

Ethno - Medicinal Plants used by Tribal Communities of Jharkhand for Prevention and Remedy of Cancer

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Abstract – Cancer is one of the deadly disease killing millions across the globe. The present treatments against the disease are not efficient enough and the associated side effects are devastating. In such a scenario herbal remedy seems to be a promising alternative. Nature has endowed India with a rich biological diversity, which includes over 40,000 species of plants and a third of the total plant species of India are endemic. The state of Jharkhand dominated by tribals (32 tribal community) is very rich in terms of cultural heritage and natural resources: minerals and biodiversity. The term “Jharkhand” itself means land of forest. Many of these plants are used for prevention and treatment of various diseases by traditional practitioners and healers since ancient times. The tribal and ethnic communities of the state of Jharkhand are using a number of these plant resources for treatment of cancer. Present Study focuses on collection and documentation of ethno-medicinal plants against cancer that can be used for further research. In present investigation 75 plant species are reported which belong to 45 different families.

Keywords – Ethno Medicinal Knowledge, Cancer, Medicinal Plants, Ethnic Community of Jharkhand.

I. INTRODUCTION

Cell division is an essential process for sustaining life in all organisms. It is required for normal growth and repair of body tissues. However, when this process of cell division becomes uncontrolled, it leads to cancer. Cancer cell continue to grow and divide and can spread throughout the body causing damage to essential organ. It is caused by a complex, poorly understood interplay of genetic and environmental factors. Various factors such as genetic make-up, diet, exposure to carcinogen, body's immune status and their interaction can cause cells to multiply uncontrollably. It follows cardiovascular ailments as second major cause of death, according to WHO International agency for Research on Cancer.

The Cancer burden is ever increasing, taking toll on human life and world economy. Each year about 11 million people are diagnosed with cancer, 8 million deaths i.e. about 13 per cent of all deaths worldwide [1].

In India Smoking, tobacco use and unhygienic living style further accentuate acquisition of disease. Among all the cancer, lung cancer is the most common worldwide and accounts for major death annually. Here every year about 8, 50, 000 new cancer cases are being diagnosed, resulting about 5, 80, 000 cancer related death every year. India has the highest number of the oral and throat cancer cases in the world. In males oral, lungs and stomach cancers are the three most common causes of cancer

incidence and death whereas in females cervical, breast and oral cancers are the three main causes of cancer related illnesses and death [2].

Till date no effective cure has been devised against this disease by modern system of medicine. It has been well recognized that allopathic anti-cancer drugs have more side effects and are cytotoxic to human beings. Various treatment options as surgery, chemotherapy, radiotherapy etc. are costly, painful and with adverse side effects. As such, scientists intend to investigate different source of medicines with effective cure and no side effects.

As an alternative, the world is turning towards herbal remedies to win this deadly disease [3].

Medicinal properties of plants were known even to pre-historic men and many of these plants have been used in traditional medicine for hundreds of years with reputation as efficacious remedies [4]. According to the WHO, about 80% of the world's population relies on traditional medicine for their primary health care. More than 50% of all modern drugs in clinical use are natural products, many of which have the ability to induce apoptosis in various tumour cells of human origin [5]. Medicinal plants, including vegetables are known to have good immune modulatory, antioxidant activities, leading to anticancer effect. They act by stimulating both non-specific and specific immunity and may promote the host resistance against infection by re-stabilizing body equilibrium and conditioning the body tissues [6].

Plant and plant based products have played a major role as drugs against cancer. Paclitaxel and camptothecin are plant derived compounds and contribute to 2/3 rd global anticancer drugs. Other major plant based drugs include Vinblastine, Vincristine (from *Catharanthus roseus*), Epipodophyllotoxin (*Podophyllum* species), Homoharringtonine (from *Cephalotaxus harringtonia*) etc [7].

A large number of plants over centuries are being used for treatment and control of various ailments including Cancer. In recent times with the increased knowledge of life and culture of the tribal communities, the social scientists are taking interest in ethnomedicinal studies. Many works have been reported specially from among the rural and tribal communities of India [8].

Study Area

The state is geographically known as the Chhotanagpur plateau which forms the North eastern portion of peninsular plateau of India. The spatial extent of Jharkhand state is approximately 21055' to 25035' North Latitude and 83020' to 88002' East Longitude (Anonymous 2011). It has forest area of 23605 square kilo

III. RESULTS AND DISCUSSION

In the present investigation a total of 75 species belonging to 45 families have been found to be used by the local people for the remedy of cancer. All plants have been alphabetically arranged, using standard format like botanical name, local names, family, part used and bioactive compounds. The detail enumerations are presented in the Table - 1 and Fig. - 2.

India occupies a unique position among developing countries as it has a good potential in terms of diversity and heritage of medicinal plants due to its varied climatic

and edaphic factors [21]. Medicinal plants are an important source of drugs in traditional system of medicine [22] [23]. They are valuable natural resources and regarded as potentially safe drugs. Plant based drugs have been in use against various disease since time immemorial. Before carrying out plant pharmacokinetic and pharmacological activity, there is need to record ethno botanical uses of plants of an area to establish their therapeutic properties. The results of this work can later be applied to biodiversity conservation, community development and for development of new drug against cancer.

Table 1. List of Anticancer plants

S. No.	Botanical Name	Common Name	English Name	Family	Parts Used	Bioactive Compounds
1	<i>Abelmoschus Esculentus</i> L.	Bhindi	Lady's finger	Malvaceae	Fruit, Seed	Carotene, vitamins (B, C) & amino acids.
2	<i>Achyranthes Aspera</i> L.	Chirchira	Prickly chaff Flower	Amaranthaceae	Whole Plant	Triterpenoid, saponins [18]
3	<i>Aegle marmelos</i> (L.) correa	Bel	Bael	Rutaceae	Leaves & fruit	Marmalodin, Lupeol
4	<i>Agave Americana</i> L.	Rambans	Century plant	Agavaceae	Leaves	
5	<i>Allium cepa</i> L.	Piyaz	Onion	Alliaceae	Bulb	Diallyl disulphide, allicin, allin, quercetin antioxidant, flavonoid & vitamins (C, E).
6	<i>Allium sativum</i> L.	Lashun	Garlic	Alliaceae	Bulb	Sulphur compounds and allicin.
7	<i>Aloe vera</i> (L.) Burm. F.	Ghrit kumara	Aloe	Liliaceae	Leaves	Emodins & lactins, Alexin B
8	<i>Argemone Mexicana</i> L.	Katela, satyanasi, rangen	Mexican poppy	Papaveraceae	Seeds	Non-edible oil, alkaloids sanguinarine and dihydrosanguinarine
9	<i>Arnebia euchroma</i> (Roya) jonst.	Ratanjot	Royle	Boraginaceae	Whole plant	Essential oils
10	<i>Asparagus recemosus</i> Wild.	Satawar	Asparagus	Liliaceae	Roots	Asparagamine A, steroidal saponins, saponin, filiasparoside C
11	<i>Avena sativa</i> L.	Je, java	Oat	Poaceae	Seed	Alkaloid, saponin, flavonoid, vitamin and protein
12	<i>Azadirachta indica</i> A. Juss.	Neem	Neem	Meliaceae	Whole plant	Liminoids and Nimbolide
13	<i>Bacopa Monnieri</i> (L.) pennel.	Brahmi	Water hyssop	Scrophulariaceae	Whole plant	Brahmine [14] and Herpestine
14	<i>Bauhinia variegata</i> L.	Kachnar		Caesalpinaceae	Roots	Peonidin glycoside, Kaempferol, Cyanidin glycoside, Malvidin
15	<i>Brassica campestris</i> L.	Sarson	Mustard	Brassicaceae	Seed oil	Dithiolthiones & isothiocyanates.
16	<i>Brassica oleracea</i>	Pattagobhi	Cabbage	Brassicaceae	Leaves	Ascorbigen, vitamins (A, B, C), sulphoraphane & isothiocyanate
17	<i>Butea monosperma</i> (Lam.) Taub.	Palas	Flame of the Forest	Fabaceae	Whole plant	Vitamin, protein and mineral
18	<i>Cajanus cajan</i> (L.) Milsp	Arhar dal	Pigeon pea	Fabaceae	Leaves	Protein, important amino acids; methionine, lysine, and tryptophan
19	<i>Calotropis procera</i> (Aiton) W.T. Aiton	Akha, Madar	Apple of Sodom	Asclepiadaceae	Root	Steroidal component
20	<i>Camellia sinensis</i> (L.) Kuntze	Chay	Tea	Theaceae	Leaves	Catechins and caffeine
21	<i>Camptotheca acuminata</i> Decne	Happy tree	Happy tree	Cornaceae	Bark	Camptothecin, Topotecan
22	<i>Capsicum frutescens</i> L.	Hari mirch	Green chili	Solanaceae	Fruits	Capsaicin
23	<i>Catharanthus roseus</i> (L.) G. Don	Sadabahar	Madagascar periwinkle	Apocynaceae	Whole plant	Vincristine, Vinblastine
24	<i>Celastrus paniculatus</i> Wild.	Jyotishmati	Black oil plant	Celastraceae	Seed	Fatty acids and alkaloids
25	<i>Cinnamomum zeylanicum</i> Blume	Dalchini	Cinnamon	Lauraceae	Bark	Cinnamaldehyde, cinnamyl acetate
26	<i>Citrus limon</i> (L.) Burm. F.	Nibu	Lemon	Rutaceae	Fruits	Vitamin C, flavonoid, flavone, limonoid, limonene (terpenoid), nobiletin & tangeretin.
27	<i>Citrus sinensis</i> (L.) Osbeck	Santra	Orange	Rutaceae	Whole plant	Flavones, Vitamin C
28	<i>Colchicum autumnale</i> L.	Naked ladies	Naked ladies	Liliaceae	Seed and flower	Colchicine
29	<i>Coriandrum sativum</i> L.	Dhaniya	Coriander	Apiaceae	Leaves, Fruits	Essential oil, vitamin C, carotene, borneol, Limonene & α -pinene.
30	<i>Curcuma longa</i> L.	Haldi	Termeric	Zingiberaceae	Rhizome	Vitamin A, Curcumin
31	<i>Daucus carota</i> L.	Gajar	Carrot	Apiaceae	Root, Leaves	Carotene, flavonoid, carotenoid & glycoside.
32	<i>Diospyros peregrine</i>	Gab, kata gab	Gaub persimmon	Ebenaceae	Stem and leaves	Glycerides, myricyl alcohol, saponin, triterpenes, β -sitosterol, α leuconanthocyanin, triterpenes, alkenes, triterpenes, betulinic acid, fatty oil

S. No.	Botanical Name	Common Name	English Name	Family	Parts Used	Bioactive Compounds
33	<i>Eclipta alba</i> L.	Bhringaraj, babri	Trailing eclipta	Asteraceae	Gum resin	Stigmasterol, wedelolactone, de-Me-wedelolactone and 2-formyl-terthienyl
34	<i>Emblica officinalis</i> Gaertn	Amla	Embelia	Euphorbiaceae	Fruits	Vitamin C, carotene, riboflavine, D-glucose, D-fructose, myoinositol, nicotinic acid, D-galacturonic acid, phyllemblic acid, mucic acid, fatty acids
35	<i>Euphorbia antiquorum</i> L.	Cactus	Cactus	Euphorbiaceae	Leaves	β -amyirin, cycloartenol
36	<i>Euphorbia hirta</i> L.	Dudhi	Garden spurge	Euphorbiaceae	Whole plant	Alkanes, triterpenes and phytosterols
37	<i>Ficus benghalensis</i> L.	Bar/ bargad	Banyan tree	Moraceae	Bark, latex, Leaves	Quercetin-3-galactoside, rutin
38	<i>Garcinia xanthochymus</i> L.	Dampel, tamal	Egg tree	Clusiaceae	Fruits	Holacetine, L-quebrachitol, kurcholessine, holonamine, aminoglycosteroid, kurchiphyllamine, kurchaline, holadysine
39	<i>Gloriosa Superba</i> L.	Kalihari, agnishikha	Glory lily	Colchicaceae	Rhizome	Colchicine [17]
40	<i>Glycine max</i> (L.) Merr.	Soyabean	Soybean	Leguminosae	Seed, oil	Zinc, Selenium, Vitamins (A, B1, B2, B12, C, D, E and K)
41	<i>Glycyrrhiza glabra</i> L.	Mulatti	Liquorice	Fabaceae	Whole plant	coumarin, triterpenoid saponin (glycyrrhizin, glabranin) and isoflavone
42	<i>Jatropha curcas</i> L.	Danti, ratanjot	Purging nut	Euphorbiaceae	Leave, seed, oils	toxalbumin curcin or jatrophin
43	<i>Lantana camara</i> L.	Putus	Wild sage	Verbanaceae	Whole plant	pentacyclic triterpenoids
44	<i>Lens culinaris</i> Medikus	Masur	Lentils	Fabaceae	Seeds	lipoidal, phytin, minerals and proteolytic enzyme
45	<i>Lycopersicon esculentum</i> L.	Tamatar	Tomato	Solanaceae	Fruit	Vitamins (A, B, C), essential amino acids & lycopene.
46	<i>Madhuca longifolia</i> (J.Konig) J.F.Macbr.	Mahua	Butter tree	Sapotaceae	Flower	Tannins, saponins, steroids, β -amyirin and fatty acids
47	<i>Mangifera indica</i> L.	Aam	Mango	Anacardiaceae	Fruits and leaves	Ataulfo, Phenolics Alkaloids, Saponin and tannin
48	<i>Mentha sp.</i> L.	Pudina	Garden mint	Lamiaceae	Whole plant	Essential oils (menthol, menthone, limonene), flavonoid & sesquiterpene.
49	<i>Mimosa pudica</i> L.	Chhui-mui, lajvanti	Touch-me-not	Mimosaceae	Whole plant	alkaloid mimosine
50	<i>Momordica charantia</i> L.	Karela	Bitter gourd	Cucurbitaceae	Leaves, Fruit, Seed	Linolenic acid, palmitic acid, momordin & vitamins.
51	<i>Morinda citrifolia</i> L.	Cheese	Mulberry	Rubiaceae	Fruit	lignans, oligo- and polysaccharides, flavonoids and iridoids
52	<i>Moringa Oleifera</i> Lam.	Munga	Drumstick	Moringaceae	Whole plant	Nitrile glycosides
53	<i>Musa sapientum</i> L.	Kela	Sweet banana	Musaceae	Fruit pulp	Albuminoids, Fats, Tannin, Starch, Iron, vitamin-B, C
54	<i>Nelumbo nucifera</i> Gaertn.	Kamal	Lotus	Nelumbonaceae	Fruit	Alkaloids, vitamins & quercetin flavonoid.
55	<i>Nerium indicum</i> L.	Kaner/kanail		Apocynaceae	Roots	
56	<i>Nicotiana tabacum</i> L.	Tambaku	Tobacco	Solanaceae	Leaves	Narcotine, Piperidine, N-methylpyrrolidine, and Pyrrolidine
57	<i>Ocimum sanctum</i> L.	Kala tulsi	Holy basil	Lamiaceae	Leaves	oleanolic acid, ursolic acid, rosmarinic acid, eugenol, carvacrol, linalool
58	<i>Oryza sativa</i> L.	Chaval	Black rice	Poaceae	Seed	Anthocyanin
59	<i>Phyllanthus amarus</i> Schum. & Thonn.	Bhoomi aamla	Tone breaker	Euphorbiaceae	Whole plant	Amarin, Alkaloids
60	<i>Plumbago Zeylanica</i> L.	Chitrak	Ceylon leadwort, doctorbush	Plumbaginaceae	Root	Plumbagin[15][19]
61	<i>Premna herbacea</i> Roxb.	Bharangi		Verbenaceae	Root	Triterpenoids
62	<i>Randia dumetorum</i> Linn. Sans	Madan phal, Maina phal	Emetic nut	Rubiaceae	Fruits and seed	
63	<i>Raphanus sativus</i> L.	Mooli	Radish	Brassicaceae	Roots	Raphanin, Vitamin C
64	<i>Ricinus communis</i> L.	Reri	Castor oil plant	Euphorbiaceae	Seed	Ricinolein, ricin
65	<i>Rubia cordifolia</i> L.	Rangua/ majith	Indian madder	Rubiaceae	Root	Alizarin
66	<i>Semecarpus Anacardium</i> L.	Bhelwa, bhallataka	Marking nut	Anacardiaceae	Fruit	Bhilwano[16][20]
67	<i>Terminalia arjuna</i> (Roxb.) Wight & Arn.	Arjuna	Arjuna	Combretaceae	Bark	arjunolic acid, gallic acid, terminic acid, pyrocatechols and β -Sitosterol
68	<i>Tinospora cordifolia</i> (Thunb.) Miers	Giloy		Menispermaceae	Stem & leaves	Giloyin, Bitter glycosides, Diterpene, polyphenols and polysaccharides

S. No.	Botanical Name	Common Name	English Name	Family	Parts Used	Bioactive Compounds
69	<i>Trigonella foenumgraecum</i> L.	Methi	Fenugreek	Fabaceae	Leaves and seeds	Choline, trigonelline, saponin, amino acids, vitamins & quercetin.
70	<i>Triticum aestivum</i> L.	Gehu	Wheat	Poaceae	Seed	flavonoids, triterpenoids, anthraquinol and alkaloids
71	<i>Viscum album</i> L.	Mistletoe	Mistletoe	Loranthaceae	Whole plant	Lectin alkaloids, Lupenol, Viscotoxin, Flavonoids and Digallic acid
72	<i>Vitis vinifera</i> L.	Angoor	Grapes	Vitaceae	Seeds	Olic acid and Linolic acid
73	<i>Withania somnifera</i> (L.) Dunal	Ashwagandha	Winter cherry	Solanaceae	Root	Withanolides, withaferin
74	<i>Zea mays</i> L.	Makka	Maize	Poaceae	Whole plant	bcarotene and vitamins (C, E, K)
75	<i>Zingiber officinale</i> Roscoe	Adrak	Ginger	Zingiberaceae	Rhizome	Curcumin, ginerenone, zingerone





Fig. 2. Photograph of anti-cancer plants (alphabetical pattern)

IV. CONCLUSION

Plants have always played a key role in world health. Some previous work done by tribal knowledgeable person in tribal areas of Jharkhand shows that many drugs of modern medicine have their roots and their origin in traditionally used medicinal plants. In spite of popularisation of modern medicine people still believe in herbal remedies and use them to prevent and cure many health problems. Most of the documented plant are very common easily available at low cost in Jharkhand and also very common in their daily food practice.

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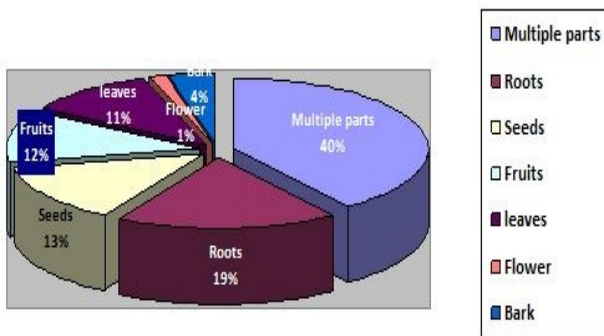


Fig. 3. Plant parts used by the tribal's of Jharkhand (in per cent)

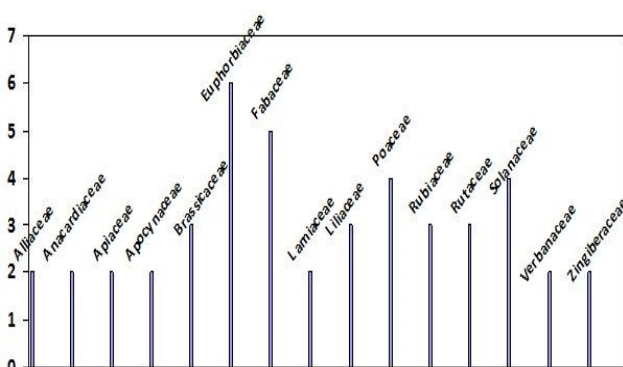


Fig. 4. Name of plant families in which plants are frequently belong

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