Ethnobotanical Survey of Plants Used As Remedy for Cancer in Imo State, Nigeria

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Abstract

In the survey, an ethnobotanical inventory was carried out to study the plant families, species and parts of plants used as remedy for cancer. The result showed that a total of 76 plant species from 47 families mostly of the Euphorbiaceae, Fabaceae, Dioscoraceae and Zingiberaceae The commonest plant species identified include; Ricinus communis L (Castor bean), Manihot esculenta Crantz (Cassava), Tetrapleura tetraptera Scm & Thonn (African yellow wood), Curcuma longa L (Tumeric), Zingiber officinale Roscoe (Ginger) and Xylopia aethiopica (Dunal) A. Rich (African pepper). All the plants studied in this survey have been used by the herbal practitioners and adjudged to be effective. Despite the inventory, more research is needed in the extraction and isolation of active chemical constituents in these medicinal plants for drug formulation and other vital pharmaceutical purposes.

Keywords: Ethnobotanical, survey, Cancer, active compound, Imo State, Nigeria.

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INTRODUCTION

Cancer is a dreaded disease which is best characterized by abnormal cell division and is caused by mutation of genes involved in the control of cell division. Cancer cells grow in uncontrollable manner, and result in malignant tumors which attack on the nearby parts of the body [1]. Cancer (malignant tumour) is an abnormal growth and proliferation of cells [2]. It is a frightful disease because the patient suffers pain, disfigurement and loss of many physiological processes. Cancer may be uncontrollable and incurable, and may occur at any time at any age in any part of the body. There are various factors involved in the genesis of cancer like toxic chemicals, excessive use of alcohol, exposure to environmental toxins, some poisonous plants like mushrooms and exposure to excessive sunlight, genetic problems, radiation, viruses, etc. It is caused by a complex, poorly understood interplay of genetic and environmental factors. However, the cause of many cancers remains unknown. The current standard approach of western medicine for treatment of cancer consists of an attempt to eradicate established tumor with combined treatment such as surgery, chemotherapy and radiation. However, this therapy has failed in many respects. In many cases it makes human life miserable and usually reduces the span of life. The patient remains sick due to toxic effects of radio and chemotherapy as these do not kill only cancer cells but normal cells also and produce low hematological picture and low immune syndromes making the patient prone to opportunistic infections, reduce strength and vitality. The failure of modern therapies has prompted complementary and alternative medicine scientists to investigate the plant derived safe and effective therapeutic agents [3].

Cancer causes about 13% of all deaths [4]. Cancer kills annually about 3500 per million population around the world [2]. Cancers figure among the leading causes of morbidity and mortality worldwide, with approximately 14 million new cases and 8.2 million cancer related deaths in 2012 [5]. The number of new cases is expected to rise by about 70% over the next 2 decades. Among men, the 5 most common sites of cancer diagnosed in 2012 were lung, prostate, colorectum, stomach, and liver cancer. Among women the 5 most common sites diagnosed were breast, colorectum, lung, cervix, and stomach cancer. Around one third of cancer deaths are due to the 5 leading behavioural and dietary risks: high body mass index, low fruit and vegetable intake, lack of physical activity, tobacco use, alcohol use. Tobacco use is the most important risk factor for cancer causing around 20% of global cancer deaths and around 70% of global lung cancer deaths. Cancer causing viral infections such as HBV (Hepatitis virus), and HPV are responsible for up to 20% of cancer deaths in low- and middle-income countries [6]. More than 60% of world’s total new annual cases occur in Africa, Asia and Central and
South America. These regions account for 70% of the world’s cancer deaths. It is expected that annual cancer cases will rise from 14 million in 2012 to 22 within the next 2 decades [5].

Cancer is a leading cause of death worldwide, accounting for 8.2 million deaths in 2012 [5]. The most common causes of cancer death are cancers of: lung (1,59 million deaths), liver (745 000 deaths), stomach (723 000 deaths), colorectal (694 000 deaths), breast (521 000 deaths), oesophageal cancer (400 000 deaths) [5]. Breast cancer is the second overall cause of death for women [6]. Colorectal cancer is the third most lethal cancer worldwide. Both genders, male and female are equally affected by this deadly disease [7].

In Nigeria, there are about 100,000 new recorded cases of cancer yearly while there are currently about 2 million recorded cases on ground. Breast and cervical cancer are the commonest forms of cancer in Nigeria and they occur in women. Through the years, the cancer mortality rate has tripled and with the vastly inadequate health care system in Nigeria, the figures are poised to get even worse. However, the key to fighting cancer is early detection, as such, it is advised that we regularly conduct check-ups [8].

Several reports describe that the anticaner activity of medicinal plants is due to the presence of antioxidants in them. In fact, the medicinal plants are easily available, cheaper and possess no toxicity as compared to the modern (allopathic) drugs. Hence, this inventory contains 63 medicinal plants, which are the natural sources of anticancer agents. A large number of chemopreventive agents are used to cure various cancers, but they produce side effects that prevent their extensive usage. Although more than 1500 anticancer drugs are in active development with over 500 of the drugs under clinical trials, there is an urgent need to develop much effective and less toxic drugs. The plant kingdom plays an important role in the life of humans and animals [2].

According to the World Health Organization (WHO), about three quarters of the world’s population currently use herbs and other forms of traditional medicines to treat diseases. Traditional medicines are widely used in India. Even in USA, use of plants and phytomedicines has increased dramatically in the last two decades [9]. The plant kingdom is playing an important role in cancer prevention and therapy in a number of ways:
(i) Medicinal plants represent a vast potential source for anticancer compounds. These compounds are extremely complex molecular structures, which would be difficult to synthesize (or conceptualize) in the laboratory. The antitumour activity of medicinal plant derived compounds may result via a number of mechanisms, including effects on cytoskeletal proteins which play a key role in cell division, inhibition of DNA topoisomerase enzymes, antiprotease or antioxidant activity, and stimulation of the immune system, etc [10, 11].
(ii) Plants can delay or even prevent cancer onset.
(iii) Plants can support the immune system, thus improving body resistance to the disease and its treatments.
(iv) Plants can prevent and decrease side effects of conventional treatments.
(v) Plants can provide nutritional, as well as psychological support.

Therefore, it is a two-sided approach: One – plant derived molecules are used by conventional medicine as anti-cancer drugs. Secondly, plants are used as a part of complementary treatment, offering psychological, nutritional and physical support, thus increasing the quality of life [12]. Plants have been used in the treatment of cancer. The National Cancer Institute collected about 35,000 plant samples from 20 different countries, and has screened around 114,000 extracts for anticancer activity. 60% of the commercially available anticancer drugs are from natural sources [1].

**STUDY SITE**

Imo state was created on February 3, 1976. Imo state is located in the southeast region of Nigeria and its capital is Owerri which is its largest city. The total land area of the state is 5,530 sq km and a population of 3,934,899. It is located between Anambra State in the North, Rivers State in the South, Akwa Ibom State to the East and on the West by Delta State. The state lies within latitudes 4°45’N and 7°15’N, and longitude 6°50’E and 7°25’E. Imo state is part of Igbo land and the original inhabitants are Igbos, a culturally homogeneous group. Igbo is the language spoken throughout the state with different dialects spoken in different parts. Some other major towns in Imo state are Okigwe, Oguta, Orlu, Mbaise, Uzoafrica and Emekuku. The state is rich in crude oil, natural gas and fertile, arable agricultural land. The people of Imo state are Igbo speaking state. They have a very rich cultural heritage which is portrayed in their dress, music, dance, festivals, arts and crafts. Imo State is divided into twenty seven local government areas [13, 14].

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<table>
<thead>
<tr>
<th>S/ N</th>
<th>FAMILY</th>
<th>BOTANICAL NAME</th>
<th>COMMON NAME</th>
<th>LOCAL NAME</th>
<th>PART USED</th>
<th>ACTIVE COMPOUND</th>
<th>TYPE OF CANCER REMEDIED</th>
<th>REFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Euphorbiaceae</td>
<td>Ricinus communis L.</td>
<td>Castor bean</td>
<td>Ogili Ugba, ogili isi</td>
<td>Seeds</td>
<td>Flavonoids, ricinoleic acid, P – coumaric acid, ferulic acid, O-coumaric acid, syringic, cinnamic, chlorogenic, neochlorogynic and gallic acid</td>
<td>Colon, liver and prostate</td>
<td>[15, 11]</td>
</tr>
<tr>
<td>2</td>
<td>Euphorbiaceae</td>
<td>Jatropha gossypifolia L.</td>
<td>Bellyach e bush</td>
<td>Ijikara,</td>
<td>Leaf</td>
<td>Breast</td>
<td>[16, 17]</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Euphorbiaceae</td>
<td>Jatropha curcas L.</td>
<td>Physic nut.</td>
<td>Olulu- idu, Uru- ekpa,</td>
<td>Breast</td>
<td>[18, 17]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Euphorbiaceae</td>
<td>Manihot esculenta Crantz</td>
<td>Cassava</td>
<td>Jigbo</td>
<td>Root</td>
<td>Linamarin</td>
<td>Prostate, breast</td>
<td>[19-21]</td>
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<td>5</td>
<td>Euphorbiaceae</td>
<td>Securinega virosa (Roxb) Bail</td>
<td>Resurrection plant</td>
<td>Ula njula, urata njele</td>
<td>Leaf</td>
<td>Phenol, flavonoid</td>
<td>Breast</td>
<td>[22]</td>
</tr>
<tr>
<td>6</td>
<td>Euphorbiaceae</td>
<td>Bridilia ferruginea Benth</td>
<td>Ala</td>
<td>Leaf</td>
<td>Isopicrodeoxypodophyllotoxin</td>
<td>Breast</td>
<td>[23]</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fabaceae</td>
<td>Glycine max L.</td>
<td>Soybean</td>
<td>Iru, Ogiri-Igala</td>
<td>Seed</td>
<td>Genistein, quercetin, saponins, isoflavonones and lectin</td>
<td>Breast, uterus, cervix, ovary, lung, stomach, colon,</td>
<td>[24]</td>
</tr>
<tr>
<td>No.</td>
<td>Family</td>
<td>Species</td>
<td>Part</td>
<td>Chemicals</td>
<td>Organs</td>
<td>Literature</td>
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<tr>
<td>8</td>
<td>Fabaceae</td>
<td>Cajanus cajan (L) Millsp</td>
<td>Root</td>
<td>Hexadecanoic acid methyl ester, α-amyrin, β-sitosterol, pinostrobin, longistylin A, isoflavanone, phytalexin, cajanol (5-hydroxyl-2-methoxyphenyl)-7-methoxychroman-4-one</td>
<td>Liver, kidney, prostate and thyroid</td>
<td>[25, 26]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Fabaceae</td>
<td>Butea monosperma (Lam.) Taub.</td>
<td>Flower</td>
<td>Cajanin, Cladrin, Medicarpin.</td>
<td>Liver, breast, skin</td>
<td>[27]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Fabaceae</td>
<td>Glycyrrhiza glabra L.</td>
<td>Root</td>
<td>Flavonoids (flavonoids, flavonals, isoflavones, chalcones, licochalcones)</td>
<td>Breast, lung, stomach, colon, liver, kidney and prostate</td>
<td>[28]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Fabaceae</td>
<td>Tetrapleur a tetraplera Scum &amp; Thonn</td>
<td>Leaf and stem</td>
<td>Quercetin.</td>
<td>Prostate</td>
<td>[29]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Dioscoracea</td>
<td>Dioscorea alata L.</td>
<td>Tuber</td>
<td>Diogenin.</td>
<td>Breast, uterine, ovarian, esophageal</td>
<td>[30, 31]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Dioscoracea</td>
<td>Dioscorea bulbifera L.</td>
<td>Tuber</td>
<td>Diogenin.</td>
<td>Esophageal, uterine and ovarian</td>
<td>[32, 31]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Dioscoracea</td>
<td>Dioscorea rotundata Poir</td>
<td>Tuber</td>
<td>Diogenin.</td>
<td>Esophageal, uterine and ovarian</td>
<td>[30]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Dioscoracea</td>
<td>Dioscorea cayenensis Lam.</td>
<td>Tuber</td>
<td>Diogenin.</td>
<td>Prostate, uterine, ovarian and esophageal</td>
<td>[30]</td>
<td></td>
<td></td>
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<tr>
<td>17</td>
<td>Zingiberaceae</td>
<td>Curcuma longa L.</td>
<td>Stem (rhizome)</td>
<td>Curcumin (Diferuloyl-methane) and curcuminoids</td>
<td>Breast, lung, liver, colon, prostate, skin and stomach</td>
<td>[33-36]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Zingiberaceae</td>
<td>Alpinia</td>
<td>Rhizome</td>
<td>1-Acetoxychavicol</td>
<td>Prostate</td>
<td>[37]</td>
<td></td>
<td></td>
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<tr>
<td>No.</td>
<td>Family</td>
<td>Genus</td>
<td>Species</td>
<td>Plant Part</td>
<td>Compound(s)</td>
<td>Tumor Type</td>
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<tr>
<td>19</td>
<td>Zingiberaceae</td>
<td>Zingiber</td>
<td>officinale Roscoe</td>
<td>Ginger Stem (rhizome)</td>
<td>6-shogaol</td>
<td>Prostate, breast, cervix, colon, ovary, rectum, urinary bladder and oral cavity [38-40]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Zingiberaceae</td>
<td>Curcuma zedoria</td>
<td>(Christm.) Roscoe</td>
<td>Iloko Stem (rhizome)</td>
<td>Sesquiterenes, curcuminoids</td>
<td>Breast [41-43]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Amaryllidaceae</td>
<td>Allium cepa L</td>
<td></td>
<td>Ayu Leaf (bulb)</td>
<td>Allypropyl disulphide, catechol, protocatechnic acid, thiropipino aldehyde and thiocyanate</td>
<td>Ovarian, breast, stomach [44]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Amaryllidaceae</td>
<td>Aloe barbadensis</td>
<td>Mill.</td>
<td>Ebube agu Leaf</td>
<td>Allicin, allin</td>
<td>Brain, breast [47]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Amaryllidaceae</td>
<td>Allium sativum L</td>
<td></td>
<td>Aayu, Ayo-ishi, Leaf (bulb)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Caesalpinaceae</td>
<td>Cassia auriculata</td>
<td>(L.) Roxb.</td>
<td>Ogaalu Leaf</td>
<td>4-(4-chlorobenzyl) – 2,3,4,5,6,7-hexahydro-7-(2-ethoxyphenonyl)benzo[h][1,4,7] triazecin – 8 (1H) – one</td>
<td>Colon [48]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Caesalpinaceae</td>
<td>Cassia senna L</td>
<td></td>
<td>Atara Leaf</td>
<td>Aloe – emodin, isorhamnetin and kaemperol</td>
<td>Stomach, colon [49, 50]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Caesalpinaceae</td>
<td>Cassia occidentali s (L.) Link,</td>
<td>Coffee senna</td>
<td>Asesa Leaf</td>
<td>Emodin, Aloe – emodin 1.8 – Dihydroxy 3-hydroxy methylanthraquinone</td>
<td>Liver, kidney [51]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Convovulaceae</td>
<td>Cuscuta trifolii</td>
<td>Bab.</td>
<td>Harper’s Dodder Leaf</td>
<td>Flavonoid; kaemperol, quercetin</td>
<td>Liver, spleen, prostate [52]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Convovulaceae</td>
<td>Ipomea batata (L.) Lam</td>
<td>Sweet potato</td>
<td>Ji-oyibo, Ekimako Tuber</td>
<td>Anthocyanins; cyanidin, peonidin, polyphenol</td>
<td>Colon, prostate [53]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Convovulaceae</td>
<td>Ipomea digitata L</td>
<td>Aigator Yam</td>
<td>Mbì-n’là Tuber</td>
<td>Glycoside; paniculatin</td>
<td>Stomach, skin [54]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Lamiaceae</td>
<td>Ocimum santum L</td>
<td></td>
<td>Ndeme Aerial part</td>
<td>Urosolic acid, apigenin, rosamarinic acid, eugenol, rosamarinic acid, myrethanol, intololin, ß-sitosterol, vicenin and carnosic acid</td>
<td>Skin, liver, oral, lung and cervical [55, 56]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Lamiaceae</td>
<td>Ocimum gratissium</td>
<td>L</td>
<td>Nchuan wu Leaf</td>
<td>Eugenol, methyl eugenol</td>
<td>Prostate [57, 58]</td>
<td></td>
<td></td>
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<tr>
<td>No.</td>
<td>Family</td>
<td>Species</td>
<td>Common name</td>
<td>Part(s)</td>
<td>Active Constituents</td>
<td>Organs affected</td>
<td>References</td>
<td></td>
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<tr>
<td>32</td>
<td>Lamiaceae</td>
<td><em>Hyptis suaveolens</em> (L.) Poit.</td>
<td>Bus tea, Ijikara</td>
<td>Leaf, root</td>
<td>Podophyllotoxin</td>
<td>Colon, liver</td>
<td>[59, 60]</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Asteraceae</td>
<td><em>Helianthus annuus</em> L.</td>
<td>Sunflower, Fulawa onwa</td>
<td>Leaf, stems, Roots</td>
<td>Nevadensin (bioflavonoid)</td>
<td>Lung</td>
<td>[61]</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Asteraceae</td>
<td><em>Vernonia amygdalina</em> L.</td>
<td>Bitter leaf, Onugbu</td>
<td>Leaf</td>
<td>Steroid saponins, luteolin, luteolin 7-O-β-glucoroniside, luteolin 7-O-β-glucoside, anthraciquinones, vernoniosides A1, A2, A3, A4, B1, B2, C, D, E</td>
<td>Breast, stomach</td>
<td>[62-67]</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Apocynaceae</td>
<td><em>Cathaartus roseus</em> (L.) G. Don</td>
<td>Madagascar periwinkle</td>
<td>Ijikere leaf</td>
<td>Vinblastine, vincristine and their derivative</td>
<td>Breast, ovary, cervix, lung, colon, rectum and prostate</td>
<td>[68, 69]</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Apocynaceae</td>
<td><em>Picralima nitida</em> (Staf.) Th &amp; H. Durand</td>
<td>Akuamm a plant, Osi-Igwe, Òsú abwa</td>
<td>Leaf</td>
<td>Phenol, flavonoid</td>
<td>Breast</td>
<td>[16]</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Combretaceae</td>
<td><em>Terminalia catappa</em> L</td>
<td>African nut tree, country-almond, Mkpuru edo</td>
<td>Leaf</td>
<td>Saponin, saponin glycosides, steroid, cardiac glycoside,</td>
<td>Lung</td>
<td>[70, 71]</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Combretaceae</td>
<td><em>Guiera senegalensis</em> J.F. Gmel</td>
<td>English Moshi, Apa</td>
<td>Leaf</td>
<td>Polyphenols; guirenone, quercetin</td>
<td>Breast</td>
<td>[72, 73]</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Solanaceae</td>
<td><em>Solanum nigrum</em> L.</td>
<td>Black nightshade, wonder berry</td>
<td>Afufa fruit</td>
<td>Steroidal glycoalkaloids, steroid glycosides (spirostane, furostane, spirosolane), lumasin</td>
<td>Liver, breast</td>
<td>[74, 75]</td>
<td></td>
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<tr>
<td>40</td>
<td>Solanaceae</td>
<td><em>Solanum lycopersicum</em> L</td>
<td>Tomato</td>
<td>Tomeret o fruit</td>
<td>Lycopene</td>
<td>Colon, prostate</td>
<td>[76, 77]</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Annonaceae</td>
<td><em>Annona senegalensis</em> is J.F. Gmel</td>
<td>Wild custard, Uburu ocha</td>
<td>Leaf</td>
<td>Flavonoids, kaurenoic acid</td>
<td>Prostate, breast</td>
<td>[78, 79]</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Annonaceae</td>
<td><em>Xylopia aethiopica</em> (Dunal) A. Rich.</td>
<td>African pepper, guinea pepper</td>
<td>Uda. fruit</td>
<td></td>
<td>Colon, cervical</td>
<td>[80, 81]</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>Rubiaceae</td>
<td><em>Uncaria tormentosa</em> (Wild. ex Schult.) DC.</td>
<td>Cat’s claw, Ubulu, u. Stem bark, root</td>
<td>Oxindole alkaloids</td>
<td>Breast, urinary</td>
<td></td>
<td>[82]</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Rubiaceae</td>
<td><em>Murinda lucida</em> Benth.</td>
<td>Brimstone tree, Eze Ogu, Njisi</td>
<td>Stem bark</td>
<td>Anthraquinones, anthraquinols</td>
<td>Liver, kidney</td>
<td>[83, 84]</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>Clusiaceae</td>
<td><em>Garcinia mangost</em></td>
<td>Mangost</td>
<td>Fruit</td>
<td>Xanthones; α-</td>
<td>Breast</td>
<td>[85, 86]</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>Clusiaceae</td>
<td><em>Garcinia kola</em> Heckel</td>
<td>Bitter kola</td>
<td>Akuilu</td>
<td>Root</td>
<td>1-3, 8-11 benzophenones, biflavones, flavonones, apigenin</td>
<td>Liver, stomach</td>
<td>[87]</td>
</tr>
<tr>
<td>47</td>
<td>Beberidaceae</td>
<td><em>Beberis vulgaris</em> L.</td>
<td>Barberry, Uhuma obi-nwoke,</td>
<td>Fruit</td>
<td>Berberine, quercentin</td>
<td>Cervical, breast, prostate, stomach, oral and liver</td>
<td>[88-90]</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>Acanthaceae</td>
<td><em>Andrographis paniculata</em> (Burman) Wall. Nees</td>
<td>Green chirayta, creat, king of bitters,</td>
<td>Egbu</td>
<td>Leaf, stem</td>
<td>Andrographo-Lide</td>
<td>Breast, ovary, stomach, colon, prostate and kidney</td>
<td>[91, 92]</td>
</tr>
<tr>
<td>49</td>
<td>Meliaceae</td>
<td><em>Azadirachta indica</em> A. Juss</td>
<td>Neem</td>
<td>Dogonyaro</td>
<td>Leaf, flowers and stem bark,</td>
<td>Nimidin, nimbin, liminoids, nimbolide, nimbinin, nimbinone and nimbic acid</td>
<td>Breast</td>
<td>[93-95]</td>
</tr>
<tr>
<td>50</td>
<td>Plumbaginaceae</td>
<td><em>Plumbago zeylanica</em> L.</td>
<td>White leadwort, Inabiri, Onayaako</td>
<td>Stem bark, root and leaf</td>
<td>Triterpenoids, anthraquinones, steroid glucosides</td>
<td>Lung, prostate</td>
<td>[96, 97]</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>Santalaceae</td>
<td><em>Viscum album</em> L.</td>
<td>Mistletoe</td>
<td>Ewe ato</td>
<td>Leaf</td>
<td>Iscador</td>
<td>All types of cancer</td>
<td>[98-101]</td>
</tr>
<tr>
<td>52</td>
<td>Gramineae</td>
<td><em>Cymbopogon citratus</em> (DC.) Stapf</td>
<td>Lemon grass</td>
<td>Acharati</td>
<td>Leaf</td>
<td>Linalool, sesquiterpene, phenolic acid</td>
<td>Cervical</td>
<td>[102-105]</td>
</tr>
<tr>
<td>53</td>
<td>Apioideae</td>
<td><em>Daucus carota</em> L.</td>
<td>Carrot, Okiru ilá</td>
<td>Tuber (juice)</td>
<td>Falcarinol</td>
<td>Colon, Breast</td>
<td>[106]</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>Papaveraceae</td>
<td><em>Sanguinaria canadensis</em> L.</td>
<td>Bloodroot, Ochiricha, Offa</td>
<td>Leaf</td>
<td>Sanguininine, chelerythrine, berberine and oxysanguinarine</td>
<td>Skin, Breast</td>
<td>[107]</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>Mimosacea</td>
<td><em>Calliandra portoricensis</em> (Jacq) Benth</td>
<td>Powder puff, fairy duster,</td>
<td>Eri Agbo</td>
<td>Leaf</td>
<td>Polyphenol, flavonoid</td>
<td>Prostate</td>
<td>[108]</td>
</tr>
<tr>
<td>56</td>
<td>Cactaceae</td>
<td><em>Cactus grandiflora</em> L.</td>
<td>Cactus pear</td>
<td>Macaloe</td>
<td>Stem</td>
<td>Hexadecanoic acid</td>
<td>Ovarian</td>
<td>[109]</td>
</tr>
<tr>
<td>57</td>
<td>Caricaceae</td>
<td><em>Carica papaya</em> L.</td>
<td>Pawpaw</td>
<td>Nbirimbik</td>
<td>Fruit, leaf</td>
<td>Quercetin, lycopene, betacarotenoids, benzylisothiocyanate, benzylglucosinolate, chlorogenic acid, caffèic acid, protocatechuic acid</td>
<td>Cervix, breast, liver, lung, pancreatic</td>
<td>[110, 111]</td>
</tr>
<tr>
<td>58</td>
<td>Cistaceae</td>
<td><em>Cistus ladanifer</em> L.</td>
<td>Rockrose</td>
<td>Nishiki</td>
<td>Stem (Gum)</td>
<td>Quercetin, kaempferol, polyphenols</td>
<td>Breast</td>
<td>[112]</td>
</tr>
<tr>
<td>59</td>
<td>Ranunculaceae</td>
<td><em>Nigella</em></td>
<td>Black</td>
<td>Usolala-</td>
<td>Seed</td>
<td>Thymoquinone</td>
<td>Liver, skin</td>
<td>[113-117]</td>
</tr>
<tr>
<td>60</td>
<td>Amaranthaceae</td>
<td>Spinacia oleracea L</td>
<td>Spinach</td>
<td>Leaf</td>
<td>Sulfoquinovosyl Diacylglycerol, flavonoids</td>
<td>Liver, kidney, stomach, skin and prostate [118, 119]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>Bignoniaceae</td>
<td>Kigelia Africana (Lam.) Benth.</td>
<td>Cucumber</td>
<td>Leaf, stem bark, fruits</td>
<td>Flavonoids; 6-hydroxyluteolin-7-alpha-glucoside and luteolin, flavonol; quercetin, flavonones</td>
<td>Breast, uterine [120]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>Simaroubaceae</td>
<td>Hannoa klainneane Pierre ex Engl.</td>
<td>Hotoro</td>
<td>Leaf</td>
<td>Quassinoids</td>
<td>Breast, ovarian, stomach, colon [121, 122]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>Plantaginaceae</td>
<td>Plantago major L</td>
<td>Plantain</td>
<td>Fruit, leaf</td>
<td>Aucubin, catalpol, acteoside</td>
<td>Skin [123, 124]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>Cucurbitaceae</td>
<td>Citrillus lanatus (Thunb.) Matsum. &amp; Nakai</td>
<td>Watermelon</td>
<td>Seeds</td>
<td>Lycopene, citrulline</td>
<td>Prostate [125, 126]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>Rosaceae</td>
<td>Prunus africana (Hook f.) Kalkm</td>
<td>Iron wood, stinkwood, African plum, Osisi igwe</td>
<td>Stem bark, flowers and fruits</td>
<td>Steroids; sitosterone, daucosterol</td>
<td>Prostate [127]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>Moringaceae</td>
<td>Moringa oleifera Lam.</td>
<td>Drumstick</td>
<td>Stem bark, seed, root, fruit</td>
<td>Quercetin, caffeoylquinic acid</td>
<td>Breast, colon, lung, skin, ovarian [128, 129]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>Araceae</td>
<td>Colocasia esculenta L</td>
<td>Cocoyam</td>
<td>Corn (tuber)</td>
<td>Cyaniding – 3-glucoside, anthocyaninsperlargoni din -3 – glucoside</td>
<td>Colon [130]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>Anacardiaceae</td>
<td>Mangifera indica Linn</td>
<td>Mango</td>
<td>Leaf, fruit</td>
<td>Isomangiferin, tetracyclic triterpenoids, manglupenone, manglupenone</td>
<td>Breast, colon [131]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>Vitaceae</td>
<td>Vitis vinifera L</td>
<td>Grape</td>
<td>Seed</td>
<td>Polyphenols, quercetin, resveratrol</td>
<td>Skin, colon, prostate [132-134]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Musaceae</td>
<td>Musa sapientum L</td>
<td>Banana</td>
<td>Fruit</td>
<td>Flavonoids, coumarins</td>
<td>Colorectal [135, 136]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>Palmae</td>
<td>Elaeis guineensis Jacq</td>
<td>African oil palm</td>
<td>Leaf</td>
<td>Vincristine, vinblastine, vindesine, etoposide, teniposide, saponin, terpenoids, steroids</td>
<td>Colon [137]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Results from this inventory show that different traditional herbal practitioners use different plant species for the treatment of various cancers and therefore the knowledge of the therapeutic value of the plant species, disease conditions, vary from one practitioner to another.

The investigation shows that Euphorbiaceae, Fabaceae, Dioscoreaceae and Zingiberaceae were the plant families mostly used in the treatment of cancer (Table-1). These plant families are among the most common plant families seen in Nigeria [148, 149].

It can be depicted from this finding that these plants possess some active compounds and metabolites for the treatment of cancer. Genistein from Glycine max blocks the supply of oxygen and nutrients to cancer cells. Isoflavones and saponins inhibits cancer cell proliferation and induces apoptosis [24, 2]. Glycyrrhiza glabra inhibits growth and spread of various kinds of cancers by inducing apoptosis and arresting cancer cell division [28, 2]. Curcumin in Curcuma longa arrest cancer cell proliferation in G2/S phase and induce apoptosis. Curcumin works in multidrug resistance hence enhancing their effect on intracranial tumours. It inhibits angiogenesis (formation of new blood vessels) and reduces apoptosis [68, 69, 2]. Steroid glycosides (spirostane, furostane, spirosolane) inhibits the growth of colon cancer while polysaccharides from Solanum nigrum inhibits cervical cancer growth and spread. It also induces apoptosis. Lumasin from Solanum nigrum is a cancer protective peptide.

Beberine (an isoquinoline alkaloid) from Beberis vulgaris possess anticancer property by arresting cancer cell cycle in G1 phase and induces apoptosis. Beberine has anticancer activity against prostate and liver cancers. It increases the penetration of some chemotherapy drugs through the brain barrier, hence enhancing their effect on intracranial tumours. Phenolic compounds from Beberis vulgaris protect against breast, stomach and oral cancer [88-90, 2].

Andrographolide; a diterpine in Andrographis paniculata anticancer activity against cancer of the breast, ovary, stomach, colon, prostate and kidney. It exerts direct anticancer activity on cancer cells by arresting G0/G1 phase of cell cycle and inducing apoptosis [91, 92]. Niminoids from Azadirachta indica regress growth and spread of various cancers such as cancer of the breast, lung, stomach, prostate and skin.
Nimbolide inhibits growth and spread of different cancers by inducing apoptosis (cell death). Ethanol extract of *Azadirachta indica* inhibits the growth and spread of prostate cancer by inducing apoptosis. It also reduces the side effect of chemotherapy and radiotherapy [2, 93-95]. Thymoquinone from *Nigella sativa* is effective in both hormone sensitive and hormone- refractory cancer. It kills cancer cells by binding to the asialofetuin (lectin) of the surface of cancerous cells causing their aggregation and clumping [113-117, 2].

Notable chemical and phytochemical works have been done on some of the plants investigated and include *Garcinia cola* [150-155], *Zingiber officinale* [156-159], *Nauclea latifolia* [160], Berberis species [161], *Carica papaya* [162, 163], *Ocimum gratissimum* [164-166], *Tetropleura tetrapeta* [164, 166].

The plants studied can be viewed as potential sources for vital drugs and hence should be explored for pharmaceutical and therapeutic value.

**REFERENCES**


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of grape seed procyanidin-induced apoptosis in colorectal carcinoma cells. *Anticancer research*, 29(1), 283-289.


