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Anticancer Plants Naturally Growing in Al-Baha Region, Saudi Arabia

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ABSTRACT

Medicinal plants have traditionally been used worldwide, including in Saudi Arabia. Globally, medicinal plants have received much attention because of their promising potential for use as anticancer treatments for different types of cancer, and their phytochemicals play a major role in biological reactions, such as in mediating cytotoxicity against cancer cell lines. This review highlights some important genera that belong to different naturally occurring plant families in the Al-Baha region and describes their importance in cancer treatment. To date, the anticancer effects of some medicinal plants that grow naturally in the Al-Baha region have been used in cancer treatment. Various electronic databases from 1990 to 2020 were searched for articles that reported the efficacy of 19 local plants against a wide range of cancer cell lines. Data collected included the plant part used, method of extraction, type of cancer cell line, and the effectiveness of the extract as an anticancer agent. Each of the 11 plant families (Amaranthaceae, Leguminosae, Apocynaceae, Vitaceae, Burseraceae, Capparaceae, Compositae, Curcurbitaceae, Oleaceae, Papaveraceae, and Rhamnaceae) included in this review had at least one genus that was considered a source of anticancer agents. Twenty-one plants from the Al-Baha region were assessed for their anticancer activities worldwide. The extracts of all tested plants showed significant results on different cell lines, and these important plant families have various conventional and novel uses in daily life.

Key words: *Al-Baha region, anticancer plants, plant extracts, cancer cell line, cytotoxicity*

INTRODUCTION

In humans, cancer is the most conspicuous disease that leads to death [1, 2]. The abnormal growth and proliferation of cancer cells lead to life-threatening complications, which pose an immense health burden and cause approximately 6 million deaths every year, worldwide [3, 4]. The high cancer mortality rate is associated with the serious adverse effects of anticancer therapies, such as chemotherapy and radiation therapy, that may motivate many cancer patients to switch to alternative medicine [5, 6]. Lung, prostate, colorectal, stomach, breast, and cervical cancers are the most common and prevalent types of cancers. Thus, traditional medicine has become a topic of global health importance, given its widespread use in the treatment of several diseases worldwide [7, 8].

Several plant genera are utilized by various systems of medicine to treat various diseases [9]. In recent years, however, attention has been focused increasingly on identifying natural substances that are capable of inhibiting multistage carcinogenesis [10]. Medicinal plants are a major source of traditional medicines, modern medicines, nutraceuticals, and pharmaceutical intermediates [11]. Furthermore, medicinal plants are considered to be a chemical resource for the pharmaceutical industry, which have recently gained much interest owing to their wide range of applications [12].

The synergistic properties and polypharmacological applications of plant extracts are most notable with regard to several significant outcomes that have been achieved through the use of natural products in the treatment of diseases [13]. Therefore, considerable scientific research is directed toward the identification of novel natural-occurring substances that could potentially cure patients with different diseases [14]. The Al-Baha province is

located in the southwest region of Saudi Arabia and comprises a plethora of geographical regions that create a huge depository for medicinal plants, which have increasingly gained popularity in traditional medical treatments [15]. The high mountain ranges of the Al Baha province are considered to be some of the most significant plant diversity zones in Saudi Arabia, estimated to contain approximately 230 species (~12% of the total plant species of) [16]. This review was undertaken with an objective to analyze the available data on the research that has been performed to date on the natural growth of some medicinal plants in the Al-Baha region.

METHODOLOGY

Scientific studies were identified through searches of various electronic databases (Medline, PubMed, Science Direct, Scopus, and Google Scholar websites) for articles published from 1990 to 2020. A comprehensive search of naturally growing anticancer plants in the Al-Baha region of Saudi Arabia turned up a total of 83 publications that were included in this review. In this review, the families and scientific names of plant species were checked for the latest changes according to "The Plant List" (http://www.theplantlist.org). Using a qualitative approach, data were collected from the included studies for the identification of characteristics, such as the plant part used, method of extraction, type of cancer cell lines, and the effectiveness of the extract as an anticancer agent (Table 1).

DISCUSSION

The electronic database searches led to the identification of 83 relevant studies that tested the anticancer efficacy of some species of medicinal plants. Based on an inventory and documentation of flora in the articles from the Al-Baha Province, Saudi Arabia, plant species were selected for inclusion in this study [17-21]. The eligible studies focused on the different methods of phytochemical extraction from different parts of the plants and described the *in vitro* investigation of the anticancer effect of these plants against various cancer cell lines. The Amaranthaceae family is a commonly growing plant family that grows in tropical to cool-temperate regions and comprises approximately 180 genera and 2500 species. Chemical characterization indicates the presence of several bioactive compounds in these plants, and these phytochemicals include phenolic acid, flavonoids, tannins, saponins, and triterpenoids [22, 23]. *Chenopodium album L. (C. album*) belongs to the family Amaranthaceae, and its leaves have a relatively high content of total phenolics and carnosol, which are activated as antioxidants and show promising potential for preventing certain types of cancer, especially skin melanomas [24].

Various solvent extracts (Pt. ether, EtOAc, and MeOH) of *C. album* leaves have been screened for cytotoxic activity against the MCF-7 human breast cancer cell lines and MDA-MB-468 that was tested in an MTT bioassay [25]. Moreover, phytochemical extracts from *C. album* leaves showed inhibitory effects on the growth of lung cancer A549 cells. The PE extract inhibited cell growth in the A549 cell line in a time- and dose-dependent manner, as determined via MTT and colony-formation assays [26]. The MCF7 cells were sensitive to treatment with the ethyl acetate and methanol extracts of *C. album*, which prevented cancer cell growth [25].

Chenopodium ambrosioides L., Amaranthus spinosus, Achyranthes aspera, Aerva javanica, and *Aerva lanata* belong to the Amaranthaceae family. *C. ambrosioides* is one of the 24 species that have been observed at different sites along the catchment area of the Al-Baha region [19]. Essential oils from *C. ambrosioides* were shown to affect human breast cancer MCF-7 cells, as assessed by the MTT assay. The proliferation of MCF-7 cells was inhibited after treatment with *C. ambrosioides* essential oil that was extracted from the branches and leaves. The cytotoxicity of the essential oil extract affected on MCF-7 cells in a concentration- and time-dependent manner [27].

A. spinosus leaf extracts were shown to have an effect on cell proliferation, leading to the inhibition of cancer cell growth, in the LNCaP prostate cancer cell lines by using MTT assays [28]. *A. aspera* root extracts have been tested for anticancer activity, and the aqueous extract of *A. aspera* suppressed cell proliferation and increased cytotoxicity in COLO-205 colon cancer cells in a time- and dose-dependent manner when tested using a clonogenic cell survival assay. The estimated antiproliferative effect of the *A. aspera* aqueous extract showed an ability to decrease the cell division and colony-forming capacity of cancer cells. Therefore, the aqueous and ethanolic extracts of *A. aspera* contain phytochemical complexes that may serve as an abundant source of bioactive compounds for the management of colon cancer.

The antioxidant assay proved that the ethanolic extracts of *A. aspera* have a greater ability to scavenge free radicals. A cell viability assay was conducted to determine the effect of the aqueous extract of *A. aspera* roots on the viability of COLO-205 cells, and the results showed a time- and dose-dependent response in growth inhibition,

which was more noticeable in the aqueous extract of *A. aspera* [29].

The methanolic extracts of *A. javanica* leaves inhibited the growth of MCF-7 cell line with a minimal reduction of viability and proliferation abilities, as observed in the *in vitro* experiments using the MTT assay [30]. The anticancer effect of *A. lanata* extracts obtained from the fresh aerial parts of the plant on Dalton's Ascitic Lymphoma (DAL) cell line in Swiss albino mice was most likely due to its cytotoxic potential and reduced the cancer cell count, which affirms its indication as a protective agent against DAL. The presence of terpenoids, alkaloids, and flavonoids may contribute to the anticancer characteristics of the extracts [31].

The Leguminosae family is one of the largest botanical families and comprises approximately 770 genera and 19,500 species [32]. A large range of natural products, including flavors, poison, and dyes, are synthesized from Leguminosae plants and they have great importance in medicinal purposes [33] *Acacia ehrenbergiana, Acacia tortilis, Astragalus vogelii*, and *Tamarindus indica* constitute the Al-Baha flora that belong to the Leguminosae family.

The ethanolic extract of *A. ehrenbergiana* yellow flowers has been shown to have potential anticarcinogenic activity against three cancer cell lines: A2780 (human ovarian adenocarcinoma), MCF7 (human breast adenocarcinoma), and HT29 (human colon adenocarcinoma). The anti-proliferative effect of the ethanol extract of *A. ehrenbergiana* Hayne was attributed to saponins, alkaloids, flavonoids, tannins, and other phytoconstituents that have been identified in the flowers of these plants in the southern part of Saudi Arabia [34].

The ethanolic extracts of the fresh leaves of the Saudi Arabian plant *A. tortilis* (Forssk.) showed significant cytotoxic activity against kidney carcinoma (HEK-293), human liver cancer (HepG2), and human breast cancer (MCF-7) cell lines [35]. The cytotoxic activity of *A. tortilis* extracts has been attributed to phenolic compounds that influence the specific mechanisms, including the cell cycle, cell death, and apoptosis, that are involved in tumor proliferation [36].

The methanol extracts of the aerial parts of *A. vogelii* have been shown to have time- and dose-dependent cytotoxic activity against the human Caco-2 (colon cancer) and A549 (lung cancer) cell lines, as assessed using the MTT assay. This cytotoxic potential of *A. vogelii* extracts is explained by the richness of phenolic, flavonoids, and tannin compounds in *A. vogelii* that have a natural antioxidant activity and may contribute to their medicinal characteristics [37]. The *in vitro* antiproliferative activity of a polysaccharide, PST001, that was isolated and purified from the seed kernel of *T. indica* has been documented against the cancer cell lines MCF-7, A549, DLA, KB, and EAC. Furthermore, this polysaccharide induced *in vitro* immunomodulatory activities, including phagocytic enhancement and inhibition of leukocyte migration in normal cells, besides the antiproliferative activity on cancer cells [38].

Apocynaceae is a large family of flowering plants that includes vines, herbs, shrubs, stem, and succulents [39]. A significant number of characteristic chemical structures, mainly alkaloids, that are typical derivatives of plants belonging to the Apocynaceae family have been considered to be potential antileishmanial agents [40, 41]. *Carissa carandas* L.*, Carissa spinarum L.*, and *Calotropis procera* are medicinal plants from the Apocynaceae family that are found in the Al Baha region. *C. carandas L.* is considered a medicinal source because of the presence of photochemically active substances, including saponins, cardiac glycosides, phenolic components, flavonoids, triterpenoids, and alkaloids. The extract of *C. carandas* leaves that is obtained using n-hexane, methanol, and chloroform as the solvents has a significant anticancer effect against lung cancer and ovarian carcinoma cell lines [42]. In another study, the anticancer and antioxidant activities of *C. carandas* leaf aqueous extracts were examined in the MCF-7 cancer cell line, and the leaf extracts showed significant antioxidant activity and led to the prevention of cell death [43]. The extracts of the stem of *C. spinarum L.* contain potential anticancer agents that may have therapeutic effects against colon (Colo-205 and SW-620), ovarian (IGR-OV-1 and OVCAR-5), prostate (DU-145 and PC-3), lung (Hop-62 and A-549), CNS (SK-N-SH and SF-295), acute promyelocytic leukemia (HL-60), and acute lymphoblastic leukemia (MOLT-4) cell lines.

C. spinarum produces various sesquiterpenes, cardiac glycosides, and flavonoids, such as naringenin, as well as triterpene acids, such as ursolic acid, which confer the anticancer effect of the *C. spinarum* extracts [44]. The root extract of *C. procera* has been shown to have an intense cytotoxic effect on COLO-320 tumor cells [45].

The Vitaceae family consists of 14 genera and about 900 species that are spread across the tropical regions of Africa, Asia, the Neotropics, Australia, and the Pacific islands [46]. The *Cissus quadrangularis* is an Al Baha plant that belongs to the *Vitaceae* family. The ethanolic extract of *C. quadrangularis* shows potent anticancer activity against the Ehrlich adenocarcinoma, A431 (skin epithelial carcinoma), KB (oral epidermoid carcinoma), HeLa (cervical cancer), MCF7 (breast cancer), HT29 (colon carcinoma), Vero (kidney epithelial cell), and HEp 2 (human laryngeal carcinoma) cell lines [47, 48].

Jun *et al.,* 2017 [49] confirmed the anticancer activity of curcumin against MG-63 osteosarcoma cells and subsequently characterized the phytochemical constituents of curcumin. The curcumin stem contains phosphorous and calcium, which help in bone formation. Some of the essential phytochemicals in curcumin include amyrins (a and b), carotene, vitamin C, resveratrol, β-sitosterol, flavonoids such as quadrangularis (A, B, and C), quercetin, and kaempferol [50], and provides a better understanding of the anticancer activity of curcumin against bone tumors [51]. The methanolic extract of *C. quadrangularis* showed cytotoxic activity against MG63 cells in a dose-dependent manner. Furthermore, the methanolic extract obtained from the aerial parts of *C. quadrangularis* showed antiproliferative activity against MG63 cells on a cytotoxicity assay [52].

The Burseraceae family is speculated to have originated in the Eocene period in North America. In its migration through the tropical and subtropical regions worldwide, the Burseraceae family, with 18 known genera and about 700 species, has dispersed throughout the southern American terrain and Europe, later reached Africa, Asia, and Oceania [53].

Commiphora gileadensis belongs to the Burseraceae family, is commonly known as the Balm of Mecca, and has widespread distribution near the Red Sea, especially within the border areas of the KSA, Oman, Eritrea, and Yemen [54]. *C. gileadensis* is an evergreen medium-sized aromatic shrub, which grows in East Africa and Arabia and is considered to be an important medicinal plant in Saudi Arabia [55]. Aliphatic alcohol glycosides, triterpenoids, sesquiterpenoids, and several new cycloartane types were isolated recently from the crushed resin of *C. gileadensis*, and the cytotoxic effect of *C. gileadensis*, especially against human prostate, liver, and cervical cancer cell lines, was attributed to these phytochemicals [56]. β-caryophyllene is an active component in the ethanolic extracts of *C. gileadensis* and inhibits growth and induce apoptosis in two lymphocytic tumor cell lines [57]. Skin cancer is characterized by hyperproliferative pathology, and skin cancer cells are typically resistant to programmed cell death [58]. Several therapeutic uses of *C. gileadensis* have been reported and include the antiproliferative properties of the ethanolic extract of *C. gileadensis* sap in cancer cell lines, especially in strongly inducing apoptosis in immortalized and transformed human epidermal cell lines [56, 59].

Capparaceae comprises a medium-sized family of about 45 genera and 700–900 species, and whose members exhibit considerable variation in their habitat [60]. The twigs and stem extract of *Capparis cartilaginea* showed the highest cytotoxic activity against the cellosaurus cell line A549. However, a previous study reported the absence of any cytotoxic effect of the leaf extract of *C. cartilaginea* on lung (A-427), urinary bladder (5637), and breast (MCF-7) cancer cell lines [61]. Moreover, the methanol extract of the flowering branch of *C. cartilaginea* exhibited no cytotoxic effect against cancer cells, including the MCF-7, human hepatocellular carcinoma (HepG-2), mouse fibrosarcoma (WEHI-164), A549, and Madin–Darby bovine kidney (MDBK) cell lines [62, 63].

The family Asteraceae ranks high in Angiosperm phylogeny in Asterideae/Asterales and includes the largest number of species (~30,000) among all plant families and has 1600-1700 plant genera that are distributed worldwide, excluding Antarctica [64].

Achillea Biebersteinii grows wild in untended agricultural fields in the Al Baha region. *A. Biebersteinii* extract showed a cytotoxic effect on sex-types of cancer cell lines, including human Caucasian gastric adenocarcinoma (AGS), human liver hepatoma (NCBI C136: PLC/PRF/5), human melanoma cancer cell (NCBI C566: A375), human lung carcinoma (NCBI C146: SKLC6), human colorectal adenocarcinoma (NCBI C135: SW742), human breast ductal carcinoma (NCBI C131: MCF7), primary cell culture of human fetal foreskin fibroblasts (NCBI C145: HFFF), and (NCBI C170) [65].

Cucurbitaceae is a medium-sized family that consists of approximately 120 genera and more than 800 species that are predominantly distributed in the tropical and subtropical regions of the New and Old World [66]. The leaf extract of *C. colocynthis* revealed growth inhibitory activity against human breast cancer cell lines in a time- and dose-dependent manner, as shown in an MTT assay in MCF-7 (ER-positive) and MDA-MB-231 (ER-negative) cell lines [67]. The antiproliferative effects of extracts from different parts of *C. colocynthis* were investigated in different cancer cell lines; the chloroform-derived leaf extract conferred a high potential for the inhibition of cancer cell growth in human colon cancer cells (HT-29) when tested by using the MTS and a model alkaline comet assay protocol [68]. The anticancer effect of *C. colocynthis* fruit juice extracts was studied in human cancer cells and resulted in a significant reduction in the proliferation of MCF-7, HepG-2, and breast cancer cells [69, 70]. Furthermore, the rate of cell growth of breast cancer cells (MCF-7) treated with the *C. colocynthis* fruit extract decreased in cancer cells compared with that in the control group [71].

Oleaceae is a family of dicotyledonous flowering plants that are commonly distributed throughout temperate and tropical regions and includes 25 genera and approximately 688 species [72]. *Olea europaea* is an evergreen tree and its leaves are obtained during the pruning process in olive farming [73]. Bioactive compounds, such as tannins,

carbohydrates, and amino acids, were abundantly found in the leaves of the *Leccino* and *Carolea* cultivars of *O. europaea* [73], and the *O. europaea* leaf extract induced toxicity in breast cancer cell lines [74].

Papaveraceae (poppy family) is one of the families of angiosperms and includes 26–42 genera and 690–800 species worldwide [75]. This family has a widespread distribution and is found especially in the Mediterranean region; central, eastern, and western Asia; India; America; middle Europe; and southern regions of Scandinavia and Great Britain [76]. The anticancer and antiproliferative activities of *Argemone mexicana* extracts were tested in the human cancer cell lines HeLa-B75, HL-60, HEP-3B, and PN-15, and the results indicated that *A. mexicana* is a medicinal plant that can be considered to be a potential resource for anticancer agents [77]. The ethanolic extract of *A. mexicana* exhibited inhibitory activity against human cancer cell lines, such as HeLa-B75, HL-60, and PN-15 [78]. In addition, the methanolic extract of *A. mexicana* leaves showed great anticancer activity against the HeLa and MCF-7 cancer cell lines. Based on the results of the MTT assay, the researchers proved that the cytotoxic activity was apoptotic rather than necrotic, which was possibly due to the presence of flavonoid constituents in the leaves [79]. *A. mexicana* stem and leaf extracts exhibited significant cytotoxicity in the A549 human lung carcinoma cell line [80].

Rhamnaceae is a cosmopolitan family of small trees, shrubs, and climbers that has been divided into three major groups based on recent taxonomic revisions [81]. Furthermore, Rhamnaceae includes approximately 60 genera distributed among 11 tribes, with some notable ambiguity. For example, the large genus *Ceanothus* L. (~50 spp.) has not yet been attributed to any tribe [82]. The total extract of *Ziziphus spina christi* and its ethanol, ethanolaqueous, and aqueous fractions inhibited the proliferation of MCF-7 cells. The ethanolic fraction was highly active against breast cancer cell lines. Apoptosis has been demonstrated to be a mechanism of the anticancer activities of *Ziziphus* extracts in different cell lines [83].

Table 1: Plants in the Al-Baha region that have anticancer properties

Family	Scientific name	Parts used	Target and anticancer effects	Ref.
Amaranthaceae	*Chenopodium album L.*	Leaves	Human breast cancer MCF-7 and MDA-MB-468 cell lines; lung cancer A549 cells	[25] [26]
	Chenopodium ambrosioides L.	Branches and leaves	Human breast cancer MCF-7 cell line	[27]
	Amaranthus spinosus	Leaves	LNCaP prostate cancer cell line	[28]
	Achyranthes aspera	Root	COLO-205 colon cancer cell line	[29]
	Aerva javanica	Leaves	Human breast cancer MCF‑7 cell line	[30]
	Aerva lanata	Fresh aerial parts	Dalton's Ascitic Lymphoma (DAL) cell line in Swiss albino mice	[31]
Leguminosae	*Acacia ehrenbergiana*	Yellow flowers	Human ovarian adenocarcinoma A2780 cell line; human breast adenocarcinoma MCF7 cell line; human colon adenocarcinoma HT29 cell line	[34]
	Acacia tortilis	Fresh leaves	Human liver cancer HepG2 cell line; human breast cancer MCF-7 cell line; human kidney carcinoma HEK-293 cell line	[35]
	Astragalus vogelii	Aerial parts	Human colon cancer Caco-2 cell line; human lung cancer A549 cell line	[37]
	Tamarindus indica	Seed kernel	Human lung cancer A549 cell line; oral epidermoid carcinoma KB cell line; human breast cancer MCF-7 cell line; Dalton's Lymphoma Ascites DLA cell line; Ehrlich Ascites Carcinoma EAC cell line	[38]
Apocynaceae	*Carissa carandas L.*	Leaves	Human ovarian carcinoma; human lung cancer A549 cell line; cancer cell lines MCF-7	[42] [43]
	Carissa spinarum	Stem	Colon (COLO-205 and SW-620), ovarian (IGR-OV-1 and OVCAR-5), prostate (DU-145 and PC-3), lung (A549 and Hop-62), CNS (SK-N-SH and SF-295), acute lymphoblastic leukemia (MOLT-4), and acute promyelocytic leukemia (HL-60) cell lines	[44]
	Calotropis procera	Root	COLO-320 tumor cell line	[45]
Vitaceae	*Cissus quadrangularis*	Leaves	Ehrlich Adenocarcinoma EAC cell line; cervical cancer HeLa cell line; oral epidermoid carcinoma KB cell line; skin epithelial carcinoma A431 cell line; breast cancer MCF7 cell line; human laryngeal carcinoma HEp 2 cell line; colon carcinoma HT29 cell line; kidney epithelial cell Vero; osteosarcoma MG-63 cell line	[47] [48] [49]

Burseraceae	*Commiphora gileadensis*	Resin, stem, and leaves	Human cancer cell lines; Prostate, liver, cervical, two lymphocytic tumors, and skin cancer	[56] [57] [58]
Capparaceae	*Capparis cartilaginea Decne.*	Twigs and stem	Lung A-427 cell line; urinary bladder 5637 cell line; breast MCF-7 cell line; human hepatocellular carcinoma HepG-2 cell line; mouse fibrosarcoma WEHI-164 cell line; A549 cell line; and Madin-Darby bovine kidney MDBK cell lines	[61] [62] [63]
Compositae	*Achillea Biebersteinii*	Whole flowers	AGS (human Caucasian gastric adenocarcinoma) NCBI C131 cell line; MCF7 (human breast ductal carcinoma) NCBI C135 cell line; SW742 (human colorectal adenocarcinoma) NCBI C146 cell line; SKLC6 (human lung carcinoma) NCBI C566 cell line; A375 (human melanoma cancer cell) NCBI C136 cell line; PLC/PRF/5 (human liver hepatoma) NCBI C145 cell line; HFFF (primary cell culture of human fetal foreskin fibroblast) NCBI C170 cell line	[65]
Curcurbitaceae	*Citrullus colocynthis*	Leaves, fruit juice, and different aerial parts	Human breast cancer MCF‑7 cell line; human colon cancer HT-29 cell line; human liver cancer HepG-2 cell line	[67] [68] [69] [70] [71]
Oleaceae	*Olea europaea*	Leaves	Breast cancer cell lines	[74]
Papaveraceae	*Argemone mexicana*	Leaves and stem	Human cancer cell lines HeLa-B75, HL-60, HEP-3B, and PN-15; human lung carcinoma A549 cell line	[77] [78] [80]
Rhamnaceae	*Ziziphus spina christi*	Leaves	Human breast cancer MCF‑7	[83]

CONCLUSION

Based on the findings of this literature review, the naturally growing plants of the Al-Baha region are rich in bioactive compounds that can be used as anticancer agents. Each of the 11 plant families (*Amaranthaceae, Leguminosae, Apocynaceae, Vitaceae, Burseraceae, Capparaceae, Compositae, Curcurbitaceae, Oleaceae, Papaveraceae,* and *Rhamnaceae)* included in this review comprised at least one genus of plants that were considered to be a source of anticancer agents. The anticancer effects of these plants differ depending on their secondary metabolites, such as phenolics, saponins, alkaloids, flavonoids, tannins, and other phytoconstituents, all of which play major roles in their cytotoxicity against carcinogenic cells. The aqueous and alcoholic extracts of 21 plant species (*C. album L., C. ambrosioides L., A. spinosus, A. aspera, A. javanica. A. lanata. A. ehrenbergiana, A. tortilis, A. vogelii, T. indica, C. carandas L., C. spinarum, C. procera, C. quadrangularis, C. gileadensis, C. cartilaginea Decne., A. biebersteinii, C. colocynthis, O. europaea, A. Mexicana*, and *Z. spina Christi*) were examined for their anticancer activities, in terms of cytotoxicity and antiproliferative effect, against different cancer cell lines. The extracts of all of the tested plants showed significant results in different cell lines, including the human lung carcinoma cell line A549; human cancer cell lines HeLa-B75, HL-60, HEP-3B, PN-15, and MCF-7; and the HepG-2, WEHI-164, MDBK, Colo-205 and SW-620, IGR-OV-1 and OVCAR-5, DU-145 and PC-3, SK-N-SH and SF-295, MOLT-4, and HL-60 cell lines. The natural growth of anticancer plants in the Al-Baha region requires further investigation to determine the specific effective components that can act as anticancer agents and to identify the best methodology to extract and use these phytochemicals. In addition, the study of a wide range of Al-Baha flora plants is necessary to record the effectiveness of local plants, which can be used as in alternative medicine against different types of cancer.

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