Review Of The Usage Of Medicinal Herbs In The Treatment Of Cancer

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Abstract
Cancer is a disease that has a major global impact on people. To treat and prevent this fatal condition, there is a constant need for novel therapeutics. Natural substances are gaining attention from science and study because they are thought to have fewer hazardous side effects than existing therapies like chemotherapy. Natural secondary metabolites produced by the plant kingdom are being investigated for the possibility of anticancer properties, which might lead to the creation of brand-new pharmaceuticals. New technologies are emerging to advance the field as a result of the success of these chemicals, that have been transformed into important medications for the treatment of cancer. Nanoparticles for nanomedicines are a new technology that aims to improve the anticancer effects of compounds produced from plants by managing the compound's release and researching alternative administration techniques. This article examines the demand for naturally occurring chemicals obtained from medicinal plants and how such compounds may potentially be used to treat cancer. Furthermore, it has been confirmed that a number of fruits, vegetables, and herbs can prevent or lower the occurrence of cancer in a number of different parts of the human body. In addition, researchers discovered that they are a far good site than synthetic ones for creating novel anticancer medications that are efficient, tolerable, and safe. As a result, scientists advised that future study concentrate more on using plants as a source for secure and efficient cancer treatments. Many natural substances and their analogues have been shown to be effective anti-cancer agents, and additional plants are being found to have anti-cancer properties every day. In this study, an attempt is being made to emphasize the natural products and their analogues that have been proved to be anti-cancer agents as well as the novel plant species that have been discovered to possess anti-cancer properties in vivo or in vitro.

Keywords: medicinal herbs, treatment Of cancer.

Introduction

A lot of progress has been made in the treatment and prevention of cancer, and it has been a continuous fight everywhere. Cells in the human body multiply uncontrollably and continuously as a result of the illness, which cannot be halted or regulated. leading in the growth of cancerous tumours that have the potential to spread [1]. Chemotherapy, radiation, and medications made from chemicals are now used as therapies. Chemotherapy is one treatment that can put people under a lot of stress and worsen their health. As a result, emphasis is placed on employing complementary and alternative medicines to combat cancer [2]. Herbal remedies have been and continue to be the mainstay of medical treatment in underdeveloped nations for many years. Because of their inherent antibacterial characteristics, plants have been employed in medicine and uses of terrestrial plants extracts for the preparation of potential nanomaterial based drugs for diseases including cancer [3]. During this century, cancer has become one of the major problems and diseases which has caused predominant death, and it will even surpass heart diseases. Many of the researchers begin to use the term lifetime risk for cancer patients which refer to the time that cancer will progress and developed or the time that the patient will die because of cancer. Cancer does not represent only one disease but it is a group involving about 100 diseases. It is characterized by two things: Firstly there is no control for the growth of cancer cells, and secondly it is the ability of the cancer cells to metastasize and migrate from the original site to different parts of the body. There are two types of tumors which are malignant and benign. Cancer can attack any person, and its occurrence increases as the age of the individual increases too [4,5]. According to the American Cancer Society, deaths arising from cancer constitute 2–3% of the annual deaths recorded worldwide. Thus cancer kills about 3500 million people annually all over the world. Several chemo preventive agents are used to treat cancer, but they cause toxicity that restricts their usage. well as chemicals and radiation in our homes and workplace along with trace levels of pollutants in food, drinking water and in air. Other factors which are more likely to affect are tobacco use, unhealthy diet, not enough physical activity, however the degree of risk from pollutants depends on the concentration, intensity and exposure. The cancer risk becomes highly increased where workers are exposed to ionizing radiation, carcinomas chemicals, certain metals and some other specific substances even exposed at low levels. Passive tobacco smoke manifold increase the risk in a large population who do not smoke but exposed to exhaled smoke of smokers [6]. In recent years, the anti-tumor actions of various phytochemicals have been thoroughly investigated and being increasingly used as therapeutic agents as they are capable to produce different pharmacological

effects in living organisms [7]. Hoping for a better cure options, more and more patients together with medical health personnel are turning towards complementary and alternative traditional healthcare systems. Cancer is a debilitating disease characterized by the formation of lumps and masses of tissues referred to as tumors which are formed due to uncontrollable division of damaged cells. The uncontrolled development of the tumour compromises and disturbs the normal physiology of the neurological, digestive, and circulatory systems. Benign tumours often exhibit slow development and remain localised in one place. The hazardous malignant tumours, on the other hand, invade distant tissues by travelling through the blood and lymphatic systems from their main site of genesis and also support angiogenesis. These metastatic tumours pose a risk as well as a limited range of available treatments [8]. Medicinal plants are regarded as a rich source of a wide range of components that may be employed in the creation of medicines. One of the most fatal illnesses, cancers are caused by uncontrolled cell division. It is the primary cause of illness in both industrialised and developing nations. The most common reason behind the cancer is changing lifestyle and due to this it become a global problem across the world. Thus there is an urgent need to find better treatment possible for this disease. As chemotherapy and radiation therapy causes various side effects, so there is a necessity to discover novel agents for the treatment of this disease; it could be possible with the use of naturally occurring compounds [9].

Importance of plant secondary metabolites

Secondary metabolites from plants have shown to be a good source of novel medical molecules. Numerous anti-cancer compounds have been isolated from plants, such Catharanthus roseus, Podophyllum species, Taxus brevifolia, Camptotheca acuminate, Betula alba, Area currently species, Erythroxylum pervillei, Curcuma longa, Ipomoeca batatas, Centaurea schischkinii, and others. Scientists are continually studying the bioavailability of anti-cancer chemicals in previously unknown plant species.

Anticancer Activity of Medicinal Plants

Plant-derived compounds are more tolerated and non-toxic to normal human cells, giving medicinal plants various benefits over artificial goods. Radiotherapy and chemotherapy are currently accessible traditional therapies for the treatment of cancer, and they have a variety of side effects such as neurological, cardiac, renal, and pulmonary toxicity, which adversely affects the person's health. As a result, an alternate technique for developing anticancer medications that are less toxic and more powerful than those already on the market is necessary.

Withania somnifera

In Hindi and Sanskrit, it is known as ashwagandha, while in English, it is known as winter cherry. It is a subtropical shrub of the Solanaceae family that grows in the Mediterranean, Africa, and India. Withanolides, withaferins, anferine, isopellertierine, and sitoindosise are all present. Because of its therapeutic characteristics, the leaves and roots have been employed in Indian traditional medicine and sold abroad. Withania somnifera extract regulates a variety of biological responses [10]. It contains anti-stress, anti-aging, anti-peroxidative, anti-inflammatory, anti-oxidant, anti-tumor, cardiotonic, and immunomodulatory characteristics and has been employed in a variety of formulations. This plant's primary constituents are withanolide A and withaferin A. Withaferin A, which is largely found in the leaves, causes cancer cells to die quickly [11]. *Withania somnifera* formulation also up regulates population of T cell population in mice (bearing tumor) with increased expression of IL-2 and IFN-gamma levels [12].

Xanthium strumarium

It is a member of the Asteraceae family and is sometimes known as burweed or cocklebur. It occurs in North America and has antibacterial, antifungal, antitumor, antitussive, antiinflammatory, anti-mitotic, anti-malarial, anti-oxidant, analgesic, and insecticidal properties. Xanthinin, xanthumin, xanthostrumarin, xanthatin, phytosterols, xanthanolides, isoxanthonol, xanthanol, and xanthinosin are all present. 8-epi-xanthatin and its epoxide have anti-tumor action by decreasing the growth of tumour cell lines. 8-epi-xanthatin serves as a farnesyl transferse inhibitor and also inhibits microtubule interfering agents, demonstrating its anti-cancer effect [13].

Ziziphus nummularia

It is found in Iran, India, Iraq, Israel, Pakistan, and Afghanistan and is a member of the Rhamnaceae family. This plant's stem, bark, roots, seeds, and flowers are utilised for therapeutic purposes. In Hindi, it is called as harbour, in Sanskrit as bhukamtaka sukhsharanphala, and in English as wild jujube. Betulinic acid and betulin (found in the stem and bark) are the active components of this plant that have anti-tumor action [14]. Betulinic acid is cytotoxic to numerous tumour cell lines and causes apoptosis by inhibiting topoisomerase I, producing reactive oxygen species, inhibiting angiogenesis, and regulating pro-growth transcriptional activators [15]. Betulinic acid also promotes apoptosis via a CD 95 and p53 independent pathway, demonstrating the compound's anti-cancer potential [16-26].

Panax ginseng

It is a member of the Araliaceae family and may be found in Korea, China, Japan, the United States, and Russia. Its active ingredient is ginsesosides, a steroidal saponin [27]. It has anti-inflammatory and immune-modulatory properties, and it also aids with hunger stimulation, physical stamina enhancement, memory enhancement, and behaviour [28].

Ginsenosides' anticancer action stems from its ability to induce cell death, as well as their anti-invasion, anti-angiogenesis, and antiproliferation capabilities [29].

Curcuma longa

It is a member of the Zingiberaceae family and is known in Hindi as haldi, Sanskrit as harida, and English as turmeric. Curcumin, a polyphenol obtained from the rhizome, is the active element in this plant, which is utilised for both cancer prevention and treatment. Several investigations have shown that curcumin promotes apoptosis, interferes with cell cycle progression, and decreases proliferation [30]. Curcumin has also been shown to prevent colon and stomach cancer in animals [31]. Curcumin protects the body by inhibiting the development of many angiogenesis and tumor-associated genes [32]. Curcumin has anticancer action by lowering tumour cell growth. Curcumin has anti-proliferative properties by suppressing the expression of multiple genes, including activator protein 1, NF-kappa B, cycloxygenase 2, epidermal growth receptor 1, nitric oxidase synthase, and tumour necrosis factor [33].

Hyptis Fasciculata

Curcumin has anticancer properties by reducing tumour cell growth. Curcumin blocks cell proliferation by downregulating the expression of multiple genes, including activator protein 1, NF-kappa B, cycloxygenase 2, epidermal growth receptor 1, nitric oxidase synthase, and tumour necrosis factor [33].

Malus Domestica

Malus domestica, one of the world's most popular and widely grown fruit trees, includes phenolic compounds and flavonoids that have high antioxidant qualities. Apple leaves have been shown to contain the following quercetin glycosides: hyperoside, isoquercitin, avicularin, rutin, and a high concentration of quercitrin [36]. The anti-oxidant property of phenolic compounds is the best recognised and documented. The cellular dysfunction seen in cancer and other disorders is caused by extremely reactive oxidant molecules, which mediate their degenerative effects by capturing electrons and causing chemical structural changes. Since quercetin glycosides are effective anti-oxidant compounds that work by scavenging free radicals or reactive oxygen species, their chemopreventive capabilities are related to their anti-oxidant and oxidative damage prevention actions. Using cancer cell survival experiments to compare quercetin, hyperoside, isoquercitin, and quercitrin demonstrates that isoquercitin is a good option for chemotreatment owing to glycosylation since it provides more beneficial pharmacological changes than its counterpart quercetin. The impact of isoquercitin on pancreatic cancer development was reduction of proliferation, promotion of apoptosis, and induction of cell cycle arrest in pancreatic cancer cells in the G1 phase [37].

Aloe vera

The extract of Aloe vera induces cytotoxicity against hepatocellular carcinoma cells in a dose-dependent and time-dependent manner. Apoptosis is induced by increasing the expression of the TP53 gene and decreasing the expression of the BCL-2 gene [38]. Aloe Emodin, a hydroxyanthraquinone derived from Aloe vera, has substantial anti-neural ectodermal tumour action both in vitro and in vivo. In mouse studies, this physiologically active drug inhibits neuro-ectodermal tumour development while also causing severe immunodeficiency without causing any significant deadly consequences. Moreover, the chemical does not reduce hemopoietic primogenitor cell growth nor does it affect the proliferation of ordinary fibroblasts [39]. Feruloyl, cinnamoyl, caffeoyl aloe-sin, and p-coumaroyl are some of the additional physiologically active chemicals identified from Aloe-vera extracts. The efficacy of Caffeoyl aloe-sin to reduce immunological suppression caused by UVB is demonstrated using the contacthypersensitivity response test. In addition to this preventative activity, aloe-sin inhibits the enzymatic activities of tyrosinehydroxylase and Dopa oxidase induced activities of monophenol mono-oxygenase in human melanocyte cell lysates [40]. Barbaloin, another anthraquinone derived from aloe vera leaves, has been shown to significantly increase the life span of mice who have undergone tumour transplantation [41].

Beta Vulgaris

In vitro and in vivo studies show that beet root extract inhibits tumour cell growth. Beet root eating has a chemopreventive effect [42]. The plant pigments extracted from beet root, betalains, are water soluble and have anti-cancer capabilities in addition to anti-inflammatory, hepatoprotective, and radical scavenging characteristics. The presence of total phenolic compounds and betalains is favourably associated to antioxidant capacity. The link is assumed to be due to the existence of a synergistic impact of phenolic compounds on betalain activity [43].

Actaea racemosa

Black cohosh and black snakeroot are both members of the Ranunculaceae family. It includes triterpenoids of the cycloartenol type, cinnamic acid derivates, and cimicifugoside. This herb is also widely recognised for its ability to treat amenorrhea [44]. This plant's major constituent is actein [45].

Annona Muricata

Annona muricata is the scientific name for Graviola. Acetogenins are a major family of medicinal components found in graviola. Acetogenins were discovered in the graviola plant's fruit, seeds, leaves, and bark. According to preliminary

studies, acetogenins prevent the formation of adenosine triphosphate, which inhibits the pump that removes cancer medicines from the cell, making chemotherapy more effective. Additionally, studies have revealed that acetogenin may have chemotherapeutic potential, particularly in cancers that are resistant to numerous treatments [45]. Graviola can produce Parkinson-like symptoms when taken orally. Several cancer cell lines, including lung solid human-breast cancer, tumour carcinoma, pancreatic carcinoma, prostatic adenocarcinoma, colonic adenocarcinoma, human lymphoma, liver cancer, and multiple-drug resistant human-breast cancer, have been found to be toxic to certain acetogenins.

Bolbostemma Paniculatum

human lymphoma, enocarcinoma, colonic adenocarcinoma Tubeimoside-V, a triterpenoid saponin isolated and characterised from the Chinese plant Bolbostemma paniculatum (Cucurbitaceae), was isolated and fractionated. Subsequent research on tubeimoside-V found that it kills glioblastoma cells via apoptosis, implying a key function in antitumor treatment [48]. Additional tubeimosides, such as tubeimodes-I, tubeimoside-II, and tubeimoside-II, have shown promising cytotoxic effect, which may be connected to DNA synthesis inhibition and may promote phenotypic reversal transformation of tumour cells [49].

Apis Mellifera

Apis mellifera is the scientific name for the honey bee, which produces honey. In Indian medicine, honey is used to speed up the healing of skin lesions, ulcerations, and burns. Apis mellifera protein has been shown to increase proliferation and decrease apoptosis in primary-cultured rat hepatocytes [50]. It has also been shown to be cytotoxic in human lymphocytes and HL-60 cells [51]. Hamzaoglu et al. (2000) implanted cancer cells into mouse neck wounds and separated the animals into two groups. Wound cancer tumours were significantly reduced in groups of mice treated with surgical wounds covered with honey pre and postoperatively. This finding might be useful in human surgery [52].

Cannabis Sativa

In vitro studies of marijuana (Cannabis sativa) components show that they have the capacity to inhibit human breast cancer cells and eradicate tumours. It was shown that adding marijuana to malignant brain tumours dramatically enhanced animal survival [53]. Cannabinoids are the active components of Cannabis sativa. Cannabinoids and its derivatives relieve cancer patients' nausea, vomiting, and pain while simultaneously stimulating their appetite. These chemicals have also been proven in cell culture and animal models to exhibit anti-tumor action by altering critical cell signalling pathways [54].

Centaurea Ainetensis

The cytotoxic efficacy of Centaurea ainetensis extracts in human colon cancer cells has been investigated. Centaurea ainetensis crude extract suppressed the growth of a variety of colon-derived cancer cells. In vivo, the crude extract, given intraperitoneally before a subcutaneous injection of 1,2-dimethylhydrazine (a strong carcinogen), reduced the number of tumours and the mean size of aberrant crypt foci. Subsequent fractionation investigations of the crude extract resulted in the identification and characterisation of Salograviolide-A, a bioactive sesquiterpene Lactonemolecule associated to colon growth suppression. When injected to normal human intestinal cells, salgraviolide-A inhibited the development of colon cancer cell lines at non-cytotoxic dosages. Salograviolide A also has a strong cytotoxic effect on epidermal squamous cell carcinogenesis [55,56].

***Camellia Sinensis* (Green Tea)**

The most abundant polyphenol in green tea is epigallocatechin-3-gallate (EGCG). According to certain epidemiological research, EGCG can suppress the invasion and migration of human colon and oral cancer cells. The effects of EGCG may be associated with reduced MMP-2, MMP-9, and uPA production [57]. EGCG has also been shown to suppress the growth of cancer cell lines such as hepatocellular carcinoma by inducing cell cycle arrest [57]. EGCG also suppressed cancer cell proliferation in the ovarian carcinoma cell lines HEY and OVCA, as well as in the human colon and rectal cancer cell lines HT-29 and HCA-7 [58]. Aside from EGCG, other flavonoids such as rutin and quercetin have been associated to anticarcinogenicity via oxidative activation inhibition [59-63].

Smilax China

The active ingredient identified from Smilax china L. rhizomes is kaempferol-7-O-beta-D-glucoside (KG), a flavonoid glycoside. KG has been shown to have a substantial anticancer impact on cancer cells, with human cervix carcinoma cells being the most sensitive. Its cytotoxic impact is achieved by interrupting the cell cycle and inducing apoptosis in cells, implying that KG might be employed as a therapeutic cure for cervix carcinomas [64,65].

Strychnos Nuxvomica

Strychnos nuxvomica, a member of the Loganiaceae family, is mostly gathered from forests in the Indian subcontinent and northern Australia. Strychnos nuxvomica has been shown to be cytotoxic to the multiple myloma cell line ROMI 8226. Using the same cell lines, a root extract of Strychnos nuxvomica was tested for anticancer activity and shown to be dosage and time dependent [66]. Strychnos nuxvomica's major ingredients are alkaloidal in nature and effective against HepG2 cell growth, with brucine alkaloid leading to HepG2 cell death by apoptosis via the engagement of caspase-3 and cyclooxygenase-2 [67].

Zingiber Officinale

The anticancer properties of Zingiber officinale ethanol extract were examined in a skin tumorigenesis model. Pre-application of Zingiber officinale ethnol extract to mouse skin resulted in a dose-dependent suppression of 12-0-tetradecanoylphorbol-13-acetate (TPA)-induced elevation of epidermal ODC, cyclo oxygenase, and lipoxygenase activities, as well as ODC mRNA expression. TPA-induced epidermal edoema and hyperplasia were significantly inhibited by pre-application of Zingiber officinale ethanol extract to mouse skin. In long-term investigations, topical administration of Zingiber officinale ethanol extract 30 minutes before each TPA injection to 7, 12-dimethylbenz(a) anthracene-induced mice provided significant protection against skin tumour incidence and multiplicity [68]. Ginger's natural bioactives, notably ginger extract and 6-gigerol, have also been studied for their in vitro prevention of two important components of colon cancer biology: cancer cell proliferation and the angiogenic ability of endothelial cell tubule formation. Several active ginger components have been related to a direct anti-cancer impact. Among other chemicals, 6-gingerol was shown to be more efficient in inhibiting endothelial cell tube formation even at lower dosages [69]. Ginger extract's method of action on colon cancer cells has been proposed as suppressing and stopping the G0/G1-phase, lowering DNA synthesis, and causing apoptosis [70].

Achillea wilhelmsii

The Achillea plant, Achillea wilhelmsii, is a member of the Asteraceae order and the Compositaea genus. Achillea contains several species, however Achillea wilhelmsii is more common in Iran and thrives in a variety of habitats. Achillea wilhelmsii is a gramineous, perennial, 15 to 40 cm tall plant. Methanol extracts and essence of this plant's leaves exhibit cytotoxic effects on colon cancer cells (HT-29), with essence having a greater cytotoxic effect[71]. In additional research, the effects of methanol extracts of plant leaves on cell lineage of colon cancer, stomach cancer, and breast cancer have been demonstrated[72]. Plant methanol extract includes phenol chemicals, particularly flavonoids, which inhibit cancer cell proliferation by triggering apoptosis[73,74]. One of the most significant monoterpene chemicals in this plant, causing death in cells is 1,8-cineole and a-piene in plants' leaf essence[75].

Allium sativum L

Allium sativum is a plant that belongs to the Aparagales order, the Amaryllidaceae family, the Allianceae subfamily, and the Allium genus. Allium sativum is a garmineous, perennial plant with a 40-cm stem. Its subterranean portion is inflated and consists of 5 to 12 segments wrapped in thin and slender gray-white membranes. Its leaves are narrow and fillet in dark green, and its blooms, which look like an umbrella at the end of the stem, are little and pink. Allium sativum and organosulfuric compounds have been demonstrated in studies to lower the risk of cancer in the breast, throat, colon, skin, womb, gullet, bladder, and lung[76,77]. In other studies, we discuss the effect of the most significant Allium sativum component, Allicin, and its anticancer properties on cancer.

Artemisia absinthium L

Artemisia is an Asteraceae family plant. There are 200 to 400 Artemisia species with clustered, bitter blooms. Artemisia absinthium L is endemic to Asia's temperate zones, north Africa, and huge portions of North America. This plant grows to a height of 80 to 120 cm. This plant's flowers are yellow and clustered[82]. A study on MCF-7 breast cancer cells has been published. 42 Comparable findings on this plant's anticancer properties on three cancer cells, HeLa, HT-29, and MCF7, have been published. According to a study on the Artemisinin effect of this plant on breast cancer cells, a plethoric reaction in cancer cells includes slowing cell development, apoptosis, blocking angiogenesis, reducing cell migration, and diminishing responses of cancer cells. Other chemicals found in this plant include quercetin, isorhamnetin, kamfrolinalol, alphapinin, limonene, and myrecene. Several cancer cells, including MCF-7, are inhibited by quercetin, while isorhamnetin suppresses the proliferation of various cancer cells, including MB-435, SKMEL-5, Du-145, MCF-7, and DLD[84]. Artesunate is also one of the most significant artemisinins with angiogenic actions, and in addition to anticancer effects on K569 (leukaemia cancer), it suppresses the formation of the angiogenic factor VEGF[85]. In additional studies, alpha-pinene, beta-pinene, limonene, and myercin found in plants have been shown to prevent the growth of human breast cancer, liver cancer, and melanoma. This plant's methanol and ethanol extracts include alpha-pinene, beta-pinene, and limonene, which are inhibitory factors of HT-29 cells (colon cancer)[86,87].

Boswellia serrate

Boswellia serrata, sometimes known as Olibanum or Frankincense, is a medicinal plant from the Spindales order and the Burseraceae family. It is derived from the Bosoolia species B sacara, B frereana, and B serrate. This plant's hydroalcoholic extract kills cervical cancer cells (HeLa cells), and the impact is dose and time dependent[88,89]. Another study found that an alcoholic extract of frankincense resin disrupted the creation of DNA and RNA, and that proteins prevent tumour development and trigger death in malignant cells in mice. In a study on leukemic cells HL60, it was discovered that frankincense lowers cell viability[90,91]. The primary components of frankincense resin include monoterpene, diterpene, triterpene, and boswellic acid, which can trigger apoptosis in malignant cells[92].

Saffron (Crocus sativus L)

Crocus sativus L is a member of the Iridaceae family. This plant is native to Khorasan in Iran. Saffron is a perennial plant that grows 10 to 30 cm tall and produces slender leaves from its bulbs. This shrub has one to three purple blooms. The

stigma of this plant is used to make saffron[93]. Many studies have shown that saffron extract has an anticancer impact on cancer cells in vitro; for example, Escribano et al discovered that compounds extracted from saffron, such as crocin, crocetin, picrocrocin, and safranal, promoted apoptosis in cancer cells[94,95]. This plant's antiangiogenic actions on breast cancer cells (MCF-7) were demonstrated, and an extract of this plant was used. In another study, the effect of saffron extract and other major plant substance called quercetin on colorectal cancer cells was studied and the results showed the toxic effects of this plant on these cells[96].Another study also showed the antiangiogenic effects of this plant on breast cancer cells (MCF-7), and extract of this plant inhibits angiogenesis in these cells[97]. In fact, the saffron extract, by inhibiting DNA synthesis, can exert its anticancer effects[98]. However, when consuming high doses of this herb, precautions should be taken because, according to Rahimifard et al's study on human cervical cancer cells, laryngeal cancer cells, and natural human monkey kidney, toxicity on natural cells is higher than on two cancer lines, indicating caution when consuming high doses of saffron[99]. Another study looked at the effect of cellular toxicity and apoptogenic qualities of saffron extract on cancer cells and concluded that saffron can play an essential role in cell death and apoptosis in HeLa and HepG2 cells. In the future, saffron may be employed as a chemotherapeutic drug to treat cancer in humans[100].

Glycyrrhiza glabra

Glycyrrhiza glabra is a wild plant from the vegetable family that is endemic to southern Europe, North Africa, and temperate Asia. It is found throughout most of Iran, particularly in the eastern and northeastern Khatam Marvast city and regions, as well as Azerbaijan and Eghlid city. Its leaves are complex, with 4 to 7 leaf pairs and an end leaflet that is sticky owing to juice secretion. The flowers are blue, and the fruit has 5 to 6 brown seeds. Its roots and stems offer medicinal properties. 98 The components of the root extract cause morphological alterations and decrease viability in the mammary cell line 4T1[101]. Its root extract promotes BCL2 phosphorylation and, like Taxol, suppresses the cell cycle in tumour cell lines in the G2/M phase. 100 Glycyrrhizin, the primary ingredient in root extract, is a triterpene glycoside that functions as an anti-proliferative agent against tumour cells, particularly breast cancer cell lines (MCF7) and HEP-2, and does so by inducing apoptosis[102,103]. Since Glycyrrhiza glabra root extract promotes apoptosis in HT-29 cells, it can be used to treat colon cancer[104].

Myrtus communis

Myrtus, sometimes known as Mort, is a genus of Murdian. Murdian is a genus of evergreen shrubs or trees with one or two species endemic to southern Europe and North Africa. This plant is an evergreen shrub or bush that may grow up to 5 metres in height. Its leaves are 3 to 5 inches long and have a pleasant aroma. It features white flowers and blue ball-shaped fruits]105]. The plant has been mentioned in certain research for its anticancer properties. The herb is also cytotoxic to cancer cell lines MCF7[106,107]. Among of the most significant substances identified in this plant include polyphenols, myrtucommulone, semimyrtucommulone, 1,8-cineole, a-pinene, myrtenyl acetate, limonene, linalool, and a-terpinolene[108]. Most studies attribute this plant's anticancer capabilities to its phenolic components (especially mitocomolon). Cell cytotoxicity affects the cell layer[109]. Apoptosis induction in cancer cells by external and internal mechanisms is a strategy for dealing with cancer cells[110].

Pegaum harmala L

This herbaceous perennial plant belongs to the Zyqophyllaceae Nitrariaceae perennial family. This plant thrives in dry soils in Mediterranean regions such as North Africa, Turkey, and Syria. It may reach a length of 30 to 50 cm and has a plant-like appearance with green leaves and regular water-filled thin divisions. It features huge blooms with large petals and a greenish-white sepal. Its extract also inhibited the viability of epithelial cervical cancer cells and colon carcinoma [111]. This plant is mostly composed of alkaloids, which have anticancer properties. The antioxidant effects of these alkaloids against human breast cancer cells were discovered in another investigation utilising chemical analysis[112].

Trigonella foenum-graecum L

Fenugreek or Shanblid (scientific name: Trigonella foenumgraecum) is a Fabaceae plant that grows to a height of 10 to 50 cm and has solitary yellow to brown blooms. This plant is native to Iran and is edible in most regions of the country, including Azerbaijan, Isfahan, Fars, Khorasan, Semnan, and Damghan[113]. A research of the effects of fenugreek crude extract found specific cytotoxicity against several cell lines, including MCF7, TCP (T-cell lymphoma), FRO (thyroid papillary carcinoma), and brain malignancies. 159 It also has a preventive effect in mice against breast cancer caused by DMBA (7,12-dimethylbenz(a) anthracene). 160 In another investigation, the plant extract was revealed to have inhibitory effects on the proliferation of cancer cells EAC. Flavonoids and alkaloids in the plant, such as ginger, cadence, zinger one, vanillin, and eugenol, have been shown to be involved in anticancer effects[114]. The main mechanism of anticancer activity is apoptosis induction[115].

Conclusion

Cancer is a major issue in both developing and wealthy countries. Many synthetic medications have been employed to treat cancer, but their usage is limited due to their harmful effects on healthy cells. As a result, there is a desire for an alternative medicine for cancer therapy. Medicinal plants have made significant contributions to human health, and they include a variety of secondary metabolites that show promise in the treatment of a variety of diseases. Anti-cancer

medicines originating from plants have made significant contributions to the creation of novel therapies. The anti-cancer effect is attributed to extracts of numerous medicinal plants and their secondary metabolites. The discovery and development of plant-derived pharmaceuticals has a lot of potential for the future. This review includes medicinal plants as well as secondary metabolites having anti-cancer action. Secondary metabolites have been shown in vitro to have anti-cancer action, and the plant metabolites listed in this review have a range of processes that contribute to their anti-cancer nature. As a result, an effort has been undertaken in this study to highlight the numerous medicinal plants and their significant phytocompounds utilised in the treatment of cancer.

Acknowledgement
I would like to acknowledge College of Pharmacy, Department of Pharmacognosy, University of Tikrit for providing the facilities to carry out this review successfully.

Conflict of Interest
All the authors have no conflict of interest

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