Journal of Applied Pharmaceutical Science Vol. 0(00), pp 001-028, 2024
Available online at http://www.japsonline.com
DOI: 10.7324/JAPS.2024.180248
ISSN 2231-3354

Kerala's anticancer flora: A comprehensive review

Mythili Srinivasan[1], Ashwini Y. Chandane[2], Amol A. Tagalpallewar[1], Anil T. Pawar[1], Manasi Nimbalkar[3], Ranjit Nimbalkar[4], Akshay M. Baheti[1*]

[1]School of Health Sciences and Technology, Dr. Vishwanath Karad MIT World Peace University, Pune, India.
[2]Abhinav Education Society's, College of Pharmacy, Pune, India.
[3]Department of Kriya Sharir, Ashtang Ayurved Mahavidyalaya, Pune, India.
[4]Anubandha Health Care, Pune, India.

ARTICLE HISTORY

Received on: 06/12/2023
Accepted on: 20/02/2024
Available Online: XX

Key words:
Anticancer, ayurveda, folklore uses, medicinal plants, phytoconstituents, tribal communities, meta-analysis.

ABSTRACT

This ethnobotanical investigation explored native healing herbs for anticancer efficacy in Kerala's Wayanad and Kozhikode districts. Insights were gathered from various stakeholders, including spice dealers, exporters, Ayurveda practitioners, tribal communities, and farmers, through discussions, interviews, and questionnaires from February 2021 to August 2022. Field expeditions to tribal settlements yielded crucial data on botanical nomenclature, common identifiers, vernacular names, traditional applications, and anecdotal applications. Following PRISMA guidelines, a systematic review incorporated a meta-analysis of 311 articles from Ovid Medline, Scopus, Web of Science, and PubMed. Results showed a significant pooled effect (p-value 0.001), variable subgroup effectiveness (RR = 0.4118, p 0.009), and study-related impacts (p = 0.4837). Reliability was confirmed through sensitivity testing with negligible bias ($p > 0.05$). Despite notable unexplained heterogeneity (I^2 = 87.82%, H^2 = 8.21), the study emphasized the statistical significance of the selected medicinal plants. This investigation advances the ethnobotanical knowledge of Malabar's anticancer herbs, underscoring the imperative for future research to exploit their therapeutic potential. It serves as pivotal groundwork for future developments in herbal medicine.

INTRODUCTION

Plants have played a significant role in human life, and their utilization for treating various diseases has a long history [1]. The earliest documented records of using medicinal plants date back to 2,600 BC, authored by the Sumerians and Akkadians. In ancient India, the knowledge of medicinal herbs and their application was described in the Rigveda and Atharvaveda (3,500–1,500 B.C.), paving the way for the alternative medical system of Ayurveda [2]. In the present era, over 70% of people worldwide rely on plant-derived medicines to treat various illnesses and health conditions [3]. India stands at the forefront of medicinal plant cultivation and is renowned as the "Botanical Garden of the World." The medicinal plant market in India is currently valued at 4.2 billion (56.6 million USD) and is projected to reach 14 billion (188.6 million USD) by 2026 [4]. According to a World Health Organization (WHO) estimate, approximately 75% of people all over the world incorporate herbal remedies as alternative or complementary medicine. Plant-derived drugs are enormously consumed, particularly in combating various types of malignancies, due to their antioxidant, immune-modulatory, and cancer-healing properties, which offer minimal side effects.

Each year, more people throughout the world succumb to cancer. According to the "Globocon 2022" survey conducted by the WHO, nearly 19,292,789 new cancer cases were reported worldwide in 2020, resulting in 9,958,133 deaths across genders [5,6]. Lung cancer remains the leading cause of death with 18.4% of cancer cases, followed by breast cancer in women at 11.6%, and stomach and liver cancer at 8.2% each. Nearly 7% of cancer-related deaths are attributable to prostate and colorectal cancers, respectively [7,8].

Three basic categories of etiological factors, namely chemical, physical, and environmental, are responsible for

*Corresponding Author
Akshay M. Baheti, School of Health Sciences and Technology, Dr. Vishwanath Karad MIT World Peace University, Pune, India.
E-mail: akshay.bahei @ mitwpu.edu.in

turning normal cells into cancerous cells. Chemical carcinogens such as benzpyrene, asbestos, and over 800 other chemical moieties; physical carcinogens, such as various forms of ionizing radiation; and biological carcinogens, including microorganisms, are to name a few [9,10]. In addition, environmental factors like pollution and lifestyle choices such as smoking, alcohol consumption, sedentary living, obesity, and the adoption of high-fat, high-calorie diets significantly contribute to the incidence of various malignancies [11]. In practical terms, identifying the precise etiology and genetic factors responsible for a specific form of cancer is a complex process with limited treatment options. Modern cancer treatment methods primarily involve chemotherapy, radiation therapy, and immunotherapy, accompanied by surgical tumor removal through different procedures. However, chemotherapeutic agents often produce multiple side effects and adverse drug events, affecting normal cells such as the bone marrow, gastrointestinal tract, and hair follicles. In addition, synthetic drugs face significant challenges, including drug resistance [4].

The utilization of plants by ancient individuals, driven by astute observation and inherited sagacity, holds historical significance. Phyto-origin drugs offer substantial advantages over synthetic medications, displaying minimal side effects, adverse events, cost-effectiveness, efficacy, and low toxicity. The anti-cancer mechanisms of phytoconstituents encompass modulation of cell growth, differentiation, induction of cell death, hindrance of angiogenesis, and obstruction of metastasis. Recently, research on phytodrugs has been escalating exponentially [12]. In addition, more than 50% of the approved new chemical entities registered with the USFDA in the last 15 years originate from phytoconstituents and their derivatives [13]. Phytopharmaceuticals and their derivatives, with their diversified structures and distinctive pharmacological and molecular characteristics, harness potential as chemotherapeutic agents. Alkaloids isolated from Vinca rosea, such as Vincristine, Vinblastine, Taxane diterpenoids (Paclitaxel and Docetaxel), Epipodophyllotoxin (Etoposide and Teniposide), and Camptothecin, have significantly contributed to cancer chemotherapy [14,15]. Drugs such as Paclitaxel and Camptothecin command over 30% of the world's anti-cancer drug market [16], accounting for nearly $9 billion, underscoring the significance of plant-derived drugs [17,18]. Numerous plant-origin drugs, such as Betulinic acid, Combretstatin, Curcumin, Homoharringtonine, Indirubin, Flavipiridol, Roscovitine, Brucantine, Lycophene, Resveratrol, and Silvestrol, are currently undergoing clinical or preclinical trials, showcasing their potential for future utilization [14,19]. Therefore, access to ethnobotanical information on medicinal plants from both traditional and folklore sources is indispensable for the scientific community to develop innovative drugs and drug delivery strategies. Kerala, renowned as "God's own country," is celebrated for its biodiversity and traditional Ayurvedic wisdom. The tribes of Kerala, comprising Malayans, Kurumbas, Karimpalans, Kattunaikans, Mullukkurumans, Malapanickars, Kadars, Koragas, and Cholanaikkans, possess extensive knowledge of medicinal plant usage for diverse ailments, spanning millennia [19]. The Wayanad and Kozhikode districts were chosen and surveyed for this review. This study approach encompassed 50% survey data, 30% meta-analysis reports, 11% observational studies, and 9% interventional studies. The PRISMA web tool (https://prisma-statement.org) was used for the systematic review guidelines [20]. Subsequently, a flow chart was plotted for the review screening process using the Prisma flow chart 2020 protocol. Furthermore, the screening of 552 articles obtained from Medline, Web of Science, and PubMed was done using the Ovid web tool (https://ovidsp.ovid.com/) [21] for duplication removal. The filtered articles underwent manual screening with two reviewers, and the final check was enabled by the third reviewer. The shortlisted articles underwent meta-analysis using the Meta-Mar web tool (https://meta-mar.shinyapps.io/) [22], covering subgroup analysis, effect size analysis, publication bias, and publication correlation.

The Wayanad and Kozhikode regions of Kerala

Kerala is situated on the south-western Malabar coast, with latitudes ranging from 8°18′ N to 12° 48′ N. The longitudes cover the span of 74° 52′ E–77°24′ E. The state is divided into three main regions, namely the eastern highlands, the central midlands, and the western lowlands. The selected territory falls between the eastern highlands and the central midlands, with latitudes ranging from 11°5′ N to 11° N and longitudes spanning from 75°2′ E to 76°5′ E. This region is situated between the Sayadri mountains and the coastal lowlands [23]. The climate in this area experiences a significant variation in temperatures throughout the year, ranging from 17°C to 48°C. During the summer months, temperatures can soar up to 50°C. In contrast, during the winter, the average temperature ranges from 17°C to 21°C in the Wayanad region and slightly higher (around ±5°C) in Kozhikode. The ethnobotanical information for this region was meticulously collected during the period from February 2021 to August 2022. Ethnobotany involves the study of the intricate relationship between plants and people, including the traditional knowledge and uses of plants in local communities. The data gathered during this time frame is expected to encompass the plant usage and traditional knowledge of the local people during that specific period [24].

The selected districts of "Wayanad and Kozhikode" in Kerala are known as the "Malabar Hill regions." These areas are inhabited by various tribes, each with its own unique culture and practices. In the "Wayanad region," the tribes include Adiyans, Paniyars, Mullukkurumans, Kattunaikans, Kurichyars of Wayanad, Kanaladi, and Wayanad Kadars. On the other hand, the tribes found in the "Kozhikode district" are Malapanickars, Malayans, Paniyans, Kattunaikans, Karimpalans, and Kurichyars [25,26]. The "Kadars" are inhabitants of various districts, including Malappuram, Wayanad, Thrissur, Kannur, and Kozhikode. The selected Malabar regions are represented in Figure 1.

The "Kattunaikans" tribes reside in the Palakkad, Kannur, and Kozhikode districts of the Malabar hills, where they are primarily involved in the cultivation of food grains and fruits. The "Mullukkurumans" community in Wayanad district is known for their traditional hunting and food gathering practices. However, in modern times, they have also extensively engaged in agriculture, particularly in growing various spices,

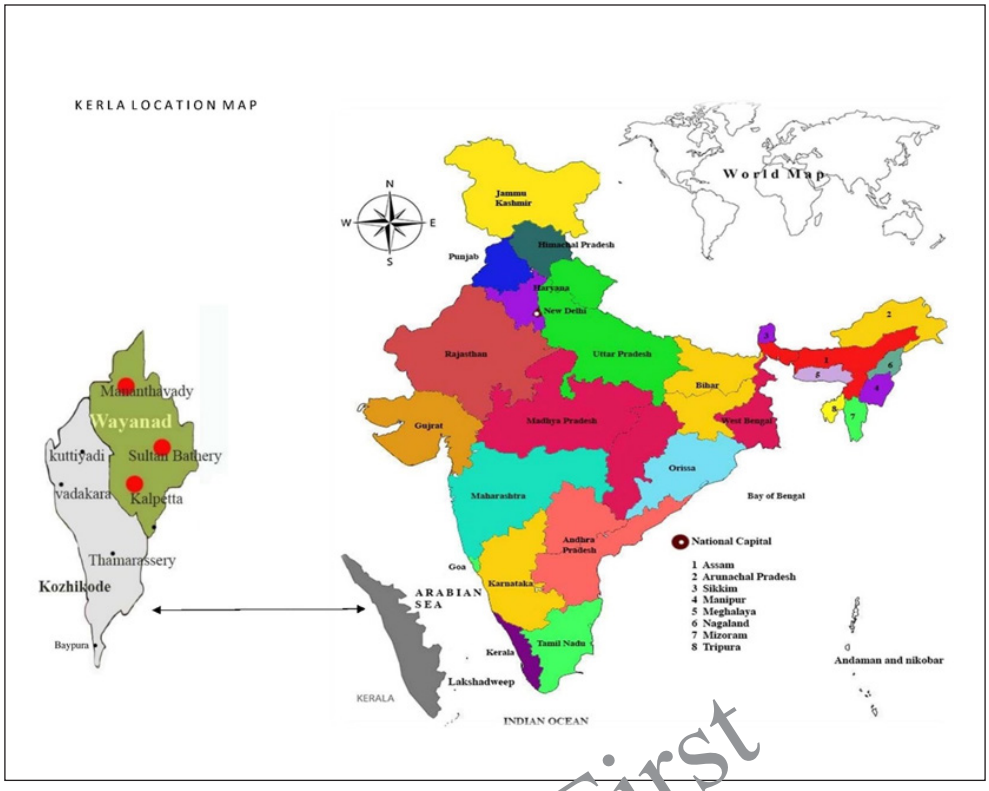

Figure 1. The selected Malabar regions (Wayanad and Kozhikode) of Kerala.

herbs, medicinal plants, and millets. The "Ayurveda" system of medicine is widely practiced and utilized by both experts and common people in the selected study regions. Moreover, the region is renowned for its enormous spice collection, trading, and exports, making it a significant hub for the spice industry [20,27].

MATERIALS AND METHODS

Data collection methods for the survey

The data collection of this survey enabled the "participatory rural appraisal method," which proved to be a cost-effective and time-efficient approach. All the data for this study were gathered through structured interviews, semi-structured questionnaires, field surveys, sample collection, and note procurement. The study took place in the selected area of the Malabar Hills, which is inhabited by various tribal communities, including Mullukurumban, Kattunaikans, Karimpalans, Malapanickars, Malayans, Paniyans, Kurichyars, Kadars, and Koragas. Within these two districts, a total of 38 villages were included in the study, each hosting more than five types of indigenous tribes unique to that particular territory. Extensive interviews were conducted with the tribal people using different methods, predominantly semi-structured questionnaires and field surveys. In addition, traditional healers among the tribes were identified, and their knowledge of folklore-related ailments was documented. To ensure the reliability of the data, two separate visits were made to the tribal settlements, and the medicinal plant samples were locally identified. The samples were labeled with ethnobotanical information, and all the acquired information was diligently recorded in field notebooks.

Meta analysis

Literature search methods

The PRISMA systematic review guidelines were followed for this study, and the flow chart was plotted using the PRISMA web tool 2020 [20]. The article search was achieved using PubMed, Ovid/MEDLINE, Scopus, and Web of Science databases. The option for English abstracts from database inception to April 3, 2023, was enabled. The search strategy consisted of keywords related to phytochemicals, the English language, and cancer. Furthermore, screening of the 552 selected articles was carried out using the Ovid web tool (https://ovidsp.ovid.com) [21]. The Prisma flow chart for the screening process is illustrated in Figure 2.

Inclusion and exclusion criteria

The inclusion criteria encompassed full-text articles with phytoconstituents, anticancer activity, and pharmacological uses. The search was enabled using Boolean search terms such as "Phytoconstituents AND anticancer activity OR pharmacological uses" and "Phytochemicals OR plant constituents AND (Antitumor activity OR cytotoxicity) OR medicinal properties." The articles that are phytoconstituent derivatives, incomplete data, duplicate articles, retracted articles, non-English articles, and articles not of interest were excluded. The inclusion and exclusion criteria were achieved with a manual review with two reviewers, followed by a final check

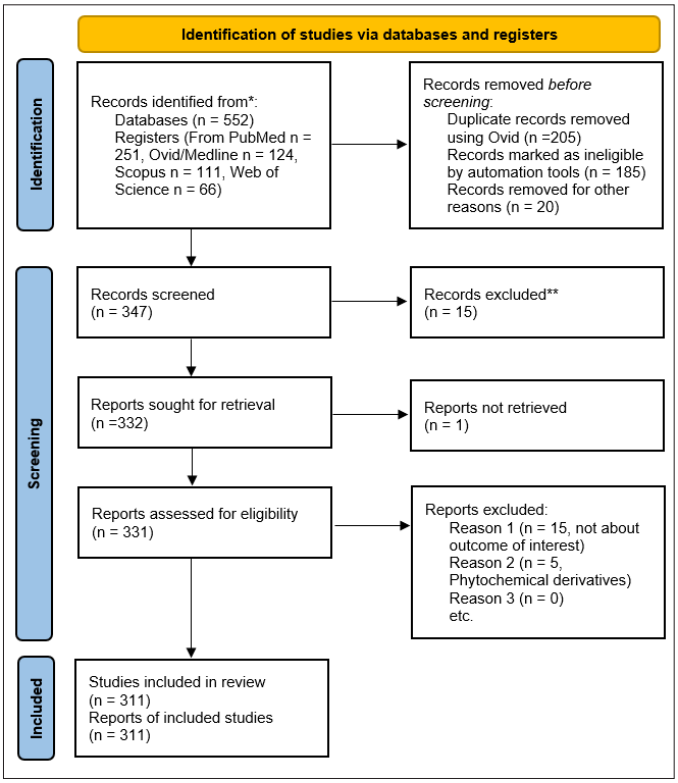

Figure 2. Prisma flow chart for the systematic review screening process.

by a third reviewer. The 347 shortlisted articles were screened for inclusion and exclusion criteria. Around 15 articles were excluded. The 331 original articles were subjected to the final screening process. Fifteen articles that were not the outcome of interest and five articles with phytochemical derivatives were excluded after screening, and the 311 articles were included for further analysis using the Meta-Mar web tool [22].

Meta analysis

The meta-analysis of the included articles covering risk ratio (RR), publication bias, publication correlation, subgroup analysis, effect size prediction, sensitivity, and heterogeneity was performed using the Meta-Mar web tool. The 311 articles were thoroughly analyzed statistically using the Meta-Mar web tool (https://meta-mar.com) [22]. Effect sizes were determined after the articles were chosen based on their quality and relevancy. To evaluate the diversity of the study outcomes and pinpoint heterogeneity, statistical techniques like Cochran's Q and I^2 were utilized. To investigate the probable cause of the discrepancy in results among selected articles, subgroup analyses were performed. To examine the potential impact of study-specific factors on the noted effects, a meta-regression analysis was conducted. Analyses using funnel plots and statistical tests were used to determine the likelihood of publication bias and publication correlation. A sensitivity analysis was carried out to guarantee the accuracy of the findings when particular articles were excluded.

RESULTS

There are 4,600 native plants in Kerala, and 900 of them have potent therapeutic properties. More than 180 medicinal plants can be found in Kozhikode and Wayanad, the two districts that were chosen. Among these, 95 plant species from 46 plant families have demonstrated the possibility of possessing anticancer characteristics. The information was gathered and organized, and screening and meta-analysis were performed for phytoconstituents and pharmacological applications, including cancer (Table 1). The common names, vernacular names, folklore applications, and traditional usage were obtained from survey reports, observational, and interventional study data. The tribal communities have used medicinal plants for centuries. They prepare decoctions and pastes from plant parts, such as leaves, flowers, stems, barks, and roots. These preparations are ingested or applied externally for a variety of health conditions. The native tribal people have a deep knowledge of the medicinal properties of plants. They are able to identify the plants that are effective for specific conditions, and they know how to prepare the plants for optimal effectiveness.

The alternative medical science of "Ayurveda" is extensively practiced and embraced by the common people in the selected districts of Wayanad and Kozhikode. Despite this, it is essential to note that many of the selected medicinal plants remain unexplored or only partially explored in terms of their potential benefits and uses. Ayurvedic practitioners in the region have a long history, with records dating back 3,000 years detailing the usage of various medicinal plants found in the region. Some Ayurvedic preparations for the aforementioned medicinal herbs can be procured from Ayurvedic pharmacies. In Ayurveda, medicinal plants and their parts are formulated in different forms depending on the disease condition, need, and efficacy. These formulations include Choornams, Vati, Kashayams, Arishtams, Avaleha, and Tailams [27].

A comprehensive analysis was conducted utilizing 326 articles. In the context of a common effect model, the pooled RR exhibited a value of 0.6503 [95% confidence interval (CI): (0.6007; 0.7040)], indicating a statistically significant association ($p < 0.0001$). The random effects model demonstrated an RR of 0.4894 [95% CI: (0.3301; 0.7257)], which was also statistically significant ($p = 0.0019$). Heterogeneity within the study was substantial, with an I^2 value of 92.1% [95% CI: (88.3%; 94.7%)] and a corresponding Tau2 value of 0.3132 [95% CI: (0.1197; 1.1115)]. The Cochran's Q test supported the presence of significant heterogeneity [Q: 152.23, degrees of freedom (d.f.): 12, $p < 0.0001$]. Subgroup analysis under the common effect model revealed varying RR values across different subgroups: subgroup 1 [RR = 0.2644, 95% CI: (0.1449; 0.4825)], subgroup 2 [RR = 0.4118, 95% CI: (0.3602; 0.4708)], subgroup 3 [RR = 0.9836, 95% CI: (0.8704; 1.1115)], and subgroup 4 [RR = 0.6563, 95% CI: (0.5519; 0.7805)]. Significant differences were identified among the subgroups (Q between groups: 97.32, d.f.: 3, $p < 0.0001$; Q within groups: 54.91, d.f.: 9, $p < 0.0001$). Similarly, the random effects model's subgroup analysis demonstrated varying RR values: subgroup 1 [RR = 0.2644, 95% CI: (0.1073; 0.6514)], subgroup 2 [RR = 0.4355, 95% CI: (0.0970; 1.9554)], subgroup 3 [RR = 0.4784, 95% CI: (0.0000; 1482.5025)], and subgroup 4 [RR = 0.6376, 95% CI: (0.3002; 1.3543)]. While the differences in subgroups were not statistically significant in the random effects model (Q: 6.87,

Table 1. Significant anticancer medicinal plants from Wayanad and Kozhikode districts of Kerala.

Sr. No	Botanical name & family	Malayalam names and common names	Phyto constituents	Folklore/Tribal uses	Uses given by *in-vitro*, *in-vivo* studies	References
1.	*Abrus precatorious* L. **Family**: Fabaceae	English: Jequirity bean, rosary pea Malayalam: Kunnikuru	Lectins, Abrin-A to D, Abrus agglutinin	Treatment for ulcer, Boils, Paralysis, Alopecia and Mouth Ulcers	Anticancer (Lung, Stomach, Breast)	[2]
2.	*Acanthus illicifolis* L. **Family:** Acanthaceae	English: Mangrove, holy leaf acanthus Malayalam: Chulli, Chullikandal, Chakkaramulli, Payinachulli	Alkaloid - (Tri terpenoids alkaloids) Acanthicifoline, Acansifoliuside, Megastigmone, Flavone glycosides, triterpenoid saponins	Hepatoprotective, Antiulcer, Anti- microbial, Vermicidal, and Anti-rheumatic Properties.	Anticancer (Breast, Stomach, Colon)	[28,29]
3.	*Acorus Calamus* **Family:** Araceae	English: Sweet flag Malayalam: Vayambu, Vasanpa	A-Asarone, β-Asarone, aterpineol, Caracorene, Acorone, Acrenone, Calacorene	Use in Bronchitis, Sinusitis, Epilepsy, Dysmenorrhoea, Mental problems, Aphrodisiac, and as a Brain tonic	Anticancer (Prostate, Liver)	[30,31]
4.	*Acyranthes aspera* L. **Family:** Amaranthaceae	English: Chaff flower, Prickly Chaff flower Malayalam: Kadaladi	Alkaloids, Cardiac glycosides, tannins, Steroids, Flavonoids, terpenoids and proteins	Antiulcer, dropsy, Boil treatment, Dog bite, Snake bite and Scorpion bite ailments	Anticancer (Lung, Breast)	[2,32,33]
5.	*Adenanthera pavonia* L. **Family:** Fabaceae	English: Red lucky seed Malayalam: Manjadi, Maniadi	Triterpenoid Alkaloids, Flavonoids, Steroids	Asthma, Gout, Inflammation, Boils, Diarrhoea, Ulcer, Rheumatism	Anticancer (Oesophagus, Lung Stomach)	[34–36]
6.	*Adhatoda vasica* L. and *Adhatoa beddomei* **Family:** Acanthaceae	English: Malabar nut, Malayalam: Adolakam, Adalodakam	Quinazoline alkaloids, Vasicine, Peganine, Vasicinone	Fever, Cough, Cold, Respiratory tract infections, Asthma, Bronchitis, Diabetes, Skin infections, Depression and Cancer	Anticancer (Breast, Lungs, Colon)	[37,38]
7.	*Allamanda cathartica* L. **Family:** Apocynaceae	English: Golden trumpet Malayalam: Manjakolambi kolaambi	Hydrocarbons, aldehydes, Flavonoids, Rutin, Plumieride,	Antiemetic, diuretic, Cathartic, Anti-colic, Anticancer and Laxative	Anticancer (Colon, Stomach)	[39]
8.	*Alstonia scholaris* **Family:** Apocynaceae	English: Devil's tree, Milk wood pine Malayalam: Ezhilam Pala	Alkaloids such as Alstonine, Echitamine, β-Amyrine	Arthritis, Dog bites, Wounds, Jaundice, Hepatitis, Malaria and Impotency	Anticancer (Stomach, Colon, Leukaemia)	[40–42]
9.	*Alternanthera brasiliana* L. (Kuntze) **Family:** Amaranthaceae	English: Brazilian joy weed, Penicillin Malayalam: Chuvanna cheera	Phenols, flavonoids, Alkaloids, Phytosterols and Tannins	Cough, inflammation, Diarrhoea, wounds, viral infections, and Tumours	Anticancer (Stomach, Intestine, Liver)	[43,44]
10.	*Anacardium occidentale* **Family:** Anacardiaceae	English: Cashewnut tree, cashew apple Malayalam: Kappamavu, Kasumavu, Parangimavu	Poly phenols, Carotenoids, Anacardic acid, Cardol, Cardanol, Zoapatanolide-A, Agasthisflavone, Vitamins (B2, B3, C, E), Pro anthocyanidins (Flavonoids)	Inflammation, Microbial infections, Herpes- simplex virus infections, Malaria, Fungal infections, Cancers, Tumours, Immuno modulatory and Dietary supplement,	Anticancer (Breast, Glioma, Cervical, Lung, Liver, Cervix)	[45–49]
11.	*Andrographis paniculata* (Burn F) Nees. **Family:** Acanthaceae	English: King of bitters Malayalam: Kaakanjiram, Kiriyatu, Nilavepu	Diterpene lactones, Andrographolide, Neo-andrographolide	An Anti-Diabetic, Antiulcer, Anticancer, Hepato protective, Immunomodulatory, Antiarthritic, Anti-inflammatory, and Antipyretic	Anticancer (Lung, Breast, Cervix, Colon and Stomach)	[50,51]

(Continued))

Sr. No	Botanical name & family	Malayalam names and common names	Phyto constituents	Folklore/Tribal uses	Uses given by *in-vitro, in-vivo* studies	References
12.	*Annona squamosa* Linn. Family: Annonaceae	English: Sugar apple, Custard apple Malayalam: Seethapazam, Aathi, Aatha	Cinnamic acid derivatives (p-Coumaric acid, Ferulic acid), Tannins, Glycosides, Alkaloids, Saponins	Antitumor, Vermicide, Skin problems, Insect bites, Antiulcer and Hysteria treatment	Anticancer (Utrus, Ovary, Breast, Cervix and Intestine)	[52–55]
13.	*Aristolochia indica* L. **Family:** Aristolochiaceae	English: India birthwort Malayalam: Eshwaramulla, Karudakodi. Ishwaramooli	Sesquiterpene hydrocarbons (Ishwarane, Aristolochene), Aristolochic acid, β-Sitosterol, Essential oils,	Malaria, Diarrhoea, Cholera, Leprosy, Ulcers, Tumours, Dermatological disorders, Spider and Insect bites	Anticancer (Breast)	[56,57]
14.	*Artemisia vulgaris* and *Artemisia nilagarica* **Family:** Asteraceae	English: Mug wort, St John's plant, Worm wood Malayalam: Thirunitripachcha, karpoora thulasi	Mono and Sesquiterpenes, Crys anthenone, Sabenene,	An Analgesic, Antispasmodic, Diuretic, Flavouring agent, Upper respiratory tract infections, Cardiotonic, Antitumor, Cough and Cold	Anticancer (Colon, Breast, Stomach, Intestine)	[58–60]
15.	*Asystasia gangetica* L. **Family:** Acanthaceae	English: Chinese violet, creeping foxglove Malayalam: Thuppalampotti	Poly Phenols, Flavonoids, Tannins (Proanthocyanins) and Polysaccharides	Tumour regression, Epilepsy, Fever, Stomach ache, Snake bite, Cough and Upper respiratory tract infections	Anticancer (Stomch, Lungs, Throat)	[61,62,25]
16.	*Azardirachta indica* A. Juss. **Family:** Meliaceae	English: Indian lilac, Margosa tree Malayalam: Ariyaveppu, Nimbam, Veppu	Azardirachtin, Nimbin, Nimbolinin, Nimbidol, Gedunin, Nimbidin Catechin, Gallic acid, Morgolone, Morgolonone and Quercetin	Chicken pox, Small pox, Tumours, Cancers, Inflammation, Skin disorders, Diabetes, Fungal and Bacterial infections	Anticancer (Lukemia, Stomach, Skin, Colon, Intestine, Breast)	[63,64]
17.	*Bauhinia variegata* L/ *Bauhinia tomentosa* L. **Family:** Fabaceae	English: Mountain ebony Malayalam: Chuvannamandaram, Malayakathi, Mandaram	Alkaloids, Flavonoids, Saponins, Quercetin, Rutin and Isoquercetin	Tumour regression, Leprosy, Worm infestation, antiseptic and Cervical lymphadenitis	Anticancer (Breast, Skin, Cervix, Ovary, Liver)	[65–67]
18.	*Berberis vulgaris* L. **Family:** Berberidaceae	English: Barberry Malayalam: Kasturimanjal Maradarisina	Benzylisoquinolines, Berberine, Berbamine, Berberubbine, Columbamine, Coumarin, Flavonoids and Tannins	Anti-tumour, Anti-inflammatory, Antibiotic, Antiseptic, Anti-microbial, Antidepressant, Hepatitis and Bilary fever treatment	Anticancer (Myeloid Leukaemia, Breast, Ovary, Lung)	[68–70]
19.	*Bidens Pilosa* var. minor. **Family:** Asteraceae.	English: Farmers friend, Black Jack Malayalam: kithachedi, Snehakoora	Polyacetylenes, Polyacetylene glycosides, Terpenes, Phyto sterols, Flavone glycosides	Ailment of Diabetes, Malaria, Hypertension, Tumours and Cancers	Anticancer (Adenocarcinoma)	[71–73]
20.	*Biophytum sensitivum* L. (D.C.). **Family:** Oxalidaceae	English: Life plant Malayalam: Mukkutti, Theendavadi	Steroids, Terpenes, Flavonoids, Tannins, Saponins, Polysaccharides and Pectin	Antitumor, Anticancer, Immunomodulatory, Antidiabetic, Anti-inflammatory and Anti-atherosclerotic	Anticancer (Lung, Liver, Breast, Cervix, Skin)	[74,75]
21.	*Blepharis maderaspatensis* L. Heyne ex Roth. **Family:** Acanthaceae	English: Creeping Blepharis Malayalam: Elumbotti, Hemakandi	Verbascoside, Vanillic acid, Apigenin, Coumoryl purine	Ailment of wounds, Skin burns, Stomach ache, Inflammation, Edema, Tumors regression, Bacterial and Fungal infections	Anticancer	[76,77]
22.	*Boerhavia diffusa* **Family:** Nyctaginaceae.	English: Hogweed, Pigweed Malayalam: Punarnava	Amino acids, Arachidic acid, Iso palmitic acid, Behenic acid, Calcium	Immunomodulatory, Hepatoprotective, Anti-tumour, Anti-oxidant, Gastro Intestinal disorders, Menstrual disorders, Diuretics, Cancer treatment	Anticancer (Lung, Liver, Ovary, Breast, Oesophagus, Glioma)	[78–80]

(Continued))

Sr. No	Botanical name & family	Malayalam names and common names	Phyto constituents	Folklore/Tribal uses	Uses given by *in-vitro, in-vivo* studies	References
23.	*Capsicum annum* L. **Family**: Solanaceae.	English: Chilli pepper, Caynne pepper Malayalam: Pacha mulaga	Capsaicinoids, Capsaicin, Capsiate, Dihydro capsaicin, Nondihydro capsaicin, Nor capsaicin	Analgesic, Anti-inflammatory, Anticholestrenemic, Anti-oxidant, Anti-tumour, Anticancer, Stimulant, Cardio diseases, Vaso dilator	Anticancer (Ovary, Breast, Liver, Oesophagus, Intestine, Lung)	[81–83]
24.	*Carica papaya* Linn. **Family:** Caricaceae	English: Papaya Malayalam: Boppayi	Alkaloids such as α-Carpaine, Suedo Carpaine, Dehydro Carpaine, Carposide	Ailment of Malaria, Platelet deficiency, Inflammation, Hypotension, Cancer, Obesity, Diabetes	Anticancer (Prostate, Ovary, Cervix, Breast)	[84–86]
25.	*Carallia brachiata* Lour. **Family:** Rhizophoraceae	English: fresh water mangrove Malayalam: Vallabham, Vankana, Varanga	Alkaloids, Hygroline, Di glycosyl megastigmane, megastigmanes, Phenolic compunds and Flavonoids.	Analgesic, Antipyretic, Cuts and Wounds healing, Anti-tumour	Anticancer	[87–89]
26.	*Cassia fistula* L. **Family:** Caesalpinioideae	English: Golden shower tree Malayalam: Kanikonna, Karnikaram	Flavonoids, Anthraquinones, Chromones, Coumarins, Alkaloids, Phytosterols, Triterpenes, Rhein,	Anti-microbial, Anti-fertility, Anti-oxidant, Anti-tumour, Anti-inflammatory, Anti-pyretic. Pulmonary protective and Hepatoprotective.	Anticancer (Uterine, Lung, Ovary)	[90–92]
27.	*Centratherum punctatum* Cass. **Family:** Asteraceae	English: Brazilian bachelor's button Malayalam; Keshavardhini	Sesquiterpenes, Centratherin, Isocentratherin	In Microbial infections, Cardiac diseases, Tumours regression, Hair fall, Alopecia	Anticancer	[93–95]
28.	*Cinnamomom Zeylanicum* CZ. **Family:** Lauraceae	English: Cinnamon, Cassia Malayalam: Elavangam	Cinnamon oil, Eugenol-Cinnamyl acetate, Trans-α-Bergamotene, Caryophyllene	Antitussive, Cold, Influenza, Diarrhoea, Hair fall, Toothache, Tumors regression , Dementia, Insomnia, Arthritis	Anticancer	[96–98]
29.	*Clitorea ternatea* L. **Family:** Fabaceae	English: Butterfly pea Malayalam: Sankupushpum, Aaral, Malayamukki	Cyclotide peptides, Phlobatannins, tannins, Saponins, Phenols, tri terpenoids, Anthraquinone	Anti-oxidant, Pesticidal, Anti-bacterial, Anti-malarial, Analgesic, Diuretic, Anti-pyretic	Anticancer (Breast, Thyroid, Medulla, Colon, Pancreas, Lung)	[99,100]
30.	*Corchorus olitorius* L. **Family:** Tiliaceae	English: Jute Malayalam: Chanacedi	Cardiac glycosides, B-Sitosterol, Riboflavin, Niacin, Flavonoids, Tannins, Alkaloids, Glycosides, Carbohydrates, Saponins	A Diuretic, Antioxidant, Purgative. Treatment of Gonorrhoea, Tumours, Headache, Chronic cystitis,	Anticancer	[101–103]
31.	*Coscinium fenestratum* **Family:** Menispamaceae	English: Yellow vine Malayalam: Maramanjal	Alkaloids, Glycosides, berberine, Sitosterol glucoside, Oleic acid, Saponin, Ceryl alcohol, Palmitic acid	Antiseptic, Tumours regression, Inflammation, Diabetes, Jaundice, Ulcers and Fever	Anticancer (Leukaemia, Head, Neck, Lung, Liver)	[104–106]
32.	*Crataeva magna* Lour. DC. **Family:** Capparaceae.	English: Three leaved caper, Garlic pear tree Malayalam: Neermanthalam, Neerval, Kili	Alkaloids, Flavonoids, Diterpenes, Saponins, Tannins, Diosgenin, Phytosterols	vermifuge, Laxative, Anti-inflammatory Treatment of Rheumatism, Spleen disorders, Liver disorders, Bronchitis, Bladder stones, Edema, Tumour and Cervical adenitis	Anticancer	[63,107]
33.	*Curcuma Zedoaria* **Family:** Zingiberaceae	English: White turmeric Malayalam: Manjakoova, Adavikachola, Kasturimanjal	Sesquiterpenes, Curcumin, β-Turmerone, β-Edusmol, Ethyl-p-methoxy cinnamate, Zingiberene, β-Elemene	A Blood purifier, Antivenom for snake bites, Anti-colic. Ailment of Coronary heart disease, Liver cancer, Bronchitis, Inflammation, Leukoderma	Anticancer (Ovary, Leukaemia, Lung, Breast, Liver)	[108–110]

(Continued))

Sr. No	Botanical name & family	Malayalam names and common names	Phyto constituents	Folklore/Tribal uses	Uses given by *in-vitro, in-vivo* studies	References
34.	*Curcuma longa* **Family:** Zingiberaceae	English: Turmeric Malayalam: Manjal	Curcuminoids (Curcumin (I, II, III), De methoxy curcumin, Carotenoids, terpenoids, Poly Phenols, α-Turmerone, β-Turmerone, Flavonoids	Leukoderma, Antiseptic, Inflammation, Tumour regression, Vaso constriction, Bronchitis, Pain, Hepatic disorders and as an Expectorant	Anticancer (Breast, Cervix, Ovary, Lung, Liver, Glioma, Head, Uterine, Mouth)	[111–114]
35.	*Cyathillium cinereum* (L) H Rob. **Family:** Asteraceae	English: Little iron weed Malayalam: Poovamkurunilla, Poovamkurunilla	Caryophyllene oxide, n-Hexa decanoic acid, Phytol, Cardiac glycosides, Tannins, Phenols, Flavonoids, Steroids, Saponins	In the ailment of Pain, Inflammation, Colic pain, Cholera, Asthma, Rheumatism, Asthma, Dysentery, Night blindness, Diarrhoea, Conjunctivitis, Arthritis and Cancers	Anticancer	[115,116]
36.	*Cyclea peltata* Hook F. Thoms. **Family:** Menispermaceae	English: Indian moon seed, Bicklered leaved moon seed Malayalam: Padakizhangu, Padathali, Padavalli	Fangchinoline, Cycleapeltine, Cycleacurine, Cycleonorine, Cycleadrine, Bisbenzyl isoquinoline alkaloids, Tetrandrine, Tropolo isoquinoline alkaloids, Parairubrine A, B	In the treatment of Fever, Nephrotic diseases, Cough, Malaria, Asthma, Diabetes, Tooth pain, Hypercholesterinaemia, Tumours. Useful as Blood purifier, Memory enhancer, Antioxidant	Anticancer (Leukaemia, Breast, Ovary, Kidney)	[117–119]
37.	*Cymbopogon citratus* **Family:** Poaceae/ Graminae	English: Lemon grass Malayalam: Chayapullu, Chenganampullu, Inchipullu	Essential oils, Quercetin, Apigenin, α-Citral, β-Citral, Geraniol, Geranyl acetate, Citronellal, Terpinolen, Myrcene, Terpinol methyl heptanone, Phenol, Alcohols, Flavonoids, Ketones	Spasms, Pain, Inflammation, Fever, Microbial infections, Bacterial infections, Tumours and Cancers	Anticancer (Lung, Liver, Thyroid, Breast, Cervix, Ovary)	[120–124]
38.	*Cyprus rotundus* SSP. **Family:** Cyperaceae	English: Nut grass, Purple flat sedge Malayalam: Muthanga	Flavonoids, Phenyl propanoids, Sesquiterpenes, Alkaloids, Saponins, Phenolic acids	Antiulcer, Inflammation, Rheumatism, Fever, Neuroleptic disorders, Tumours regression.	Anticancer (Breast, Cervix)	[125–129]
39.	*Desmodium triflorum* L. (DC) **Family:** Fabaceae	English: Creeping tick-trefoil, Tick clover, Beggar lice Malayalam: Nilamparanda, Cherupulladi, Kunnappalai	Alkaloids, Terpenoids, Flavonoids, Steroids, Phenylpropanoids, Coumarins, Pterocarpans, 5-Methoxy-N, N, dimethyl tryptamine, N-methyl-H4-Harman, β-Carbolinium cation, Rutin, Quercetin, β-Sitosterol, Stigmasterol, Lupeol, α-Amyrone.	Anti-inflammatory, Bactericidal, Anti-diarrhoeal, Antioxidant, Anticonvulsant, Anti spasmodic, Anthelmintic, Anti-nociceptive, Treatment of Neurological disorders, Anxiety, Dysentery and Diarrhoea	Anticancer	[130–132]
40.	*Dodonea viscosa* L. Jack., Hook. **Family:** Sapindaceae	English: Hopspeed bush, switch sorrel Malayalam: Aattotta, Vrali, Krali,	Alkaloids, Saponins, Tannins, Flavonoids, Steroids, Phenols, Sapogenins	Tumours regression, Cold, Sore throat, Rheumatism, Inflammation, Spasms, Diarrhoea, antiulcer, Constipation	Anticancer (Breast, Ovary, Cervix, Uterus)	[133–136]
41.	*Elephantopus scaber* Linn. **Family:** Asteraceae	English: Prickly leaved elephant's foot Malayalam: Anayadi, Anachuvadi,	Sesquiterpene lactones, Scabertopin, Deoxyelephantopin, Iso-deoxyelephantopin, Isoscabertopin	Aphrodisiac, Astringent, Expectorant, Analgesic, Antipyretic, Anti-tumour. Anti-hepatitis, Bronchial spasms, Neoplasms, Pneumonia,	Anticancer (Breast, Skin)	[137–142]

(Continued))

Sr. No	Botanical name & family	Malayalam names and common names	Phyto constituents	Folklore/Tribal uses	Uses given by *in-vitro, in-vivo* studies	References
42.	*Elettaria cardamomum* **Family:** Zingiberaceae	English: Cardamom Malayalam: Bavula, Ealakkaya, Eallam	Essential oils, Pinene, methyl Eugenol, Myrcene, Sabinene, Phellandrene, Geraniol, Citronellol, Nerol, Linalyl acetatae	Flavouring agent, Condiment, Immune protective, Hepato protective, Carminative, Stimulant, and Antiulcer. Pulmonary infections, Teeth, Throat infections, Bronchial spasms, Pulmonary tuberculosis	Anticancer (Breast, Ovary, Rectum, Gastro intestine)	[143–146]
43.	*Embilica officinalis* **Family:** Euphorbiaceae	English: Amla Malayalam: Nellimaram, Nellika	Flavonoids Quercetin, Rutin, PolyPhenols, Gallic acid, Ellagic acid, Vitamin C, D, Amino acids, tannins,	Cardioprotective, Immuno modulatory, Anticholestrnemic, Antilipidemic, Antidiabetic, Antioxidant, Anticancer, Antiulcer	Anticancer	[147–149]
44.	*Erigeron Karvinskianus* L. **Family:** Asteraceae	English: Daisy fleabane Malayalam: Pottu poovu	Mono terpenoids, Sesquiterpenoids, Diterpenoids, Triterpenoids, Phenolic derivatives	Anti- hepatitis, Dermatological disorders, Haematuria, Indigestion and Tumours regression.	Anticancer	[150,151]
45.	*Euphorbia heterophylla* L. **Family:** Euphorbiaceae	English: Painted leaf poinsettia, green poinsettia, Milk weed, Mexican fire Plant, Malayalam: Upila, Nelapalai	Diterpenoids, Terpenoid coumarins, Quercetin, Lignin, Quinin, Flavonoids, Phenols, Essential oils, saponins, Glycosides, Sitosterol, Tannins	Purgative, Anthelmintic, Hair tonic, Anti-bacterial, Anti-septic, Anticoagulant, Antitumour	Anticancer (Gastric, Intestine, Ovary, Breast)	[152–155]
46.	*Eurycoma longifolia* Jack. **Family:** Simaroubaceae	English: Long Jack, Malaysian Ginseng Malayalam: Nedu pazha	Quassinoids, Alkaloid-9-methoxy canthine, Tepenoids	Tonic during childbirth. Malaria, Diarrhoea, Fatigue, Inflammation, Ulcer, Elevated Blood pressure, Dropsy, Fever, Cough, Hypogonadism, Male- infertility, Osteoporosis	Anticancer (Breast, Ovary, Lung, Cervix, Melanoma, Fibrosarcoma)	[156–159]
47.	*Garcinia gummi-gutta* Linn. Robs. Or *Garcinia cambogia* **Family:** Clusiaceae/ Guttiferae	English: Malabar tamarind, Goraka, Malayalam: Pinampuli, Kadampuli	Hydroxy citric acid, Garcinol, Garbogiol, Isogarcinol, Tartaric acid, Citric acid, Guttiferone, Iso-guttiferone, Proteins, Pectins, Tannins, fat, Alkaloids, Polysaccharides,	Rheumatism, Bleeding piles, Wounds, Ulcers, Inflammatory bowel disease, Edema, Menstrual disorders, Obesity, Diabetes, Immune disorders	Anticancer	[160–162]
48.	*Garcinia indica* Choisy. **Family:** Clusiaceae/ Guttiferae	English: Wild mangosteen, Goa butter tree, Malayalam: Punampuli	Garcinol, Isoxanthochymol, Xanthochymol, Isogarcinol, Citric acid, tartaric acid, Malic acid	To heal Piles, Dysentery, Ulcers, Wounds, Inflammations, Cardiac diseases and as a Diuretic	Anticancer	[163–166]
49.	*Gaultheria fragrantissima* Wall. **Family:** Ericaceae	English: Fragrant winter green Malayalam: Kolakatta chedi, Kolgate chedi	B-Thujone, Camphor, Crysanthenone, Borneol, Germacrene, Sabinene, Methyl salicylate (Oil of wintergreen), Asarone, Flavonoids, Rutin, Morin, Luteolin,	Cough, Cold, Inflammation, Tumour, Bacterial and Fungal infections. Insecticidal activity	Anticancer Breast, Cervix, Ovary)	[167–171]
50.	*Gloriosa superba* **Family:** Liliaceae	English: Climbing Lily, Malabar Glory Lily Malayalam: Kanthel, Kariyilanchi, Karthika poovu	Tropalane alkaloids, Gloriosine, Colchicine, Isoperlolyrine, Trioxsalen, Caffeic acid, β-Sitsterol, β-Lumi colchicine, Colchicoside	Rheumatic disorders, Arthritis, Gout, Leprosy, Ulcers, Skin diseases, Tumours, Inflammation, Pain, Bacterial infections	Anticancer (Liver, Intestine, Breast, Ovary)	[172–175]

(Continued))

Sr. No	Botanical name & family	Malayalam names and common names	Phyto constituents	Folklore/Tribal uses	Uses given by *in-vitro, in-vivo* studies	References
51.	*Glycosmis mauritiana* Lam. **Family:** Rutaceae	English: Ash sheora, Gin berry, Rum berry Malayalam: Panal, Pooni Patty	Quinolinone alkaloids, Acridone alkaloids, Flavone glycosides, 7,8 -Di methoxy 2-2-6 -tri methyl pyranoquinoline-5-one,	Jaundice, Anaemia, Inflammation, Skin diseases, Eczema, Helminthiasis, Ascariasis, Snake bites	Anticancer (Breast, Cervix, Skin, Hepatocellular carcinoma)	[176–178]
52.	*Gymnema silvestre* R. Br. **Family:** Asclepiadaceae	English: Small Indian Ipecac, Australian cow plant Malayalam: Chakkaraikolli, Madhunaasini	Anthraquinone derivatives, Butyric acid, Gymnemic acids, d-Quercitol, Inositol, Hentriacontane, Formic acid, tartaric acid, Pentriacontane, Phytin	Diabetes, Inflammation, Cancers, Bone deformities, Atherosclerosis, Hepatic disorders. Larvicidal and Fungicidal activities	Anticancer (Melanoma, Osteosarcoma, Breast, Colon, Cervix)	[179–183]
53.	*Hemidesmus indicus* L. R. Br. **Family:** Apocynaceae	English: Indian sarsaparilla, Malayalam: Kappikodi, Nannari,	Triterpenoids, Flavonoids, Phenols, Saponins, Catechin, β-Erythroidine, Butorphanol, Sinomanine, Methyl daphnetin	Diabetes, Cancer, Ulcer, Inflammation Neuroprotective, Cardioprotective, Hepatoprotective, Nephroprotective	Anticancer (Liver, Colon, Breast, Leukaemia, Skin)	[184–188]
54.	*Habenaria longicorniculata* J graham. **Family:** Orchidaceae	English: Long-tailed Habenaria Malayalam: Riddhi	Dendrobine type alkaloids, Bibenzyls, Stilbenoids, Terpenoids, Flavonoids, Phenanthrenes, Gigantol, Batatasin III	Haemorrhage, Blood disorders, Inflammation, Tumours	Anticancer (Liver, Breast, Cervix)	[189,190]
55.	*Hemigraphis colorata* Blume. **Family:** Acanthaceae	English: Red ivy. Red flame ivy, Waffle plant Malayalam: Murikooti	Alkaloids, Anthraquinones, Flavonoids, Glycosides, Anthocyanin, Carbohydrate, Coumarins, Phenols, Tannins, proteins, Terpenoids, Saponins, Steroids	Wounds, Cuts, Ulcers, Inflammation, Vitiated pitta, Excessive menstruation, Gall bladder stones, Piles, Bloody dysentery, Anaemia, Skin diseases	Anticancer (Skin)	[191–193]
56.	*Holarrhena pubescens* Wall ex D. Gon. **Family:** Apocynaceae	English: Conessi bark, Ester tree, Ivory tree Malayalam: Kadalpala, Kudagapala	Pregnane alkaloids, Makluangin D, Steroidal alkaloids, Triterpenoids, Coumarins, Ergosterols, Flavonoids, Saponins, Phenols, Carbohydrates, Tannins	Diarrhoea, Amoebic dysentery, Piles, Inflammatory bowel disease, Ulcer, Skin disorders, Diabetes, Hyperlipidaemia, Blood infections,	Anticancer (Oral, Tongue, Buccal, Squamous cell carcinoma, Liver, Breast, Ovary, Colon, Neuroblastoma,)	[194–196]
57.	*Holigarna arnottiana* Wall. **Family:** Anacardiaceae	English: Black varnish tree Malayalam: Charu, Cheru, Kattu chera	Tetramethyl-2-hexa-decan, Squalene, 1-Iodo-2methylundecane	Antimicrobial, Antifungal, Obesity, Arthritis, Anti-inflammatory, Antitumour, Haemorrhoids, Cancers	Anticancer	[197–199]
58.	*Hybanthus enneaspermus* (Linn) F. Muell. **Family:** Violaceae	English: Spade flower Malayalam: Orilathamara, Kalthamara	Triterpenoids, Anthraquinones, Alkaloids, Flavonoids, Saponins, Sterols, Amino acids, Carbohydrates, Phenols, Phytosterols, Cyclotides, Cycloviolacin O2	Nephroprotective, Anticonvulsant, Anti-diabetic, Larvicidal, Anti-arthritic, Hepato protective, Anti-oxidant, Anti-tumour	Anticancer (Breast, Liver, Colon, Lung, Kidney, Cervix)	[200–203]
59.	*Ipomoea batata* **Family:** Convolvulaceae	English: Sweet potato, Purple sweet potato Malayalam: Cheeni kizhangu, Chakkara kizhangu, Madura kizhangu	Amino acid peptides, Phenolic compounds, Carbolines, Chlorogenic acid, Anthocyanins, Citrus nine- I, Poly phenols, Sterols, Caffeic acids,	Anti-stress, Anti-oxidant, Anti-inflammatory, Anti-tumour, Anticancer	Anticancer (Cervix, Ovary, Breast, Colon, Colorectum, Gastric cancers)	[204–210]
60.	*Ipomoea pestigridis* L. **Family:** Convolvulaceae	English: Bind weed, Cupid's flower, Tiger's foot Malayalam: Naripadam, Pulichuvadi, Poochakkal Valli	Alkaloids, Flavonoids, Tannins, Saponins, Terpenoids, Sterols, Chlorogenic acid, Polyphenols	Ailment of Boils, Sores, Eczema, Skin disorders, Dog bites, Microbial infections, Constipation, Tumours, Inflammation	Anticancer (Liver, Lung)	[211–214]

(Continued))

Sr. No	Botanical name & family	Malayalam names and common names	Phyto constituents	Folklore/Tribal uses	Uses given by *in-vitro, in-vivo* studies	References
61.	*Justica adhatoda* **Family:** Acanthaceae	English: Vasa, Malabar nut, Vasaka Malayalam: Adalodakam, Vasika of Malabar	Pyrroquinazolidine alkaloids, Vasicol, Vasinone, Preganine, Vasicine, Alkaloids, saponins, Tannins	Cough, Bronchitis, Inflammation, Tuberculosis, Upper respiratory tract infections, Hepatic diseases, Rheumatism, Joint pain, Sprains, Tumours	Anticancer (Breast, Cervix, Lymphoma)	[215–218]
62.	*Justica gendarussa* Linn. **Family:** Acanthaceae	English: Willow leaved Justica, Warer willow Malayalam: Karunochi, Vathakodi	Alkaloids, Phenols, Flavonoids, Triterpenoidal Saponins, Lupeol, Stigmasterol, Naringenin, Kaempferol, Amino acids, Aromatic amines	Rheumatism, Fever, Bronchitis, Lumbago, Injuries, Inflammations, Ear and Headache, Eye infections	Anticancer (Liver, Breast, Cervix)	[219–221]
63.	*Justica simplex* **Family:** Acanthaceae	English: Water willow, Shrimp Plant Malayalam: Vathakodi	Alkaloids, Flavonoids, Phenols, Amino acids, α-Sitosterol, β- Sitosterol	Inflammation, Chronic rheumatism, Bronchitis, Tumours	Anticancer	[222,223]
64.	*Lantana camara* L. **Family:** Verbenaceae	English: Lantana, Shrub Verbana, Wild sage Malayalam: Aripoochedi, Konda, Kongini, Njandukali	Sesquiterpenoids, β-Gurgunene, Spatulenol, Essential oils, β-Caryophyllene, Spathulenol, Sabinene, Limonene,	Bronchitis, Cough, Tumours, Inflammation, Cancers. Useful as Vermifuge	Anticancer (Liver, Lung, Breast)	[224–227]
65.	*Leucas aspera* (Wild.) Link. **Family:** Lamiaceae	English: Common Leucas Malayalam: Thumba, Chiruthumba	Triterpenoids, Oleanolic acid, Ursolic acid, Nicotine, B-Sitosterol, Poly phenols, Di terpenes,	Anti-microbial, Anti-fungal, Anti-oxidant, Antihistaminic, Anti-pyretic, Anticancer, Anti-nociceptive	Anticancer (Liver, Prostate, Cervix)	[228–230]
66.	*Mangifera indica* **Family:** Anacardiaceae	English: Mango tree, Cuckoo's joy Malayalam: Amaram, Manga, Mampazham	Poly Phenols, Carotenoids, Tocopherols, Mangeferin, Benzophenone, Ascorbic acid, Flavonoids, Anthocyanins	Ailment of Immune disorders, Microbial infections, Anticancer	Anticancer (Breast, Cervix, Oesophagus, Liver)	[231–235]
67.	*Mahonia leschenaultii* **Family:** Berberidaceae	English: Toda plant, Holy leaved berry Malayalam: Mullukadambu, Manjanathi	Isoquinoline alkaloids, Berberine, Palmatine, Barbamine, Neprotine, Oxycanthine, Columbamine, Palmatine, Coptisine	Dermatitis, Skin diseases, Psoriasis, Inflammation, Neoplasms, Melanoma, Tumours, Fungal infections	Anticancer (Skin, Melanoma, Breast, Lung, Gastric, Colorectum, Ovary, Endometrium)	[236–239]
68.	*Melastoma malabathricum* **Family:** Melastomataceae	English: Indian Rhododendron, Senduduk Malayalam: Athirani	Ursolic acid, Asiatic acid, 2α-Hydroxy Ursolic acid, Phyto sterols, Saponins	Injuries, Wounds, Cuts, Inflammation, Tumours	Anticancer (Skin, Cervix, Uterus, Breast)	[240–242]
69.	*Mesua ferrea* Linn. **Family:** Clusiaceae/ Guttiferae	English: Indian rose chesnut, Cobra's saffron, Nagas's tree Malayalam: Churuli, Naga champakam, Nagakesaram, Nagapoovu	Alkaloids, Coumarins, Xanthones, Triterpenoids, saponins, Flavones, Terpenes, Mesuaxanthone-A and B, M-ferrone-b, β-Sitosterol	Inflammation, Tumour, Scabies, Piles, Burning feet, Sores, Wounds, Ulcers, Rheumatic pain.	Anticancer (Pancreas, Breast, Liver)	[243–245]
70.	*Michelia champaca* Linn. **Family :** Magnoliaceae	English: Joy perfume tree Malayalam: Champakam	Aporpine alkaloid, Liriodenine, 4-o-β-D-Gluco pyranoside aldehyde, Magnograndiolide, Michampanolide, Parthenolide, Anolobine, Champacaine, Quercetin, Syringaresinol, Vanillic acid, Vanillin, Michelia-A, Scopoletin	Inflammation, Arthritis, Hyperlipidaemia, Cancer, Muscle spasms, Helminthiasis, Rheumatism, Dyspepsia, Nausea, Vomiting, Fever	Anticancer (Nasopharynx)	[246–248]

(Continued))

Sr. No	Botanical name & family	Malayalam names and common names	Phyto constituents	Folklore/Tribal uses	Uses given by *in-vitro, in-vivo* studies	References
71.	*Myristica fragrans* **Family :** Myristicaceae	English: Nutmeg tree, Mace tree Malayalam: Jathikka, Jathi	Volatile oils, Myristicine, Elemicin, Iso-eugenol, EugenolLignan, Neo lignan, Camphene, 4-Terpineol	Anti-oxidant, Anti-tumour, Condiment, Food spice, Carminative, Stimulant	Anticancer (Breast, Ovary, Liver, Lung, Cervix, Prostate, Colon)	[249–253]
72.	*Naringi crenulata* **Family:** Rutaceae	English: Toothed leaf limonia Malayalam: Dadhiphala, Kattunarakam, Narinarakam	Terpenoids, Steroids, Quinones, Alkaloids, Flavonoids, Naringin, Hesperetin, Hesperetin-7-rhamnoglucoside, Tanakamine	Antioxidant, Hepatoprotective, Anti-inflammatory, Larvicidal, Anti-microbial, Fungicidal, Anti-emetic, Anti-malarial. Mitigation of Dysentery	Anticancer	[254–256]
73.	*Nerium oleander* **Family:** Apocynaceae	English: Indian oleander, Rose Bay Malayalam: Chuvanna arali, Arali	Cardiac glycosides, Steroids, Terpenoids, Flavonoids, Oleandrin, Odoroside-A, H, Neritalodise,	Antidepressant, Inflammation, Antihyperlipidemic agent, Cancers, Ulcer, Hepatic disorders	Anticancer (Breast, Ovary, cervix)	[257–259]
74.	*Oroxylum indicum* (L.) Benth. **Family:** Bignoniaceae	English: Indian trumpet flower, Broken bones plant Malayalam: Aralu, Veluthapathiri	Iso-flavonoids, triterpenoids, Steroids, Anthraquinone, Aloe-emodin, Baicalein, Baicalin, Oroxin-A, B, Oroxylin-A, Scuttellarin	Immunomodulatory, Antitumour, Antioxidant, Anti-inflammatory	Anticancer (Lung, Liver, Breast)	[260–264]
75.	*Phyllanthus amrus* **Family:** Euphorbiaceae/ Phyllanthaceae	English: Phyllanthus Malayalam: Keezhanelli, Kiruthnelli	Gallic acid, Phyllaemblic acid, Phyllanthine, Hypopyllanthine, Quercetin, Gallolyl gluco pyranoside, Rutin, Corilagen,	Antiviral, Jaundice, Hepatic infections, Inflammation, Cancer	Anticancer (Prostate, Liver, Kidney)	[265–269]
76.	*Piper nigrum* L. **Family:** Piperaceae	English: Black Pepper, Common Pepper Malayalm: Kurumulaku	Alkaloids, Piperine, Piperolein, Piperinenamide, Dihydro- piperlonaline, Iso piperolein, Retrofractamide, 3,4, Methylene-di-oxy-cinnamaldehyde, Chabamide	Gastro intestinal disorders, Diarrhoea, Depression, Inflammations, Spasms, Asthma, Microbial infections, Tumours, Nasal decongestion, Upper respiratory infections	Anticancer (Leukaemia, Cervix, Ovary, Breast, Prostate, Lung, Colon, Gastro intestinal tract)	[270–274]
77.	*Polyalthia longifolia* **Family:** Annonaceae	English: Cemetery tree, Mast tree Malayalam: Aranamaram, Ashokam	Flavonoids, Sterols, Lignans, Diterpenes, Organic acids, Tannins	Fungal, Bacterial, Plasmodial infections, Tumours, Inflammations, Ulcer, Diabetes, Cancers	Anticancer (Cervix, Liver, Lung, Breast, Prostate)	[275–277]
78.	*Quisuqualis indica* **Family:** Combretaceae	English: Burma creeper Malayalam: Kulamarinji, Thookuchethi	Alkaloids, Flavonoids, Trigonelline, Rutin, Quisqualic acid, Amino acids, L-Proline, L-Asparagine	To circumvent Skin diseases, Piles, Boils, Fever, Diarrhoea	Anticancer (Skin, Melanoma, Ovary, Colorectum)	[278–280]
79.	*Rauvolfia tetraphylla* **Family:** Apocynaceae	English: Devil Pepper, Garden Rauvolfia Malayalam: Pambumkolli	Alkaloids, Flavonoids, Steroids, Terpenoids, Reserpine, Canescine, Yohimbine, Rauvolscine, Ajmaliscine, Ajmaline, Carbohydrates, Amino acids, Phenols, saponins,	Anti-microbial, Anticancer, Anti-diabetic, Anti-HIV Cough, Cold, Stomach-ache, Anxiety, Nervous disorders, Convulsions	Anticancer (Breast, Ovary, Cervix, Rectum)	[281–284]
80.	*Sarcostemma viminale* (L.) R. BR. **Family:** Asclepiadaceae	English: Moon creeper, Caustic bush, Milk bush Malayalam: Somam, Somavalli	Alkaloids, Saponins, Triterpenes, Flavonoids, Glycosides	Dermatological disorders, Skin cancers, Tumours	Anticancer (Skin, Cervix)	[285–288]
81.	*Semecarpus anacardium* Linn., f. **Family:** Anacardiaceae	English: Marking nut tree, Oriental Cashew Malayalam: Cherkuru, Cherumaram	Anacardic acid, Bilawanol, Cardol, Anacrdol, Semecarpol,	Central nervous system stimulant, Anti-inflammatory, Hypoglycaemic, Anti-tumour. Ailment of Blood diseases, Skin diseases	Anticancer (Cervix, Lung, Blood, Breast, Liver)	[289–291]

(Continued))

Sr. No	Botanical name & family	Malayalam names and common names	Phyto constituents	Folklore/Tribal uses	Uses given by *in-vitro, in-vivo* studies	References
82.	*Solanum torvum* **Family**: Solanaceae.	English: Devil's fig, Turkey berry Malayalam: Anachunda, Chunda	Flavonoids, Alkaloids, Steroids, Terpenoids, Saponins, Neochlorogenin-6-o-β-D-quinovic pyranoside,3-o-acetyl-stigmasta-5,25-diene-2,3-diol, Quercetin, Iso-quercetin, Kaempferol	Rheumatism, Inflammation, Tumour, Hepatic disorders, Liver Cirrhosis	Anticancer (Breast, Ovary, Liver, Cervix)	[292–295]
83.	*Spondias pinnata* **Family:** Anacardiaceae	English: Hog plum, Indian Hog plum Malayalam: Ambazham, Mampuli, Kattambazham	Aliphatic alcohols, Monoterpene hydrocarbon, α-Terpeneoil, furfurol, Benzoic acid, Methyl salicylate, Iso prophyl myristinate, Limonene, Isophorone, n-Nonacosane	Whooping cough, Diarrhoea, Indigestion, Inflammation, Pain, Detoxification, Tumours.	Anticancer (Glioblastoma)	[296–298]
84.	*Strobilanthes ciliatus* (Nees) Bremek. **Family:** Acanthaceae	English: Lesser Kurinji Malayalam: Cherukurinji, Karimkurinji	Triterpenoids, Betulin, Lupeol, Stigmasterol, Phenols, Flavones, Steroids, Glycosides, Tannins,	Inflammation, Pain, Diabetes, Immune disorders, Tumours, CNS disorders, Cancers	Anticancer (Cervical, Breast, Ovary)	[299–301]
85.	*Tabernaemontana divaricate* R. Br. **Family:** Apocynaceae	English: east India Rose bay Malayalam: Nandiyar vattom, Kattampale	Bis-indole alkaloids, 19,20, Dihydro-ervatanine-A, Alkaloids, Voacristine, Voacamine, Flavonoids, Diterpenoids, Phenolic acids, Vanillic acid, salicylic acid, Gentisic acid, Benzoic acid	Anti-asthmatic, Anti-epilepsy, Anti-diarrhoeal, Anti-tumour, Anti-leprotic, Anti-ulcer, Anti-emetic. Ailment of Eye infections, Arthritis, Myalgia, Edema, Fractures	Anticancer (Liver, Bladder, Breast)	[302–305]
86.	*Thunberiga fragrans* Roxb. **Family:** Acanthaceae	English: White Thunberiga Malayalam: Noorvan valli	Glycosides, Phenols, Sterol, Cis-9-Hexadecenol, Campesterol, Palmitic acid,	Diabetes, Gout, Bloody dysentery, Inflammation, Tumours, Cancers	Anticancer (Colorectal, Cervical, Ovary)	[306–308]
87.	*Vanilla planifolia* **Family:** Orchidaceae	English: Vanila, Vanilla orchid Malayalam: Vanila	Essential oils, Vanillin, Naphthalene, caproic acid, Methyleicosane, Trimethylacetophenone,	Carminative, Stimulant, Flavouring agent, Aphrodisiac, Anticancer. Hepato protective, Immune booster, Larvicidal, Antimalarial, Antispasmodic, Anti-dysmenorrhoea. Ailment of Skin disease	Anticancer (Breast, Skin, Liver)	[309–311]
88.	*Vateria indica* Linn. **Family:** Dipterocarpaceae	English: Indian copal tree, Piney varnish tree Malayalam: Pandam Payin, Vellappayin	Poly phenols, Azulenes, Epi-Catechin, Fisitinedol, Bergenin, Pzelechin, tri terpene hydro carbons, ketones, Oleo resins, Alcohols	Diarrhoea, Dysentery, Bronchitis, Piles, Skin eruptions, Gonorrhoea, Syphilis, Tumours, Microbial infections, Helminthiasis, Cancer, Ulcer	Anticancer (Sarcoma, Breast)	[312–314]
89.	*Veronica cinerea* **Family:** Asteraceae/ Compositae	English: Ash coloured fleabane, purple fleabane Malayalam: Pirina, Puvankurunal	Flavonoids, Sesquiterpene lactones, Terpenoids, Sterols, terpenoid, Lupeol acetate	Anti-asthmatic, Anti-arthritis, Anti-rheumatism, Anti-inflammatory, Anticancer, Anti-diabetic, Anti-viral, Treatment of Urinary calculi, Cough, Malaria.	Anticancer (Breast, Colorectum, Lung)	[315–318]
90.	*Vitex negundo* **Family:** Lamiaceae	English: Chaste tree Malayalam: Indrani, Karunochi	Flavonoids, Phenolic compounds, Artemetin, Penduletin, Vitexicarpin, Tannins, Glycosides, Alkaloids	Leukoderma, Skin diseases, Spleen enlargement, Inflammations	Anticancer (Liver, Breast, Colorectum)	[319–322]

(Continued))

Sr. No	Botanical name & family	Malayalam names and common names	Phyto constituents	Folklore/Tribal uses	Uses given by *in-vitro, in-vivo* studies	References
91.	*Withania somnifera* **Family**: Solanaceae.	English: Winter cherry Malayalam: Amukkuram	Steroidal lactones, Steroids, flavonoids, Alkaloids, Phenols, saponins, Withanolides, Withaferin-A, Somniferine, Somnine, Withanmine, Withamine, Somniferinine	Benign tumours, Inflammation, Arthritis, Diabetes, Depression, Fungal and Bacterial infections, Hepatic disorders, Ulcer, Alzheimer's disease, Cancers	Anticancer (Breast, Lung, Liver, Colorectal, Intestine, Cervix, Glioblastoma, Glioma, Leukaemia)	[323–326]
92.	*Woodfordia fruticose* Kurz. **Family:** Lythraceae	English: Fire flame bush Malayalam: Thathiri poovu, Thathiri	Poly phenols, Anthraquinones, Flavonoids, Triterpenoids, Glycosides, Betulin, Betulinic acid, Lupeol, Ursolic acid, Oleanolic acid	Homeothermia, Dysentery, Ulcers, Fever, Boils, Inflammation, Hepatic disorders, cardiac diseases, Microbial infections	Anticancer (Liver)	[327–329]
93.	*Wrightia tinctoria* Roxb. (R.Br.) **Family:** Apocynaceae	English: Pala indigo, Sweet indrajao Malayalam: Aiyappala, Adukomba, Neelappala	Alkaloids, terpenoids, Flavonoids, Phenols, Steroids, Betulin, Lupeol, α -Amyrin, β-Amyrin, Campesterol, Tocopherol, Squalene, Lupenone	Cancers, Bacterial infections, Scabies, Psoriasis, Skin infections	Anticancer (Breast, Liver)	[330–332]
94.	*Zingiber officinale* Var. **Family:** Zingiberaceae	English: Ginger, Canton ginger, Spice ginger Malayalam: Andrakam, Chukku, Inchi	Phenolic compounds, Gingerol, Shogaol, Paradol, Terpenes, α- Terpineol, α-Terpinene, Diaryl heptanoids, Volatile oils	Inflammation, Nerve disorders, Cough, Cold, Haemorrhoids, Edema, Indigestion, osteoarthritis, Chronic fever, Rheumatoid arthritis Useful as Carminative, Anti-tumour, Immuno modulatory, Anticancer, Anti-microbial, Larvicidal	Anticancer (Colon, Pancreas, Gastro intestinal, Prostate, Breast)	[333–339]
95.	*Ziziphus mauritiana* **Family:** Rhamnaceae	English: Jujube tree Malayalam: Badari, Lanthapazam	Phenolic compounds, Caffeic acid, Ferulic acid, P-Coumaric acid, P-Hydroxy-benzoic acid	Anti-asthma, Anti-allergy, Anti-depressant, Analgesic, Anti-tumour, Anti-ulcer	Anticancer (Breast, Lung, Ovary, Cervix, Colorectum)	[340–342]

d.f.:3, p = 0.0763), a potential publication bias was assessed through Egger's regression, yielding a nonsignificant result (t = −1.40, d.f.: 11, p = 0.1887). Subgroup meta-regression was carried out, indicating that the intercept was −1.2958 [standard error (SE): 0.4565, t-value: −2.8384, d.f.: 9, p = 0.0195], subgroup2 had a coefficient of 0.4650 (SE:0.5725, t-value: 0.8123, d.f.: 9, p = 0.4376), subgroup3 had a coefficient of 0.6880 (SE: 0.6462, t-value: 1.0646, d.f.: 9, p = 0.3148), and subgroup 4 had a coefficient of 0.8558 (SE: 0.5428, t-value: 1.5766, d.f.: 9, p = 0.1493). This comprehensive analysis underscores the complex interplay of factors influencing the observed outcomes. The relevant data are listed in Supplementary Tables S1–S6. The graphical visualization of the stated data as box plots, drapery plots, funnel plots, and forest plots is depicted in Figure 3a and b. A need for increased sensitivity is indicated by subgroup 1, which displays apparent imbalances between true positives (ranging from 3 to 6) and false negatives (ranging from 119 to 300). From ranges 11 to 29, false positives exist with a control strategy. True negatives exhibit rather an evenly distributed dispersion. The greater true positives (ranging from 33 to 180) and significant false negatives (ranging from 1,361 to 13,536) in subgroup 2 suggest that recall has to be improved. In addition, noteworthy are false positives, which range from 47 to 372. Subgroup 3 has a balanced performance with low false positives and high true negatives, along with respectable true positives and false negatives (between 1,699 and 50,448) in subgroup 4, which highlights the need to improve sensitivity. True negatives and false positives can be controlled. Improved sensitivity in subgroups 1, 2, and 4 while preserving precision is necessary to maximize model performance. Already, subgroup 3 performs in a more even manner (Fig. 3c). The numerical values are categorized and illustrated in Supplementary Table S7. The average "n" value and average "r" value for subgroup 1 are 38 and 0.44, respectively. Similarly, the "n" and "r" values of subgroup 2 are 144 and 0.18. The average "n" for subgroup 3 is 115, while the average "r" is 0.70. The data distribution is depicted as a Pareto chart (Fig. 3c), and the details are listed in Supplementary Table S8.

DISCUSSION

This review dives into 4,600 native plants in Kerala's botanical treasure trove, 900 of which have therapeutic promise. The districts of Wayanad and Kozhikode stand out since they are home to more than 180 medicinal plants, 95 of which may have anticancer qualities. India is a significant exporter of almost 960 medicinal herbs to different regions of the globe, with 178

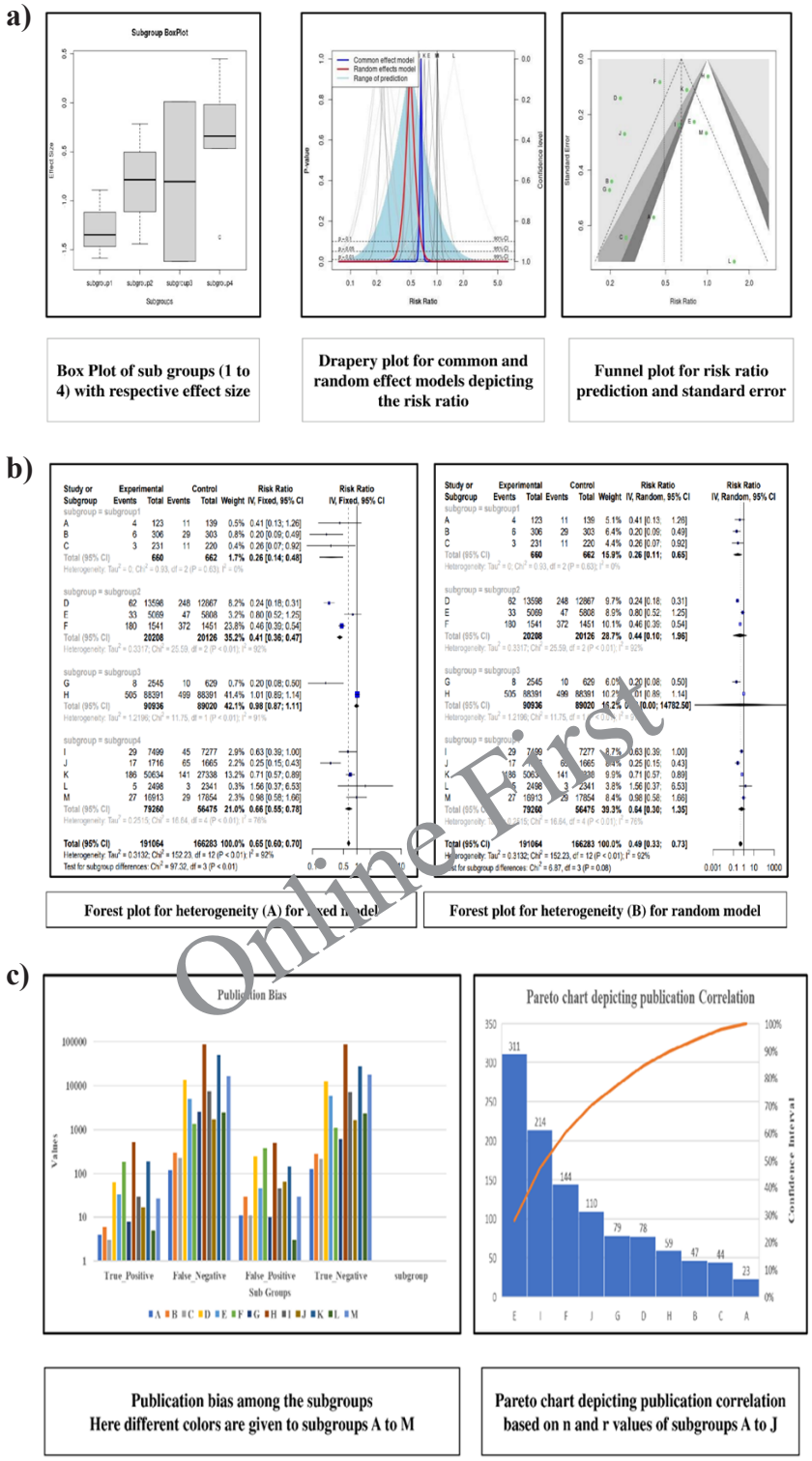

Figure 3. (a). Box plot (effect size), Drapery (risk ratio), Funnel plot (standard error and risk ratio), (b). Forest plots for heterogeneity (A) fixed model, (B) random model, (c). Publication bias depicted as bar plot and publication correlation depicted as pareto chart.

plant species being traded for more than 100 metric tons. The global market has a significant demand for medicinal herbs such as barberry, senna, isabgol, chandan, long pepper, brahmi, kalmegh, satavari, madhunashini, ashwagandha, sankhpushpi, kokum, and guggal, which are highly sought after. The Malabar Hill region, in particular, plays a crucial role, contributing more than 60% to the trade of medicinal plants [19]. Inspired by folklore origins, several drugs have been adapted for pilot

studies to address chronic conditions such as psoriasis, leprosy, HIV infections, cancer, arthritis, tuberculosis, and asthma [23]. Some of these drugs are currently in clinical use, while others are undergoing various stages of clinical trials. In a collaborative effort with India, the WHO established the "Global Centre for Traditional Medicine" in 2022, with a significant contribution of 250 million USD from the Indian government (gctm@who.int). This initiative aims to promote traditional medicine and explore its potential benefits further. In this study, 552 articles were carefully examined, and the results revealed a statistically significant relationship between specific plants and their anticancer potential. However, the studies' notable variation highlights the complexity of this topic. Finally, Kerala's plant diversity offers hope for both conventional and cutting-edge medicine.

CONCLUSION

The study's findings emphasized Kerala's enormous potential for using its rich botanical resources, with an emphasis on the Kozhikode and Wayanad districts. There are 4,600 native species in the area, and 900 of them have plausible therapeutic benefits. The ongoing practice of Ayurveda, a science rooted in history, adds to this treasure. The examination of 552 articles along with the survey emphasized the complexity of this topic and the necessity for careful analysis. Hence, in the existing conditions, the exploration of more medicinal plants with extraordinary phytoconstituents for cancer therapy is crucial. In addition, it is imperative to focus on reinstating medicinal herbs that are on the verge of extinction, utilizing modern, sophisticated methods and tissue culture techniques. The selected region, along with the entire Malabar Mountains, houses an abundance of medicinal plants that remain unexplored or only partially studied. Therefore, scrutinizing these untapped medicinal plants is essential to addressing rare, chronic diseases, including cancer.

ACKNOWLEDGMENT

The authors want to thank the tribal settlement villages of the Wayanad and Kozhikode regions of Kerala for their contribution to the collection of data.

AUTHOR'S CONTRIBUTION

Conceptualization: Mythili Srinivasan

Data Collection: Mythili Srinivasan, Ashwini Y. Chandane, Amol Tagalpallewar, and Akshay M. Baheti

Article Screening: Mythili Srinivasan, Ashwini Y. Chandane, and Amol Tagalpallewar

Data Analysis: Mythili Srinivasan, Anil Pawar, and Akshay M. Baheti

Ayurvedic Insights: Manasi Nimbalkar, Ranjit Nimbalkar

Medicinal Plant Selection: Akshay M. Baheti

Manuscript Writing: Mythili Srinivasan

Manuscript Review and Approval: All authors.

FUNDING

There is no funding to report.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in this research.

ETHICAL APPROVAL

This study does not involve experiments on animals or human subjects.

DATA AVAILABILITY

All the data is available with the authors and shall be provided upon request.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declares that they have not used artificial intelligence (AI)-tools for writing and editing of the manuscript, and no images were manipulated using AI.

PUBLISHER'S NOTE

All claims expressed in this article are solely those of the authors and do not necessarily represent those of the publisher, the editors and the reviewers. This journal remains neutral with regard to jurisdictional claims in published institutional affiliation.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the author(s) used Chat-GPT for writing assistance. After using this tool or service, the author(s) reviewed and edited the content as needed and took full responsibility for the content of the publication.

REFERENCES

1. Kumar S, Jawaid T, Dubey SD. Therapeutic plants of Ayurveda; a review on anticancer. Pharmacogn J. 2011;3(23):1–11. doi: https://doi.org/10.5530/pj.2011.23.1
2. Akbar S. Introduction. In: Handbook of 200 medicinal plants. Cham, Switzerland: Springer; 2020. doi: https://doi.org/10.1007/978-3-030-16807-0_1
3. Majola F, Becker Delwing LK, Marmitt DJ, Bustamante-Filho IC, Goettert MI. Medicinal plants and bioactive natural compounds for cancer treatment: important advances for drug discovery. Phytochem Lett. 2019;31:196–207. doi: https://doi.org/10.1016/j.phytol.2019.04.003
4. Pandey G, Madhuri S. Some medicinal plants as natural anticancer agents. Pharmacogn Rev. 2009;3(6):259–63.
5. Chhikara SB, Parang K. Global cancer statistics 2022: the trends projection analysis. Chem Biol Lett. 2023;10(1):451. Available from: https://pubs.thesciencein.org/journal/index.php/cbl/article/view/451
6. Siegel RL, Miller KD, Wagle NS, Jemal A. Cancer statistics, 2023. CA Cancer J Clin. 2023;73(1):17–48. doi: https://doi.org/10.3322/caac.21763
7. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2018;68(6):394–424. doi: https://doi.org/10.3322/caac.21492
8. Mehrotra R, Yadav K. Breast cancer in India: present scenario and the challenges ahead. World J Clin Oncol. 2022;13(3):209–18. doi: https://doi.org/10.5306/wjco. v13.i3.209

9. Bukhtoyarov OV, Samarin DM. Pathogenesis of cancer: cancer reparative trap. J Cancer Ther. 2015;06(05):399–412. doi: https://doi.org/10.4236/jct.2015.65043
10. Pérez-Herrero E, Fernández-Medarde A. Advanced targeted therapies in cancer: drug nanocarriers, the future of chemotherapy. Eur J Pharm Biopharm. 2015;93:52–79. doi: https://doi.org/10.1016/j.ejpb.2015.03.018
11. Kumari I, Kaurav H, Choudhary G. *Rubia cordifolia* (Manjishtha): a review based upon its Ayurvedic and medicinal uses. Himal J Heal Sci. 2021;6(2):17–28. doi: https://doi.org/10.22270/hjhs.v6i2.96
12. Shaikh R, Pund M, Dawane A, Iliyas S. Evaluation of anticancer, antioxidant, and possible anti-inflammatory properties of selected medicinal plants used in Indian traditional medication. J Tradit Complement Med. 2014;4(4):253–7. doi: https://doi.org/10.4103/2225-4110.128904
13. Pan L, Chai HB, Kinghorn AD. Discovery of new anticancer agents from higher plants. Front Biosci. 2012;4S(1):142–56. doi: https://doi.org/10.2741/257
14. Demain AL, Zhang L. Natural products and drug discovery. In: Zhang L, Demain AL, editors. Natural products. Totowa, NJ: Humana Press; 2005. pp. 3–29.
15. Butler MS. Natural products to drugs: natural product-derived compounds in clinical trials. Nat Prod Rep. 2008;25(3):475–516. doi: https://doi.org/10.1039/b514294f
16. Shoeb M. Anticancer agents from medicinal plants. Bangladesh J Pharmacol. 2008;1(2):35–41. doi: https://doi.org/10.3329/bjp.v1i2.486
17. Mouid MG. Effect of ethanolic extract of aerial parts of *Andrographis paniculata* on the pharmacokinetics of gliclazide in rats. Asian J Biomed Pharm Sci. 2015;05(51):21–4. doi: https://doi.org/10.15272/ajbps.v5i51.755
18. Lichota A, Gwozdzinski K. Anticancer activity of natural compounds from plant and marine environment. Int J Mol Sci. 2018;19(11):3533. doi: https://doi.org/10.3390/ijms19113533
19. Tojo Jose VA, Sebastian A. Ethnobotanical study of traditional medicinal plants used by indigenous people in north Kerala. Indian J Appl Res. 2015;5(10):184–6.
20. Page MJ, Moher D, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, *et al.* PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. BMJ. 2021;372:n160. doi: https://doi.org/10.1136/bmj. n160
21. McKeown S, Mir ZM. Considerations for conducting systematic reviews: evaluating the performance of different methods for de-duplicating references. Syst Rev. 2021;10(1):4–11. doi: https://doi.org/10.1186/s13643-021-01583-y
22. Beheshti A, Chavanon ML, Christiansen H. Emotion dysregulation in adults with attention deficit hyperactivity disorder: a meta-analysis. BMC Psychiatry. 2020;20(1):120. doi: https://doi.org/10.1186/s12888-020-2442-7
23. Jain DL, Baheti AM, Jain SR, Khandelwal KR. Use of medicinal plants among tribes in Satpuda region of Dhule and Jalgaon districts of Maharashtra-an ethnobotanical survey. Indian J Tradit Knowl. 2010;9(1):152–7.
24. Morvin Yabesh JE, Prabhu S, Vijayakumar S. An ethnobotanical study of medicinal plants used by traditional healers in silent valley of Kerala, India. J Ethnopharmacol. 2014;154(3):774–89. doi: https://doi.org/10.1016/j.jep.2014.05.004
25. Drishya NS, Joseph S, Anusree N, Theertha PC, Atheena K. Ethnobotanical survey of medicinal plants in Urdhook hills, Kuttiady, Kozhikode District, Kerala. Int J Creat Res Thoughts. 2021;9(3):4029–40.
26. Soja S, Saradha M. Documentation of medicinal plants used by the traditional healers, Mayannur forest, Thrissur district, Kerala, India. Kongunadu Res J. 2021;8(2):8–26. doi: https://doi.org/10.26524/krj.2021.14
27. Raja R, Aswani BS. Identification and conservation status of medicinal plants in Chengottumala hills, Kerala. J Univ Shanghai Sci Technol. 2022;24(8):228–47.
28. Smitha PRB, Madhusoodanan PV. Anticancer activity of *Acanthus illicifolius* Linn. From chettuva mangroves, Kerala. Int J Bioassays. 2014;3(11):3452–5.
29. Singh D, Aeri V. Phytochemical and pharmacological potential of *Acanthus ilicifolius*. J Pharm Bioallied Sci. 2013;5(1):17–20. doi: https://doi.org/10.4103/0975-7406.106557
30. Rahamooz Haghighi S, Asadi MH, Akrami H, Baghizadeh A. Anti-carcinogenic and anti-angiogenic properties of the extracts of *Acorus calamus* on gastric cancer cells. Avicenna J phytomedicine. 2016;7(2):145–6. doi: https://doi.org/10.22038/ajp.2016.7485
31. Liu XC, Zhou LG, Liu ZL, Du SS. Identification of insecticidal constituents of the essential oil of *Acorus calamus* rhizomes against *Liposcelis bostrychophila* badonnel. Molecules. 2013;18(5):5684–96. doi: https://doi.org/10.3390/molecules18055684
32. Sharma V, Singh R. Achyranthes aspera: phytochemical estimation. Am J Pharmtech Res. 2013;3(2):243–51.
33. Tiwari P, Gond P, Koshale S, Tiwari CP. Phytochemical analysis of different parts of *Achyranthes aspera*. J Pharmacogn Phytochem. 2018;2(1):60–2.
34. Ahmed SM, Tasleem F, Mazhar F, Rizvi SRZ, Azhar I. Pharmacological evaluation on methanol extract of *Adenanthera pavonina* leaves. Pak J Pharmacol. 2018;35(1&2):57–63.
35. Bhadran S, George SA, Malla S, Harini BP. Screening of bioprotective properties of various plant extracts and gas chromatography-mass spectrometry profiling of *Adenanthera pavonina* stem extract. Asian J Pharm Clin Res. 2017;10(7):188–94. doi: https://doi.org/10.22159/ajpcr.2017.v10i7.18141
36. Lindamulage IKS, Soysa P. Evaluation of anticancer properties of a decoction containing *Adenanthera pavonina* L. and *Thespesia populnea* L. BMC Complement Altern Med. 2016;16:70. doi: https://doi.org/10.1186/s12906-016-1053-9
37. Ali A, Khan N, Qadir A, Warsi MH, Ali A, Tahir A. Identification of the phytoconstituents in methanolic extract of *Adhatoda vasica* L. leaves by GC-MS analysis and its antioxidant activity. J AOAC Int. 2022;105(1):267–71. doi: https://doi.org/10.1093/jaoacint/qsab113
38. Shoaib A. A systematic ethnobotanical review of *Adhatoda vasica* (L.). Cell Mol Biol. 2021;67(4):248–63. doi: https://doi.org/10.14715/CMB/2021.67.4.28
39. Petricevich VL, Abarca-vargas R. *Allamanda cathartica*: a review of phytochemistry, pharmacology, toxicology, and biotechnology. Molecules. 2019;24(7):1238. doi: https://doi.org/10.3390/molecules24071238
40. Pandey K, Shekar C, Bairwa K, Kate AS. Pharmaceutical perspective on bioactives from *Alstonia scholaris*: ethnomedicinal knowledge, phytochemistry, clinical status, patent space, and future directions. Phytochem Rev. 2020;19:191–233. doi: https://doi.org/10.1007/s11101-020-09662-z
41. Wang CM, Yeh KL, Tsai SJ, Jhan YL, Chou CH. Anti-proliferative activity of triterpenoids and sterols isolated from *Alstonia scholaris* against non-small-cell lung carcinoma cells. Molecules. 2017;22(12):2119. doi: https://doi.org/10.3390/molecules22122119
42. Itam A, Wulandari A, Rahman MM, Ferdinal N. Preliminary phytochemical screening, total phenolic content, antioxidant and cytotoxic activities of *Alstonia scholaris* R. Br leaves and stem bark extracts. J Pharm Sci Res. 2018;10(3):518–22.
43. Riyama Shirin VK, Arthi I, Neethu Krishnan S, Fathima Suman P. Review on *Alternanthera brasiliana* (L.) Kuntze for its pharmacognostic, phytochemical, pharmacological perspectives. World J Pharm Res. 2021;10(11):382–92. doi: https://doi.org/10.20959/wjpr202111-21352
44. Kannan M, Chandran RP, Manju S. Preliminary phytochemical and antibacterial studies on leaf extracts of *Alternanthera brasiliana* (L.) Kuntze. Int J Pharm Res. 2017;6(7):626–8.

45. Taiwo BJ, Popoola TD, Van Heerden FR, Fatokun AA. Penta galloyl glucose, isolated from the leaf extract of *Anacardium occidentale* L., could elicit rapid and selective cytotoxicity in cancer cells. BMC Complement Med Ther. 2020;20(1):1–9. doi: https://doi.org/10.1186/s12906-020-03075-3
46. Salehi B, Gültekin-Özgüven M, Kirkin C, Özçelik B, Morais-Braga MFB, Carneiro JNP, *et al*. Antioxidant, antimicrobial, and anticancer effects of *Anacardium* plants: an ethnopharmacological perspective. Front Endocrinol (Lausanne). 2020;11:295. doi: https://doi.org/10.3389/fendo.2020.00295
47. Shankar A, Gopinath SM, Shareef MI. Phyto sensitization and cytotoxic studies of *Anacardium occidentale* L. on cancer cell lines—a herbaceutical approach. Int J Curr Microbiol Appl Sci. 2020;9(2):1589–603. doi: https://doi.org/10.20546/ijcmas.2020.902.183
48. Sundaram V, Thiyagarajan D, Lawrence AV, Mohammed SSS, Selvaraj A. *In-vitro* antimicrobial and anticancer properties of green synthesized gold nanoparticles using *Anacardium occidentale* leaves extract. Saudi J Biol Sci. 2019;26(3):455–9. doi: https://doi.org/10.1016/j.sjbs.2018.12.001
49. Souza NC, de Oliveira JM, Morrone MDS, Albanus RD, Amarante MDSM, Camillo CDS, *et al*. Antioxidant and anti-inflammatory properties of *Anacardium occidentale* leaf extract. Evid Based Complement Alternat Med. 2017;2017:2787308. doi: https://doi.org/10.1155/2017/2787308
50. Khan I, Khan F, Farooqui A, Ansari IA. Andrographolide exhibits anticancer potential against human colon cancer cells by inducing cell cycle arrest and programmed cell death via augmentation of intracellular reactive oxygen species level. Nutr Cancer. 2018;70(5):787–803. doi: https://doi.org/10.1080/01635581.2018.1470649
51. Wanandi SI, Limanto A, Yunita E, Syahrani RA, Louisa M, Wibowo AE, *et al*. *In silico* and *in vitro* studies on the anti-cancer activity of andrographolide targeting survivin in human breast cancer stem cells. PLoS One. 2020;15(11):e0240020. doi: https://doi.org/10.1371/journal.pone.0240020
52. Alaqeel NK, Almalki WH, Binothman N, Aljadani M, Al-Dhuayan IS, Alnamshan MM, *et al*. The inhibitory and anticancer properties of *Annona squamosa* L. seed extracts. Braz J Biol. 2023;82:e268250. doi: https://doi.org/10.1590/1519-6984.268250
53. Abd-Elghany AA, Ahmed SM, Masoud MA, Atia T, Waggiallah HA, El-Sakhawy MA, *et al*. *Annona squamosa* L. extract-loaded niosome and its anti-Ehrlich Ascites' carcinoma activity. ACS Omega. 2022;7(43):38436–47. doi: https://doi.org/10.1021/acsomega.2c03649
54. Fadholly A, Purnama R, Iskandar D. *In vitro* anticancer activity *Annona squamosa* extract nanoparticle on WiDr cells. J Adv Pharm Technol Res. 2019;10(1):149–54. doi: https://doi.org/10.4103/japtr.JAPTR
55. Shehata MG, Abu-Serie MM, Abd El-Aziz NM, El-Sohaimy SA. Nutritional, phytochemical, and *in vitro* anticancer potential of sugar apple (*Annona squamosa*) fruits. Sci Rep. 2021;11(1):6224. doi: https://doi.org/10.1038/s41598-021-85772-8
56. Vinodhini R, Saravanan D, Baskaran D, Ramalingam S. *In vitro* free radical scavenging and anticancer potential of *Aristolochia indica* against MCF-7 cell line. Int J Pharm Sci. 2015;7(6):392–6.
57. Subramanian PV, AlSalhi MS, Devanesan S, Thomas PA. Evaluation of antioxidant, anticancer and DNA binding potentials of noble metal nanoparticles synthesized using *Aristolochia indica* and *Indigofera tinctoria*. J Clust Sci. 2021;32(4):917–27. doi: https://doi.org/10.1007/s10876-020-01858-9
58. Siwan D, Nandave D, Nandave M. *Artemisia vulgaris* Linn: an updated review on its multiple biological activities. Future J Pharm Sci. 2022;8(47):1–14. doi: https://doi.org/10.1186/s43094-022-00436-2
59. Ekiert H, Pajor J, Klin P, Rzepiela A, Ślesak H, Szopa A. Significance of *Artemisia vulgaris L.* (Common Mugwort) in the history of medicine and its possible contemporary applications substantiated by phytochemical and pharmacological studies. Molecules. 2020;25(19):4415. doi: https://doi.org/10.3390/molecules25194415
60. Singh NB, Devi ML, Biona T, Sharma N, Das S, Chakravorty J, *et al*. Phytochemical composition and antimicrobial activity of essential oil from the leaves of *Artemisia vulgaris L*. Molecules. 2023;28(5):2279. doi: https://doi.org/10.3390/molecules28052279
61. Tandyekkal A, Pandurangan NN, Mohanan J, Nehru J, Botanic T. *Asystasia gangetica* var. krishnae (Acanthaceae): a new variety from Kerala, India. Rheedea. 2019;29(2):174–7. doi: https://doi.org/10.22244/rheedea.2019.29.2.02
62. Barbaza MYU, De Castro-Cruz KA, Hsieh CL, Tsai PW. Determination of the chemical constituent contents and antioxidation properties of *Asystasia gangetica*. Indian J Pharm Educ Res. 2021;55(3):863–1. doi: https://doi.org/10.5530/ijper.55.3.160
63. Ahmad Eid NE, Jaradat N. A review of chemical constituents and traditional usage of neem plant (*Azardirachta indica*). Palest Med Pharm J. 2017;2(2):75–81. doi: https://doi.org/10.59049/2790-0231.1060
64. Gupta A, Ansari S, Gupta S, Narwani M. Therapeutics role of neem and its bioactive constituents in disease prevention and treatment. J Pharmacogn Phytochem. 2019;8(3):680–91.
65. Singh A, Singh N, Pabla D. A review on medicinal uses of *Bauhinia variegata* Linn. Pharma Tutor. 2019;7(6):12–6. doi: https://doi.org/10.29161/PT. v7.i6.2019.12
66. Pandey S. *In vivo* antitumor potential of extracts from different parts of *Bauhinia variegata* linn. against b16f10 melanoma tumour model in c57bl/6 mice. Appl Cancer Res. 2017;37(1):33–41. doi: https://doi.org/10.1186/s41241-017-0039-3
67. Shahi NP, Sharma O, Shahi SR. Kanchnara (*Bauhinia variegata* Linn.)-a review. World J Pharm Res. 2022;11(8):386–94. doi: https://doi.org/10.20959/wjpr20228-24522
68. El Khalki L, Maire V, Dubois T. Berberine impairs the survival of triple negative breast cancer cells: cellular and molecular analyses. Molecules. 2020;25(3):506. doi: https://doi.org/10.3390/molecules25030506
69. Imenshahidi M, Hosseinzadeh H. Berberine and barberry (*Berberis vulgaris*): a clinical review. Phytother Res. 2019;33(3):504–23. doi: https://doi.org/10.1002/ptr.6252
70. Li J, Yang L, Shen R, Gong L, Tian Z, Qiu H, *et al*. Self-nanoemulsifying system improves oral absorption and enhances anti-acute myeloid leukaemia activity of berberine. J Nanobiotechnol. 2018;16(1):76. doi: https://doi.org/10.1186/s12951-018-0402-x
71. Kuo TF, Yang G, Chen TY, Wu YC, Minh HTN, Chen LS, *et al*. *Bidens pilosa*: nutritional value and benefits for metabolic syndrome. Food Front. 2021;2(1):32–45. doi: https://doi.org/10.1002/fft2.63
72. Mtenga DV, Ripanda AS. A review on the potential of underutilized Blackjack (*Biden Pilosa*) naturally occurring in sub-Saharan Africa. Heliyon. 2022;8(6):e09586. doi: https://doi.org/10.1016/j.heliyon.2022.e09586
73. Mtambo SE, Krishna SB, Govender P. Physico-chemical, antimicrobial and anticancer properties of silver nanoparticles synthesised from organ-specific extracts of *Bidens pilosa* L. S Afr J Bot. 2019;126:196–206. doi: https://doi.org/10.1016/j.sajb.2019.07.046
74. Giridharan B, Sachidanandam M, Meenakumari K. *In vitro* anticancer activity of *Biophytum sensitivum* whole plant. Int J Pharm Sci Res. 2016;7(12):2320–5148. doi: https://doi.org/10.13040/IJPSR.0975-8232.7(12).5128-35
75. Saravanan K, Jayabal P, Elavarasi S, Santhi MP, Palanivel K. Anticancer activity of *Biophytum sensitivum* in breast cancer mcf-7 cell line. J Cell Tissue Res. 2016;16(1):5387–91.
76. Dirar AI, Wada M, Watanabe T, Devkota HP. Phenolic compounds from the aerial parts of *Blepharis linariifolia* Pers. and their free radical scavenging and enzyme inhibitory activities. Medicines (Basel). 2019;6(113):113. doi: https://doi.org/10.3390/medicines6040113
77. Baskar A, Al Numair K, Alsaif M, Ignacimuthu S. *In vitro* antioxidant and antiproliferative potential of medicinal plants used in traditional

Indian medicine to treat cancer. Redox Rep. 2012;17(4):145–56. doi: https://doi.org/10.1179/1351000212Y.0000000017
78. Vidhya RU, Bhuminathan S, Rekha M, Nandhini MS, Ravishankar. Therapeutic and pharmacological efficacy of plant *Boerhaavia diffusa* -a review. Int J Appl Pharm. 2022;14(TI):58–62. doi: https://doi.org/10.22159/ijap. 2022.v14ti.41
79. Kaur H. *Boerhaavia diffusa*: bioactive compounds and pharmacological activities. Biomed Pharmacol J. 2019;12(4):1675–82. doi: https://doi.org/10.13005/bpj/1797
80. Thuy TT, Thu Trang NT, Hoa PN, Trang PT, Khoi NM, Hoang VD, *et al*. A new coumaronochromone from *Boerhaavia diffusa*. Nat Prod Commun. 2019;14(6):2019. doi: https://doi.org/10.1177/1934578X19856253
81. Friedman JR, Richard SD, Merritt JC, Brown KC, Denning KL, Tirona MT, *et al*. Capsaicinoids: multiple effects on angiogenesis, invasion and metastasis in human cancers. Biomed Pharmacother. 2019;118:109317. doi: https://doi.org/10.1016/j.biopha.2019.109317
82. Chilczuk B, Marciniak B, Stochmal A, Pecio Ł, Kontek R, Jackowska I, *et al*. Anticancer potential and capsianosides identification in lipophilic fraction of sweet pepper (*Capsicum annuum* L.). Molecules. 2020;25(13):3097. doi: https://doi.org/10.3390/molecules25133097
83. Al-Samydai A, Alshaer W, Al-Dujaili EAS, Azzam H, Aburjai T. Preparation, characterization, and anticancer effects of capsaicin-loaded nanoliposomes. Nutrients. 2021;13(11):3995. doi: https://doi.org/10.3390/nu13113995
84. Abdel-Halim SA, Ibrahim MT, Mohsen MMA, Abou-Setta LM, Sleen AA, Morsey FA, *et al*. Phytochemical and biological investigation of *Carica papaya* Linn. leaves cultivated in Egypt (Family Caricaceae). J Pharmacogn Phytochem. 2020;9(5):47–54. doi: https://doi.org/10.22271/phyto.2020.v9.i5a.12421
85. Gadge S, Game M, Salode V. Marvelous plant *Carica papaya* Linn: a herbal therapeutic option. Phytopathology. 2020;9(4):629–33. doi: https://doi.org/10.22271/PHYTO.2020.V9.I4I.11771
86. Rafiqi UN, Gul I, Saifi M, Nasrullah N, Ahmad J, Dash P, *et al*. Cloning, identification, and *in silico* analysis of terpene synthase involved in the competing pathway of artemisinin biosynthesis pathway in *Artemisia annua* L. Pharmacogn Mag. 2019;15(61):38–46. doi: https://doi.org/10.4103/pm.pm_244_18
87. Nalinratana N, Suriya U, Laprasert C, Wanidsri N, Poldorn P, Rungrotmongkol T, *et al*. *In vitro* and *in silico* studies anti—inflammatory lignans from *Carallia brachiata* as p38 MAP kinase inhibitors. Sci Rep. 2023;13(1):3558. doi: https://doi.org/10.1038/s41598-023-30475-5
88. Kuthi NA, Chandren S, Basar N. Biosynthesis of gold nanoisotrops using *Carallia brachiata* leaf extract and their catalytic application in the reduction of 4-nitrophenol. Front Chem. 2022;9:800145. doi: https://doi.org/10.3389/fchem.2021.800145
89. Junejo JA, Zaman K, Rudrapal M, Mondal P, Singh KD, Verma VK. Preliminary phytochemical and physicochemical evaluation of *Carallia brachiata* (Lour.) Merr. leaves. J Appl Pharm Sci. 2014;4:123–7. doi: https://doi.org/10.7324/JAPS.2014.41221
90. Kanwal A, Azeem F, Nadeem H, Ashfaq UA, Aadil RM, Kober AKMH, *et al*. Molecular mechanisms of *Cassia fistula* against epithelial ovarian cancer using network pharmacology and molecular docking approaches. Pharmaceutics. 2022;14(9):1970. doi: https://doi.org/10.3390/pharmaceutics14091970
91. Kaur S, Kumar A, Thakur S, Kumar K, Sharma R, Sharma A, *et al*. Antioxidant, antiproliferative and apoptosis-inducing efficacy of fractions from *Cassia fistula* L. leaves. Antioxidants (Basel). 2020;9(2):173. doi: https://doi.org/10.3390/antiox9020173
92. Bahorun T, Neergheen VS, Aruoma OI. Phytochemical constituents of *Cassia fistula*. Afr J Biotechnol. 2005;4(13):1530–40.
93. Bevelle CA, Handy GA, Segal RA, Cordell GA, Farnsworth NR. Isocentratherin, a cytotoxic germacranolide from *Centratherum punctatum* (compositae). Phytochemistry. 1981;20(7):1605–7.
94. Krithika KS, Shabir AG, Arun KP, Brindha P, Vijayalakshmi M. *In silico* and *in vitro* evaluation of the anti-inflammatory potential of *Centratherum punctatum* cass-A. J Biomol Struct Dyn. 2017;35(4):765–80. doi: https://doi.org/10.1080/07391102.2016.1160840
95. Chukwujekwu JC, Ndhlala AR, De Kock CA, Smith PJ, Van Staden J. Antiplasmodial, HIV-1 reverse transcriptase inhibitory and cytotoxicity properties of *Centratherum punctatum* Cass. and its fractions. S Afr J Bot. 2014;90:17–9. doi: https://doi.org/10.1016/j.sajb.2013.10.001
96. Aggarwal S, Bhadana K, Singh B, Rawat M. *Cinnamomum zeylanicum* extract and its bioactive component cinnamaldehyde show anti-tumor effects via inhibition of multiple cellular pathways. Front Pharmacol. 2022;13:918479. doi: https://doi.org/10.3389/fphar.2022.918479
97. Dutta A, Chakraborty A. Cinnamon in anticancer armamentarium: a molecular approach. J Toxicol. 2018;2018:8978731. doi: https://doi.org/10.1155/2018/8978731
98. Kubatka P, Kello M, Kajo K, Samec M, Jasek K, Vybohova D, *et al*. Chemopreventive and therapeutic efficacy of *Cinnamomum zeylanicum* L. bark in experimental breast carcinoma: mechanistic *in vivo* and *in vitro* analyses. Molecules. 2020;25(6):1399. doi: https://doi.org/10.3390/molecules25061399
99. Sen Z, Zhan XK, Jing JIN, Yi Z, Wanqi Z. Chemosensitizing activities of cyclotides from *Clitoria ternatea* in paclitaxel-resistant lung cancer cells. Oncol Lett. 2013;5(1):641–4. doi: https://doi.org/10.3892/ol.2012.1042
100. Alshaya DS, Awad NS. Antiproliferative effect of *Clitoria ternatea* ethanolic extract against colorectal, breast, and medullary thyroid cancer cell lines. Seperations. 2022;9(11):331. doi: https://doi.org/10.3390/separations9110331
101. Oluwole OB, Obode OC, Elemo GN, Ibekwe D, Adesioye T, Raji FA, *et al*. Anti-inflammatory and anti-cancer properties of selected green leafy vegetables—a review. J Nutr Food Process. 2021;1(11):1–5. doi: https://doi.org/10.31579/2637-8914/070
102. Tosoc JPS, Nuñeza OM, Sudha T, Darwish NHE, Mousa SA. Anticancer effects of the *Corchorus olitorius* aqueous extract and its bioactive compounds on human cancer cell lines. Molecules. 2021;26(19):6033. doi: https://doi.org/10.3390/molecules26196033
103. Soykut G, Becer E, Calis I, Yucecan S, Vatansever S. Apoptotic effects of *Corchorus olitorius* L. leaf extracts in colon adenocarcinoma cell lines. Prog Nutr. 2018;20(4):689–98. doi: https://doi.org/10.23751/pn. v20i4.6892
104. Ashalatha, Gopinath SM. Phytochemical profiling of *Coscinium fenestratum* (Gaertn.) Colebr Cultivar, by liquid chromatography-mass spectrometry. Int J Curr Microbiol App Sci. 2019;8(1):3194–201.
105. Tungpradit R, Sinchaikul S, Phutrakul S, Wongkham W, Chen ST. Anti-cancer compound screening and isolation: *Coscinium fenestratum*, *Tinospora crispa* and *Tinospora cordifolia*. Chiang Mai J Sci. 2010;37(3):476–88.
106. Potikanond S, Chiranthanut N, Khonsung P, Teekachunhatean S. Cytotoxic effect of *Coscinium fenestratum* on human head and neck cancer cell line (HN31). Evid Based Complement Alternat Med. 2015;2015:701939. doi: https://doi.org/10.1155/2015/701939
107. Kumar D, Sharma S, Kumar S. Botanical description, phytochemistry, traditional uses, and pharmacology of *Crataeva nurvala* Buch. Ham.: an updated review. Futur J Pharm Sci. 2020;6:113. doi: https://doi.org/10.1186/s43094-020-00106-1
108. Gharge S, Hiremath SI, Kagawad P, Jivaje K, Palled MS, Suryawanshi SS. *Curcuma zedoaria* Rosc (Zingiberaceae): a review on its chemical, pharmacological and biological activities. Futur J Pharm Sci. 2021;7:166. doi: https://doi.org/10.1186/s43094-021-00316-1
109. Puspita SD, Yulianti R, Mozartha M. The effectiveness of white turmeric (*Curcuma zedoaria*) extracts as root canal irrigation alternative material on *Streptococcus* viridans. J Phys Conf Ser. 2019;1246:012040. doi: https://doi.org/10.1088/1742-6596/1246/1/012040

110. Mishra J, Bhardwaj A, Misra K. *Curcuma* sp.: the nature's souvenir for high-altitude illness. In: Misra K, Sharma P, Bhardwaj A, editors. Management of high-altitude pathophysiology. Cambridge, MA: Academic Press; 2018. pp. 153–69.
111. Venkatadri B, Shanparvish E, Rameshkumar MR, Arasu MV, Al-Dhabi NA, Ponnusamy VK, *et al*. green synthesis of silver nanoparticles using aqueous rhizome extract of *Zingiber officinale* and *Curcuma longa*: *in-vitro* anti-cancer potential on human colon carcinoma HT-29 cells. Saudi J Biol Sci. 2020;27(11):2980–6. doi: https://doi.org/10.1016/j.sjbs.2020.09.021
112. Poompavai S, Gowri Sree V. Anti-proliferative efficiency of pulsed electric field treated *Curcuma longa* (Turmeric) extracts on breast cancer cell lines. IETE J Res. 2020;68(6):4555–69. doi: https://doi.org/10.1080/03772063.2020.1799873
113. Tong R, Wu X, Liu Y, Liu Y, Zhou J, Jiang X, *et al*. Curcumin-induced DNA demethylation in human gastric cancer cells is mediated by the DNA-damage response pathway. Oxid Med Cell Longev. 2020;2020:2543504. doi: https://doi.org/10.1155/2020/2543504
114. Liu P, Ying Q, Liu H, Yu SQ, Bu LP, Shao L, *et al*. Curcumin enhances anti-cancer efficacy of either gemcitabine or docetaxel on pancreatic cancer cells. Oncol Rep. 2020;44(4):1393–402. doi: https://doi.org/10.3892/or.2020.7713
115. Suja S, Varkey IC. Medicinal and pharmacological values of *Cyanthillium cinereum* (Poovamkurunilla) extracts: investigating the antibacterial and anti-cancer activity in Mcf-7 breast. Int J Res Anal Rev. 2019;6(1):412–5.
116. Ariya SS, Baby J. Anticancer effect of phytochemicals from *Cyanthillium cinereum* against cancer target matrix metallopeptidase. Int J Adv Res Eng Technol. 2020;11(4):204–17.
117. Bhagya N, Chandrashekar KR, Prabhu A, Rekha PD. Tetrandrine isolated from *Cyclea peltata* induces cytotoxicity and apoptosis through ROS and caspase pathways in breast and pancreatic cancer cells. *In Vitro* Cell Dev Biol Anim. 2019;55(5):331–40. doi: https://doi.org/10.1007/s11626-019-00332-9
118. Jayaraman S, Variyar EJ. Immunomodulatory, anticancer and antioxidant activities of *Cyclea peltata* (Lam.) Hook. F. and Thomson. Int J Pharm Sci. 2019;11(10):40–6.
119. Yamuna CV, Arthi I, Rajagopal PL, Sajith Kumar PN, Lithashabin PK, Anjana AK. *Cyclea peltata* (Lam.) Hook.F. & Thomson: a pharmacological review. World J Pharm Res. 2020;9(4):265–73. doi: https://doi.org/10.20959/wjpr20204-17020
120. Trang DT, Hoang TKV, Nguyen TTM, Van Cuong P, Dang NH, Dang HD, *et al*. Essential oils of Lemongrass (*Cymbopogon citratus* Stapf) induces apoptosis and cell cycle arrest in A549 lung cancer cells. Biomed Res Int. 2020;2020:5924856. doi: https://doi.org/10.1155/2020/5924856
121. Alwaili MA. Protective effects of lemongrass (*Cymbopogon citratus* STAPF) extract mediated mitochondrial fission and glucose uptake inhibition in SW1417. Food Sci Technol. 2023;43:e94522. doi: https://doi.org/10.1590/fst.94522
122. Pan D, Machado L, Bica CG, Machado AK, Steffani JA, Cadoná FC. *In vitro* evaluation of antioxidant and anticancer activity of Lemongrass (*Cymbopogon citratus* (D.C.) Stapf). Nutr Cancer. 2022;74(4):1474–88. doi: https://doi.org/10.1080/01635581.2021.1952456
123. Rojas-Armas JP, Arroyo-Acevedo JL, Palomino-Pacheco M, Herrera-Calderón O, Ortiz-Sánchez JM, Rojas-Armas A, *et al*. The essential oil of *Cymbopogon citratus* stapt and carvacrol: an approach of the antitumor effect on 7,12-dimethylbenz-[α]-anthracene (DMBA)-induced breast cancer in female rats. Molecules. 2020;25(14):3284. doi: https://doi.org/10.3390/molecules25143284
124. Mukarram M, Choudhary S, Khan MA, Poltronieri P, Khan MMA, Ali J, *et al*. Lemongrass essential oil components with antimicrobial and anticancer activities. Antioxidants (Basel). 2021;11(1):20. doi: https://doi.org/10.3390/antiox11010020
125. Bezzera JJL, Pinheiro AAV. Traditional uses, phytochemistry, and anticancer potential of *Cyperus rotundus* L. (Cyperaceae): a systematic review. S Afr J Bot. 2022;144:175–86. doi: https://doi.org/10.1016/j.sajb.2021.08.010
126. Nafisah W, Pinanti HN, Christina YI, Rifa'i M, Djati MS. Computational biological activity and pharmacological properties analysis for anticancer *Cyperus rotundus* bioactive compounds. AIP Conf Proc. 2021;2353:030118. doi: https://doi.org/10.1063/5.0052746
127. Simorangkir D, Masfria M, Harahap U, Satria D. Activity of anticancer n-hexane fraction of *Cyperus rotundus* L. rhizome against breast cancer MCF-7 cell line. Open Access Maced J Med Sci. 2019;7(22):3904–6. doi: https://doi.org/10.3889/oamjms.2019.530
128. Lin CH, Peng SF, Chueh FS, Cheng ZY, Kuo CL, Chung JG. The ethanol crude extraction of *Cyperus rotundus* regulates apoptosis-associated gene expression in HeLa human cervical carcinoma cells *in vitro*. Anticancer Res. 2019;39(7):3697–709. doi: https://doi.org/10.21873/anticanres.13518
129. Mannarreddy P, Denis M, Munireddy D, Pandurangan R, Thangavelu KP, Venkatesan K. Cytotoxic effect of *Cyperus rotundus* rhizome extract on human cancer cell lines. Biomed Pharmacother. 2017;95:1375–87. doi: https://doi.org/10.1016/j.biopha.2017.09.051
130. Karim R, Begum MM, Jui Y, Islam T, Billah M, Arafat Y, *et al*. *In-vitro* cytotoxic and anti-Vibrio cholerae activities of alcoholic extracts of *Desmodium triflorum* (L.) whole plant and *Terminalia citrina* (Roxb.) fruits. Clin. Phytosci. 2021;7:36. doi: https://doi.org/10.1186/s40816-021-00272-6
131. Dhanabal SP, Dhamodaran P, Chaitnya NL, Duraiswamy B. Ethnopharmacological and phytochemical profile of three potent *Desmodium* species: *Desmodium gangeticum* (L.) DC, *Desmodium triflorum* Linn and *Desmodium triquetrum* Linn. J Chem Pharm Res. 2016;8(7):91–7.
132. Lai SC, Ho YL, Huang SC, Huang TH, Lai ZR, Wu CR, *et al*. Antioxidant and antiproliferative activities of *Desmodium triflorum* (L.) DC. Am J Chin Med. 2010;38(2):329–42. doi: https://doi.org/10.1142/S0192415X10007889
133. Alzandi AA, Taher EA, Al-Sagheer NA, Al-Khulaidi AW, Azizi M, Naguib DM. Phytochemical components, antioxidant and anticancer activity of 18 major medicinal plants in Albaha region, Saudi Arabia. Biocatal Agric Biotechnol. 2021;34:102020. doi: https://doi.org/10.1016/j.bcab.2021.102020
134. Malik FH, Haq I, Fatima H, Ahmad M, Naz I, Mirza B, *et al*. Bioprospecting *Dodonaea viscosa* Jacq.; a traditional medicinal plant for antioxidant, cytotoxic, antidiabetic and antimicrobial potential. Arab J Chem. 2022;15(3):103688. doi: https://doi.org/10.1016/j.arabjc.2022.103688
135. Kaigongi MM, Lukhoba CW, Ochieng' PJ, Taylor M, Yenesew A, Makunga NP. LC-MS-based metabolomics for the chemosystematics of Kenyan *Dodonaea viscosa* Jacq (Sapindaceae) populations. Molecules. 2020;25(18):4130. doi: https://doi.org/10.3390/molecules25184130
136. Alghamdi MD, Nazreen S, Ali NM, Amna T. ZnO nanocomposites of *Juniperus procera* and *Dodonaea viscosa* extracts as antiproliferative and antimicrobial agents. Nanomaterials (Basel). 2022;12(4):664. doi: https://doi.org/10.3390/nano12040664
137. Christina YI, Rifa'i M, Widodo N, Djati MS. The combination of *Elephantopus scaber* and *Phaleria macrocarpa* leaves extract promotes anticancer activity via downregulation of ER-α, Nrf2 and PI3K/AKT/mTOR pathway. J Ayurveda Integr Med. 2022;13(4):100674. doi: https://doi.org/10.1016/j.jaim.2022.100674
138. Silalahi M. Utilization of *Elephantopus scaber* as traditional medicine and its bioactivity. GSC Biol Pharm Sci. 2021;15(1):112–8. doi: https://doi.org/10.30574/gscbps.2021.15.1.0106
139. Jasmine R, Abarna N, Verghese S. Anticancer potential of *Elephantopus scaber* L. leaves against MCF-7 cell lines. Asian J Adv Med Sci. 2021;3(4):94–8.
140. Ho WY, Liew SS, Yeap SK, Alitheen NB. Synergistic cytotoxicity between *Elephantopus scaber* and tamoxifen on MCF-7-derived

multicellular tumor spheroid. Evid-Based Complement Altern Med. 2021;2021:6355236. doi: https://doi.org/10.1155/2021/6355236
141. Kabeer FA, Rajalekshmi DS, Nair MS, Prathapan R. *In vitro* and *in vivo* antitumor activity of deoxyelephantopin from a potential medicinal plant *Elephantopus scaber* against Ehrlich ascites carcinoma. Biocatal Agric Biotechnol. 2019;19:101106. doi: https://doi.org/10.1016/j.bcab.2019.101106
142. Beeran AA, Maliyakkal N, Rao CM, Udupa N. The enriched fraction of *Elephantopus scaber* triggers apoptosis and inhibits multi-drug resistance transporters in human epithelial cancer cells. Pharmacogn Mag. 2015;11(42):257–68. doi: https://doi.org/10.4103/0973-1296.153077
143. Almeer RS, Alnasser M, Aljarba N, AlBasher GI. Effects of Green cardamom (*Elettaria cardamomum* Maton) and its combination with cyclophosphamide on Ehrlich solid tumors. BMC Complement Med. Ther. 2021;21(1):133. doi: https://doi.org/10.1186/s12906-021-03305-2
144. Qiblawi S, Kausar MA, Shahid SMA, Saeed M, Alazzeh AY. Therapeutic interventions of Cardamom in cancer and other human diseases. J Pharm Res Int. 2020;32(22):60087.
145. Vutakuri N, Somara S. Natural and herbal medicine for breast cancer using *Elettaria cardamomum* (L.) Maton. Int J Herb Med. 2018;6(2):91–6.
146. Elguindy NM, Yacout GA, El Azab EF, Maghraby HK. Chemoprotective effect of *Elettaria cardamomum* against chemically induced hepatocellular carcinoma in rats by inhibiting NF-κB, oxidative stress, and activity of ornithine decarboxylase. South African J Bot. 2016;105:251–8. doi: https://doi.org/10.1016/j.sajb.2016.04.001
147. Arbade GK, Kumar V, Tripathi V, Menon A, Bose S, Patro TU. *Emblica officinalis*-loaded poly(ϵ-caprolactone) electrospun nanofiber scaffold as potential antibacterial and anticancer deployable patch. New J Chem. 2019;43(19):7427–40. doi: https://doi.org/10.1039/c9nj01137d
148. Thoidingjam S, Tiku AB. Therapeutic efficacy of *Phyllanthus emblica*-coated iron oxide nanoparticles in A549 lung cancer cell line. Nanomedicine. 2019;14(17):2355–71. doi: https://doi.org/10.2217/nnm-2019-0111
149. Baby B, Antony P, Vijayan R. Antioxidant and anticancer properties of berries. Crit Rev Food Sci Nutr. 2018;58(15):2491–507. doi: https://doi.org/10.1080/10408398.2017.1329198
150. Chaitanya MV, Suresh P. The neglected anticancer phytoceutical treasures from the Nilgiris biosphere: a short review. J Pharm Res Int. 2018;22(1):1–13. doi: https://doi.org/10.9734/JPRI/2018/40529
151. Rajalakshmi P, Sumathi, Pugalenthi MR. Antioxidant activity of *Erigeron karvinskianus* DC. and *Ageratina adenophora* (Spreng.) King (leaves). Int J Food Sci Nutr. 2016;1:64–8.
152. Sulaiman CT, Deepak M, Praveen TK, Lijini KR, Salman M, Satheesh N, *et al*. Metabolite profiling and anti-cancer activity of two medicinally important *Euphorbia* species. Med Omi. 2023;7:100018. doi: https://doi.org/10.1016/j.meomic.2022.100018
153. Linga Raju K, Naika HR, Nagabhushana H, Nagaraju G. *Euphorbia heterophylla* (L.) mediated fabrication of ZnO NPs: characterization and evaluation of antibacterial and anticancer properties. Biocatal Agric Biotechnol. 2019;18:100894. doi: https://doi.org/10.1016/j.bcab.2018.10.011
154. Aleksandrov M, Maksimova V, Koleva Gudeva L. Review of the anticancer and cytotoxic activity of some species from genus euphorbia. Agric Conspec Sci. 2019;84(1):1–5.
155. Manikandarajan PA, Sathish M, Suresh R, Suresh AJ. Isolation, characterization, docking and anti-cancer activity of quercetin from leaves of *Euphorbia heterophylla* Linn. Int J Pharm Sci Res. 2018;9(1):197–202. doi: https://doi.org/10.13040/IJPSR.0975-8232.9(1).197-02
156. Yusuf H, Satria D, Suryawati S, Fahriani M. Combination therapy of eurycomanone and doxorubicin as anticancer on T47D and MCF-7 cell lines. Syst Rev Pharm. 2020;11(10):335–41. doi: https://doi.org/10.31838/srp.2020.10.55
157. Moses LB, Abu Bakar MF, Mamat H, Aziz ZA. Unfermented freeze-dried leaf extract of Tongkat Ali (*Eurycoma longifolia* Jack.) induced cytotoxicity and apoptosis in MDA-MB-231 and MCF-7 breast cancer cell lines. Evid Based Complement Altern Med. 2021;2021:8811236. doi: https://doi.org/10.1155/2021/8811236
158. Rahman EY, Kusworini K, Ali M, Purnomo BB, Kania N. The cytotoxic effect of *Eurycoma longifolia* jack root extract on the prostate adenocarcinoma pc-3 cells through apoptosis enhancement. Open Access Maced J Med Sci. 2020;8(A):317–22. doi: https://doi.org/10.3889/oamjms.2020.4420
159. Rehman SU, Choe K, Yoo HH. Review on a traditional herbal medicine, *Eurycoma longifolia* Jack (Tongkat Ali): its traditional uses, chemistry, evidence-based pharmacology and toxicology. Molecules. 2016;21(3):331. doi: https://doi.org/10.3390/molecules21030331
160. Andueza N, Giner RM, Portillo MP. Nutraceutical, functional, and therapeutic properties of *Garcinia cambogia*: a review. Int J Food Prop. 2023;26(1):729–38. doi: https://doi.org/10.1080/10942912.2023.2178458
161. Baky MH, Fahmy H, Farag MA. Recent advances in *Garcinia cambogia* nutraceuticals in relation to its hydroxy citric acid level. A comprehensive review of its bioactive production, formulation, and analysis with future perspectives. ACS Omega. 2022;7(30):25948–57. doi: https://doi.org/10.1021/acsomega.2c02838
162. Cock IE, Gailot C, Shalom J. An examination of the antimicrobial and anticancer properties of *Mangosteen pericarp* extracts. Acta Hortic. 2015;1106:231–7. doi: https://doi.org/10.17660/ActaHortic.2015.1106.35
163. Aggarwal V, Tuli HS, Kaur J, Aggarwal D. Garcinol exhibits anti-neoplastic effects by targeting diverse oncogenic factors in tumor cells. Biomedicines. 2020;8(5):103. doi: https://doi.org/10.3390/biomedicines8050103
164. Wang J, Wang L, Ho CT, Zhang K, Liu Q, Zhao H. Garcinol from *Garcinia indica* downregulates cancer stem-like cell biomarker $ALDH_1A_1$ in nonsmall cell lung cancer A_{549} cells through $DDIT_3$ activation. J Agric Food Chem. 2017;65(18):3675–83. doi: https://doi.org/10.1021/acs.jafc.7b00346
165. Ullah MF, Ahmad A. Critical dietary factors in cancer chemoprevention. Cham, Switzerland: Springer; 2015.
166. Zhang M, Lu Q, Hou H, Sun D, Chen M, Ning F, *et al*. Garcinol inhibits the proliferation of endometrial cancer cells by inducing cell cycle arrest. Oncol Rep. 2021;45(2):630–40. doi: https://doi.org/10.3892/or.2020.7900
167. Shylla A, Roy B. Phytochemical screening and toxicological assessment of crude extract of *Aesculus assamica* Griff. and *Gaultheria fragrantissima* Wall. in Swiss albino mice. Gorteria J. 2021;34(8):140–51. doi: https://doi.org/10.22159/ajpcr.2017.v10i1.15481
168. Yan-Ling X, Du XY, Yi-Rong L, Lu L. The complete chloroplast genome of *Gaultheria fragrantissima* Wall. (Ericaceae) from Yunnan, China, an aromatic medicinal plant in the wintergreens. Mitochondrial DNA B Resour. 2021;6(6):1761–2. doi: https://doi.org/10.1080/23802359
169. Narayanan DP, Rexliene MJ, Suresh S. Assessment of carrageenan-induced anti-inflammatory activity of *Gaultheria fr agrantissima* Wall. and *Byttneria herbaceae* Roxb. collected from Idukki district. Int J Pharmacogn Phytochem Res. 2020;12(3):138–2. doi: https://doi.org/10.25258/phyto.12.3.3
170. Kumar M, Sarma P, Dkhar MS, Kayang H, Raghuvanshi R, Dubey NK. Assessment of chemically characterised *Gaultheria fragrantissima* Wall. essential oil and its major component as safe plant-based preservative for millets against fungal, aflatoxin contamination and lipid peroxidation during storage. J Food Sci Technol. 2018;55(1):111–9. doi: https://doi.org/10.1007/s13197-017-2842-y

171. Pandey BP, Thapa R, Upreti A. Chemical composition, antioxidant and antibacterial activities of essential oil and methanol extract of *Artemisia vulgaris* and *Gaultheria fragrantissima* collected from Nepal. Asian Pac J Trop Med. 2017;10(10):952–9. doi: https://doi.org/10.1016/j.apjtm.2017.09.005
172. Goel B, Dey B, Chatterjee E, Tripathi N, Bhardwaj N, Kumar S, *et al*. Antiproliferative potential of gloriosine: a lead for anticancer drug development. ACS Omega. 2022;7(33):28994–9001. doi: https://doi.org/10.1021/acsomega.2c02688
173. Ionkova I, Shkondrov A, Zarev Y, Kozuharova E, Krasteva I. Anticancer secondary metabolites: from ethnopharmacology and identification in native complexes to biotechnological studies in species of genus *Astragalus* L. and *Gloriosa* L. Curr Issues Mol Biol. 2022;44(9):3884–904. doi: https://doi.org/10.3390/cimb44090267
174. Pandey DK, Kaur P, Kumar V, Banik RM, Malik T, Dey A. Screening the elite chemotypes of *Gloriosa superba* L. in India for the production of anticancer colchicine: simultaneous microwave-assisted extraction and HPTLC studies. BMC Plant Biol. 2021;21(1):77. doi: https://doi.org/10.1186/s12870-021-02843-8
175. Balkrishna A, Das SK, Pokhrel S, Joshi A, Laxmi, Verma S, *et al*. Colchicine: isolation, LC–MS QT of screening, and anticancer activity study of *Gloriosa superba* seeds. Molecules. 2019;24(2772):2772. doi: https://doi.org/10.3390/molecules24152772
176. Teja PK, Patel P, Bhavsar D, Bindusri C, Jadhav K, Chauthe SK. Traditional uses, phytochemistry, pharmacology, toxicology and formulation aspects of *Glycosmis* species: a systematic review. Phytochemistry. 2021;190:112865. doi: https://doi.org/10.1016/j.phytochem.2021.112865
177. Amutha S, Sridhar S. Green synthesis of magnetic iron oxide nanoparticle using leaves of *Glycosmis*. J Innov Pharm Biol Sci. 2018;5(2):22–6.
178. Shoja MH, Reddy ND, Nayak PG, Biswas S, Srinivasan KK, Rao CM. *In vitro* mechanistic and *in vivo* anti-tumor studies of *Glycosmis pentaphylla* (Retz.) DC against breast cancer. J Ethnopharmacol. 2016;186:159–68. doi: https://doi.org/10.1016/j.jep.2016.04.002
179. Ghosh AR, Alsayari A, Habib AH, Wahab S, Nadig AR, Kafeeq MM, *et al*. Anti-tumor potential of *Gymnema sylvestre* saponin rich fraction on *in vitro* breast cancer cell lines and *in vivo* tumor-bearing mouse models. Antioxidants (Basel). 2023;12(1):134. doi: https://doi.org/10.3390/antiox12010134
180. Packialakshmi B, Raga Sowndriya S. Anti-cancer effect of *Gymnema sylvestre* leaf extract against MG63, human osteosarcoma cell line—an *in vitro* analysis. Int J Curr Res Rev. 2019;11(11):18–24. doi: https://doi.org/10.31782/IJCRR.2019.11114
181. Chakraborty D, Ghosh S, Bishayee K, Mukherjee A, Sikdar S, Khuda-Bukhsh AR. Antihyperglycemic drug *Gymnema sylvestre* also shows anticancer potentials in human melanoma A375 cells via reactive oxygen species generation and mitochondria-dependent caspase pathway. Integr Cancer Ther. 2013;12(5):433–41. doi: https://doi.org/10.1177/1534735413485419
182. Yasukawa K, Okuda S, Nobushi Y. Inhibitory effects of gymnema (*Gymnema sylvestre*) leaves on tumour promotion in two-stage mouse skin carcinogenesis. Evid Based Complement Altern Med. 2014;2014:328684. doi: https://doi.org/10.1155/2014/328684
183. Arunachalam KD, Arun LB, Annamalai SK, Arunachalam AM. Potential anticancer properties of bioactive compounds of *Gymnema sylvestre* and its biofunctionalized silver nanoparticles. Int J Nanomed. 2014;10:31–41. doi: https://doi.org/10.2147/IJN.S71182
184. Tummala PK, Nannapaneni S, Durvasula SP, Chadalavada S, Venigandla S, Vemuru S, *et al*. Evaluation of *Hemidesmus indicus* plant compounds for anti-cancer studies—an *in-silico* approach. J Pharm Res Int. 2021;33:64–9. doi: https://doi.org/10.9734/jpri/2021/v33i26a31472
185. Nandy S, Mukherjee A, Pandey DK, Ray P, Dey A. Indian Sarsaparilla (*Hemidesmus indicus*): recent progress in research on ethnobotany, phytochemistry and pharmacology. J Ethnopharmacol. 2020;254:112609. doi: https://doi.org/10.1016/j.jep.2020.112609
186. Turrini E, Catanzaro E, Ferruzzi L, Guerrini A, Tacchini M, Sacchetti G, *et al*. *Hemidesmus indicus* induces apoptosis via proteasome inhibition and generation of reactive oxygen species. Sci Rep. 2019;9(1):7199. doi: https://doi.org/10.1038/s41598-019-43609-5
187. Joshi A, Lad H, Sharma H, Bhatnagar D. Evaluation of phytochemical composition and antioxidative, hypoglycaemic and hypolipidaemic properties of methanolic extract of *Hemidesmus indicus* roots in streptozotocin-induced diabetic mice. Clin Phytosci. 2018;4:7. doi: https://doi.org/10.1186/s40816-018-0064-0
188. Statti G, Marrelli M, Conforti F, Spagnoletti A, Tacchini M, Fimognari C, *et al*. Inhibition of cancer cell proliferation and antiradical effects of decoction, hydroalcoholic extract, and principal constituents of *Hemidesmus indicus* R. Br. Phyther Res. 2015;29(6):857–63. doi: https://doi.org/10.1002/ptr.5322
189. Śliwiński T, Kowalczyk T, Sitarek P, Kolanowska M. Orchidaceae-derived anticancer agents: a review. Cancers (Basel). 2022;14(3):754. doi: https://doi.org/10.3390/cancers14030754
190. Satish B, Vishwanatha D. Screening for cytotoxic activity of *Habenaria longicorniculata* J graham tubers- an *in-vitro* study. J Phytopharm. 2020;9(5):367–70. doi: https://doi.org/10.31254/phyto.2020.9513
191. Shana KM, Vishnupriya VV, Fahmeeda PP, Prajna PP, Reshmi R, Jothi ET. A review on the phytochemistry and pharmacology of *Hemigraphis colorata*. World J Biol Pharm Heal Sci. 2022;12(2):105–9. doi: https://doi.org/10.30574/wjbphs.2022.12.2.0195
192. Hallier H, Mathew F. Phytochemical screening of *Hemigraphis colorata* (Blume) H.G. Hallier. J Pharmacogn Phytochem. 2021;10(6):360–3.
193. Sasidharan S, Pottail L. Anti-bacterial and skin-cancer activity of AuNP, rGO and AuNP-rGO composite using *Hemigraphis alternata* (Burm.F.) T. Anderson. Biocatal Agric Biotechnol. 2020;25:101596. doi: https://doi.org/10.1016/j.bcab.2020.101596
194. Zahara K, Panda SK, Swain SS, Luyten W. Metabolic diversity and therapeutic potential of *Holarrhena pubescens*: an important ethnomedicinal plant. Biomolecules. 2020;10(9):1341. doi: https://doi.org/10.3390/biom10091341
195. Cheenpracha S, Boapun P, Limtharakul Née Ritthiwigrom T, Laphookhieo S, Pyne SG. Antimalarial and cytotoxic activities of pregnene-type steroidal alkaloids from *Holarrhena pubescens* roots. Nat Prod Res. 2019;33(6):782–8. doi: https://doi.org/10.1080/14786419.2017.1408108
196. Yoon H, Park J, Park KK, Kim J, Bandara NC, Bandara BMR, *et al*. Methanol extract of *Holarrhena antidysenterica* inhibits the growth of human oral squamous cell carcinoma cells and osteoclastogenesis of bone marrow macrophages. Evid Based Complement Alternat Med. 2017;2017:7272947. doi: https://doi.org/10.1155/2017/7272947
197. Yende A, Rama Bhat P, Zainab A, Acharya S, Padyana S. Evaluation of antioxidant and antimicrobial activities of *Holigarna arnottiana* Hook. f. Photon. 2013;139:278–88.
198. Manilal A, Idhayadhulla A. Potential *in vitro* antimicrobial efficacy of *Holigarna arnottiana* (Hook F). Asian Pac J Trop Biomed. 2014;4(1):25–9. doi: https://doi.org/10.1016/S2221-1691(14)60203-3
199. Ravi A, Saj OP. Antioxidant and cytotoxic potential of the plant *Holigarna arnottiana* hook.f. bark ethanolic extract. World J Pharm Res. 2013;2(5):1685–703.
200. Du Q, Chan LY, Gilding EK, Henriques ST, Condon ND, Ravipati AS, *et al*. Discovery and mechanistic studies of cytotoxic cyclotides from the medicinal herb *Hybanthus enneaspermus*. J Biol Chem. 2020;295(32):10911–25. doi: https://doi.org/10.1074/jbc.ra120.012627
201. Murugan M, Kamaraj M, Naidu T. Green synthesis of CeO2 nanoparticles using *Hybanthus enneaspermus* and their cytotoxic effects against human breast cancer cell line (MCF-7). J Emerg

Technol Innov Res. 2018;5(11):316–5. doi: https://doi.org/10.15297/JETIR191184
202. Jaikumar K, Sheik Noor Mohamed M, Marimuthu S, Anantha Padmanabhan S, Anand D, Saravanan P. *In vitro* anticancer activity of ethanolic leaf extract of *Acampe praemorsa* (Roxb.). Indo Am J Pharm Res. 2018;7(7):1020–5. doi: https://doi.org/10.5281/zenodo.1318534
203. Beaula Stary BL, Uma Devi S, Johnsi Cristobel G, Beena L. Phytochemical screening of *Hybanthus enneaspermus* (Linn) F. Muell. Int J Innov Sci Eng Technol. 2008;1(5):111–22.
204. Kato K, Nagane M, Aihara N, Kamiie J, Miyanabe M, Hiraki S, *et al*. Lipid-soluble polyphenols from sweet potato exert antitumor activity and enhance chemosensitivity in breast cancer. J Clin Biochem Nutr. 2021;68(1):193–200. doi: https://doi.org/10.3164/jcbn.20-73
205. Silva-Correa CR, Vargas JH, Torre VEVL, Calderon-Pena AA, Gonzalez-Siccha AD, Aspajo-Villalaz CL, *et al*. Potential anticancer activity of bioactive compounds from *Ipomoea batatas*. Pharmacogn J. 2022;14(3):650–9. doi: https://doi.org/10.5530/pj.2022.14.84
206. Lin HH, Lin KH, Wu KF, Chen YC. Identification of *Ipomoea batatas* anti-cancer peptide (IbACP)-responsive genes in sweet potato leaves. Plant Sci. 2021;305:110849. doi: https://doi.org/10.1016/j.plantsci.2021.110849
207. Budiman MR, Wiraswati HL, Rezano A. Purple sweet potato phytochemicals: potential chemo-preventive and anticancer activities. Open Access Maced J Med Sci. 2021;9(F):288–98. doi: https://doi.org/10.3889/oamjms.2021.6784
208. Sun Y, Pan Z, Yang C, Jia Z, Guo X. Comparative assessment of phenolic profiles, cellular antioxidant and antiproliferative activities in ten varieties of sweet potato (*Ipomoea batatas*) storage roots. Molecules. 2019;24(24):4476. doi: https://doi.org/10.3390/molecules24244476
209. Das G, Patra JK, Basavegowda N, Vishnuprasad CN, Shin HS. Comparative study on antidiabetic, cytotoxicity, antioxidant and antibacterial properties of biosynthesized silver nanoparticles using outer peels of two varieties of *Ipomoea batatas* (L.) Lam. Int J Nanomed. 2019;14:4741–54. doi: https://doi.org/10.2147/IJN.S210517
210. Kang HG, Jeong SH, Cho JH. Antimutagenic and anticarcinogenic effect of methanol extracts of sweet potato (*Ipomea batata*) leaves. Toxicol Res. 2010;26(1):29–35. doi: https://doi.org/10.5487/TR.2010.26.1.029
211. Ashraf VKM, Kalaichelvan VK, Venkatachalam VV, Ragunathan R. *In vitro* anticancer potential of aerial parts of *Ipomoea horsfalliae* hook in different human cancer cell lines. Ind Crops Prod. 2020;155:112746. doi: https://doi.org/10.1016/j.indcrop.2020.112746
212. Babu K, Dharishini P, Austin A. Studies on anatomy and phytochemical analysis of *Ipomoea pes-tigridis* L. J Pharmacogn Phytochem. 2018;7(1):791–4.
213. Venkateshan N, Subramaniyam M, Santhanakumar M. Review of *Ipomoea pes-tigridis* L.: ethnobotanical characteristics, pharmacological activities. Int J Curr Pharm Res. 2018;10(6):1–4. doi: https://doi.org/10.22159/ijcpr.2018v10i6.30968
214. Begum SS, Aruna A, Sivakumar T, Premanand C. *In vitro* cytotoxic activity on ethanolic extracts of leaves of *Ipomoea pes-tigridis* (Convolulaceae) against liver Hepg2 cell line. Int J Ayu Her Med. 2015;5(3):1778–84.
215. Carneiro MRB, Sallum LO, Martins JLR, Peixoto JC, Napolitano HB, Rosseto LP. Overview of the *Justicia* genus: insights into its chemical diversity and biological potential. Molecules. 2023;28(3):1190. doi: https://doi.org/10.3390/molecules28031190
216. Kumar S, Singh R, Dutta D, Chandel S, Bhattacharya A, Ravichandiran V, *et al*. *In vitro* anticancer activity of methanolic extract of *Justicia adhatoda* leaves with special emphasis on human breast cancer cell line. Molecules. 2022;27(23):8222. doi: https://doi.org/10.3390/molecules27238222
217. Sudevan S, Parasivam R, Sundar S, Velauthan H, Ramasamy V. Investigation of anti-inflammatory and anti-cancer activity of *Justicia adathoda* metabolites. Pak J Pharm Sci. 2019;32(4):1555–61.
218. Jiju V. Assessment of *in vivo* anticancer activity of *Justicia adathoda* using Dal cell lines. East Afr J Med Sci. 2019;2(7):438–42. doi: https://doi.org/10.36349/easms. 2019.v02i0
219. Mangai AS. A cytotoxic approach of *Justica gendarussa* Burm.F against human cancer cell lines. Int Res J Pharm. 2018;8(12):34–7. doi: https://doi.org/10.7897/2230-8407.0812247
220. Chandra S, Lo D. A review on the bioactivities of *Justicia gendarussa*. IOP Conf Ser Earth Environ Sci. 2021;794(1):012137. doi: https://doi.org/10.1088/1755-1315/794/1/012137
221. Ayob Z, Mohd Bohari SP, Abd Samad A, Jamil S. Cytotoxic activities against breast cancer cells of local *Justicia gendarussa* crude extracts. Evid Based Complement Alternat Med. 2014;2014:732980. doi: https://doi.org/10.1155/2014/732980
222. Joseph L, Ranjani JM, Pai KSR, Srinivasan KK. Promising anticancer activities of *Justicia simplex* D. Don. in cellular and animal models. J Ethnopharmacol. 2017;199:231–9. doi: https://doi.org/10.1016/j.jep.2017.01.046
223. Eswari MG, Rathi RL, Harini J, Aruna R. Phytochemical screening of *Justicia simplex* D. Don a valuable medicinal plant extract against dental pathogens. Int Lett Nat Sci. 2014;21:10–21. doi: https://doi.org/10.18052/www.scipress.com/ilns.21.10
224. Ravi L, Sreenivas BKA, Kumari GRS, Archana O. Anticancer cytotoxicity and antifungal abilities of green-synthesized cobalt hydroxide (Co $(OH)_2$) nanoparticles using *Lantana camara* L. Beni-Suef Univ J Basic Appl Sci. 2022;11:124. doi: https://doi.org/10.1186/s43088-022-00304-1
225. Al-Hakeim HK, Al-Zabibah RS, Alzihari HF, Almensoori AK, Al-Zubaidi HA. Anticancer and antiangiogenic activities of alkaloids isolated from *Lantana camara* by adsorption on the magnetic nanoparticles. Karbala Int J Mod Sci. 2021;7(1):11. doi: https://doi.org/10.33640/2405-609X.2577
226. Bhaskar D, Mashrea DS, Amresh N, Sathyamurthy B. *In vitro* studies on the effect of *Lantana camara* Linn. in liver. Eur J Pharm Med Res. 2017;4(9):539–45.
227. Han EB, Chang BY, Jung YS, Kim SY. *Lantana camara* induces apoptosis by Bcl-2 family and caspases activation. Pathol Oncol Res. 2015;21(2):325–31. doi: https://doi.org/10.1007/s12253-014-9824-4
228. Radhakrishnan R, Liakath F, Khan A, Muthu A. Green synthesis of copper oxide nanoparticles mediated by aqueous leaf extracts of *Leucas aspera* and *Morinda tinctoria*. Lett Appl Nano Biosci. 2021;10(4):2706–14. doi: https://doi.org/10.33263/lianbs104.27062714
229. Madhu GC, Kannaiyan J, Paulraj B, Veeramani V. Anti-diabetic, anti-cancer activity and associated toxicity of *Leucas aspera* extract in Wistar albino rats. Int J Pharm Sci Drug Res. 2019;11(06):387–92. doi: https://doi.org/10.25004/ijpsdr.2019.110617
230. Mohan A, Nair SV, Lakshmanan VK. *Leucas aspera* nanomedicine shows superior toxicity and cell migration retarded in prostate cancer cells. Appl Biochem Biotechnol. 2017;181(4):1388–400. doi: https://doi.org/10.1007/s12010-016-2291-5
231. Rasul A, Riaz A, Wei W, Sarfraz I, Hassan M, Li J, *et al*. *Mangifera indica* extracts as novel PKM2 inhibitors for treatment of triple negative breast cancer. Biomed Re Int. 2021;2021:5514669. doi: https://doi.org/10.1155/2021/5514669
232. Yap KM, Sekar M, Seow LJ, Gan SH, Bonam SR, Mat Rani NNI, *et al*. *Mangifera indica* (Mango): a promising medicinal plant for breast cancer therapy and understanding its potential mechanisms of action. Breast Cancer (Dove Med Press). 2021;13:471–503. doi: https://doi.org/10.2147/BCTT.S316667
233. Morozkina SN, Nhung Vu TH, Generalova YE, Snetkov PP, Uspenskaya MV. Mangiferin as new potential anti-cancer agent and Mangiferin-integrated polymer systems-a novel research direction. Biomolecules. 2021;11(1):79. doi: https://doi.org/10.3390/biom11010079

234. Kumar M, Saurabh V, Tomar M, Hasan M, Changan S, Sasi M, *et al*. Mango (*Mangifera indica* L.) leaves: nutritional composition, phytochemical profile, and health-promoting bioactivities. Antioxidants. 2021;10(2):299. doi: https://doi.org/10.3390/antiox10020299
235. Kemegne GA, Bettache N, Nyegue MA, Etoa FX, Menut C. Cytotoxic activities of *Psidium guajava* and *Mangifera indica* plant extracts on human healthy skin fibroblasts and human hepatocellular carcinoma. Issues Biol Sci Pharma Res. 2020;8(4):58–64. doi: https://doi.org/10.15739/ibspr.20.007
236. Chaudhary MK, Misra A, Srivastava S. Comparative pharmacognostical studies of three *Mahonia* species: exploring the possibilities as a substitute for the Ayurvedic drug 'Daruharidra'. Indian J Tradit Knowl. 2022;21(4):774–81. doi: https://doi.org/10.56042/ijtk. v21i4.42479
237. Tuzimski T, Petruczynik A, Kaproń B, Makuch-Kocka A, Szultka-Młyńska M, Misiurek J, *et al*. Determination of cytotoxic activity of selected isoquinoline alkaloids and plant extracts obtained from various parts of *Mahonia aquifolium* collected in various vegetation seasons. Molecules. 2021;26(4):816. doi: https://doi.org/10.3390/molecules26040816
238. Latha R, Rajanathan TM, Khusro A, Chidambaranathan N, Agastian P, Nagarajan S. Anticancer activity of *Mahonia leschenaultii* methanolic root extract and berberine on Dalton's ascitic lymphoma in mice. Asian Pac J Trop Med. 2019;12(6):264–71. doi: https://doi.org/10.4103/1995-7645.261273
239. He JM, Mu Q. The medicinal uses of the genus *Mahonia* in traditional Chinese medicine: an ethnopharmacological, phytochemical and pharmacological review. J Ethnopharmacol. 2015;175:668–3. doi: https://doi.org/10.1016/j.jep.2015.09.013
240. Lestari OA, Palupi NS, Setiyono A, Kusnandar F, Yuliana ND. *In vitro* antioxidant potential and phytochemical profiling of *Melastoma malabathricum* leaf water extract. Food Sci Technol Campinas. 2022;42:e92021. doi: https://doi.org/10.1590/fst.92021
241. Kumar V, Sachan R, Rahman M, Rub RA, Patel DK, Sharma K, *et al*. Chemopreventive effects of *Melastoma malabathricum* L. extract in mammary tumor model via inhibition of oxidative stress and inflammatory cytokines. Biomed Pharmacother. 2021;137:111298. doi: https://doi.org/10.1016/j.biopha.2021.111298
242. Idris A, Ahmad S. *Melastoma malabathricum* ethyl acetate fraction induces secondary necrosis in human breast and lung cancer cell lines. Pharmacogn Mag. 2017;13(Suppl 4):179–88. doi: https://doi.org/10.4103/pm.pm
243. Adib JC, Yunos N. Anti-cancer, antimicrobial, and antioxidative potentials of *Mesua ferrea* L. and its phytochemical constituents: a review. Asian J Pharmacogn. 2019;3(3):5–19.
244. Asif M, Shafaei A, Abdul Majid AS, Ezzat MO, Dahham SS, Ahamed MBK, *et al*. *Mesua ferrea* stem bark extract induces apoptosis and inhibits metastasis in human colorectal carcinoma HCT 116 cells, through modulation of multiple cells signalling pathways. Chin J Nat Med. 2017;15(7):505–14. doi: https://doi.org/10.1016/S1875-5364(17)30076-6
245. Rajendran K, Reddy EV, Khanna A. Anticancer effect of *Mesua ferrea* extracts on human pancreatic cancer cell line. Int J Life Sci Res. 2016;2(2):198–205.
246. Yesmin R, Das PK, Belal H, Aktar S, Siddika MA, Asha SY, *et al*. Anticancer potential of *Michelia champaca* Linn. bark against Ehrlich Ascites carcinoma (EAC) cells in Swiss albino mice. Nat Prod J. 2021;11(1):85–96. doi: http://dx.doi.org/10.2174/2210315509666191120105647
247. Sinha R, Varma R. Antioxidant activity in leaf extracts of *Michelia champaca* L. J Adv Pharm Educ Res. 2017;7(2):86–8.
248. Zuhrotun A, Suganda AG, Wirasutisna KR, Wibowo MS. Isolation of bioactive compound of *Michelia champaca* L. bark and its activity test using mechanism-based yeast bioassay. Asian J Pharm Clin Res. 2016;9(5):158–61. doi: https://doi.org/10.22159/ajpcr. 2016.v9i5.12856
249. Ginting B, Mustanir, Nurdin, Maulidna, Murniana, Safrina. Evaluation of antioxidant and anticancer activity of *Myristica fragrans* houtt. bark. Pharmacogn J. 2021;13(3):780–6. doi: 10.5530/pj.2021.13.99
250. Ginting B, Saidi N, Murniana, Mustanir, Maulidna, Simanjuntak P. Lignan compound isolated from n-hexane extract *Myristica fragrans* Houtt root as antioxidant and antitumor activities against MCF-7 cell lines data. Data Brief. 2020;31:105997. doi: https://doi.org/10.1016/j.dib.2020.105997
251. Le TV, Nguyen PH, Choi HS, Yang J, Kang KW, Ahn S, *et al*. Diarylbutane-type lignans from *Myristica fragrans* (Nutmeg) show the cytotoxicity against breast cancer cells through activation of AMP-activated protein kinase. Nat Prod Sci. 2017;23(1):21–8. doi: https://doi.org/10.20307/nps.2017.23.1.21
252. Rengasamy G, Venkataraman A, Veeraraghavan VP, Jainu M. Cytotoxic and apoptotic potential of *Myristica fragrans* Houtt. (mace) extract on human oral epidermal carcinoma KB cell lines. Braz J Pharm Sci. 2018;54(3):e18028. doi: https://doi.org/10.1590/s2175-97902018000318028
253. Prakash E, Gupta DK. Cytotoxic activity of ethanolic extract of *Myristica fragrans* (Houtt) against seven human cancer cell lines. Univers J Food Nutr Sci. 2013;1(1):1–3. doi: https://doi.org/10.13189/ujfns.2013.010101
254. Vallinayagam S, Rajendran K, Sekar V. Pro-apoptotic property of phytocompounds from *Naringi crenulata* in HER2+ breast cancer cells *in vitro*. Biotechnol Equip. 2021;35(1):354–65. doi: https://doi.org/10.1080/13102818.2020.1868333
255. Manjula V, Norman TSJ, Senthilnathan S. *Naringi crenulata* (Roxb.) —a potential drug for the future. Pharma Innov J. 2017;6(10):261–3.
256. Pratheeba T, Vivekanandhan P, Nur Faeza AK, Natarajan D. Chemical constituents and larvicidal efficacy of *Naringi crenulata* (Rutaceae) plant extracts and bioassay guided fractions against *Culex quinquefasciatus* mosquito (Diptera: Culicidae). Biocatal Agric Biotechnol. 2019;19:101137. doi: https://doi.org/10.1016/j.bcab.2019.101137
257. Rashan LJ, Özenver N, Boulos JC, Dawood M, Roos WP, Franke K, *et al*. Molecular modes of action of an aqueous *Nerium oleander* extract in cancer cells *in vitro* and *in vivo*. Molecules. 2023;28(4):1871. doi: https://doi.org/10.3390/molecules28041871
258. Barai AC, Paul K, Dey A, Manna S, Roy S, Bag BG, *et al*. Green synthesis of *Nerium oleander*-conjugated gold nanoparticles and study of its *in vitro* anticancer activity on MCF-7 cell lines and catalytic activity. Nano Converg. 2018;5(1):10. doi: https://doi.org/10.1186/s40580-018-0142-5
259. Hamad O, Obaidi SA. Studies on antibacterial and anticancer activity of *Nerium oleander* extracts. Eur Chem Bull. 2014;3(3):259–62.
260. Ahmed SS, Rahman MO, Algahtani AS, Sultana N, Almarfadi OM, Ali MA, *et al.* Anticancer potential of phytochemicals from *Oroxylum indicum* targeting lactate dehydrogenase a through bioinformatic approach. Toxicol Rep. 2023;10:56–75. doi: https://doi.org/10.1016/j.toxrep.2022.12.007
261. Menon S, Albaqami JJ, Hamdi H, Lawrence L, Padikkala J, Mathew SE, *et al*. *Oroxylum indicum* vent root bark extract inhibits the proliferation of cancer cells and induce apoptotic cell death. Processes. 2023;11(1):188. doi: https://doi.org/10.3390/pr11010188
262. Rai D, Aswatha Ram HN, Neeraj Patel K, Babu UV, Sharath Kumar LM, Kannan R. *In vitro* immuno-stimulatory and anticancer activities of *Oroxylum indicum* (L.) Kurz.: evidence for substitution of aerial parts for conservation. J Ayurveda Integr Med. 2022;13(2):100523. doi: https://doi.org/10.1016/j.jaim.2021.09.001
263. Sharmila KP, Shetty SS, Kumari S, Harishkumar M, Prabhu A, Satheesh Kumar Bhandary B. *Oroxylum indicum* stem bark extract exerts antitumor potential against Ehrlich's ascites carcinoma in Swiss albino mice. Biomedicine. 2022;42(4):686–92. doi: https://doi.org/10.51248/. v42i4.1559

264. Rishu K, Nutan K. Review on *Oroxylum indicum*: unfathomed source of anticancer drug. Scope Phytochem Unexplored Med Plants. 2017;2017:99–109.
265. Saahene RO, Agbo E, Barnes P, Yahaya ES, Amoani B, Nuvor SV, *et al*. A review: mechanism of *Phyllanthus urinaria* in cancers—NF-κB, P13K/AKT, and MAPKs signaling activation. Evid Based Complement Altern Med. 2021;2021:4514342. doi: https://doi.org/10.1155/2021/4514342
266. Pammi S, Giri A. *In vitro* cytotoxic activity of *Phyllanthus amarus* Schum. & Thonn. World J Biol Pharm Heal Sci. 2021;6(2):34–42. doi: https://doi.org/10.30574/wjbphs.2021.6.2.0050
267. Omoregie FO, Eriyamremu GE, Kapur S. Therapeutic effects of aqueous and ethanolic extracts of *Phyllanthus amarus* on 1, 2 dimethylhydrazine induced colon carcinogenesis in Balb/c mice. Int J Biochem Res Rev. 2020;29(7):36–43. doi: https://doi.org/10.9734/ijbcrr/2020/v29i730206
268. Ahmad MS, Bano S, Anwar S. Cancer ameliorating potential of *Phyllanthus amarus: in vivo* and *in vitro* studies against aflatoxin B1 toxicity. Egypt J Med Hum Genet. 2015;16(4):343–53. doi: https://doi.org/10.1016/j.ejmhg.2015.05.005
269. Tang YQ, Jaganath I, Manikam R, Sekaran SD. Phyllanthus suppresses prostate cancer cell, PC-3, proliferation and induces apoptosis through multiple signalling pathways (MAPKs, PI3K/Akt, NFκB). Evid Based Complement Alternat Med. 2013; 2013:609581. doi: https://doi.org/10.1155/2013/609581
270. Mitra S, Anand U, Jha NK, Shekhawat MS, Saha SC, Nongdam P, *et al*. Anticancer applications and pharmacological properties of piperidine and piperine: a comprehensive review on molecular mechanisms and therapeutic perspectives. Front Pharmacol. 2022;12:772418. doi: https://doi.org/10.3389/fphar.2022.85307
271. Turrini E, Sestili P, Fimognari C. Overview of the anticancer potential of the 'King of spices' *Piper nigrum* and its main constituent piperine. Toxins (Basel). 2020;12(12):747. doi: https://doi.org/10.3390/toxins12120747
272. Ngo QMT, Cao TQ, Hoang LS, Ha MT, Woo MH, Min BS. Cytotoxic activity of alkaloids from the fruits of *Piper nigrum*. Nat. Prod. Commun. 2018;13(11):1467–9. doi: https://doi.org/10.1177/1934578x1801301114
273. Prashant A, Rangaswamy C, Yadav AK, Reddy V, Sowmya MN, Madhunapantula S. *In vitro* anticancer activity of ethanolic extracts of *Piper nigrum* against colorectal carcinoma cell lines. Int J Appl Basic Med Res. 2017;7(1):67–72. doi: https://doi.org/10.4103/2229-516x.198531
274. Krishnan V, Bupesh G, Manikandan E, Thanigai Arul K, Mangesh S, Kalyanaraman R, *et al*. green synthesis of silver nanoparticles using *Piper nigrum* concoction and its anticancer activity against MCF-7 and Hep-2 Cell lines. J Antimicrob Agents. 2016;2(3):1000123. doi: https://doi.org/10.4172/2472-1212.1000123
275. Chen YC, Chia YC, Huang BM. Phytochemicals from *Polyalthia* species: potential and implication on anti-oxidant, anti-inflammatory, anti-cancer, and chemoprevention activities. Molecules. 2021;26(17):5369. doi: https://doi.org/10.3390/molecules26175369
276. Afolabi SO, Olorundare OE, Babatunde A, Albrecht RM, Koketsu M, Syed DN, *et al*. *Polyalthia longifolia* extract triggers ER stress in prostate cancer cells concomitant with induction of apoptosis: insights from *in vitro* and *in vivo* studies. Oxid Med Cell Longev. 2019;2019:6726312. doi: https://doi.org/10.1155/2019/6726312
277. Vijayarathna S, Chen Y, Kanwar JR, Sasidharan S. Standardized *Polyalthia longifolia* leaf extract (PLME) inhibits cell proliferation and promotes apoptosis: the anti-cancer study with various microscopy methods. Biomed Pharmacother. 2017;91:366–77. doi: https://doi.org/10.1016/j.biopha.2017.04.112
278. Luna PYM, Limbo CA, Jacinto SD. Cytotoxicity of fractions from *Quisqualis indica* Linn. against selected human cancer cell lines. Int J Biosci. 2019;15(5):518–26. doi: https://doi.org/10.12692/ijb/15.5.518-526
279. Ub Wijerathne C, Park HS, Jeong HY, Song JW, Moon OS, Seo YW, *et al*. *Quisqualis indica* improves benign prostatic hyperplasia by regulating prostate cell proliferation and apoptosis. Biol Pharm Bull. 2017;40(12):2125–33. doi: https://doi.org/10.1248/bpb. b17-00468
280. Mukhopadhyay R, Kazi J, Debnath MC. Synthesis and characterization of copper nanoparticles stabilized with *Quisqualis indica* extract: evaluation of its cytotoxicity and apoptosis in B16F10 melanoma cells. Biomed Pharmacother. 2018;97:1373–85. doi: https://doi.org/10.1016/j.biopha.2017.10.167
281. Abraham S, Selvaraj J, Gayatri R, Dilipan E. *In-vitro* anticancer activity of *Rauvolfia tetraphylla* extract on mcf-7 breast cancer cell lines. Bioinformation. 2023;19(1):43–7. doi: https://doi.org/10.6026/97320630019043
282. Vanjari K, Bangar S, Thorve A, Wagh S. Medicinal plant *Rauvolfia tetraphylla* l its medicinal uses and pharmacological activities. J Med Plants Stud. 2022;10(5):119–21.
283. Das S, Langbang L, Haque M, Belwal VK, Aguan K, Singha Roy A. Biocompatible silver nanoparticles: an investigation into their protein binding efficacies, anti-bacterial effects and cell cytotoxicity studies. J Pharm Anal. 2021;11(4):422–34. doi: https://doi.org/10.1016/j.jpha.2020.12.003
284. Iqbal AAM, Khan FAK, Khan M. Ethno-phyto-pharmacological overview on *Rauwolfia tetraphylla* L. Int J Pharm Phytopharm Res. 2013;2(4):247–51.
285. Arora S, Meena S. Bio-activity in flowers of *Sarcostemma viminale* (L.) R.Br.- an endangered medicinal plant from Thar Desert of Rajasthan (India). Pharmacogn J. 2018;10(5):871–4. doi: https://doi.org/10.5530/pj.2018.5.146
286. Brestovac B, Coghlan O, Jackaman C, Nelson D, Townsend D. *Sarcostemma viminale* activates macrophages to a pro-inflammatory phenotype. Comp Clin Path. 2015;24:817–26. doi: https://doi.org/10.1007/s00580-014-1988-5
287. Brian B, Jessica S, Gaywin E, Alexander P, David T. *Sarcostemma viminale*: a potential anticancer therapy. Comp Clin Path. 2015;24:9–17. doi: https://doi.org/10.1007/s00580-013-1843-0
288. Girme AS, Bhalke RD, Nirmal SA, Chavan MJ. Chromatographic and chemical analysis of *Sarcostemma viminale* R. Br. Pharm Exp Med. 2014;14:279–84. doi: https://doi.org/10.1007/s13596-014-0157-3
289. Sulaiman CT, Deepak M, Praveen TK, Lijini KR, Anandan EM, Salman M, *et al.* Purification of Bhallathaka (*Semecarpus anacardium* L.f.) enhanced anti-cancer activity. Regul Toxicol Pharmacol. 2021;122:104898. doi: https://doi.org/10.1016/j.yrtph.2021.104898
290. Joseph JP, Raval SK, Sadariya KA, Jhala M, Kumar P. Anti-cancerous efficacy of ayurvedic milk extract of *Semecarpus anacardium* nuts on hepatocellular carcinoma in Wistar rats. Afr J Tradit Compliment Altern Med. 2013;10(5):299–304.
291. Premalatha B, Muthulakshmi V, Sachdanandam P. Anticancer potency of the milk extract of *Semecarpus anacardium* Linn. nuts against aflatoxin B1 mediated hepatocellular carcinoma bearing Wistar rats with reference to tumour marker enzymes. Phyther Res. 1999;13(3):183–7. doi: https://doi.org/10.1002/(SICI)1099-1573(199905)13:3<183: AID-PTR420>3.0.CO;2-5
292. Kowalczyk T, Merecz-Sadowska A, Rijo P, Mori M, Hatziantoniou S, Górski K, *et al*. Hidden in plants-a review of the anticancer potential of the Solanaceae family in *in vitro* and *in vivo* studies. Cancers (Basel). 2022;14(6):1455. doi: https://doi.org/10.3390/cancers14061455
293. Helilusiatiningsih N, Yunianta A, Harijono A, Wijanarko SB. Cytotoxic activity and selectivity index of *Solanum torvum* fruit on T47D breast cancer cells. Indian J Public Heal Res Dev. 2020;11(2):1592. doi: https://doi.org/10.37506/v11/i2/2020/ijphrd/195053
294. Balachandran C, Emi N, Arun Y, Yamamoto Y, Ahilan B, Sangeetha B, *et al*. *In vitro* anticancer activity of methyl caffeate isolated from

Solanum torvum Swartz. fruit. Chem Biol Interact. 2015;242:81–90. doi: https://doi.org/10.1016/j.cbi.2015.09.023
295. Panigrahi S, Muthuraman MS, Natesan R, Pemiah B. Anticancer activity of ethanolic extract of *Solanum torvum* sw. Int J Pharm Sci. 2014;6(1):93–8.
296. Li R, Yang JJ, Song XZ, Wang YF, Corlett RT, Xu YK, *et al*. Chemical composition and the cytotoxic, antimicrobial, and anti-inflammatory activities of the fruit peel essential oil from *Spondias pinnata* (Anacardiaceae) in Xishuangbanna, Southwest China. Molecules. 2020;25(2):343. doi: https://doi.org/10.3390/molecules25020343
297. Patathananone S, Daduang J, Koraneekij A, Li CY. Tyrosinase inhibitory effect, antioxidant and anticancer activities of bioactive compounds in ripe hog plum (*Spondias pinnata*) fruit extracts. Orient J Chem. 2019;35(3):916–26. doi: https://doi.org/10.13005/ojc/350302
298. Chaudhuri D, Ghate NB, Singh SS, Mandal N. Methyl gallate isolated from *Spondias pinnata* exhibits anticancer activity against human glioblastoma by induction of apoptosis and sustained extracellular signal-regulated kinase 1/2 activation. Pharmacogn Mag. 2015;11(42):269–76. doi: https://doi.org/10.4103/0973-1296.153078
299. Zhu X, Xu Y, Sun D, Li H, Chen L. The genus *Strobilanthes*: phytochemistry and pharmacology. TMR Mod Herb Med. 2022;5(3):15. doi: https://doi.org/10.53388/mhm2022b0701001
300. Senniyappan V, Subban R, Kaveri S, Ramasamy K. Acetylcholinesterase inhibitory and cytotoxic activity of extracts and isolated compounds from *Strobilanthes ciliatus* Nees. Int J Pharm Sci Rev Res. 2022;77(25):155–9. doi: https://doi.org/10.47583/ijpsrr.2022.v77i01.025
301. Farzana H, Aysha OS. Phytochemical, antioxidant, antibacterial and mutagenic property (AMES) *in vitro* analysis of *Strobilanthes barbatus*. Int J Innov Res Technol. 2021;7(11):728–35.
302. Puranik SI, Hiremath MB, Nerli RB, Ghagane SC. Evaluation of *in vitro* antioxidant and anticancer activity of *Tabernaemontana divaricata* leaf extracts against T-24 human bladder cancer cell lines. Int J Cancer Res. 2018;14(2):100–8. doi: https://doi.org/10.3923/ijcr.2018.100.108
303. Selvakumar S, Kumar A. Antiproliferative efficacy of *Tabernaemontana divaricata* against HEP2 cell line and Vero cell line. Pharmacogn Mag. 2015;11(Suppl 1):S46–52. doi: https://doi.org/10.4103/0973-1296.157682
304. Poornima K, Gopalakrishnan VK. Anticancer activity of *Tabernaemontana coronaria* against carcinogen-induced clear cell renal cell carcinoma. Chin J Biol. 2014;2014:584074. doi: https://doi.org/10.1155/2014/584074
305. Akhila SD, Shankar Guru P, Ramya Devi D, Vedha Hari BN. Evaluation of *in vitro* anticancer activity of hydroalcoholic extract of *Tabernaemontana divaricata*. Asian J Pharm Clin Res. 2012;5(4):59–61.
306. Chandrasekaran C, Ramar K. Molecular docking studies of potential anticancer agents from *Thunbergia fragrans* against colorectal cancer mutant genes through *in-silico* study. Int J Ayurvedic Med. 2021;12(4):792–5. doi: https://doi.org/10.47552/ijam. v12i4.2263
307. Kumar PY, Subramaniyan M. Phytochemical evaluation and pharmacological activities of *Thunbergia* species—a comprehensive review. Int J Biol Pharm Allied Sci. 2021;10(11):233–43. doi: https://doi.org/10.31032/ijbpas/2021/10.11.1017
308. Pal P, Gupta N, Jain S. Preparation, characterization and evaluation of silver nanoparticles of *Thunbergia grandiflora* and its antimicrobial activity. J Drug Deliv Ther. 2019;9(s):229–35.
309. El-Hakim A, Kinasih A, Putri R, Putri SU, Kurniawan FY, Semiarti E. *In silico* study of secondary metabolite in *Vanilla planifolia* to inhibit nudt5 as breast cancer target. 1st Bioinformatics and Biodiversity Conference; 2021; Jawa Timur, Indonesia: NST Proceedings.
310. Kaliappan V, Kumaravelu P. Antiproliferative effects of *Vanilla planifolia* leaf extract against breast cancer MCF-7 cells. Int J Basic Clin Pharmacol. 2019;8(1):51–5.
311. Vijaybabu K, Punnagai K. *In-vitro* anti-proliferative effects of ethanolic extract of *Vanilla planifolia* leaf extract against A431 human epidermoid carcinoma cells. Biomed Pharmacol J. 2019;12(3):1141–6. doi: https://doi.org/10.13005/bpj/1742
312. D'Souza JN, Nagaraja GK, Prabhu A, Navada KM, Kouser S, Manasa DJ. AgVI and Ag/ZnOVI nanostructures from *Vateria indica* (L.) exert antioxidant, antidiabetic, anti-inflammatory and cytotoxic efficacy on triple negative breast cancer cells *in vitro*. Int J Pharm. 2022;615:121450. doi: https://doi.org/10.1111/j.1533-869X.2003.01102. x
313. Siddiqui A, Tabassum K, Anjum A. Pharmacological activities of Kahruba (*Vateria indica* Linn.)-a literary review. Int J Adv Res Dev. 2019;4(2):6–9.
314. Mishima S, Matsumoto K, Futamura Y, Araki Y, Ito T, Tanaka T, *et al*. Antitumor effect of stilbenoids from *Vateria indica* against allografted sarcoma S-180 in animal model. J Exp Ther Oncol. 2003;3(5):283–88. doi: https://doi.org/10.1111/j.1533-869X.2003.01102. x
315. Pakpisutkul J, Suwapraphan J, Sripaya N, Sitkhuntod N, Loyrat S, Yahayo W, *et al*. The effects of *Vernonia cinerea* less extracts on antioxidant gene expression in colorectal cancer cells. Asian Pac J Cancer Prev. 2022;23(11):3923–30. doi: https://doi.org/10.31557/APJCP.2022.23.11.3923
316. Amuthan A, Devi V, Shreedhara CS, Rao V, Jasphin S, Kumar N. *Vernonia cinerea* regenerates tubular epithelial cells in cisplatin induced nephrotoxicity in cancer-bearing mice without affecting antitumor activity. J Tradit Complement Med. 2020;11(3):279–86. doi: https://doi.org/10.1016/j.jtcme.2020.08.004
317. Chandra S, Das A, Ray T, Mukherjee L, Samanta J. Putative role of *Moringa oleifera* in prophylaxis of chemotherapy-induced neuropathic pain in mice. J Drug Deliv Ther. 2019;9(3Suppl.):615–20.
318. Khay M, Toeng P, Mahiou-Leddet V, Mabrouki F, Sothea K, Ollivier E, *et al*. HPLC analysis and cytotoxic activity of *Vernonia cinerea*. Nat Prod Commun. 2012;7(10):1259–62. doi: https://doi.org/10.1177/1934578x1200701001
319. Vo GV, Nguyen TH, Nguyen TP, Do TH, Tran NM, Nguyen HT, *et al*. *In silico* and *in vitro* studies on the anti-cancer activity of Artemetin, Vitexicarpin and Penduletin compounds from *Vitex negundo*. Saudi Pharm J. 2022;30(9):1301–14. doi: https://doi.org/10.1016/j.jsps.2022.06.018
320. Gouthami K, Veeraraghavan V, Nagaraja P. *In-silico* characterization of phytochemicals identified from *Vitex negundo* (L) extract as potential therapy for Wnt-signaling proteins. Egypt J Med Hum Genet. 2022;3:23. doi: https://doi.org/10.1186/s43042-022-00219-7
321. Edwin Jose B, Manikandan S, Jebaseelan S, Meera DR. Phytochemical investigation and anti-cancer activity of *Vitex negundo*. Int J Pharm Sci Rev Res. 2021;66(1):65–9. doi: https://doi.org/10.47583/ijpsrr.2021.v66i01.012
322. Winarno EK, Susanto, Winarno H. Antiproliferative activity against cancer cell lines of gamma irradiated 'legundi' (*Vitex trifolia* L.) leaves and its chromatogram profiles. AIP Conf Proc. 2020;2296:020068. doi: https://doi.org/10.1063/5.0030628
323. Lacombe J, Cretignier T, Meli L, Wijeratne EMK, Veuthey JL, Cuendet M, *et al*. Withanolide D enhances radiosensitivity of human cancer cells by inhibiting DNA damage non-homologous end-joining repair pathway. Front Oncol. 2020;9:1468. doi: https://doi.org/10.3389/fonc.2019.01468
324. Aziz A, Azhar MF. Antioxidant and phytochemical composition of leaves, stem and root extracts of *Withania coagulans* and *Withania somnifera*. J Med Spice Plants. 2020;24(1):27–30.
325. Akhtar N, Baig MW, Haq IU, Rajeev V, Cutillas PR. Withanolide metabolites inhibit PI3K/AKT and MAPK pro-survival pathways and induce apoptosis. Biomedicines. 2020;8(9):333. doi: https://doi.org/10.3390/biomedicines8090333
326. Saleem S, Muhammad G, Hussain MA, Altaf M, Bukhari SNA. *Withania somnifera* L.: insights into the phytochemical profile, therapeutic potential, clinical trials, and future prospective. Iran J

Basic Med Sci. 2020;23(12):1501–26. doi: https://doi.org/10.22038/ijbms.2020.44254.10378
327. Thakur S, Kaurav H, Chaudhary G. A Review on *Woodfordia fruticosa* Kurz (Dhatki): ayurvedic, folk and modern uses. J Drug Deliv Ther. 2021;11(3):126–31. doi: https://doi.org/10.22270/jddt.v11i3.4839
328. Raji NR, Roshni P, Latha MS. Induction of apoptosis by the ethyl acetate fraction of *Woodfordia fruticosa* Kurz. flowers through NFκB mediation in hepatocellular carcinoma. Int J Adv Res. 2017;5(8):885–93. doi: https://doi.org/10.21474/ijar01/5132
329. Kumar D, Sharma M, Sorout A, Saroha K, Verma S. *Woodfordia fruticosa* Kurz.: a review on its botany, chemistry and biological activities. J Pharmacogn Phytochem. 2016;5(3):293–8.
330. Rao BG, Devarakonda R, Battu H. Phytochemical and pharmacological studies on *Wrightia tinctoria*. World J Pharm Sci. 2019;7(4):562–85. doi: https://doi.org/10.20959/wjpps20184-11336
331. Jose B. Evaluation of anticancer potential of the medicinal plant *Wrightia tinctoria* (Roxb) R. Br., from South India. J Forensic Res. 2016;7(5Suppl):74.
332. Fatima N, Ahmad MK. Ansari JA, Ali Z, Khan AR, Mahdi AA. Anticancer, antioxidant potential and profiling of polyphenolic compounds of *Wrightia tinctoria* Roxb. (R.Br.) bark. J Adv Pharm Technol Res. 2016;7(4):159–65. doi: https://doi.org/10.4103/2231-4040.191428
333. Wang Y, Chinnathambi A, Nasif O, Alharbi SA. Green synthesis and chemical characterization of a novel anti-human pancreatic cancer supplement by silver nanoparticles containing *Zingiber officinale* leaf aqueous extract. Arab J Chem. 2021;14(4):103081. doi: https://doi.org/10.1016/j.arabjc.2021.103081
334. Qian S, Fang H, Zheng L, Liu M. Zingerone suppresses cell proliferation via inducing cellular apoptosis and inhibition of the PI3K/AKT/mTOR signaling pathway in human prostate cancer PC-3 cells. J Biochem Mol Toxicol. 2021;35(1):e22611. doi: https://doi.org/10.1002/jbt.22611
335. Abbas A, Ali A, Seidmostafa N, Elaheh A, Rezvan A, Elham M. *et al*. Apoptotic effects of ginger extract (*Zingiber officinale*) on esophageal cancer cells ESO26: an *in vitro* study. J Reports Pharm Sci. 2020;9(2):183–8. doi: https://doi.org/10.4103/jrptps.JRPTPS_98_19
336. Mathiyazhagan J, Kodiveri Muthukaliannan G. Combined *Zingiber officinale* and *Terminalia chebulic* induces apoptosis and modulates mTOR and hTERT gene expressions in MCF-7 cell line. Nutr Cancer. 2020;73(7):1207–16. doi: https://doi.org/10.1080/01635581.2020.1792518
337. Zhao L, Rupji M, Choudhary I, Osan R, Kapoor S, Zhang HJ, *et al*. Efficacy based ginger fingerprinting reveals potential antiproliferative analytes for triple negative breast cancer. Sci Rep. 2020;10:19182. doi: https://doi.org/10.1038/s41598-020-75707-0
338. Sarmoko S, Solihati I, Setyono J, Ekowati H, Fadlan A. *Zingiber officinale* Var. rubrum extract increases the cytotoxic activity of 5-fluorouracil in colon adenocarcinoma widr cells. Indonesian J Pharm. 2020;31(4):266–72. doi: https://doi.org/10.22146/ijp.859
339. Dissanayake K, Waliwita W, Liyanage R. A review on medicinal uses of *Zingiber officinale* (Ginger). Int J Heal Sci Res. 2020;10(6):142–8.
340. Maslikah SI, Lestari SR, Amin M, Amalia A. Anticancer activity of phenolic leaves of Bidara (*Ziziphus mauritiana*) against breast cancer by *in silico*. AIP Conf Proc. 2021;2353:030042. doi: https://doi.org/10.1063/5.0053086
341. Beg MA, Teotia UVS, Farooq S. *In vitro* antibacterial and anticancer activity of *Ziziphus*. JMPS. 2016;4(5):230–3. doi: 10.1088/1742-6596/1341/3/032042
342. Bhatia A, Mishra T, Khullar M. Anticancer potential of aqueous ethanol seed extract of *Ziziphus mauritiana* against cancer cell lines and Ehrlich ascites carcinoma. J Evid Based Complement Alternat Med. 2011;2011:765029. doi: https://doi.org/10.1155/2011/765029

How to cite this article:
Srinivasan M, Chandane AY, Tagalpallewar AA, Pawar AT, Nimbalkar M, Nimbalkar R, Baheti AM. Kerala's anticancer flora: A comprehensive review. J Appl Pharm Sci. 2024. http://doi.org/10.7324/JAPS.2024.180248

SUPPLEMENTARY MATERIALS

Supplementary Table S1. RR for common effect and random effect models.

Model	RR	95%-CI	*p*-value
Common effect	0.6503	[0.6007; 0.7040]	<0.0001
Random effects	0.4894	[0.3301; 0.7257]	0.0019

Supplementary Table S2. Test of heterogeneity.

Measure	Value	95%-CI
Tau^2	0.3132	[0.1197; 1.1115]
I^2	92.1%	[88.3%; 94.7%]
H	3.56	[2.93; 4.34]

Here, *Q*: 152.23, d.f.: 12, *p*-value: < 0.0001.

Supplementary Table S3. Subgroup analysis (Common effects model).

Subgroup	*k*	RR	95%-CI
Subgroup 1	3	0.2644	[0.1449; 0.4825]
Subgroup 2	3	0.4118	[0.3602; 0.4708]
Subgroup 3	2	0.9836	[0.8704; 1.1115]
Subgroup 4	5	0.6563	[0.5519; 0.7805]

Here, test for subgroup differences (Common Effect Model): *Q* (Between groups): 97.32, d.f.: 3, *p*-value: <0.0001, *Q* (Within groups): 54.91, d.f.: 9, *p*-value: < 0.0001.

Supplementary Table S4. Subgroup analysis (Random effects model).

Subgroup	*k*	RR	95%-CI
Subgroup 1	3	0.2644	[0.1073; 0.6514]
Subgroup 2	3	0.4355	[0.0970; 1.9554]
Subgroup 3	2	0.4784	[0.0000; 14782.502]
Subgroup 4	5	0.6376	[0.3002; 1.3543]

Test for subgroup differences (Random Effects Model): *Q*: 6.87, d.f.: 3, *p*-value: 0.0763.

Supplementary Table S5. Publication bias analysis.

Test	*t*-value	df	*p*-value
Egger's regression	−1.40	11	0.1887

Supplementary Table S6. Meta regression analysis of subgroups.

Coefficient	Estimate	SE	*t*-value	df	*p*-value
Intrcpt	−1.2958	0.4565	−2.8384	9	0.0195
Subgroupsubgroup 2	0.4650	0.5725	0.8123	9	0.4376
Subgroupsubgroup 3	0.6880	0.6462	1.0646	9	0.3148
Subgroupsubgroup 4	0.8558	0.5428	1.5766	9	0.1493

Supplementary Table S7. Publication bias analysis.

Study	True_ Positive	False_ Negative	False_ Positive	True_ Negative	Subgroup
A	4	119	11	128	Subgroup 1
B	6	300	29	274	Subgroup 1
C	3	228	11	209	Subgroup 1
D	62	13,536	248	12,619	Subgroup 2
E	33	5,036	47	5,761	Subgroup 2
F	180	1,361	372	1,079	Subgroup 2
G	8	2,537	10	619	Subgroup 3
H	505	87,886	499	87,892	Subgroup 3
I	29	7,470	45	7,232	Subgroup 4
J	17	1,699	65	1,600	Subgroup 4
K	136	30,448	141	27,197	Subgroup 4

Supplementary Table S8. Publication correlation analysis.

Study	*n*	*r*	Subgroup
A	23	0.33	Subgroup 1
B	47	0.44	Subgroup 1
C	44	0.55	Subgroup 1
D	78	0.22	Subgroup 2
E	311	0.11	Subgroup 2
F	144	0.23	Subgroup 2
G	79	0.88	Subgroup 3
H	59	0.66	Subgroup 3
I	214	0.55	Subgroup 3
J	110	0.73	Subgroup 3