

# Herbal Remedies for Cancer by Various Indigenous Kenyan Communities: A Review of Ethnobotanical Surveys and Anticancer Studies

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## ABSTRACT

From the dawn of ancient medicine, chemical compounds derived from plants have been used to treat human diseases. Therefore, different communities throughout the world have specialized and knowledge on the use of medicinal plants for various diseases. Today, the use of herbal medicine is increasingly finding more relevance, especially with the recognition of more challenges in the treatment of medical conditions such as cancer which is a life threatening disease characterized by uncontrolled proliferation of malignant cells. Therefore, plants products have become more popular for their potential as novel anti-cancer agents. Ethnobotanical studies in Kenya indicate that herbal medicine is increasingly getting acceptance among the various Kenyan communities and many have some form of herbal anti-cancer remedies. Therefore, it is prudent that this information be compiled together and documented for future reference and research. The main objective of this work is to review medicinal plants used as herbal remedies for cancer in Kenya by various Kenyan communities, local name by the community using it, method of preparation and administration. The method adopted in this research involved the analysis of the available literature on herbal medicine practice among the various communities of Kenya. The review reported 55 species springing from 36 families as being used by various Kenyan communities for treatment of cancer. Fabaceae has the highest number of species (7) followed by Asteraceae. This information was then compared with those in other countries in order to establish the existing inadequacies.

**Key words:** Cancer, Anticancer activity; Medicinal plants, herbs; Ethnobotanical

## INTRODUCTION

Plants have long been a valuable resource in the history of mankind, both as a source of food and medicine [1]. As medicines, plants were often used to prepare poultices, powders, tinctures and other forms of herbal formulations for the treatment of different ailments [2]. The literature has so much information on therapeutic use of plants, said to be as old as 4000 - 5000 B.C. [3], and Chinese were the first to use natural herbal preparations as medicines [4]. In India, however, earliest references of use of plants as medicine appear in 'Rig-Veda', a document said to have been written between 1600 - 3500 B.C. [5]. Plants still remain as the foundation for traditional medicinal systems, being the source of primary health care for many people worldwide and have proven their value as contributing novel entities to modern medicine [6]. Although modern medicine exists side-by-side with such traditional practice, herbal medicines have often maintained their popularity for their low cost, historical and cultural reasons [7].

Cancer is a global burden. In low- and middle-income countries, around 70% of deaths are due to cancer [8]. The search for anticancer agents from plant sources started in the 1950s and resulted in the discovery and development of such products as vincristine, a vinca alkaloid recommended for treatment of lymphomas and acute lymphoblastic leukemia [9]. There

was also the isolation of the cytotoxic podophyllotoxins [10] used for treatment of acute myeloid leukemia, Hodgkin's and non-Hodgkin's lymphomas [11]. Other anticancer products derived from plants include vinblastine, etoposide, paclitaxel, camptothecin, topotecan and irinotecan [12]. Therefore, herbal based medicines have long been used in cancer treatment [13].

Currently, it is estimated that more than 60% of currently used anticancer agents are derived from natural sources [14]. Patel [15] notes that the shortcomings of chemotherapy has boosted the use of plant derived products, evidenced by the number of plant derived products that are currently used in the treatment of various forms of cancer. Various plant natural products have undergone clinical trials and showed promising results for treating several hematological malignancies. In Africa, several plants have been used to treat Cancer. A study by Dushimemaria [16] reported Namibian plants, *Schinziophyton rautanenii* and *Colophospermum mopane* roots and bark extract had anticancer activity.

In Kenya, cancer is a significant health problem, being the third highest cause of death, after infectious diseases and cardiovascular diseases, with an estimated 39,000 new cases being diagnosed and 26 941 deaths annually [17,18]. Unfortunately, most health facilities are ill equipped to handle cancer patients [19] and where the facility is equipped, the cost is far out of reach for many patients. Furthermore, the conventional therapeutic methods which include surgery and radiotherapy for localized tumors and chemotherapy in cases of metastasis are hampered by high cost and associated with development of side effects [20]. This, therefore, pushes most patients to seek herbal therapies which are increasingly gaining popularity among cancer patients [20].

Anecdotal evidence indicates that most Kenyan communities have some form of herbal anticancer remedies [21]. With the increase in cancer cases in Kenya and

associated high cost, attention in cancer management is gradually shifting to herbal remedies which are more appealing to most patients, and several researchers in Kenya have also reported several medicinal plants that are used to manage cancer.

## METHODOLOGY

A comprehensive literature search was performed in different websites/ data bases such as Scopus, Web of Science Core Collection, PubMed, Science Direct, Google Scholar, and Scientific Electronic Library Online (SciELO). In addition, previously published data in textbooks, periodicals and folklore information written in Pharmacological and Ethnobotanical profile were checked for information. Traditional uses of Kenyan medicinal plants were also checked for collecting information.

## RESULTS AND DISCUSSION

Ethno-medicinal data about medicinal plants used as remedy for cancer in Kenya

The review focused on medicinal plants used in treatment of cancer, and the outcome of the review of the medicinal plants used in Kenya for management of cancer in Kenya are summarized in Table 1.

The present review reported that 55 species springing from 36 families have been used in Kenya Pharmacopeia treatment of cancer (Table 1). Fabaceae has the highest number of species (7) followed by Asteraceae (3). Majority of the families have one (1) or two (2) species used as cancer remedy. Two plants were not identified by the original authors. The present data show some relationship with other study by Obakiro et al., [22], which also reveals the two families as having the higher number of species with medicinal property.

The plant parts most commonly used were leaves, stem bark, Roots, leaves, whole aerial part. The greatest number of published work reported oral route of administration; however, few reported topical administrations. The oral dose of the herbal remedies varied among the

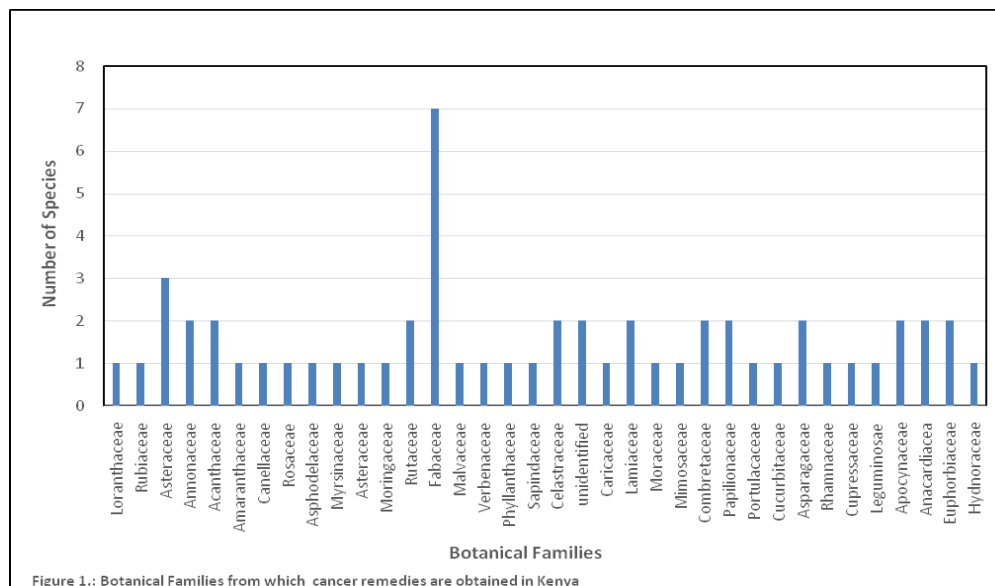
respondents but most of them reported administering twice per day for until recovery. In some cases, same plants are used by different communities, for instance *Prunus Africana* is used by various communities [23,24,21]. From the review, it is evident that indigenous communities in Kenya have some information about cancer though not all are fully aware of cancer. It is also clear that the indigenous communities of Kenya prefer herbal/traditional remedies due to low cost, accessibility and convenience which makes it suit the traditional lifestyle of the local community in comparison to the

conventional medicine. [25] From the review, 55 plant species belonging to 36 botanical families claimed as anticancer plants in Kenya have been reported (Table 1.) One plant was not taxonomically identified though known by the local community. The most cited families were Fabaceae, followed by Asteraceae. Most families encountered in this review have reported use in the traditional management of cancer in other countries across the globe. For example, Apocynaceae, Asteraceae, Caricaceae, Fabaceae, Malvaceae, Moraceae, Rutaceae and Sapindaceae were cited in Ethiopia [26], Tanzania [27].

**Table 1: Medicinal Plants used as herbal remedy for cancer by various communities of Kenya**

Family	Scientific Name	Local name by the community using it	Processing	Literature references
Loranthaceae	<i>Phragmanthera usuiensis</i>	Mondoiwet- Sabaot Community	Bark is pounded, boiled and taken orally	[25]
Rubiaceae	<i>Galium simense</i>	Tipsoliet' - Ogiek community	leaves are pounded and then soaked water. After about 30 minutes the mixture is used to bathe cancerous wounds	[24]
Asteraceae	<i>Sonchus oleraceus</i>	Mũthũnga- Kikuyu community	Decoction of roots and leaves	[28]
Annonaceae	<i>Annona cherimola</i>	Mutomoko	Decoction of the bark	[28]
Acanthaceae	<i>Acanthus pubescens</i>	'Chepkurbet' - Nandi community	Leaves are dried and burnt and the ashes licked	[29]
Amaranthaceae	<i>Amaranthus graecizans</i>	'Mbogiat' - Nandi community	leaves are used as paste and applied on the cancerous wounds	[29]
Canellaceae	<i>Warburgia ugandensis</i>	Mũthũnga- Kikuyu community	Decoction of bark roots and leaves	[28]
Rosaceae	<i>Prunus africana</i>	'Tenduet' - Ogiek community 'Mwiritsa' -Luhya community	mature bark is boiled in water. 250ml of infusion is taken once daily until recovery	[23,24,21]
Asphodelaceae	<i>Aloe volkensii</i>	'Linakha'-Luhya community	Ground to powder or boiled fresh in water and taken orally. Also applied fresh on the breast cancer wound.	[21]
Myrsinaceae	<i>Myrsine africana</i>	Mũgaita- Kikuyu community	Decoction of fruits and bark	[28]
Asteraceae	<i>Launaea cornuta</i>	Mũthũnga- Kikuyu community 'Kipche'' - Keiyo community 'Muthunga' - Embu community	Decoction of roots and leaves. stem is also chewed. Aerial parts (leaves and stems) are boiled and the vapor inhaled	[28] [30] [31]
Moringaceae	<i>Moringa oleifera</i>	Moringa-Kikuyu community	Seeds are chewed while decoction of the leaves is taken orally	[28]
Rutaceae	<i>Clausena anisata</i>	'Olmataasia' -Maasai and Samburu communities	Not clear from the literature	[32]
Fabaceae	<i>Cassia afrofistula</i>	'Mkithunga'-Giriama community	Roots and barks are boiled and taken orally	[33]
Malvaceae	<i>Grewia villosa</i>	'Olmankulai'-Maasai community & 'Mubuu'-Mbere community	Concoction of the boiled roots is drunk by the patient	[34]
Verbenaceae	<i>Vitex doniana</i> ,	Muburu-Mbere community	Concoction of the boiled leaves is drunk by the patient	[34]
Phyllanthaceae	<i>Flueggea virosa</i>	Mukururu -Mbere community	Concoction of the boiled roots is drunk by the patient	[34]
Sapindaceae	<i>Pappea capensis</i>	'Kibiryo' - Marakwet community	Fruit bodies Burnt and ash licked	[34]
Celastraceae	<i>Mytenus obscura</i>	'Muraga'-Mbere community	Concoction of the boiled roots is drunk by the patient	[35]
Fabaceae	<i>Indigofera arrecta</i> L	'Sargellat'-Marakwet community	Roots Boiled & mixed with other herbs	[34]
unidentified	<i>Ovarioidendron anisalum</i>	'Ndonga' -Mbere community	Concoction of the boiled root tubers is drunk by the patient	[35]
Celastraceae	<i>Hippocratea africana</i>	'Shikhalikhanga'-Luhya community	Leaves are made into powder and roots are boiled, the mixture is taken orally as an infusion	[34]

Asteraceae	<i>Microglossa pyrifolia</i>	'Ingwe'/'Ingoyi'/'Enguu'-Luhya community	Leaves are used as powder and taken orally daily as an infusion in hot water for one month while the stem bark is boiled and taken orally as an infusion half a glass twice per day until recovery.	[21]
Caricaceae	<i>Carica papaya</i>	'Lipopayi' - Luhya community	Milky juice from the tree is collected and used to wash the wound. Ground dry pawpaw leaves are applied topically on the cancerous wounds	[21]
Lamiaceae	<i>Salvia coccinea</i>	Muonyi- Luhya community	Leaves are boiled in water and taken as an infusion orally. Leaves are dried indoors and powdered then applied topically on cancerous wounds.	[21]
Moraceae	<i>Ficus thonigii</i> ,	"Simotwet nebo chego" - Keiyo community	A concoction made together with other plants as <i>Toddalia asiatica</i> is taken orally	[21]
Fabaceae	<i>Acacia nilotica</i>	Keiyo community		[30]
Mimosaceae	<i>Acacia tortilis</i>	'Sesia' - Marakwet community	Fruit bodies are burnt and ash licked	[30]
Combretaceae	<i>Terminalia brownie</i>	'Kaloswet' -Keiyo community	A concoction made from the boiled roots together with bark from <i>Olea africana</i> , <i>Vachelia xanthophloea</i> , <i>Ficus thonigii</i> ,	[35]
Fabaceae	<i>Albizia spp.</i>	'Seet' -Marakwet community	Fruit bodies Burnt, ash licked	[30]
Fabaceae	<i>Acacia tortilis Hayne</i>	'Sesia' - Marakwet community	Fruit bodies Burnt and ash licked	[35]
Asparagaceae	<i>Drimia indica</i>	'Barangoya' -Marakwet community	Bulb applied on the ulcers	[35]
Fabaceae	<i>Faidherbia albida</i>	'Kokocho' -marakwet community	Fruit bodies Burnt and ash licked	[35]
Papilionaceae	<i>Indigofera swaziensis</i>	(Unknown) – Embu community	Roots are boiled and the decoction is drunk	[35]
Combretaceae	<i>Combretum apiculatum Sond.</i>	'Leleiya' -Marakwet community	Fruit bodies Burnt and ash licked	[31]
Portulacaceae	<i>Portulaca oleracea L.</i>	'Chemorin' -Marakwet community	Whole plant crushed and boiled with other herbs	[35]
Cucurbitaceae	<i>Zehneria scabra</i>	'Cheserya' -Marakwet community	Whole plant Boiled with other herbs	[35]
Asparagaceae	<i>Albucca bracteata</i>	<i>K'dow- marakwet</i>	Bulbs are boiled and administered orally	[35]
Rhamnaceae	<i>Rhamnus Prinooides</i>	'Kosisityet' - Nadi community	Boiled roots are taken orally	[35]
Fabaceae	<i>Acacia hockii De Wild</i>	Chuiya – Marakwet community	Root and barks are Boiled or dried and pound to powder	[36]
Cupressaceae	<i>Juniperus procera</i>	Torokwo – Marakwet community	Barks and roots are boiled	[37]
Leguminosae	<i>Tylosema fassogensis</i>	'Cheptebesiet' -Nandi community	Boiled tubers are taken	[37]
Apocynaceae	<i>Tabernaemontana stapfiana Britten.</i>	Kaparar – Marakwet community	Bark , roots and fruit are Boiled, dried and pound to powder, burnt to soot and licked	[36]
Lamiaceae.	<i>Rotheca myriocoides,</i>	"Ketbaiyat" - Marakwet community	concoction from the boiled roots of <i>Launaea cornuta</i> , "Kipche", <i>Rotheca myriocoides</i> , "Ketbaiyat" and <i>Toddalia asiatica</i> , "Ketemwet	[37]
Acanthaceae	<i>Dicliptera laxata</i>	'Eshitoo' – Luhya Community	Leaves are boiled in water and taken as concoction orally	[21]
Anacardiaceae	<i>Rhus vulgaris</i>	Sungula – Luhya community	Roots, leaves and fruits are Pound and boiled, mixed with <i>Carica papaya</i> roots and taken orally	[21]
Anacardiaceae	<i>Mangifera Indica</i>	Liembe – Luhya community	Roots, leaves and stem bark are boiled and taken orally as an infusion .	[21]
Apocynaceae	<i>Catharanthus roseus</i>	Olubinu – Luhya community	Whole plant Taken orally as an infusion half. Also pound and applied topically.	[21]
Euphorbiaceae	<i>Tragia brevipes</i>	Isambakhalu – Luhya Community	Leaves are Powdered and taken in hot water orally.	[21]
Hydnoraceae	<i>Hydnora abyssinica</i>	Ndonga or Mutumurathi- embu community	The whole rhizome is boiled and the decoction drunk with soup	[38, 31]
Euphorbiaceae	<i>Flueggea virosa</i>	Mukuru- embu community	The roots are boiled and decoction drunk	[31]
Rutaceae	<i>Fagaropsis angolensis</i>	'Mukuria Hungu' – Embu community	The stem bark is boiled and decoction drunk	[31]
Papilionaceae	<i>Indigofera swaziensis</i>	(Unknown)	Roots are boiled and the decoction is drunk	[31]
Annonaceae	<i>Annona cherimola</i>	Mūtomoko – Kikuyu community	Decoction prepared from the bark and taken orally	[28]
unidentified	unidentified	'Turesio' - Marakwet community	Bark/roots Burnt and with other herbs Cancer	[35]



## CONCLUSION

All the medicinal plants reported in the current review work have been used in Kenya traditional medicine for the treatment of cancer. Even though many plants/herbs have been used by traditional healers of Kenya, many species still do not have scientific evidence of their anticancer activity. So, there is a need for scientific study to know their therapeutic potential for cancer treatment. In addition to *in vitro* analysis documented in literature for some, there is need for further investigation at *in vivo* and in clinical trials to assess further their anticancer potential and safety for future use. Furthermore, there is need to have better knowledge and skills on the mechanism of action of such plants in order to establish rational phototherapeutic approaches. This review Open window for Researches to use it and develop new molecules as well as, to continue studying the effects of extracts and isolated phytochemicals derived from these plants for their health benefits in combating different forms of cancer.

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