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Prevalence of Traditional Herbal Medicines in Management of Cancer: An Organized Review



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ABSTRACT

Cancer is one of the leading causes of death worldwide and is primarily managed by chemotherapy, radiation, and surgery. Traditional medicine is widely used worldwide due to its availability, affordability, wide applicability, and accessibility. While the potential for traditional medicines in the management of cancer is well-documented, there is limited literature that collates traditional knowledge and contemporary herbal medicine practice. Many of the classes of phytochemicals in herbal medicine are finding therapeutic use. Cancer patients are reported to benefit from treatment with herbal medicine and survivability in many cases is significantly enhanced. Individual herbal medicines show antipyretic, analgesic, anti-inflammatory, and anti-cancer effects. In addition to sharing many therapeutic activities, herbal medicine is also used as a nutrient supplement for anti-cancer activity. This review aims to give an overview on the recent development of herbal medicine in the prevention and treatment of cancer.



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INTRODUCTION:

Herbal medicines: Herbal medicines include herbs, herbal materials, herbal preparations, and finished herbal products, that contain active ingredients parts of plants, or other plant materials, or combinations.¹ These herbs are derived from plant parts such as leaves, stems, flowers, roots, and seeds.²

Traditional Medicine: Also known as indigenous medicine or folk medicine) comprises medical aspects of traditional knowledge that developed over generations within the folk beliefs of various societies, including indigenous peoples, before the era of modern medicine.

Throughout the world herbal medicines have provided many of the most potent medicines to the vast arsenal of drugs available to modern medical science, both in crude form as well as a pure chemical upon which modern medicines are constructed.³

The World Health Organization (WHO) defines traditional medicine as "the sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness". Traditional medicine is often contrasted with scientific medicine.⁴

The WHO notes, however, that "inappropriate use of traditional medicines or practices can have negative or dangerous effects" and that "further research is needed to ascertain the efficacy and safety" of such practices and medicinal plants used by traditional medicine systems. Its "Traditional Medicine Strategy 2014–2023" said that the WHO would "support Member States in developing proactive policies and implementing action plans that will strengthen the role traditional medicine plays in keeping populations healthy."⁵

Traditional herbal medicine has played a pivotal role in cancer treatment throughout history, though it was only from the 1950s that modern medicine turned its attention toward plants with anticancer activity. Anticancer compounds from plants such as vinca alkaloids and podophyllotoxins were discovered during this period. Because of the success of finding significant anticancer compounds in plants in the past, the United States National Cancer Institute (NCI) began a program in 1960 in which plants were collected from all over the world and screened for possible anticancer activities. Anticancer compounds,

including taxanes and camptothecins, were discovered by this program and are still used today for the treatment of a range of cancer types.⁶

Characteristics of Traditional Medicine:

Though these traditional medicines diverge in their therapeutic principles, theoretical background, and associated technologies, they converge in particular characteristics.

1. TM applies a holistic approach that treats the human body as a whole and not a particular body part. It relies on the concept that every organ of the human body is interconnected with others. The emphasis of TM is on maximizing the body's innate ability to heal itself.
2. TM are personalized or customized medicines encompassing a person's lifestyle, mental state, physical activity, and even spiritual beliefs.
3. TM focus on the use of Polyherbal preparations whose exact chemical composition is challenging to elucidate.
4. Many of the traditional remedies are field-tested but are not explained well by modern medicine.⁷

Cancer: Cancer is a disease in which some of the body's cells grow uncontrollably and spread to other parts of the body.⁸ Cancer can start almost anywhere in the human body, which is made up of trillions of cells. Normally, human cells grow and multiply (through a process called cell division) to form new cells as the body needs them. When cells grow old or become damaged, they die, and new cells take their place.

Sometimes this orderly process breaks down, and abnormal or damaged cells grow and multiply when they shouldn't. These cells may form tumors, which are lumps of tissue. Tumors can be cancerous or not cancerous (benign). Cancerous tumors spread into, or invade, nearby tissues and can travel to distant places in the body to form new tumors (a process called metastasis). Cancerous tumors may also be called malignant tumors. Many cancers form solid tumors, but cancers of the blood, such as leukemias, generally do not.

Benign tumors do not spread into, or invade, nearby tissues. When removed, benign tumors usually don't grow back, whereas cancerous tumors sometimes do. Benign tumors can

sometimes be quite large, however. Some can cause serious symptoms or be life-threatening, such as benign tumors in the brain.[8]

Why is called cancer?

Hippocrates is credited with naming "cancer" as "karkinoma" (carcinoma) because a tumor looked like a "crab" ("karkinoma" is Greek for "crab") in that there is a central body to a tumor and the tumor extension appeared as the legs of the "crab".⁹

Causative Agents of Cancer:

1.Genetics

2.Physical and chemical agents

- Smoking
- Chemicals

3.Lifestyle

- Alcohol
- Diet
- Obesity

4.Hormones

5.Infection and inflammation

- Viruses
- Inflammation
- Bacteria and parasites

6.Radiation

- Non-ionizing radiation
- Ionizing radiation

7.Rare causes

- Organ transplantation
- Maternal-fetal transmission¹⁰

What are the four stages of cancer?

Most cancers have four stages. The specific stage is determined by a few different factors, including the tumor's size and location:

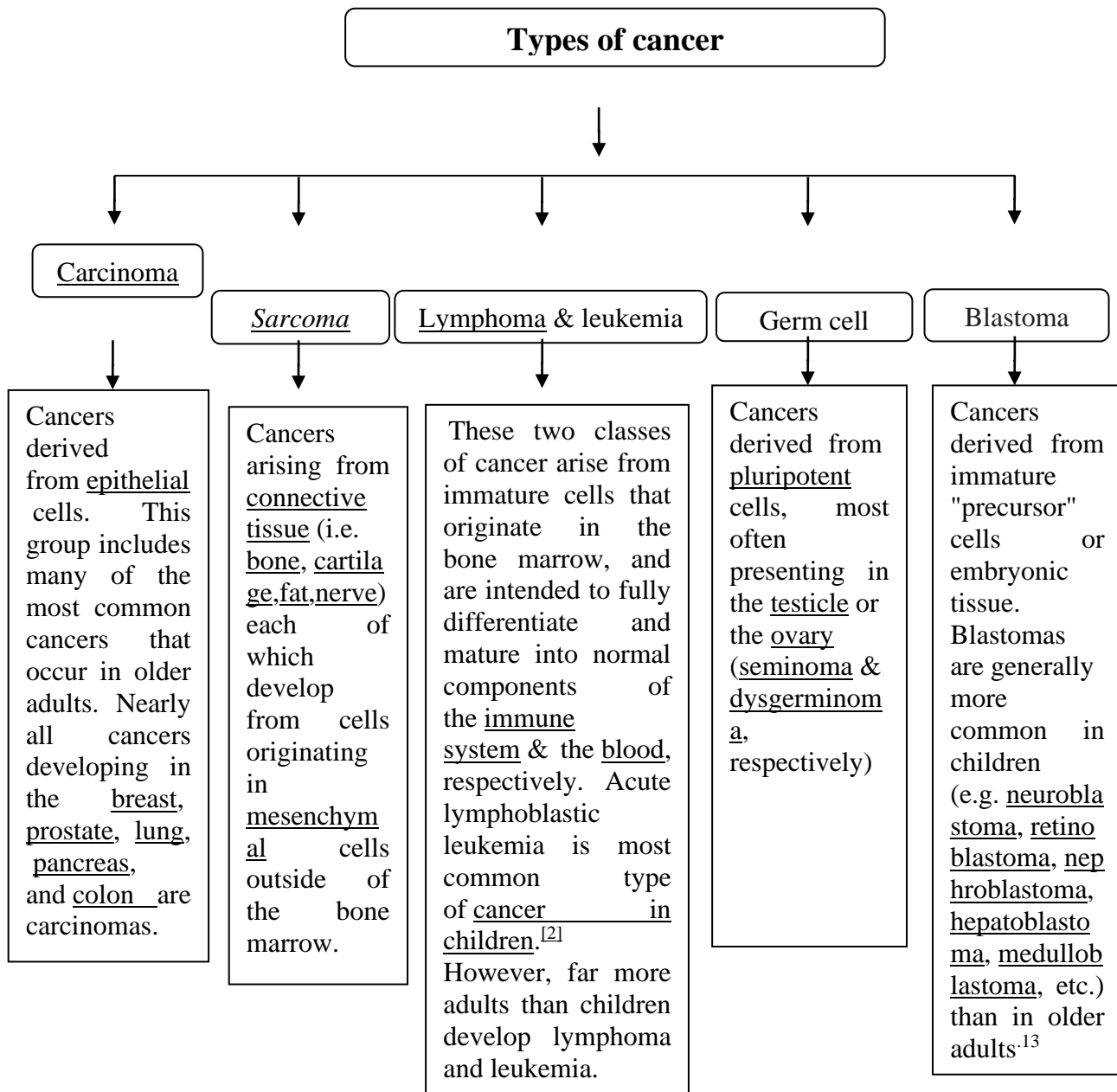
- Stage I: The cancer is localized to a small area and has not spread to lymph nodes or other tissues.
- Stage II: The cancer has grown, but it has not spread.
- Stage III: The cancer has grown larger and has possibly spread to lymph nodes or other tissues.
- Stage IV: The cancer has spread to other organs or areas of your body. This stage is also referred to as metastatic or advanced cancer.¹¹

Broadly, 19 cancers can be generally related to lifestyle:

1. Breast Cancer
2. Cervical Cancer
3. Oral Cancers
4. Cancer of the Bladder
5. Cancer in the Eyes
6. Cancer of the Pancreas
7. Colorectal Cancer
8. Esophageal Cancer
9. Kidney Cancer
10. Laryngeal Cancers
11. Liver Cancers
12. Lung Cancers
13. Ovarian Cancers
14. Prostrate Cancer
15. Skin Cancers
16. Stomach Cancer
17. Testicular Cancer
18. Thyroid Cancers
19. Uterine Cancer¹²

Table 1: Types of Cancer

Benefits of Herbal Medicine:



1. More Affordable: Prescription drugs can be costly, with average new cancer drugs costing anywhere from \$6,000 to \$15,000 monthly. On the other hand, herbal medicines can be quite affordable. You can often grow or forage the plants yourself. Additionally, even if you purchase herbal medicines over the counter, they are generally less expensive than prescription drugs.

2. Improved Immune Function: Herbal medicine can help improve immune function, which is essential for maintaining overall health. That is because many herbs contain

compounds that can balance our immune response, helping to prevent illness and improve the body's ability to recover from injury or disease. Various wild mushrooms, including oyster, reishi, and chaga, are studied and used for their immune-boosting properties.

3. Better Digestive Health: Herbal medicine can also be beneficial for improving gut health. Indeed, herbs that contain anti-inflammatory compounds can help soothe inflammation and irritation in the digestive system. They can also assist with digestion and nutrient absorption from foods. Some herbs, like peppermint and ginger, are also beneficial for relieving nausea. And mucilaginous herbs, including dandelion, echinacea, and burdock, support the intestinal system by eliminating toxins.

4. Reduced Stress and Anxiety: Many herbs are adaptogens, meaning they are considered to effectively reduce stress by working to reduce the body's cortisol levels. These include chamomile, lavender, and St. John's Wort, which have natural calming properties. Adaptogenic herbs can help improve sleep, reduce anxiety and depression, and improve overall mood.

5. Enhanced Cognition: Are you familiar with nootropic herbs? The brain loves them! Nootropic herbs can improve memory, reduce brain fog, and sharpen focus. Some of our favorites include ashwagandha and lion's mane mushrooms.

6. Balanced Hormones: In our modern world, the endocrine-disrupting chemicals found in plastics, cosmetics, household cleaners, and more are nearly impossible to avoid. These are linked to hormone imbalances and can cause serious diseases, including cancer. Hormone imbalances are also particularly troublesome for women, causing irregular menstrual cycles, fertility challenges, and menopausal symptoms. Therefore, limiting your exposure to endocrine disruptors and supplementing with hormone-balancing herbs, like black cohosh and wild yam, can help support your endocrine health.

7. Natural Pain Management: Pain is primarily caused by inflammation, and herbs with anti-inflammatory and antioxidant properties can be a natural alternative to conventional pain relief medications. These compounds can help reduce inflammation and alleviate pain without the risk of addiction or other harmful side effects associated with many over-the-counter and prescription pain medications.

8. Sustainable and Eco-friendly: Another one of the advantages of using herbs is that they can be naturally grown and ethically wildcrafted (harvested), unlike chemically-produced conventional medicine. Ethical harvesting of plants involves taking only what is needed, avoiding over-harvesting, and respecting the plant and its environment. By ethically foraging and preparing your own herbal medicines, you are protecting biodiversity and promoting conservation for the well-being of the plants and the ecosystem.

Take plantain, for example. Plantain is a common “weed” and popular remedy for skin conditions such as wounds, burns, and insect bites that you can ethically harvest from your own backyard or garden.

9. Earth Connection: Making your own herbal medicine can be a powerful way to connect with the Earth. Undoubtedly, you can gain a deep understanding and appreciation for the natural world by foraging, growing, harvesting, and processing medicinal herbs. Learning to identify the plants, their properties, and their ecosystems, can help you become more attuned to the cycles of the Earth and the interconnectedness of all living things.

10. Autonomy: By making your own herbal remedies, you can gain a sense of self-sufficiency that is deeply empowering. And if you want to play a more active role in your healthcare, establishing a wellness practice with herbal medicine is an excellent way. In our Wildcrafting and Medicine Making Intensive, you can learn how to identify, harvest, prepare, and use medicinal plants yourself.

Disadvantages of Herbal Medicine:

We cannot talk about the advantages of herbs without also reviewing some of their disadvantages. While herbal medicine can be a natural alternative to conventional medicine, it is not without its drawbacks.

1. Inconsistency: While some herbs are effective in treating certain conditions, many have yet to be studied extensively, and their effectiveness may be unknown. In addition, the potency of herbal remedies can vary depending on the quality of the plant, its growing conditions, and how it was processed. This can impact the dosage recommendations of certain herbal protocols.

2. There are some potential risks: Unfortunately, the potential for health risks is one of the disadvantages of herbal medicine. That is because some herbal medicines can cause allergic reactions or interact with certain prescription drugs. Some herbs, like pokeweed, can be toxic if not prepared correctly. Many herbs may also be harmful to pregnant or women.

Luckily, tools like the Memorial Sloan-Kittering Cancer Center Integrative Medicine Database make it easy to research the safety and efficacy of many herbs and mushrooms. It's also essential to consult your healthcare provider before using herbal medicine, especially if you take prescription medication. It is important to note that synthetic medicines can be dangerous, too, and the risks of herbal medicine are often much less than those of drugs.

3. Contamination: Mass-produced medicinal herbs are susceptible to contamination, which can negatively impact human health. Herbal medicine can become contaminated by several sources, including pesticides, heavy metals, bacteria, and environmental pollution. It is crucial to ensure that herbs are grown and processed safely and hygienically to prevent contamination.¹⁴

4. Adverse Interactions With Pharmaceuticals: This applies to those who have to take prescribed medicines. Many times, it's difficult to understand how some herbal medicines react with medicines that have been prescribed by a primary care provider. Feel free to ask the helpful staff at SOHMA Integrative Medicine in Long Beach CA any questions regarding how our herbal supplements may interact with any prescribed medicine you may be taking. Before deciding on an herbal medicine healing program, consult with your herbal pharmacist and primary care provider to reduce the risk of adverse interactions between your medications and herbal supplements.

The interactions between herbal medicine and pharmaceuticals may seem insignificant to some, and in many cases, it can be. However when pharmaceuticals and herbal medicine share similar side effects it can cause side effects to exhibit worse symptoms.

5. Lack of Regulation: With the growing use of herbal medicines, the lack of or eased regulations for herbal medicine makes it difficult for consumers to reliably buy safe herbal medicine. The herbal supplements we carry at SOHMA are held to the highest standards of quality and reliability. Unlike traditional pharmaceuticals, herbal medicine does not have as strict an inspection for safety or efficacy. There exist many companies that are just in it for themselves and take advantage of less fortunate people. The lack of dosage instructions

required for claimed effects may not be properly stated. Unknown growing and processing conditions can result in a contaminated or diluted product.

It is extremely important to only purchase from reputable sources which are known for working efficiently and have a history of producing quality products.

6. Slower Healing Than Pharmaceuticals: The time required to see results is varied though usually, it's much slower than pharmaceuticals. Herbal medicine and supplements work to resolve and heal the root cause of the problem which takes time. Herbal medicines have amazing healing capabilities but are not as effective in dealing with emergency situations. Many over-the-counter pharmaceuticals repress a bodily function that triggers symptoms of diseases or infections. Herbal medicine takes more time because it is attempting to heal the root cause of your condition.¹⁵

Side Effects of Herbal Medicines:

- Allergic reactions
- Bloodshot eyes
- Depression
- Diarrhea
- Dizziness
- Fevers
- Hallucinations
- Headaches
- Increased heart rate
- Insomnia
- Low blood pressure
- Muscle relaxation
- Nausea
- Skin irritation
- Sleepiness
- Slowed digestion
- Soreness or inflammation at the injection site
- Stomach discomfort
- Tingling sensation

- Vascular flushing

Herbs may seem like a natural and safe way to improve health. However, herb and drug interactions are complex and varied. Mesothelioma doctors can consider patients' full medical histories before recommending any herbs.¹⁶

Table 2: Herbal Drugs Used In Different Types of Cancers¹⁷

Name of herbal drug	Part of the drug used	Chemical constituent	Types of cancer	Dosage form
ALLSPICE Family: Myrtaceae	Dried fruits, flowers, leaves	Polyphenols, lignins, terpenoids, essential oil, flavonoids, eugenol, myrcene, methyl eugenol.	Breast cancer, Prostate cancer	5 to 10 ml per 240 ml of water taken 3 times a day.
HOLY BASIL Family: Lamiaceae	Green leaves	linalool, 1,8-cineole, estragole, eugenol, Rosmarinic acid, Oleanolic acid	Skincancer, Pancreatic cancer, Lung cancer, Liver cancer, Oral cancer	1 to 2.5 mg/daily; In adults in doses of 500 mg daily, for 1.5-3 months
CARAWAY Family: Apiaceae	Dried fruit	Carvone, limonene, β -myrcene, α -selinene	Intestinal cancer, Colon cancer, GIT cancer	50 mg by mouth one to three times daily.
CARDAMOM Family: Zingiberaceae	Whole or ground dried fruits, or seeds	α -terpineol, myrcene, limonene, 6% menthone, 3% β -phellandrene, 2% 1,8-cineol, 2% sabinene and 2% heptane	Colorectal cancer, Breast cancer, Hematological cancer, Gastrointestinal cancer.	3 grams daily for up to 4 weeks in adults, 250 mg twice a day.
CINNAMON Family: Lauraceae	Inner dried bark, Dried bark strips, bark powder and flowers of the small tree	Cinnamaldehyde, cinnamate, cinnamic acid, and numerous essential oils, eugenol.	Breast cancer	
CLOVE Family: Myrtaceae	Dried flower buds	Eugenol, eugenyl acetate, β -caryophyllene, and α -	Breast cancer, Colorectal cancer, Lung cancer and	Adults are 4 g (one to two

		humulene.	Leukemic cancer.	cloves) per day, one 300-mg dried powder tablet
CORIANDER Family:Apiaceae.	Leaves and stalks of the plant,dried seeds .	Linalool , λ -terpinene , α -pinene, camphor , limonene , geranyl acetateand p-cymene.	Lung, Prostate, Breast, and Colon cancer	9.1 mg per pound of body weight or 20 mg per kg
CUMIN Family:Apiaceae	Dried seed, flowers,	Monoterpenes beta-pinene, p-cymene and gamma-terpinene and the terpenoid aldehydes cuminic aldehyde and the isomeric menthadien carboxaldehydes.	Liver cancer, Stomach cancer, and Colon cancers.	1.5-3 grams by mouth daily for up to 6 months, 3 g/day 1.5 g twice daily
DILL Family:Apiaceae.	Green leaves,stalks of the plant.	Coumarins, flavonoids, phenolic acids and steroids,limonene, carvone and dill ether	Uterus cancer	3 g/day dill
GARLIC Family:Amaryllidaceae	Bulb, roots, flowers.	Sulfur compounds with diallyl trisulfide, diallyl disulfideand methyl allyl trisulfide	Colorectal cancer, Liver, or Pancreatic cancer.	2 to 5 g of fresh raw garlic; 0.4 to 1.2 g of dried garlic powder; 2 to 5 mg of garlic oil; 300 to 1,000 mg of garlic extract
GINGER Family:Zingiberaceae	Bulb,stem, roots	Phenolic and terpene compounds, Gingerol, Shogaol, trans-6-shogaol, Zingiberene, Citral, elemol, Borneol	Gastric cancer, Pancreatic cancer, Liver cancer, Colorectal cancer	0.5g to 1.0 g daily, 170 mg to 1 g 3 to 4 times daily.
ROSEMARY Family:Lamiaceae	Leaves, roots, stem, flowers.	1,8-cineol, camphor, α -pinene, limonene, camphene and linalool, triterpenes, phenolic diterpenes and phenolic	Breast cancer, Colon cancer, Skin cancer.	4 to 6 grams of the dried herb.

		acids including Rosmarinic acid, carnosic acid, rosmanol, carnosol, ursolic acid and betulinic acid.		
SAFFRON Family: Iridaceae	Saffron stigmas, flowers.	Crocin, picrocrocin and saffranal, 65% carbohydrates, 6% fat, 11% protein (table) and 12% water.	Lung cancer, Pancreatic cancer, Breast cancer, Colorectal cancer, Leukemia, Cervical cancer, Skin cancer.	20 to 400 mg/day of pure saffron, 1.5 g/day of saffron, 20-100 mg by mouth daily for up to 3 months.
THYME Family:Lamiaceae	Leaves, stem, flowrs.	p-cymene (8.41%), γ -terpinene (30.90%) and thymol (47.59%),limonene (7.93%), α -pinene (7.22%).	Triple-negative breast cancers.	50–200 mg/kg
TURMERIC Family: Zingiberaceae	Underground rhizomesm, leaves.	Curcumin, Curcuminoid, Bisacurone, Curcumene, vanillylidene acetone, Germacrone, Bisdemethoxycurcumin, Bisabolene, Curdione, Desmethoxycurcumin, Zingiberene, Beta-sesquiphellandrene, Phellandrene, Dihydrocurcumin, EF-24, Eucalyptol	Lung cancer, Breast cancer, Prostate cancer, and Colon cancers.	1.44 g of curcumin per day
BLACK PEPPER Family: Piperaceae	Ground, dried, and cooked peppercorns, fruit.	Terpenoids (α -pinene, β -pinene, δ 3-carene, limonene, α -terpinene-4-ol, p-cymene) and alkaloids (piperine and related compounds), α - and β -pinene, myrcene, α -phellandrene, linalool, methyl propanal, 2- and 3-methylbutanal, butyric acid and 3-	Chronic myeloid leukemia. [It's a type of cancer that starts in certain blood-forming cells of the bone marrow.]	20 mg daily.

		methylbutyric acid.		
CAYENNE PEPPER Family: Solanaceae	Leaves and fruit	Vitamins A and C, and flavonoids and carotenoids, Capsaicin, Nordihydrocapsaicin, Dihydrocapsaicin, Homodihydrocapsaicin, Cryptoxanthin.	Prostate cancer, Skin cancer, and Pancreatic cancer.	2.5 mg of capsaicin per gram.
ASTRAGALUS Family: Fabaceae	Root, leaves.	Polysaccharides, flavonoids, and triterpenoid saponins	Non-small cell lung cancer.	9 to 30 grams per day.
DONG QUAI Family: Umbellifers	Root, stalk	Coumarins, essential oils, ferulic acids, psoralens, and vitamin B12 and folic acid, the active form of folic acid	Breast cancer.	3 to 15 g/day.
BURDOCK ROOT Family: Asteraceae	Deep roots, stem	Inulin, amino acids, sulphur-acetylene class, multi-polyacetylenes, poly-phenols and volatile oil, flavonoides, minerals	Pancreatic carcinoma.	6 g/day of burdock root tea, and 12 g/day of a burdock fruit extract
ESSIAC TEA Family: Theaceae	Roots, bark, flowers, stalks.	Carbohydrates, flavonoids, proteins, minerals, amino acids, volatile oil, penolic acid.	Breast cancer.	2 to 4 ounces of this tea every day.
HYPERICIN Family: Hypericaceae	Flowers.	Monoterpenes α - and β -pinene, limonene and myrcene; the sesquiterpenes β -caryophyllene and caryophyllene oxide; and hydrocarbons such as n-decane, C16- and C29 alkanes and C24, C26 and C28 alkanols.	Breast cancer, Cervical cancer, Colorectal cancer, Colon cancer, Hepatocellular carcinoma, Stomach carcinoma, Leukemia, Lung cancer, Melanoma, and Glioblastoma cancer.	0.05 to 0.50 mg/kg once each morning for up to 3 months.
MORINGA TREE Family: Moringaceae	Root, bark, gum, leaf, fruit (pods), flowers, seeds.	Tannins, saponins, flavonoids, terpenoids and glycosides.	Pancreatic cancer.	6-10 grams by mouth daily.

MISTLETOE EXTRACTS Family: Viscaceae	The leaves, berries, and stem of the mistletoe plant	Viscotoxins, lectins, flavonoids, phenolic acids, terpenoids, sterols, phenylpropanoids, and alkaloids.	Breast cancer.	1000 mg i.v. weekly for three weeks on a 28-day cycle.
NUTMEG Family: Myristicaceae	Leaf, mace, kernel, and seed	Sabinene, α -pinene, β -pinene, d-limonene, and β -myrcene, D-pinene, limonene, D-borneol, L-terpineol, geraniol, safrol, and myristicin.	Colon cancer.	1 to 2 mg/kg body weight.
FENUGREEK Family: Fabaceae	Green leaves, seeds.	Carbohydrates, proteins, lipids, alkaloids, flavonoids, fibers, saponins, steroidal saponins, vitamins, and minerals, nitrogen compounds.	MCF-7 estrogen receptor-positive breast cancer, colon cancer, osteosarcoma cancer, leukemia cancer, and liver cancer.	5-10 grams by mouth daily for up to 3 years.
ASHWAGANDHA Family: Solanaceae	Root, leaves, stem.	Alkaloids steroidal lactones (withanolides, withaferin's) and saponins.	Breast cancer.	225–600 mg per day.
NEEM Family: Meliaceae.	Fruits, leaves, stem, roots, flowers, stalks, seeds.	Azadirachtin and the others are nimbolinin, nimbin, nimbidin, nimbidol, sodium nimbinate, gedunin, salannin, and quercetin.	Prostate cancer.	Neem Leaves: 4-5 leaves once a day. Neem Churna: ¼-½ tsp twice a day. Neem Capsule/ Tablet: 1-2 tablets or capsules twice a day. Neem Juice: 2-4 tsp twice a day. Neem Syrup: 3-4 tsp

				twice a day after meals.
ASAFOETIDA Family: Ferulaceae.	Rhizome and roots	40–64% resin, 25% endogenous gum, 10–17% volatile oil, and 1.5–10% ash	Breast cancer, Lung cancer, Liver cancer.	100 mg/kg asafoetida for 21 d against breast cancer, a daily dosage of asafetida resin 200 to 500 mg is used for medicinal purposes.
FENNEL Family: Apiaceae.	Fruit, leaves	Trans-anethole (31.49%), 2-pentanone (25.01%), fenchone (11.68%) and benzaldehyde-4-methoxy (8.01%), β -pinene, anisic acid, phellandrine, and anisic aldehyde.	Breast and Liver cancer.	5 to 7 g and 0.1 to 0.6 ml.

Conclusion:

A substantial number of people with cancer are likely to take herbal medicines at any one time. With such a high number of potential users and the potential for adverse effects, including adverse drug interactions, a robust evidence base for understanding all aspects of herbal medicine use by those with cancer is required. An understanding of the self-medication behaviors of these individuals is essential if healthcare professionals are to support treatment adherence and avoid unwanted pharmacological interactions and compromised treatment efficacy. Health professionals need to be aware of which herbal medicines are being taken by their patients. People are getting interested gradually in using herbal remedies as fruitful sources for cancer treatments. Surely, there is ever-increasing evidence that herbal compounds with anticancer activity can modulate a variety of signaling pathways comprising autophagy and apoptosis pathways. Finally, the study sheds lights on the pharmacological applications of herbal medicine in the treatment of cancer and its potential use as anti-cancer agents.

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