cinnamomum cassia* Nees and *Cinnamomum zeylanicum* Nees) widely used as spice. These species contain several active components such as essential oils (cinnamic aldehyde and cinnamyl aldehyde) and tannin with anti-oxidant, anti-inflammation and anticancer properties [95, 96]. *Crocus sativus* L. (saffron) from the family Iridaceae is a spice derived from dried filaments and dark red stigmata of *Crocus sativus* flowers and it is used not only as spice but also as food colorant and a

drug in medicine. A growing body of research has demonstrated that saffron extract itself and its main constituents, the carotenoids, possess chemopreventive properties against cancer [97, 98]. *Rosmarinus officinalis* L. (rosemary) of the family Lamiaceae contains carnosic acid and rosmarinic acid, compounds which may shield the brain from free radicals, acting as anti-inflammatory and anti-cancer agent [99]. The leaves of *Rosmarinus officinalis* are used as a flavouring in foods like stuffing and roast lamb, pork, chicken. Others species from the family Lamiaceae commonly used in many kinds of food preparations with reported anticancer activity are *Ocimum basilicum* L. (sweet basil), (*Thymus vulgaris* L. (thyme) and *Mentha spicata* L (mint). The named species possess essential oil, luteolin, flavonoids and ursolic acid which have been reported to have as antioxidant and anticancer activity towards human oral cavity squamous cell carcinoma [99, 100, 101].

## 2.5 Plant families with anticancer ethnomedicinal species used in foods and beverages

Plants of the family Zingiberaceae have been frequently and widely used as spices and also, in traditional oriental medicine. The rhizome of *Zingiber officinale* Roscoe (ginger), contain a plant-based nutrients curcumin which has powerful antioxidant properties. Curcumin is believed to have medicinal properties because it inhibits production of the inflammation-related enzyme cyclo-oxygenase 2 (COX-2), levels of which are abnormally high in certain inflammatory diseases and cancers, especially bowel, pancreatic and colon cancer [102]. Studies have reported that curcumin acts as a free radical scavenger, thus could be the answer to stopping a fatal brain cancer known as glioblastoma [103, 104]. Curcumin has revealed its potential anticancer effects from its ability to induce apoptosis in cancer cells without cytotoxic effects on healthy cells, suggesting curcumin selectively targets cancer cells [105]. *Curcuma longa* L. (turmeric) is another rhizomatous herbaceous perennial plant containing curcumin from the Zingiberaceae family. Curcumin a yellow natural polyphenol

extracted from *Curcuma longa* has demonstrated effective anti-cancer properties in various human cancer cells [106]. The Rhizome of *Alpinia galanga*, *Kaempferia galanga* and *Kaempferia rotunda* also of the family Zingiberaceae contain biologically active compounds reported to show anticancer activity [107].

*Camellia sinensis* (L.) Kuntze (green tea) from the family Theaceae is used in common beverages. *C. sinensis* contain certain antioxidants known as polyphenols which appear to prevent cancer cells from dividing and may protect against various types of cancer [108]. This beneficial health effect has been in particularly attributed to the catechins (flavonoids) in tea. Their biological benefits are due to their strong antioxidant and antiangiogenic activity as well as their potential to inhibit cell proliferation and modulate carcinogen metabolism. Green tea polyphenols have also shown the ability to lower risk of cardiovascular disease and many types of cancer including breast, ovarian, prostate, gastrointestinal and lung cancer [109, 110].

From this review, it has been revealed that the families Apiaceae, Brassicaceae, Fabaceae and Rutaceae and Zingiberaceae had many ethnomedicinal species used as anticancer. Occurrence of other families also suggests the importance of all those families as source of useful chemical compounds in the management of cancer. Dietary ethnomedicinal plants possess plant derived natural products such as flavonoids, isoflavone genistein and curcumin as very promising anti-cancer agents because of their antioxidant, free radical scavenging properties and non-toxic and potent anti-cancer properties. Epidemiological and experimental studies reveal a negative correlation among the consumption abundant foods from plant-based dietary resources, fruits or vegetables and the risks for chronic diseases, including cancer [111, 112]. More research should continue on medicinal plants used traditionally as anticancer including dietary ethnomedicinal plants. In this review only some of the dietary ethnomedicinal plants have been explained here and there are many unexplored plants which need investigations for cancer fighting potentials.

### 3. Conclusion

Most investigations of anticancer agents from dietary ethnomedicinal species discussed herein are based on scientific evidences reported anticancer bioactive compounds in these plants, which have received greater attention in the field of cancer prevention and treatment research. Cancer has demonstrated to be a largely preventable disease through an appropriate diet, thus consideration of these ethnomedicinal important plants in diet components is recommended since they have medicinal properties that may alleviate symptoms or prevent the cancer disease. In a nutshell, the intervention or prevention of cancer by use of dietary ethnomedicinal plants may be considered as cheap herbal drug affordable to the rural and poor people and holds great promise in efforts to control cancers of various types. Dietary ethnomedicinal plants are likely to play a significant role in discovery of novel products for cancer treatment.

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