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PHYTOCHEMICALS IN HEMATOLOGICAL MALIGNANCIES: A COMPREHENSIVE OVERVIEW WITH FOCUS ON LEUKEMIA

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ABSTRACT

Leukemia is a group of hematological malignancies characterized by abnormal proliferation of white blood cells, leading to impaired hematopoiesis and immune dysfunction. Conventional treatments such as chemotherapy, radiation therapy, and stem cell transplantation have improved survival rates but are often associated with severe adverse effects, drug resistance, and reduced quality of life. This has driven increasing interest in plant-derived phytochemicals as alternative or complementary therapeutic agents. The present review highlights the role of medicinal plants, fruits, and their bioactive compounds in the management of leukemia. Numerous herbs including *Catharanthus roseus*, *Allium sativum*, *Annona glabra*, *Curcuma longa*, *Withania somnifera*, and *Viscum album* have demonstrated significant antileukemic potential through mechanisms such as induction of apoptosis, inhibition of cell proliferation, cell cycle arrest, modulation of mitochondrial pathways, and immune enhancement. These phytochemicals act on multiple molecular targets, offering advantages over single-target chemotherapeutic agents. Overall, the review emphasizes the potential of phytochemicals as safer and effective therapeutic candidates for leukemia, warranting further preclinical and clinical investigations.

KEY WORDS: Leukemia, Phytochemicals, Medicinal plants, Apoptosis, Antiproliferative activity, Herbal therapy.

INTRODUCTION

Leukemia is considered to be among the most common cancer types and happens because of the abnormal proliferation of white blood cells [1,2]. Leukemia can be classified as acute or chronic according to the patient's age; and using the blood cell type into chronic (CML) or acute (AML) myeloblastic leukemia; or chronic (CLL) or acute (ALL) lymphoblastic leukemia. ALL appears to be more common in children with a high incidence between two and five years of age, whereas the other categories are more common in adults [3]. A patient suspected of having leukemia needs to consult an oncologist-hematologist to make a diagnosis and start treatment. Chemotherapy drugs, radiation and monoclonal hematopoietic stem cell transplantation are now the most common treatments for each type of leukemia. The treatment plan varies based on the subtype of leukemia, cytogenetic and molecular studies and the age of the patient. Although chemotherapeutic drugs such as cyclophosphamide, fludarabine, prednisone, chlorambucil and doxorubicin are used clinically to treat

leukemia, they are used in combination instead of being used as single drugs and often do not improve the patient's overall survival rate. Complications of intensive chemotherapeutic treatment for a patient suffering from leukemia include risk of death from cardiac and neurological complications [4], oral mucositis [5], gastrointestinal and liver toxicities [6], an infectious complication for ALL patients [7] and reduced bone mineral density at a high rate for children with ALL [8,9]. In spite of causing several side effects, the overuse of these drugs leads to chemotherapeutic drug resistance in leukemia cells [10]. Thus, the production of new therapeutic drugs having higher potency and lower toxicity is important to expanding the overall life expectancy.

Leukaemia is diagnosed 10 times more often in adults than in children and more common in males than females [11]. In the year 2000, nearly 2, 56,000 children and adults around the world developed some form of leukaemia, and 2,09,000 died from it [12]. Many factors are related to the development of leukaemia: prior.

chemotherapy, hereditary syndromes (Down syndrome), ionizing radiation, viruses infection, and smoking People with leukaemia are treated with a combination of treatment including chemotherapy (main treatment), antibiotic, blood transfusion, radiation therapy, and bone marrow transplantation. Although these treatments have prolonged the survival rate of patients with leukaemia. Some of these treatments are difficult to handle [13]. Thus, there is a need to seek for other remedies in combating the disease.

Types of Leukemia

Physiologically and on the verge of occurrence, Leukemia is classified into different Types: Based on Characteristics of the disease:

- Acute Leukemia
- Chronic Leukemia

Based on the types of WBCs affected:

- Lymphocytic Leukemia
- Myelogenous Leukemia

Acute Leukemia:

Occurs due to the malignant transformation of Hemopoietic stem cells into undifferentiated primitive cell with abnormal longevity.

These lymphoid cells Acute Lymphocytic Leukemia [ALL] or myeloid cells Acute Myelogenous Leukemia [AML]-proliferate, replacing normal bone marrow tissue and hematopoietic cells and inducing anemia, thrombocytopenia, and granulocytopenia. They can infiltrate various organs and sites, including the liver, spleen, lymph nodes, CNS, kidneys, and gonads as they are blood borne.

Chronic Leukemia:

A group of malignancies involving the hematopoietic system. Chronic myelogenous leukemia (CML) is a proliferation of myeloid neoplasm that arises from a clonal process involving an early progenitor hematopoietic stem cell. It also is associated with the BCR-ABL1 fusion gene localized to the Philadelphia (Ph) chromosome.

Chronic myelomonocytic leukemia (CMML):

By World Health Organization (WHO) has been redefined as a myelodysplastic/myeloproliferative neoplasm. It originates from a clonal hematopoietic malignancy, in which there

Chronic lymphocytic leukemia (CLL):

It is a neoplasm comprised of small, round to slightly irregular B lymphocytes.

Symptoms of Blood Cancer:

Symptoms Vary Based on Blood Cancer Type, But There Some Symptoms All Three Have in Common.

1. Fatigue

This Is Feeling So Tired You Can't Manage Your Daily Activities You May Also Feel Weak.

2. Persistent Fever

A Fever Is a Sign Your Body Is Fighting Infection or Responding to Abnormal Cancer Cells.

3. Drenching Night Sweats

This Is Sweating That Comes on Suddenly While You're Sleeping, Disturbing Your Sleep

4. Unexpected or Unexplained Weight Loss

Unexpected Weight Loss Of 10 Pounds Over A Six To 12 Month Period Is Considered Unexplained Weight Loss.

5. Frequent Infections

Frequent Infections May Be A Sign Something Is Affecting Your Immune System.

6. Lymph Nodes or An Enlarged Liver (or) Spleen

These Symptoms May Be Signs of Leukemia or Lymphoma.

7. Bone Pain

Myeloma And Leukemia May Cause Bone Pain or Tender Spots or Your Bones.

8. Fever, loss of weight, Night sweats, joint pain, abdominal discomfort, Headache. Shortness of breath, Itchy skin^{3,4}.

1. Risk Factors for Developing Hodgkin Lymphoma Include

- ❖ History of infection with EPSTEIN BARR VIRUS [EBV]
- ❖ which causes infection mononucleosis [mono].
- ❖ Advancing age
- ❖ Gender
- ❖ Family history of Hodgkin lymphoma
- ❖ Compromised immune system

2. Risk Factors for Developing Non-Hodgkin Lymphoma Include

- ❖ Exposure to certain industrial chemicals, herbicides and insecticides
- ❖ History of chemotherapy
- ❖ Radiation exposure
- ❖ Compromised immune system
- ❖ History of autoimmune disease such as rheumatoid arthritis or lupus

3. Risk Factors for Developing Multiple Myeloma

- ❖ Advancing age
- ❖ Gender
- ❖ Race higher risk among African American
- ❖ Obesity or extra body weight

Catharanthusroseus:

Catharanthusroseus (synonym of *Vincarosea*). *C. roseus*, usually known as Madagascar periwinkle, belongs to the Apocynaceae family. The plant has a short stem and glossy green leaves, and flowers appear in spring and autumn (three colors: pink, purple and white) [79,80]. *C. roseus* is originally endemic to Madagascar, Jamaica and the Philippines [81]. The most potentially active chemical constituents of *C. roseus* are alkaloids. More than 400 alkaloids were isolated from this plant. Vinca alkaloids vinblastine and vincristine are the two major active compounds; the two semi-synthetic analogues derived from such active compounds are vinorelbine and vindesine. Vincristine and vinblastine are the first plant alkaloids to be clinically used as anticancer drugs.

Hibiscus cannabinus:

It contains bioactive components such as tannins, saponins, polyphenolics, alkaloids, fatty acids, phospholipids, tocopherol, and phytosterols. Seed oil of kenaf is a unique and rich source of bioactive compounds with high antioxidative and anticancer properties. In addition, it has been reported that this herb inhibits the action of carcinogenic chemicals in colon cancer induction in rats and also kills ovarian cancer cells through apoptosis. Further study from unpublished data confirmed that kenaf seed oil causes cells death of human leukaemia HL60 and K562 cells and murine myelomonocytic WEHI-3H cell lines through induction of apoptosis.

Annonaglabra:

Annonaglabra L., known as the pond apple, belongs to the Annonaceae family [82]. It is a tropical wild tree native to Asia and the Americas that has been used in traditional Chinese medicine. Its phytochemical constituents, such as acetogenins; diterpenoids like cunabac acid and Ent-kaurenoic acid and alkaloids, have been shown to exhibit antimalarial, anti-HIV and anticancer properties [82, 83].

Allium sativum:

Garlic extract (GE) has a prominent role in the cancer prevention. It was well known because of its possible health benefits. *A. sativum* has free radical activity and its direct cytotoxic effect on cancer cells, particularly leukaemia. The mechanisms by which garlic extract induces cytotoxic effects in cancer cells remain unknown. However, significant decreased of human leukaemia (HL-60) were observed when the cells were treated with GE in a concentration and time dependent manner. This finding demonstrates that at therapeutic concentrations, garlic treatment induced cytotoxic effects on HL-60 cells in vitro. Ajoene as one of the noticed compounds in garlic has shown to inhibit proliferation and induce apoptosis of human leukaemic cells and act as

an antileukaemic agent for acute myeloid leukaemia therapy.

Basellaalba:

Basella alba is a widely cultivated, cool-season vegetable categorized under the family of Basellaceae [65]. *B. alba* is known as vine spinach, Chinese spinach, Indian spinach, Malabar spinach and Ceylon spinach. *B. alba* is native to Malaysia, India, the Philippines, Indonesia, tropical Africa, tropical and South America, Southeast of Brazil and the Caribbean [84]. India and China are the two major countries utilizing the plant for its medicinal benefits. In India, the Ayurvedic treatment uses *B. alba* leaves against oral cancer, leukemia and melanoma. The plant was reported for its anticonvulsant, anti-inflammatory and antifungal activities, and as an analgesic, an anemia treatment and an androgenic therapy [85, 86].

Ferulagoangulata:

Ferulagoangulata also known as chovir is a Persian medicinal herb, a common plant found in Iran, Iraq, Turkey, Serbia, Greece and Macedonia [87]. *F. angulata* is from the Apiaceae family, and many *Ferulago* species have traditionally been used to treat intestinal worms, hemorrhoids, ulcers, headaches and snake bites, and act as sedatives. *F. angulata* is well studied for immunomodulatory, anti-proliferative, anti-apoptotic and cytotoxic activities against various cancer lines [88].

Blumealacera:

Blumealacera (Asteraceae) is commonly used as a medicinal plant in Bangladesh, and its Bengali name is Kukurshinga [89]. *B. lacera* is a yearly herb with a strong odor. Its essential oil contains cineol, fenchone and camphor [90]. *B. lacera* is largely grown in the Philippines and is traditionally used in Taiwan as a medicinal plant due to its many biological activities, including diuretic, antiscorbutic, astringent and broad anti-leukemic activities [89,90].

Oleaeuropaea:

Oleaeuropaea, also known as the olive, is one of the plants that is used in common, traditional Mediterranean herbal teas to treat many illnesses. *O. europaea* is in the Oleaceae family, native to coastal areas of southern Asia and Europe, and especially prevalent in the Mediterranean region [91]. *O. europaea* leaves have many effective pharmacological abilities, including neuroprotective, anti-inflammatory, antiviral, hypoglycemic, antimicrobial and anticancer effect. [91].

Viscum album:

Viscum album (mistletoe) belongs to the Viscaceae family, is distributed in Europe, southwest and central Asia and northwest Africa and has been used to

treat cancer since the 1920s [92]. *V. album* contains several active phytochemicals, including Visco toxins and lectins, which are essentials in treating cancer because of their antiproliferative and apoptotic effects [93]. It also contains a class of compounds that includes phenylpropanoids, flavonoids and phenolic acids which showed anti-inflammatory and antioxidant effects.

Houttuyniacordata Thunb:

Houttuyniacordata is considered one of the aromatic medicinal plants in the Saururaceae family. *H. cordata* is a local plant found in Northern Thailand, Japan, Korea, Southern China and Southeast Asia generally [94]. This plant has commonly used the world over for many medical purposes.

Litchi chinensissonn:

Litchi chinensissonn Litchi belongs to the Sapindaceae family [95], and is known for its delicious fruit in southeast Asia. The plants is also Planted in other semitropical regions for its fruits [96]. In China, the plant is popular due to its attractive shape. Often, the fresh and dried litchi fruit extracts are made into powders to be utilized in traditional Chinese medicine and Indian herbal medicine. [97].

Typhoniumflagelliforme:

Typhoniumflagelliforme is native to a tropical region and is in the family Aracerecognized in Malaysia as the “rodent tuber”. *T. flagelliforme* is native to Bangladetan, Cambodia and Indonesia and is largely distributed in south India, south-east Anorthern Australia [98]. *T. flagelliforme* juice extract is traditionally used orally tcoughing, swelling and more predominantly for treating different cancers by thpopulation of Malaysia.

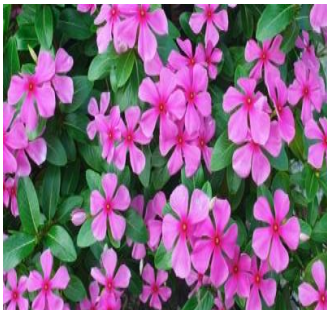
Table 1: A list of traditionally used medicinal plants demonstrating cytotoxic effects in different leukemia cell lines

S.No	Name	Family	Active compound	Mechanism of Action	Reference
1.	Annonaglabra	Annonaceae	AcetogeninsDiterpenoid (Cunabic acid, Ent – kaur – en-oic acid)	Inhibition of mitotochondrial respiratory chain complex, Inhibition of proliferation and Induce apoptosis and necrosis.	14-16
2.	Allium sativam	Amaryllidaceae	Allin	Damaging microbial cell walls, acting as antioxidants, inducing cancer cell apoptosis.	17
3.	Aloe vera	Asphodelacea	Aloin	Induce apoptosis, cell cycle arrest in leukemia cell lines	18
4.	Allium wallichii	Amaryllidaceae	Steroids, terpenoids, flavonoids, reducing sugars of glycosides	Apoptosis Induction, NFkB pathway modulation and enzyme activity regulation.	19
5.	Azadirachtaindica	Meliaceae	Limonoids	Induce apoptosis, Inhibit proliferation	20
6.	Basella alba	Basellaceae	□ - SitosterolTerpenoids (Lupeol)	Anti – leukemic, and growth Inhibition	21
7.	Berberisamurensis	Berberidaceae	Alkaloids Bisbenzylisquinoline group Berbamine,4-chlorobenzoyl Berbamine and Berberine.	Induce cell apoptosis, Apoptosis, K562 –r cell growth arrest and cell proliferation inhibition	22-24
8.	Blumealacera	Asteraceae	Alkaloids, Tannins, steroids, gums. Terpenoids, diterpenoid glycoside	Antiproliferation	25

9.	<i>Bidenspilosa</i>	Asteraceae	Flavonoids	Antiproliferation	26,27
10.	<i>Berberis vulgaris</i>	Berberidaceae	Berberine	Induce cell cycle arrest, and autophagy in cancer cell	28
11.	<i>Catharanthus roseus</i>	Apocynaceae	Alkaloids: Vincristine, Vinblastin, Vindesine, Vinorelbine.	Mitotic inhibitor and Arrest the cell division which causes the death of the cells	29
12.	<i>Coreopsis lanceolata</i>	Asteraceae	Flavonoids: flavanone, Chalcones, and auronones 4 methoxylanceoletin.	Antiproliferation and apoptosis induction	30-32
13.	<i>Citrus limon</i>	Rutaceae	5-hydroxy-6,7,8,3',4'-pentamethoxyflavone	Promote apoptosis, enhance cellular defenses	33
14.	<i>Curcuma longa</i>	Zingiberaceae	Curcumin, ascorbic acid	Induce apoptosis, Inhibiting the proliferation of the cancer cell	34
15.	<i>Cannabis sativa</i>	Cannabaceae	Cannabinoid	Inducing programmed cell death and inhibiting cancer cell proliferation	35
16.	<i>Emblica Officinalis</i>	Euphorbiaceae	Alkaloids	Inducing apoptosis, modulating cell cycle regulation and enhancing Immune response	36
17.	<i>Ferulagoangulata</i>	Apiaceae	Phenolic Flavonoid Monoterpenes: α - Pinene $\square$ - Pinene	Antiproliferation, Apoptosis induction and Autophagy and necrosis.	
18.	<i>Ficusdeltoidea</i>	Moraceae	Flavonoid, tannins, terpenoids, phenol , Proantocyanins, lignans, Alkaloids and coumarins	Apoptosis induction	
19.	<i>Ginkgo biloba</i>	Ginkgoaceae	Ginkgetin, ginkgolide A&B	Induce apoptosis and causing cell cycle arrest in leukemia cell	40
20.	<i>Glycyrrhiza glabra</i>	Fabaceae	Licochalcone-A, Licoagrochalcone	Induce apoptosis	41
21.	<i>Gossypium hirsutum</i>	Malvaceae	Gossypol	Targeting the Bcl-2 family of apoptotic proteins	42
22.	<i>Houttuynia cordata</i> Thunb	Saururaceae	Flavonoids	Antiproliferation, Apoptosis induction through an endoplasmic reticulum stress pathway.	43-44
		Sapindaceae	Phenols, Flavonoids,	Antiproliferation and	

23.	Litchi chinensis sonn		Polysaccharides tannins: epicatechin, proanthocyanidin B2 and proanthocyniodin B4	Apoptosis induction	45
24.	Nyctanthes arbor -tristis	Oleaceae	Phenols: Phenol, (dimethylethyl), hydroxypyridine oxide glycosides, tannins, phenols and steroids.	Antiproliferation and Apoptosis induction	46-49
25.	Olea europaea	Oleaceae	Phenols, oleuropeosidesoleuropein/ verbascoside, Hydroxytyrosol, FlavonsFlavonols (rutin), Catechin phenols (vanillin, tyrosolhydroxytyrosol, caffeic acid and vanillic acid)		50-55
26.	Panax ginseng	Araliaceae	Panaxadiol, panaxatriol	Induce apoptosis, suppressing cancer cell proliferation	56
27.	Piper longum	Piperaceae	Amide alkaloids	Induce cancer cell death	57
28.	Panax pseudoginseng	Araliaceae	Panaxadiol	Inhibit cancer cell growth, Induce apoptosis	58
29.	Pisumsativum	Fabaceae	Protease inhibitors, rTI1B, rTI2B	Induce apoptosis, Inhibition of cell proliferation	59
30.	Scutellaria baicalensis	Lamiaceae	Flavonoid, Baicalein, bicalin, and wogonin	Growth inhibition induce apoptosis and cell cycle arrest, Induction of apoptosis and Dose – dependent reduction of mitochondrial metabolism.	60,61
31.	Solanumnigrum	Solanaceae	Solamargine, solasonine	Induce apoptosis, and causing cell cycle arrest in cancer cell	62
32.	Salvia officinalis	Lamiaceae	Flavonoids and rosmarinic acid	Antiproliferative, Anti-migratory and antiangiogenic.	63
33.	Tithonia diversifolia	Asteraceae	Sesquiterpene lactones (STLs) Chlorogenic acid derivatives (CAs) Flavonoids, Phenolics, tannins and terpenoids	Antiproliferation and cytotoxic	64,65
34.	Typhonium flagelliforme	Araceae	Hexadecanoic acid, gamma sitosterol, phytol ,octadecadienoic acid, pentadecyne, squalene, eicosane, octacosane, and geranylgeraniol. Pheophorbide, oleic acid, campesterol, stigmasterol and sitosterol, linolic acid.	Antiproliferation via apoptosis induction	66-70
35.	Viscum album	Viscaceae	Proteins such as lectins and polypeptides like viscotoxins	Apoptosis induction and G2/M Cell cycle arrest.	71

36.	Vernonia amygdalina	Compositae	Sesquiterpenelactones: Vernodaline and vernolide	Antiproliferation DNA damage, and apoptosis induction	72-73
37.	Vitisvinifera	Vitaceae	Procyanidins	Induction of apoptosis in cancer cell	74
38.	Willows tree	Salicaceae	Salicin and saligenin	Apoptosis induction by causing DNA damage. Antiproliferation.	75
39.	Withania Somnifera	Solanaceae	Withaferin A, D	Trigger apoptosis, Causing cell arrest and boosting immune response	76
40.	Xanthium Strumarium	Asteraceae	Xanthatin	Induce apoptosis, Inhibiting cancer cell proliferation	77
41.	Zingiberofficinale	Zingiberaceae	Gingerol	Induce cancer cell death and Inhibit proliferation	78

Catharanthusroseus:	Hibiscus cannabinus:	Annonaglabra:	Allium sativum:
			
Basellaalba:	Ferulagoangulata:	Blumealacera:	Oleaeuropaea:
			
Viscum album:	HouttuyniacordataThunb:	Litchi chinensissonn:	Typhoniumflagelliforme:



RESULTS AND DISCUSSION

The reviewed data demonstrate that a wide range of medicinal plants exhibit cytotoxic and antiproliferative effects against various leukemia cell lines such as HL-60, K562, WEHI-3H, and others. Bioactive compounds including alkaloids (vincristine, vinblastine, berberine), flavonoids (baicalein, quercetin), terpenoids (lupeol, withaferin A), phenolics, and cannabinoids were identified as major contributors to antileukemic activity. These compounds were shown to induce apoptosis, cause cell cycle arrest at G0/G1 or G2/M phases, inhibit mitochondrial respiratory complexes, and suppress oncogenic signaling pathways. Several plants, notably *Catharanthus roseus*, *Allium sativum*, *Annona glabra*, *Olea europaea*, and *Viscum album*, demonstrated consistent and strong antileukemic effects across different experimental models.

The findings highlight the therapeutic relevance of phytochemicals in leukemia management, particularly due to their multi-target mechanisms of action and comparatively lower toxicity. Unlike conventional chemotherapeutic agents, plant-derived compounds can simultaneously modulate apoptosis pathways, oxidative stress, immune responses, and cell proliferation. The review underscores the significance of traditional medicinal knowledge in identifying potential antileukemic agents.

However, most evidence is derived from in vitro and preclinical studies, with limited clinical validation. Challenges such as poor bioavailability, lack of standardized extracts, and insufficient clinical trials remain major barriers to clinical translation. Despite these limitations, the synergistic potential of phytochemicals with existing chemotherapy offers promising prospects for reducing drug resistance and treatment-related toxicity.

CONCLUSION

Phytochemicals derived from medicinal plants and fruits represent a promising source of novel antileukemic agents. The reviewed evidence supports their ability to inhibit leukemia cell growth through apoptosis induction, cell cycle arrest, and modulation of key molecular pathways. Given their multi-mechanistic actions and reduced side-effect profiles, phytochemicals may serve as effective complementary or alternative therapies for leukemia. Nevertheless, extensive in vivo studies, toxicity profiling, and well-designed clinical trials are essential to establish their safety, efficacy, and therapeutic applicability. Integrating phytochemical research with modern oncology could lead to the development of safer and more effective leukemia treatments in the future.

REFERENCES

1. Khalafalla, M.M.; Abdellatif, E.; Daffalla, H.M.; Nassrallah, A.A.; Aboul-Enein, K.M.; Lightfoot, D.A.; El Shemy, H.A. *et al.* Antileukemia activity from root cultures of *Vernonia amygdalina*. *J. Med. Plant Res.* 28009,3,556-562.
2. Sarkar, M.K.; Mahapatra, S.K.; Vadivel, *et al.* V. Oxidation stress medication cytotoxicity in leukemia cells induced by active phyto-constituents isolated from traditional herbal drugs of west Bengal. *J. Ethnopharmacol.* 251, 2020, 112527.
3. Davis, A.S.; Viera, A.J.; Mead, M.D. *et al.* Leukemia: An overview for primary care. *Am. Fam. Physician* 2014, 89, 731–738.
4. Berg, S. & Nand, S. Neurological Complications of the Leukemias Across the Ages. *Curr. Neurol. Neurosci. Rep.* 2017
5. Ribeiro, I.L.A.; Limeira, R.R.T.; De Castro, R.D.; Bonan, P.R.F.; Valença, A.M.G. *et al.* Oral Mucositis in Pediatric Patients in Treatment for Acute Lymphoblastic Leukemia. *Int. J. Environ. Res. Public Health* 14, 2017, 1468.
6. Zawitkowska, J.; Lejman, M.; Zaucha-Prazmo, A.; Drabko, K.; Płonowski, M.; Bulsa, J.; Romiszewski, M.; Mizia-Malarz, A.; Kołtan, A.; Derwich, K.; *et al.* Grade 3 and 4 Toxicity Profiles During Therapy of Childhood Acute Lymphoblastic Leukemia. *In Vivo* 33, 2019, 1333–1339.
7. Kato, H.; Fujita, H.; Akiyama, N.; Kimura, S.-I.; Hiramoto, N.; Hosono, N.; Takahashi, T.; Shigeno, K.; Minamiguchi, H.; Miyatake, J.; *et al.* Infectious complications in adults undergoing intensive chemotherapy for acute myeloid leukemia in 2001–2005 using the Japan Adult Leukemia Study Group AML201 protocols. Support. *Care Cancer* 26, 2018, 4187–4198

8. Kaste, S.C.; Rai, S.N.; Bs, K.F.; McCammon, E.A.; Tylavsky, F.A.; Danish, R.K.; Rose, S.R.; Rt, C.D.S.; Pui, C.-H.; Hudson, M.M. *et al.* Changes in bone mineral density in survivors of childhood acute lymphoblastic leukemia. *Pediatr. Blood Cancer* 46, 2005, 77–87.
9. Thomas, I.H.; Donohue, J.E.; Ness, K.K.; Dengel, D.R.; Baker, K.S.; Gurney, J.G. *et al.* Bone mineral density in young adult survivors of acute lymphoblastic leukemia. *Cancer* 113, 2008, 3248–3256.
10. Adult T-Cell Leukemia/Lymphoma (HTLV-1), Lymphoma Research Foundation. Cochrane, C.B.; Nair, P.K.R.; Melnick, S.J.; Resek, A.P.; Ramachandran, C. *et al.* Anticancer effects of Annonaglabra plant extracts in human leukemia cell lines. *Anticancer Res.* 28, 2008, 965–971.
11. American Cancer Society. Cancer Facts and Figures. Atlanta, Ga, USA: American Cancer Society; 2010.
12. Mathers CD, Boschi-Pinto C, Lopez AD, Murray CJL. *et al.* Cancer Incidence, Mortality and survival By site for 14 regions of the world. Global programme on Evidence for Health policy; 2001. Discussion Paper no.13.
13. Chiang LC, Cheng HY, Liu MC, Chiang W, Lin CC. *et al.* In vitro evaluation of antileukemic activity of 17
14. Cochrane, C.B.; Nair, P.K.R.; Melnick, S.J.; Resek, A.P.; Ramachandran, C. *et al.* Anticancer effects of Annonaglabra plant extracts in human leukemia cell lines. *Anticancer Res.* 28, 2008, 965–971.
15. Hien, N.T.T.; Nhiem, N.X.; Yen, D.T.H.; Hang, D.T.T.; Tai, B.H.; Quang, T.H.; Kim, E.J. *et al.* Chemical constituents of the Annonaglabra fruit and their cytotoxic activity. *Pharm. Biol.* 53, 2015, 1602–1607.
16. Liu, Y.; Liu, D.; Wan, W.; Zhang, H. *et al.* In vitro mitochondria-mediated anticancer and antiproliferative effects of Annonaglabra leaf extract against human leukemia cells. *J. Photochem. Photobiol. B Biol.* 189, 2018, 29–35.
17. M. Khan, D. Urolagin, A.A.R.M. Imtiyaz, S. Panda, M. *et al.* Boro A comprehensive study on: allopathy and herbal therapy on breast cancer. *Int. J. Sci. Res. Arch.*, 12 (1), 2024, 2863–2873
18. R. Majumder, P. Parida, S. Paul, P. *et al.* Basak In vitro and in silico study of Aloe vera leaf extract against human breast cancer. *Nat. Prod. Res.*, 34 (16), 2020, 2363–2366
19. K. Iwar, K. Ochar, Y. Am Seo, B.K. Ha, S.H. *et al.* Kim Alliums as potential antioxidants and anticancer agents. *Int. J. Mol. Sci.*, 25 (15), 2024
20. A. Nepal, S. Jana, S. *et al.* Bhutia Review on medicinal plants of Sikkim himalayan region with emphasis on anticancer study. *J. Appl. Pharm. Sci.*, 14 (2), 2024, 013–026
21. Kumar, S.; Prasad, A.; Iyer, S.; Vaidya, S. *et al.* Systematic pharmacognostical, phytochemical and pharmacological review on an ethno medicinal plant, Basella alba L. *J. Pharm. Phytother.* 5, 2013, 53–58
22. Wei, Y.-L.; Xu, L.; Liang, Y.; Xu, X.-H.; Zhao, X.-Y. *et al.* Berbamine exhibits potent antitumor effects on imatinib-resistant CML cells in vitro and in vivo. *Acta Pharmacol. Sin.* 30, 2009, 451–457.
23. Liang, Y.; Qiu, X.; Xu, R.-Z.; Zhao, X.-Y. *et al.* Berbamine inhibits proliferation and induces apoptosis of KU812 cells by increasing Smad3 activity. *J. Zhejiang Univ. Sci. B* 12, 2011, 568–574.
24. Xu, R.; Dong, Q.; Yu, Y.; Zhao, X.; Gan, X.; Wu, D.; Lu, Q.; Xu, X.; Yu, X.-F. *et al.* Berbamine: A novel inhibitor of bcr/abl fusion gene with potent anti-leukemia activity. *Leuk. Res.* 2006, 30, 17–23.
25. Akter, R.; Uddin, S.J.; Tiralongo, J.; Grice, I.D.; Tiralongo, E. *et al.* A new cytotoxic diterpenoid glycoside from the leaves of Blumealacera and its effects on apoptosis and cell cycle. *Nat. Prod. Res.* 30, 2016, 2688–2693.
26. Chang, J.-S.; Chiang, L.-C.; Chen, C.-C.; Liu, L.-T.; Wang, K.-C.; Lin, C.-C. *et al.* Antileukemic Activity of Bidenspilosa L. var. minor (Blume) Sherff and Houttuyniacordata Thunb. *Am. J. Chin. Med.* 29, 2001, 303–312.
27. Yi, J.; Wu, J.-G.; Peng, W. *et al.* Antioxidant and Anti-proliferative Activities of Flavonoids from Bidenspilosa L varradiata Sch Bip. *Trop. J. Pharm. Res.* 15, 2016, 341.]
28. A. Och, M.K. Lemieszek, M. Cieřla, D. Jedrejek, A. Kozłowska, S. Pawelec, R. *et al.* Nowak Berberis vulgaris L. Root extract as a multi-target chemopreventive agent against colon cancer causing apoptosis in Human colon adenocarcinoma cell lines. *Int. J. Mol. Sci.*, 25 (9), 2024, 4786
29. Mishra, J.N.; Verma, N.K. *et al.* A brief study on Catharanthus roseus: A review. *Intern. J. Res. Pharm. Pharm. Sci.* 2, 2017, 20–23.
30. Pardede, A.; Mashita, K.; Ninomiya, M.; Tanaka, K.; Koketsu, M. *et al.* Flavonoid profile and antileukemic activity of Coreopsis lanceolata flowers. *Bioorganic Med. Chem. Lett.* 26, 2016, 2784–2787.]
31. Pardede, A.; Adfa, M.; Kusnanda, A.J.; Ninomiya, M.; Koketsu, M. *et al.* Chemical Constituents of Coreopsis lanceolata Stems and Their Antitermitic Activity against the Subterranean Termite Coptotermes curvignathus. *J. Econ. Entomol.* 111, 2018, 803–807.]
32. Amirghofran, Z.; Bahmani, M.; Azadmehr, A.; Javidnia, K.; Miri, R. *et al.* Immunomodulatory Activities of Various Medicinal Plant Extracts: Effects on Human Lymphocytes Apoptosis. *Immunol. Investig.* 38, 2009, 181–192.]
33. R. Gan, Y. Liu, H. Li, Y. Xia, H. Guo, F. Geng, ..., D. *et al.* Wu Natural sources, refined extraction, biosynthesis, metabolism, and bioactivities of dietary polymethoxyflavones (PMFs) Food Sci. Hum. Wellness, 13 (1), 2024, 27–49

34. M.R. Islam, A. Rauf, S. Akash, S.I. Trisha, A.H. Nasim, M. Akter, et al. M. Thiruvengadam Targeted therapies of curcumin focus on its therapeutic benefits in cancers and human health: molecular signaling pathway-based approaches and future perspectives *Biomed. Pharmacother.*, 170, 2024, 116034
35. E. Nigro, M. Formato, G. Crescente, A. et al. Daniele Cancer initiation, progression and resistance: are phytocannabinoids from *Cannabis sativa* L. promising compounds *Molecules*, 26 (9), 2021, . 2668
36. S.M. Hassan, A. Mughal, M. Farman et al. *Emblica officinalis* (Amla): a prospective review on distinctive properties and therapeutic applications of *Amla* *Biomed. Nurs.*, 6, 2020, pp. 22-30
37. Lorigooini, Z.; Koravand, M.; Haddadi, H.; Rafieian-Kopaei, M.; Shirmardi, H.A.; Hosseini, Z. et al. A review of botany, phytochemical and pharmacology properties of *Ferulago angulata*. *Toxin Rev.* 38, 2019, 13-20
38. Norrizah, J.; Norizan, A.; Ruzaina, S.S.; Dzulsuhaim, D.; Hida, M.N. et al. Cytotoxicity Activity and Reproductive Profiles of Male Rats Treated with Methanolic extracts of *Ficus deltoidea*. *Res. J. Med. Plant* 6, 2012, 197–202.]
39. Ren, W.; Qiao, Z.; Wang, H.; Zhu, L.; Zhang, L. et al. Flavonoids: Promising anticancer agents. *Med. Res. Rev.* 23, 2003, 519–534.
40. Q. Liu, L. Chen, W. Yin, Y. Nie, P. Zeng, X. et al. Yang Anti-tumor effect of ginkgetin on human hepatocellular carcinoma cell lines by inducing cell cycle arrest and promoting cell apoptosis *Cycle Cell*, 21 (1), 2022, 74-85
41. Y. Wang, W. Xia, M. Tao, X. et al. Fu Oncopreventive and oncotherapeutic potential of licorice chalcone compounds: molecular insights *Mini Rev. Med. Chem.*, 23 (6), 2023, 662-699
42. M. Mayer, A. Berger, C. Leischner, O. Renner, M. Burkard, A. Böcker, S. et al. Venturelli Preclinical efficacy and toxicity analysis of the pan-histone deacetylase inhibitor gossypol for the therapy of colorectal cancer or hepatocellular carcinoma *Pharmaceuticals*, 15 (4), 2022, p. 438
43. Prommaban, A.; Kodchakorn, K.; Kongtawelert, P.; Banjerdpongchai, R. et al. Houttuyniacordata Thunb fraction induces human leukemic Molt-4 cell apoptosis through the endoplasmic reticulum stress pathway. *Asian Pac. J. Cancer Prev.* 13, 2012, 1977–1981.]
44. Kumnerdkhonkaen, P.; Saenglee, S.; Asgar, M.A.; Senawong, G.; Khongsukwiat, K.; Senawong, T. et al. Antiproliferative activities and phenolic acid content of water and ethanolic extracts of the powdered formula of *Houttuyniacordata* Thunb. fermented broth and *Phyllanthusemblica* Linn. fruit. *Complement. Altern. Med. Plants*. 18, 2018, 130.
45. Sutapa, B.M.; Vansh, K.; Vaibhav, A.; Gopa, R.B.; Majee, S.B.; Khattry, V.; Agarwal, V.; Biswas, et al. G.R. Polyphenols derived from four indigenous Indian fruits for cancer chemoprevention and chemotherapy. *J. Med. Plants Res.* 10, 2016, 838–847
46. Heendeniya, S.N.; Keerthirathna, L.R.; Manawadu, C.K.; Dissanayake, I.H.; Ali, R.; Mashhour, A.; Alzahrani, H.; Godakumbura, P.; Boudjelal, M.; Peiris, D.C. et al. Therapeutic Efficacy of *Nyctanthes arbor-tristis* Flowers to Inhibit Proliferation of Acute and Chronic Primary Human Leukemia Cells, with Adipocyte Differentiation and in Silico Analysis of Interactions between Survivin Protein and Selected Secondary Metabolites. *Biomolecules* 2020, 10, 165
47. Khanapur, M.; Avadhanula, R.K.; Setty, O.H. et al. In Vitro Antioxidant, Antiproliferative, and Phytochemical Study in Different Extracts of *Nyctanthes arbor-tristis* Flowers. *BioMed Res. Int.* 2014, 1–10.
48. Jain, P.K. & Pandey, A. The wonder of Ayurvedic medicine—*Nyctanthes arbor-tristis*. *Int. J. Herb. Med. Plants* 2016, 4, 9–
49. Parekh, S. & Soni, A. *Nyctanthes arbor-tristis*: Comprehensive review on its pharmacological, antioxidant, and anticancer activities. *J. Appl. Biol. Biotechnol.* 8, 2020, 95–104.
50. Fares, R.; Bazzi, S.; Baydoun, S.E.; Abdel-Massih, R.M. et al. The Antioxidant and Anti-proliferative Activity of the Lebanese *Olea europaea* Extract. *Plant Foods Hum. Nutr.* 66, 2011, 58–63.
51. Samet, I.; Han, J.; Jlaiel, L.; Sayadi, S.; Isoda, H. et al. Olive (*Olea europaea*) Leaf Extract Induces Apoptosis and Monocyte/Macrophage Differentiation in Human Chronic Myelogenous Leukemia K562 Cells: Insight into the Underlying Mechanism. *Oxidative Med. Cell. Longev.* 2014, 1–16
52. Fabiani, R.; Rosignoli, P.; De Bartolomeo, A.; Fuccelli, R.; Servili, M.; Montedoro, G.F.; Morozzi, G. et al. Oxidative DNA Damage Is Prevented by Extracts of Olive Oil, Hydroxytyrosol, and Other Olive Phenolic Compounds in Human Blood Mononuclear Cells and HL60 Cells. *J. Nutr.* 138, 2008, 1411–1416.
53. Salah, M.B.; Abdelmelek, H.; Abderraba, M. et al. Study of phenolic composition and biological activities assessment of olive leaves from different varieties grown in Tunisia. *Med. Chem.* 2, 2012, 107–111.
54. Özcan, M.M. & Matthäus, B. A review: Benefit and bioactive properties of olive (*Olea europaea* L.) leaves. *Eur. Food Res. Technol.* 243, 2017, 89–99.
55. Kumagai, T.; Müller, C.I.; Desmond, J.C.; Imai, Y.; Heber, D.; Koeffler, H.P. et al. *Scutellaria baicalensis*, a herbal medicine: Antiproliferative and apoptotic activity against acute lymphocytic leukemia, lymphoma and myeloma cell lines. *Leuk. Res.* 31, 2007, 523–530.
56. L. Xu, X. Zhang, S. Xiao, X. Li, H. Jiang, Z. Wang, Y. et al. Zhao Panaxadiol as a major metabolite of AD-1 can significantly inhibit the proliferation and migration of breast cancer cells: in vitro and in vivo study *Bioorg. Chem.*, 116, 2021, 105392

57. R. Wu, J. Zhao, P. Wei, M. Tang, Z. Ma, Y. Zhao, ..., L. et al. WaniPipernigrum extract inhibits the growth of human colorectal cancer HT-29 cells by inducing p53-mediated apoptosis *Pharmaceuticals*, 16 (9) , 2023, p. 1325
58. L. Zhao, H. Zhao, Y. Zhao, M. Sui, J. Liu, P. Li, ..., K. et al. ZhangRole of ginseng, quercetin, and tea in enhancing chemotherapeutic efficacy of colorectal cancer *Front. Med.*, 9, 2022, Article 939424
59. S. Agarwal, S. Kumari, A. et al. KumarNatural immunity boosters and anticancer medicinal plantsTraditional Herbal Therapy For the Human Immune System, *CRC Press* 2021, 431-454
60. Parajuli, P.; Joshee, N.; Rimando, A.M.; Mittal, S.; Yadav, A.K. et al. In vitro Antitumor Mechanisms of Various Scutellaria Extracts and Constituent Flavonoids. *Planta Med.* 75, 2008, 41–48.
61. Huang, S.-T.; Wang, C.-Y.; Yang, R.-C.; Chu, C.-J.; Wu, H.-T.; Pang, J.-H.S. et al. Wogonin, an active compound in Scutellaria baicalensis, induces apoptosis and reduces telomerase activity in the HL-60 leukemia cells. *Phytomedicine* 17, 2010, 47–54
62. H. Zhang, J.L. Lv, Q.S. Zheng, J. et al. LiActive components of Solanum nigrum and their antitumor effects: a literature review *Front. Oncol.*, 13 , 2023, 132995
63. Kumnerdkhonkaen, P.; Saenglee, S.; Asgar, M.A.; Senawong, G.; Khongsukwiwat, K.; Senawong, T. et al. Antiproliferative activities and phenolic acid content of water and ethanolic extracts of the powdered formula of Houttuynia cordata Thunb. fermented broth and Phyllanthus emblica Linn. fruit. *Complement. Altern. Med. Plants.* 18, 2018, 130
64. Gu, J.-Q.; Gills, J.J.; Park, E.J.; Mata-Greenwood, E.; Hawthorne, M.E.; Axelrod, F.; Chavez, P.I.; Fong, H.H.S.; Mehta, R.G.; Pezzuto, J.M.; et al. Sesquiterpenoids from Tithonia diversifolia with potential cancer chemopreventive activity. *J. Nat. Prod.* 65, 2002, 532–536.
65. Ang, A.M.G.; Enot, M.M.; Baltazar, G.J.D.; Alinapon, C.V.; Buncales, E.O.; Barbosa, G.B. et al. Antioxidant and Cytotoxic Activity of the Leaf Ethanolic Extracts of Tithonia diversifolia and Gliricidia sepium from Bukidnon, Philippines. *Asian J. Biol. Life Sci.* 8, 2019, 8–15.
66. Mohan, S.; Abdul, A.B.; Abdelwahab, S.I.; Al-Zubairi, A.S.; Sukari, M.A.; Abdullah, R.; Taha, M.M.E.; Beng, N.K.; Isa, N.M. et al. Typhonium flagelliforme inhibits the proliferation of murine leukemia WEHI-3 cells in vitro and induces apoptosis in vivo. *Leuk. Res.* 34, 2010, 1483–1492.
67. Choo, C.Y.; Chan, K.L.; Sam, T.W.; Hitotsuyanagi, Y.; Takeya, K. et al. The cytotoxicity and chemical constituents of the hexane fraction of Typhonium flagelliforme (Araceae). *J. Ethnopharmacol.* 77, 2001, 129–131.
68. Sianipar, N.F. & Purnamaningsih, R. Enhancement of the contents of anticancer bioactive compounds in mutant clones of rodent tuber (Typhonium flagelliforme Lodd.) based on GC-MS analysis. *Pertanika J. Trop. Agric. Sci.* 41, 2018, 305–320.
69. Mohan, S.; Bustamam, A.; Ibrahim, S.; Al-Zubairi, A.S.; Aspollah, M.; Abdullah, R.; Elhassan, M.M. et al. In Vitro Ultramorphological Assessment of Apoptosis on CEMss Induced by Linoleic Acid-Rich Fraction from Typhonium flagelliforme Tuber. *Evid. Based Complement. Altern. Med.* 2011, 1–12.
70. Seifert, G.; Jesse, P.; Laengler, A.; Reindl, T.; Lüth, M.; Lobitz, S.; Henze, G.; Prokop, A.; Lode, H.N. et al. Molecular mechanisms of mistletoe plant extract-induced apoptosis in acute lymphoblastic leukemia in vivo and in vitro. *Cancer Lett.* 264, 2008, 218–228
71. Mishra, R.; Sharma, S.; Sharma, R.S.; Singh, S.; Sardesai, M.M.; Sharma, S.; Mishra, V. Viscum articulatum Burm. et al. f. aqueous extract exerts antiproliferative effect and induces cell cycle arrest and apoptosis in leukemia cells. *J. Ethnopharmacol.* 219, 2018, 91–102.
72. Khalafalla, M.M.; Abdellatif, E.; Daffalla, H.M.; Nassrallah, A.A.; Aboul-Enein, K.M.; Lightfoot, D.A.; El-Shemy, H.A. et al. Antileukemia activity from root cultures of Vernonia amygdalina. *J. Med. Plant Res.* 3, 2009, 556–562.
73. Yedjou, C.G.; Sims, J.N.; Njiki, S.; Tsabang, N.; Ogungbe, I.V.; Tchounwou, P.B. et al. Vernonia amygdalina Delile Exhibits A Potential for the Treatment of Acute Promyelocytic Leukemia. *Glob. J. Adv. Eng. Technol. Sci.* 5, 2018, 1–9
74. E. Neira-Ospina, J. Rojas, G.A. Santa-Gonzalez, M.A.G. et al. Garzón Phenolic compounds in grapes (genus Vitis): a review of their antioxidant activity, antiproliferative capacity, and cytotoxic effect on colorectal cancer *J. Appl. Pharm. Sci.*, 14 (6) , 2024, 071-08
75. Hostanska, K.; Jürgenliemk, G.; Abel, G.; Nahrstedt, A.; Saller, R. et al. Willow bark extract (BNO1455) and its fractions suppress growth and induce apoptosis in human colon and lung cancer cells. *Cancer Detect. Prev.* 31, 2007, 129–139
76. R. Dutta, R. Khalil, R. Green, S.S. Mohapatra, S. et al. Mohapatra Withania somnifera (Ashwagandha) and withaferin A: potential in integrative oncology *Int. J. Mol. Sci.*, 20 (21), 2019, p. 5310
77. O.H. Ahmed, E. jawad Kadhim, A.A. Tawfeeq, M.S. et al. Jabir Review of the usage of medicinal herbs In the treatment of cancer *J. Surv. Fish. Sci.* 2023, 3124-313
78. P. Zivarpour, E. Nikkhah, P. Maleki Dana, Z. Asemi, J. et al. Hallajzadeh Molecular and biological functions of gingerol as a natural effective therapeutic drug for cervical cancer *J. Ovarian Res.*, 14 (1) , 2021.
79. Xu, B. Pharmacology of some natural products of China. *Trends Pharmacol. Sci.* 2, 1981, 271–272.
80. Moudi, M.; Go, R.; Yien, C.Y.S.; Nazre, M. et al. Vinca alkaloids. *Int. J. Prev. Med.* 4, 2013, 1231–1235.
81. Cragg, G.M.; Newman, D.J. et al. Plants as a source of anti-cancer agents. *J. Ethnopharmacol.* 100, 2005, 72–79.

82. Cochrane, C.B.; Nair, P.K.R.; Melnick, S.J.; Resek, A.P.; Ramachandran, C. *et al.* Anticancer effects of Annonaglabra plant extracts in human leukemia cell lines. *Anticancer Res.* 28, 2008, 965–971.
83. Hien, N.T.T.; Nhiem, N.X.; Yen, D.T.H.; Hang, D.T.T.; Tai, B.H.; Quang, T.H.; Kim, E.J. *et al.* Chemical constituents of the Annonaglabra fruit and their cytotoxic activity. *Pharm. Biol.* 53, 2015, 1602–1607.
84. Islam, M.; Rahi, M.; Jahangir, C.A.; Rahman, M.H.; Jerin, I.; Amin, R.; Reza, M.A. *et al.* In Vivo Anticancer Activity of Basellaalba Leaf and Seed Extracts against Ehrlich's Ascites Carcinoma (EAC) Cell Line. *Evid.Based. Complement. Alternat.Med.* 2018, 1537896.
85. Kumar, S.; Prasad, A.; Iyer, S.; Vaidya, S. Systematic pharmacognostical, phytochemical and pharmacological review on an ethno medicinal plant, Basellaalba L. *et al. J. Pharm. Phytother.* 5, 2013, 53–58.
86. Deshmukh, S.; Gaikwad, D. A review of the taxonomy, ethnobotany, phytochemistry and pharmacology of Basellaalba (Basellaceae). *J. Appl. Pharm. Sci.* 4, 2014, 153–165.
87. Shahneh, F.Z.; Valiyari, S.; Azadmehr, A.; Hajiaghaee, R.; Ali, B.; Baradaran, B. *et al.* Cytotoxic activities of Ferulagoangulata extract on human leukemia and lymphoma cells by induction of apoptosis. *J. Med. Plant Res.* 7, 2013, 677–682.
88. Filiz, B.; Songül, K.; Bostanlı, D.; Gül, F.; Sibel, K.C. *et al.* Anticancer effect of FerulagomughleaPe,smen (Apiaceae) on cancer cell proliferation. *Iran. J. Pharm. Sci.* 15, 2016, 501–504.
89. Tomar, A. Folk medicinal use of Blumealacera (BURM. F.) DC. To cure threadworms. *J. Med. Plants Stud.* 5, 2017, 336–337.
90. Ragasa, C.Y.; Wong, J.; Rideout, J.A. *et al.* Monoterpene glycoside and flavonoids from Blumealacera. *J. Nat. Med.* 61, 2007, 474–475.
91. Goulas, V.; Exarchou, V.; Troganis, A.N.; Psomiadou, E.; Fotsis, T.; Briasoulis, E.; Gerothanassis, I.P. *et al.* Phytochemicals in olive-leaf extracts and their antiproliferative activity against cancer and endothelial cells. *Mol. Nutr. Food Res.* 53, 2009, 600–608.
92. Evans, M.; Bryant, S.; Huntley, A.L.; Feder, G. *et al.* Cancer Patients' Experiences of Using Mistletoe (Viscum album): A Qualitative Systematic Review and Synthesis. *J. Altern. Complement. Med.* 22, 2016, 134–144.
93. Nazaruk, J. & Orlikowski, P. Phytochemical profile and therapeutic potential of Viscum album L. *Nat. Prod. Res.* 30, 2016, 373–385.
94. Pawinwongchai, J. & Chanprasert, S. Antileukemic activity of HouttuyniacordataThunb. extracts in Jurkat and U937 human leukemic cells. *J. Chem. Pharm. Res.* 3, 2011, 204–212.
95. Wen, L.; You, L.; Yang, X.; Yang, J.; Chen, F.; Jiang, Y.; Yang, B. *et al.* Identification of phenolics in litchi and evaluation of anticancer cell proliferation activity and intracellular antioxidant activity. *Free Radic. Biol. Med.* 84, 2015, 171–184.
96. Zhao, M.; Yang, B.; Wang, J.; Liu, Y.; Yu, L.; Jiang, Y. *et al.* Immunomodulatory and anticancer activities of flavonoids extracted from litchi (Litchi chinensisSonn.) pericarp. *Int. Immunopharmacol.* 7, 2007, 162–166.
97. Yang, B.; Wang, J.; Zhao, M.; Liu, Y.; Wang, W.; Jiang, Y. *et al.* Identification of polysaccharides from pericarp tissues of litchi (Litchi chinensisSonn.) fruit in relation to their antioxidant activities. *Carbohydr. Res.* 341, 2006, 634–638.
98. Kaushik, P.; Pahwa, P.; Kaushik, D. *et al.* A comprehensive review on medicinal plants with anticancer activity. *Glob. J. Pharmaceu. Edu. Res.* 3, 2014, 1–13.