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# Ethnobotanical Survey and Antioxidant Properties of Plants Used Locally in the Management of Cancer in Fika and Fune Local Government Area of Yobe State

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## ABSTRACT

The uncontrolled traits of growth, invasion and sometime metastasis displayed by group of cells is a class of disease called Cancer. Ethnobotanical survey was employed to collect data from the prominent and selected traditional medicinal practitioners and the instrument used was questionnaire to collect data. *In vitro* Antioxidant activities of the surveyed plant's extracts were measured using 1,1-diphenyl-2-picrylhydrazyl (DPPH). A total of 30 healers from Fika and Fune LGA of Yobe State- Nigeria were involved in the study. Fouty six (46) plants species were identified and their information with respect to cancer were documented. Antioxidant assay revealed better inhibitory concentration ($IC_{50}$) and percentage inhibition (%INH) effects at minimum concentration by *Boswellia dalzielli, Dichrostachy cineria* and *Vitellaria paradoxa* with percentage inhibitions and inhibitory concentration ($IC_{50}$) of 58% (1.16), 58% (1.19), and 58% (1.19) respectively in comparison with standard drug (Ascorbic acid) with percentage inhibition and inhibitory concentration ($IC_{50}$) of 45% (1.2). Thus, it could be concluded that all the plants collected in this study shows antioxidant potentials which could be attributed to the presence of chemical compounds in the plants, additionally, it can prove its uses in management of cancer traditionally.

**Keywords:** Ethno botanical Survey, Antioxidants, Phytochemicals, Medicinal plants, Cancer

## INTRODUCTION

The anticipated number of cancer cases will rise from 14.1 million to 21.6 million in 2012-2030 with a current number of more than 10 million people affected with cancer worldwide (Dhyani *et al*., 2022). Cancer treatment can be effective by reducing tumour weight and inhibiting the stem cells. For decades the medications were less effective and have adverse effects, and over 90% of cancer patients' deaths are associated with multi-drug resistance (Karol *et al*., 2020). Dhyani *et al*. (2022) also reported the drug-resistance development in patients over time and minimal efficacy in in-vivo systems due to low absorption. Plant-based natural compounds have presented a promising and unique opportunity due to their chemo-preventive secondary metabolites with almost 60% of anticancer drugs originating from natural products such as vincristine, vinblastine, campthothecin, topotecans and irinotecan (Rahier *et al*., 2015). There are many basic ancient medicinal systems derived from dietary sources. Traditional medicines are still used in many countries as basic healthcare, including developed countries. Although many conventional pharmaceutical approaches have been replaced, however there is a current resurgence in the interest in natural products by the public, and the use of complementary and alternative medicine is increasing rapidly from 9.6% to 76% (Harris *et al.,* 2012). Twelve (12) systematic reviews report reasons for complementary and alternative medicine

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(CAM) use mainly in cancer populations compared to other condition-specific populations (Weeks *et al.,* 2014).

Historically, natural products in the field of anti-cancer research have made significant achievements, over 60% of the clinical use of anti-cancer drugs originate from natural products (Seelinger *et al*., 2012), including plants, marine organisms, microbes, and more than 3,000 species of plants can be used to treat cancer. Accumulation of reactive oxygen species (ROS) coupled with an increase in oxidative stress has been implicated in the pathogenesis of several disease states particularly in cancer. The roles of oxidative stress in vascular diseases, diabetes, renal ischemia, atherosclerosis, pulmonary pathological states, inflammatory diseases, and cancer have been well established (Srivastava and Kumar, 2015). Free radicals and other reactive species are constantly generated in vivo after exposure to drugs, xenobiotic or ionizing radiation (Aldosari *et al*., 2018) and cause oxidative damage to biomolecules, a process held in check by the existence of multiple antioxidants and repair systems as well as the replacement of damaged nucleic acids, proteins and lipids. Measuring the effect of antioxidant therapies and ROS activity intracellularly is crucial for suppressing or treating oxidative stress inducers. The major biochemical change associated with cancer cells after treatment with anticancer drugs is the increase in ROS generation which is often considered as a cancer-promoting factor (Chen *et al*., 2009).

Therefore, many pharmaceutical companies and research groups will not place too much attention on identifying novel cancer treatments that have a selective effect on cancer cells with established efficacy, safety, fewer side effects, accessibility, and acceptance. In order to provide valuable indigenous knowledge on herbal practices, the current study set out to gather and identify medicinal plants with possible anticancer properties from well-known traditional medicine practitioners in the Fika and Fune Local Government areas of Yobe State, Nigeria. Similarly, it is expected that the investigation would reveal details on the comparatively unknown plants possessing cytotoxic properties.

## MATERIALS AND METHODS

### Study Areas (Fika and Fune LGAs)

The study areas include Fika and Fune local government of Yobe state, Northeastern, Nigeria (Figure).

***Fika*** is a local government area in Yobe state with it's headquarter in the town of Fika in the south area at 11°17′00″N 11°18′29″E in the sahel savannah with an annual rainfall of 550-680mm. It has an area of 2,208 km² and a population of 136,895 at the 2006 census. The northeasterly line of equal latitude and longitude passes through the area close to Fika. Gadaka is the largest town in the Fika LGA. It is located at about 12 km off the Potiskum-Gombe main road, about 55km from the commercial city of Potiskum. The area is divided into 11 wards and over 80% of the people are farmers. Ethnic groups in the locality include Bolewa, Ngamo, Ngizim, Fulani and kare-kare (NPC, 2006, Yobe State diary, 2006).

***Fune*** is a Local Government Area in Yobe State, Nigeria. It's headquarter is Damagum in the southwest of the area on the A3 highway at 11°40′39″N 11°20′04″E. It has an area of 4,948 km² and a population of 300,760 at the 2006 census. The headquarter (Damagum) is located along Kano-Maiduguri express-way with its major towns like Jajere, Ngelzarma, Kayeri and Daura. The area is divided into 11 wards and over 70% of the populations are farmers and 30% nomads. The major ethnic

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groups include Fulani, Kanuri, Kare-kare, Ngizim, and Hausa (Ngulde *et al*., 2015).

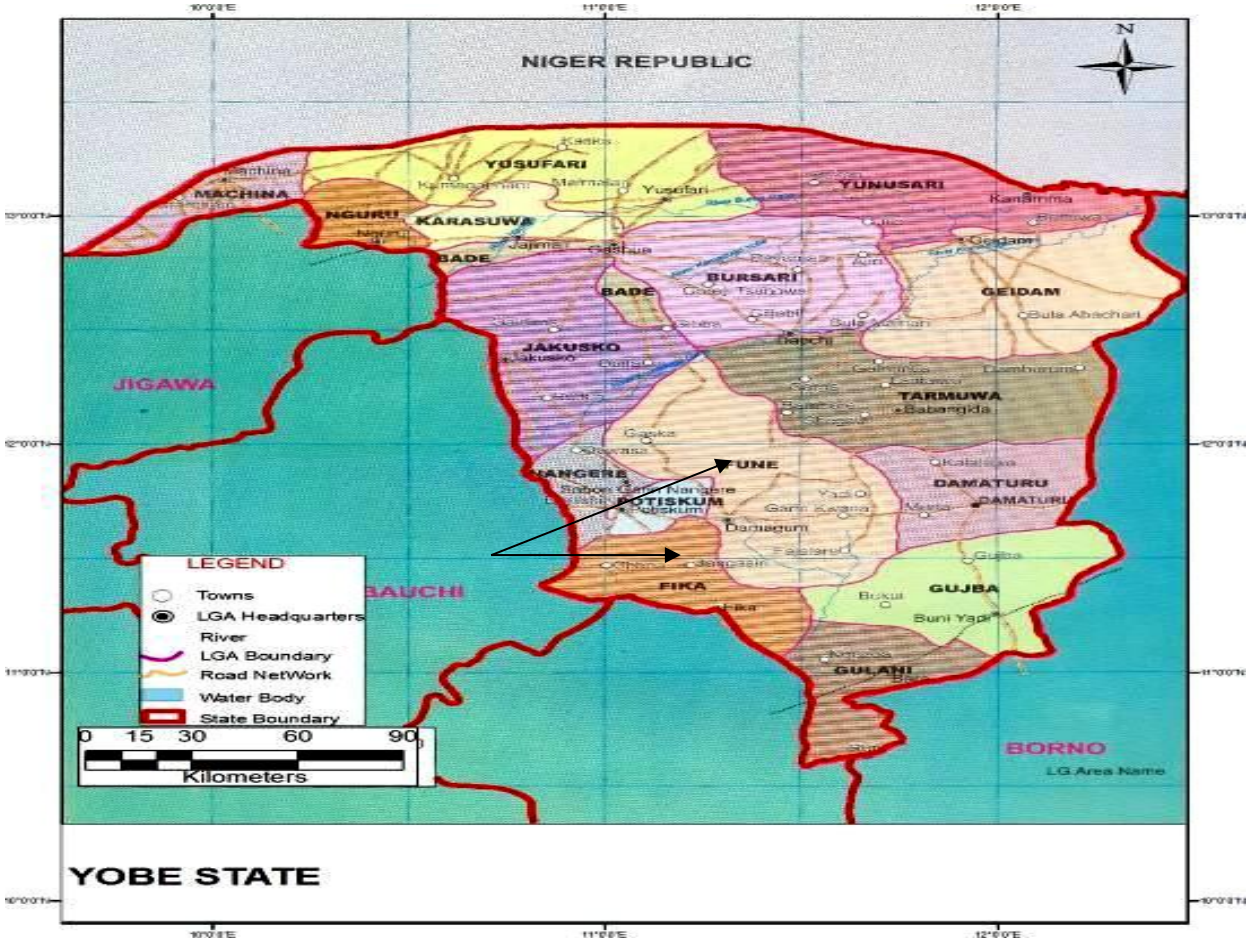


**Figure 1:** A Map of Yobe State Showing the Study Areas

**Ethnobotanical Survey**

***Administration and Analysis of Questionnaires***

A total of 30 renowned traditional practitioners spread across the localities were selected and interviewed at their respective homes. The survey was commenced from September 2022 to January 2023. Field survey was piloted in the localities and bushes, direct plant observation, identification and photograph of the relevant plants was taken with an aid of some of the practitioners and finally local home clinics were visited where real cancer cases were seen, snapped and documented. All the data collected after the retrieval of the questionnaires was coded and analysed for proper interpretation and documentation as described by Ngulde, *et al.* (2015).

***Bio-data and other Relevant Information from the Respondents***

Bio-data of the practitioners (TMPs) and relevant information was collected and documented including age, sex, marital status, level of education, occupation and other relevant information include; duration of practice, specialties, registration with councils,

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knowledge about cancer, causes, signs and symptoms, complications, types, diagnosis and treatment of cancer, medicinal plants or recipes used for treatment, parts of the plant used, mode of preparation and administration of medication as well as duration of treatment and degree of accomplishments recorded.

### Collection and Identification of the Selected Anticancer Plants

Relevant anticancer plant's parts (leaves, stem bark, roots and fruits) were collected from the study areas (Fika and Fune) with the help of practitioners and the collected samples were taken to Herbarium unit in the Department of Botany, Faculty of Life sciences, Ahmadu Bello University, Zaria and also herbarium section in the Department of Pharmacognosy and Drug Development, Gombe State University, Gombe for identification and authentication by taxonomist. Voucher numbers were assigned and kept for further references.

### DPPH Radical Scavenging Assay

Free radical scavenging activities was determined according to the method of Bozin *et al.*, (2008) with some modifications in conditions of incubation (dark, 25°C for 2 hrs). The reagent used for the assay was 2, 2-diphenyl-1-picrylhydrazyl solution (Sigma Aldrich GmbdH, Germany) (950 µl) was added to 50 µl of the extract (10 mg/ml) and the volumes of the solutions was made up to 4 ml by adding 95% ethanol. This mixture was shaken vigorously and incubated at room temperature for two hours in the dark. All samples were measured at 515 nm using a Genesys 20 Thermo Scientific (USA) spectrophotometer. The percentage of DPPH radical scavenging activity of the resulting solutions was calculated using the following equation: DPPH radical scavenging activity (%) = [(A control – A sample)/ A control] $_{x}$ 100 (Bozin *et al.*, 2008) Ascorbic acid (10 mg/ml) was used as a positive control of the assay. $IC_{50}$ was calculated using linear regression plots. The $IC_{50}$ values represent the concentrations of the sample that is required to scavenge 50% of DPPH free radicals.

## RESULTS

### Ethnobotanical Survey, Collection and Identification of Plant Samples

The ethnobotanical survey of anticancer plants was conducted from 2022-2023 in Fika and Fune area of Yobe state. The samples were collected, identified and authenticated at the Herbarium unit of the Department of Biological Sciences, Ahmadu Bello University, Zaria and their respective voucher numbers were deposited (Table 1).

The respondents were all traditional medicine practitioners (TMPs), males, age range from 18 to 70 and most of them inherited the practice of traditional medicine from their parents, 50% of the respondents have informal education with farming as occupation for 70% of them. They have identified cancer as a disease that is called '*daji"* in Hausa, '*buhdi*' in fulfulde languages. They perceived cancer as a disease that appeared like a wound but could grow and expand or spread from its site of origin to other parts of the body; and usually difficult to treat. Specific cancers mentioned were cancers of the breast, skin, flesh/muscle, brain/head, bone, stomach, neck and lungs.

### Preparation, Extraction/Fractionation of the Ethnobotanical Plants

500g each of plant materials (powdered) was extracted exhaustively with 70% Ethanol and the percentage yield was determined and reported in (Table 2).

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**Table 1:** Details Identification and Authentication of Ethnobotanical Survey.

| S/N | Scientific Names | Voucher No. | Family | Hausa Names | Parts |
|---|---|---|---|---|---|
| 1. | *Pterocarpus erinaceous* | 01636 | Fabaceae | Madobiya | Stembark |
| 2. | *Boswellia dalzielii* | 900121 | Burseraceae | Harrabi, Hanuu | Stembark |
| 3. | *Dischrostachys cineria* | 900236 | Fabaceae | Dundu | Leaves |
| 4. | *Detarium microcarpum* | 0480 | Fabaceae | Taura | Stembark |
| 5. | *Prosopis Africana* | 06908 | Fabaceae | Kirya | Stembark |
| 6. | *Securidaca longipedunculata* | A00/1880 | Polygalaceae | Sanya | Roots |
| 7. | *Sterculia stigera* | 02243 | Sterculiaceae | Kukkuki | Stembark |
| 8. | *Vitellaria paradoxa* | 090072 | Sapotaceae | Kadanya | Stembark |
| 9. | *Guierra senegalensis* | A00/407 | Combretaceae | Sabara | Leaves |
| 10. | *Anona senagalensis* | 900167 | Annonaceae | Gwandar daji | Root |
| 11. | *Morinda citrifolia* | 900065 | Moraceae | Noni | Fruits |

**Table 2:** Mass and Percentage Yield of the Ethnobotanical Surveyed Plants.

| S/N | Extract | Powdered (500g) | Mass (g) | Yield (%) |
|---|---|---|---|---|
| 1 | PEE | 500g | 60.0g | 12.0% |
| 2 | BDE | 500g | 35.7g | 7.1% |
| 3 | DCE | 500g | 171g | 34.2% |
| 4 | DME | 500g | 55.0g | 11.0% |
| 5 | PAE | 500g | 77.0g | 15.4% |
| 6 | SLE | 500g | 32.7g | 6.5% |
| 7 | SSE | 500g | 42.0g | 8.5% |
| 8 | VPE | 500g | 53.4g | 10.6% |
| 9 | GSE | 500g | 54.0g | 10.8% |
| 10 | ASE | 500g | 35.1g | 7.0% |
| 11 | MCE | 500g | 43.5g | 8.7% |

**Table 3:** Frequency of Usage of Some Anticancer Plants among Traditional Medicine Practitioners (TMPs) In Fika and Fune LGA, Yobe State.

| Scientific name | Local name | Family name | Vour No. | Parts used | Types of cancer use | Frequency |
|---|---|---|---|---|---|---|
| *Prosopis africana* | Kirya | *Fabaceae* | 06908 | Stembark | General | 27% |
| *Detarium microcarpum* | Taura | *Fabaceae* | 0480 | Stembark | Foot and legs, cervical, breast | 18% |
| *Securidaca longipedunculata* | Sanya | *Polygalaceae* | A00/1880 | Root | General | 18% |
| *Gueira senegalen* | Sabara | *Combretaceae* | A00/407 | Leaf | Breast, Cervical | 18% |
| *Boswellia dalziell* | Gondan daji | *Annonaceae* | 900167 | Root, fruit | Breast, Skin, General | 18% |
| *Azadiracta indica* | Dalbejiya | *Meliaceae* | | Leaf | General | 9% |
| *Vitellaria paradoxa* | Kadanya | *Sapotaceae* | 0900072 | Stembark | General | 9% |
| *Annona senegal* | Ararrabi | *Burseraceae* | 900121 | Stembark | General | 9% |
| *Dichrostachy cinerea* | Dundu | *Fabaceae* | 900236 | Leaf | Breast, Cervical, Gen | 9% |
| *Pterocarpus erinaceous* | Madubiyshajini | *Fabaceae* | 01636 | Leaf, stembark Fruits | Breast, skin, cervical | 9% |
| *Morinda citrifolia* | Noni | *Rubiaceae* | 900065 | | Breast, Cervical | 9% |

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**Table 4:** Biodata and Socio-economic Information.

| **Sex** | **Frequency** | **Percentage (%)** |
|---|---|---|
| Male | 30 | 100 |
| Female | 0 | 0 |
| **Total** | **100** | **100%** |
| **Age Distribution** | **Frequency** | **Percentage (%)** |
| 18-22 | 0 | 0 |
| 23-27 | 0 | 0 |
| 28-32 | 5 | 16.7 |
| 33-38 | 10 | 33.3 |
| 39≥above | 15 | 50.0 |
| **Total** | **30** | **100%** |
| **Marital Status** | **Frequency** | **Percentage (%)** |
| Single | 3 | 10.0% |
| Married | 27 | 90.0% |
| Divorcee | 0 | 0% |
| Widow | 0 | 0% |
| Total | 30 | 100% |
| **Level of Education** | **Frequency** | **Percentage (%)** |
| None | 7 | 23.3% |
| Formal | 8 | 26.7% |
| Informal | 15 | 50.0% |
| Total | 30 | 100% |
| **Occupation** | **Frequency** | **Percentage (%)** |
| Farming | 21 | 70.0% |
| Nomadic | 7 | 23.3% |
| Business | 2 | 6.7% |
| Civil service | 0 | 0% |
| **Total** | **30** | **100%** |

**Table 5:** Knowledge, Practice and Treatment of Cancer in Traditional Medicine Practice.

| **S/N** | **Objectives** | **Responses** | **Frequency** | **Percentage** |
|---|---|---|---|---|
| 1 | Knowledge of TMP about Cancer | Yes = 30 | 30 | 100 |
| | | No = 30 | 0 | 0.0% |
| | | **Total = 30** | **30** | **100%** |
| 2 | Sources of Knowledge in Management of Cancer Traditionally | Formal = 0 | 0 | 0.0% |
| | | From Elders =15 | 15 | 50.0% |
| | | Apprenticeship = 5 | 5 | 16.75 |
| | | Inheritance = 10 | 10 | 33.3% |
| | | **Total = 30** | **30** | **100%** |
| 3 | Duration of Practicing | i) 0-10 Years | 5 | 16.7% |
| | | ii) 20-20years | 10 | 33.3% |
| | | iii) 20-30years | 12 | 40% |
| | | iv) 30years and above | 3 | 10.0% |
| | | **Total = 30** | **30** | **100%** |
| 4 | Registration with Councils | Yes = | 5 | 16.7% |
| | | No = | 25 | 83.3% |
| | | **Total = 30** | **30** | **100%** |
| 5. | Councils of TMP registered with? | i) CCTM = 2 | 2 | 6.67% |
| | | ii) THAN = 3 | 3 | 10.0% |
| | | iii) HAS = 0 | 0 | 0% |
| | | iv) Others = 0 | 0 | 0% |

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| | | | | |
|---|---|---|---|---|
| | | **Total = 5** | **5** | **16.7%** |
| 6 | Specialization in TMP | i) Child Health Care | 1 | 3.33 |
| | | ii) General Health | 3 | 10.0 |
| | | Care | 1 | 3.33 |
| | | iii) O$G | 5 | 16.7 |
| | | iv) Orthopedics | 20 | 66.7 |
| | | v) Oncology | **30** | **100.0%** |
| | | **Total = 30** | | |

**Table 6:** Traditional Medicine Practitioners' Knowledge and Practice in Management of Cancer.

| S/N | Queries | Responses | Frequencies | Percentage (%) |
|---|---|---|---|---|
| 7 | Knowledge about Medicinal Plants for the Treatment of Cancer | Yes | 30 | 100% |
| | | No | 0 | 0% |
| | | **Total =** | **30** | **100%** |
| 8 | Local Names of Plants use for the treatment of Cancer | Kirya | 11 | 36.7% |
| | | Ararrabi | 3 | 10% |
| | | Taura | 3 | 10% |
| | | Sanya | 3 | 10% |
| | | Sabara | 2 | 6.7% |
| | | Kadanya | 2 | 6.7% |
| | | Gondar daji | 2 | 6.7% |
| | | Dundu | 2 | 6.7% |
| | | Dalbejia | 1 | 3.3% |
| | | Noni | 1 | 3.3% |
| | | **Total** | **30** | **100%** |
| 9 | Types of Cancer treated with Plants | i) Breast | 13 | 43.3% |
| | | ii) Cervical | 5 | 16.7% |
| | | iii) Head | 0 | 0% |
| | | $ Neck | 12 | 40% |
| | | iv) General | 0 | 0% |
| | | v) Others | **30** | **100%** |
| | | **Total** | | |
| 10 | Mode of Drug Preparations | i) Concoction | 15 | 50% |
| | | ii) Infusion | 8 | 26.7% |
| | | iii) Maceration | 7 | 23.3% |
| | | iv) Poultices | 2 | 6.7% |
| | | **Total** | **30%** | **100%** |
| 11 | Mode of Drug Administration | i) Orally | 22 | 73.3% |
| | | ii) Injectable | 0 | 0% |
| | | iii) Bathing | 2 | 6.7% |
| | | iv) Massaging | 6 | 20% |
| | | **Total = 30** | **30** | **100%** |
| 12 | Duration of Treatment | i) 1week | 0 | 0% |
| | | ii) 1month | 0 | 0% |
| | | iii) 6-12months | 12 | 40% |
| | | iv) Until | 18 | 60% |
| | | recovery | **30** | **100%** |
| | | **Total = 30** | | |
| 13 | Incantation Prior to Treatment | Yes | 9 | 30% |
| | | No | 21 | 70% |
| | | **Total = 30** | **Total = 30** | **100%** |
| 14 | Optimum time of plant's part | i) Morning | 12 | 40% |

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| | | | |
|---|---|---|---|
| collection | ii) Afternoon | 8 | 26.7% |
| | iii) Evening | 6 | 20% |
| | iv) At Night | 0 | 0% |
| | v) Anytime | 4 | 13.3% |
| | **Total =** | **Total = 30** | **100%** |

**Results of Antioxidants Activity**

The in-vitro DPPH antioxidant assay of the ethnobotanical plant's extracts presented in (Tables 7 and Table 8) of the three (3) extracts exhibit excellent inhibitory effects in comparison with the standard drug (Ascorbic acids). The plants with finest percentage inhibitory effects and inhibitory concentration ($IC_{50}$) at lowest concentration includes the followings; *Boswellia dalzielli, Dichrostachy cineria* and *Vitellaria paradoxa* with percentage inhibitions of 58% (1.16), 58% (1.19), and 58% (1.19) respectively in comparison with standard drug (ascorbic acid) with percentage inhibition and lowest inhibitory concentration ($IC_{50}$) of 45% (1.2).

**Table 7:** Antioxidant Inhibitory Effects of Extracts and Standard drug at Various Concentration.

| **S/N** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | **Vit C** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **% INH** | **% INH** | **% INH** | **% INH** | **% INH** | **% INH** | **% INH** | **% INH** | **% INH** | **% INH** | **% INH** | **% INH** | **% INH** |
| **Conc. mg/ml** | **PEE** | **BDE** | **DCE** | **DME** | **PAE** | **SLE** | **SSE** | **VPE** | **GSE** | **ASE** | **MCE** | **NNE** | **VIT C** |
| 2.5 | 28% | 37% | 34% | 16% | 27% | 0% | 0% | 34% | 8.7% | 0% | 12.6% | 19% | 40% |
| 1.25 | 33% | 43% | 45% | 19% | 25% | 3.75 | 0% | 455 | 0% | 11% | 27% | 285 | 44% |
| 0.625 | 36% | 43% | 41% | 28% | 26% | 6.9% | 0% | 41% | 5.8% | 19% | 33% | 32% | 41% |
| 0.325 | 42% | 52% | 53% | 39% | 275 | 16% | 12% | 53% | 22% | 22% | 61.5% | 49% | 40% |
| 0.156 | 46% | **58%** | **58%** | 45% | 25% | 11% | 0% | **58%** | 30% | 25% | 45% | 31% | **45%** |
| **$IC_{50}$** | **1.49** | **1.16** | **1.19** | **2.17** | **1.9** | **9.71** | **153** | **1.19** | **5.03** | **3.68** | **1.98** | **1.82** | **1.2** |

**Keys: %INH** = Percentage Inhibition, **$IC_{50}$** = Inhibitory Concentration, **PEE** = *Pterocarpus erinaceous extract,* ***BDE*** = *Boswellia dalzielli extract,* ***DCE*** = *Dischrostachy cineria extract,* ***DME*** = *Detarium microcarpum extract,* ***PAE*** = *Prosopis Africana extract,* ***SLE*** = *Securidaca longipedunculata extract,* ***SSE*** = *Sterculia stigera extract,* ***VPE*** = *Vitellaria paradoxa extract,* ***GSE*** = *Guierra senegalensis extract, ASE = Anona senegalensis extract,* ***MCE*** = *Morinda citrifolia extract*

**Table 8:** Summary of Plants extracts with Prime Percentage Inhibitory (INH) Concentration and the Lowest Concentration ($IC_{50}$).

| **Plant Extracts** | ***BDE*** | ***DCE*** | ***VPE*** | **STD (Vit C )** |
|---|---|---|---|---|
| **Conc. mg/ml** | 0.156mg/ml | 0.156mg/ml | 0.156mg/ml | 0.156mg/ml |
| **%INH** | 58% | 58% | 58% | 45% |
| **$IC_{50}$** | 1.16 | 1.19 | 1.19 | 1.2 |

**Keys: %INH** = Percentage Inhibition, **$IC_{50}$** = Half Inhibitory Concentration, ***BDE*** = *Boswellia dalzielli extract,* ***DCE*** = *Dischrostachy cineria extract,* ***VPE*** = *Vitellaria paradoxa extract,* **VIT C** = *Vitamin C*

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## DISCUSSION

Cancer poses a significant issue to the globe because a suitable treatment might be extremely costly and, in many situations, unbelievable (Awal *et al*., 2004). The International Agency for Research on Cancer (IARC, 2022) released Globocan (2022) estimates of cancer incidence and mortality toll to 9,743,832 with an emphasis on geographic diversity across 20 geographical regions. According to Ferlay *et al.* (2008), cancer was identified as the seventh most common cause of death in Africa in 2004. By 2030, it is predicted to cause 970,000 deaths and 1.28 million cases per year. According to Globocan (2020), there are over 120,000 new cancer cases reported in Nigeria each year, with a total cancer incidence of 124,815 and a mortality rate of 78,899 (NICRAT, 2023). According to WHO (2022), Nigeria had a total incidence of 127,763 cases and a total fatality rate of 79,542. Due to the rising rate of cancer worldwide and in Africa, many scientists are currently working to discover novel and potent anti-cancer drugs from natural biodiversity, including plants and other sources, as well as natural compounds from biodiversity that may one day be used as anti-cancer drugs (Craigg *et al*., 2016). It's important to highlight some significant advancements in the field of natural product-based research against cancer. For example, some secondary metabolites, like vincristine, vinblastine, campthotecin, irinotecan, and topotecans, are currently undergoing clinical trials as potential anticancer therapeutic agents derived from biodiversity (Seca and Pinto, 2018).

According to Akinde *et al*. (2015), traditional medicine practitioners in the study areas reported a high frequency of using anticancer plants in the management of cancer. Commonly diagnosed cancer cases among Nigerians include breast cancer, cervical, prostate, haematological, and ovarian malignancies (Table 3). Chemotherapy, radiotherapy, and medical surgery are examples of conventional approaches to cancer management. However, these treatments have significant socioeconomic drawbacks, including high treatment costs (Chidiaka, 2018), cytotoxic side effects, and multi-drug resistance (Wang *et al*., 2019, Karol *et al*., 2020). These issues made it necessary to find new anticancer agents from natural biodiversity (Arunadevi and Anantharaj, 2013). The research locations (Fika and Fune LGA) were known to the traditional medicine practitioners (TMPs) about cancer incidence and symptoms (Table 5).

The names "daji" in Hausa and "buhdi" in Fulfulde are the most common ones, according to a previous study done in the Northeastern part of Nigeria (Ngulde *et al*., 2015), and this is consistent with the research findings in the study areas. However, they call it by different names depending on the tribe or language in a particular area. Amongst the traditional medicine practitioners (TMPs), a total of eleven (11) plants were identified to commonly used for the management of cancer and these plants belong to eight families (Figure 2, table 1 and 2) however Fabaceae had the most prevalent occurrence (Figure2). The most used plant is *Prosopis africana* with a frequency of 27% and the popular part of the plant used among all the practitioners was the stem bark (Table 2). Additionally, most of the plants identified are used for specific types of cancer treatment such as breast, cervical, prostate (table 2) while others like Prosopis Africana is used for general cancer treatment.

The above findings on the most predominant plants and families used in the study were *Prosopis Africana, securidaca Longepedunculata, Boswellia dalzielli, Detarium microcarpum, Pterocarpus erinaceous and Guierra senegalensis* (Figure2)

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were all reported in the ethnobotanical survey conducted by Ibrahim *et al.,* 2020 and Ngulde *et al.,* 2015 in both Northwestern and Northeastern parts of Nigeria where Leguminosae is the most frequent family of the plants. For many years, over 80% inhabitants of rural and urban areas have exclusively count on medicine plants for their primary health care needs (Ahmadi *et al*., 2016), in fact, patients with mild or late stage of cancer often retreat from health facilities to have faith in exclusively use of herbal therapies which its faith ascribed to potential efficacy, safety and affordable than using conventional anticancer drugs (Ibrahim *et al*., 2020).

Many respondents clearly expressed the mode of administration of the plants' parts and the frequency of the topical application while others refused because it is their family secret. All the plants that were gathered have antioxidant qualities, according to the antioxidants assay. The % inhibition and inhibitory concentration (IC50) was calculated and the top three plant's extracts were presented in (Table 8): In contrast to the standard drug, ascorbic acid, which has a percentage inhibition of 45% and the lowest inhibitory concentration ($IC_{50}$) of 1.2, *Boswellia dalzielli, Dichrostaschy cineria*, and *Vitellaria paradoxa* exhibit percentage inhibitions of 58% (1.16), 58% (1.19), and 58% (1.19), respectively (Table 8). In a lot of literary works, the amount of free radical play increases the risk of cancer; hence, the presence of metabolites with antioxidant potentials would be essential for both the treatment and overall management of cancer (Ngulde *et al*., 2015). It was found that more than 60% of anticancer drugs currently on the market have some connection to natural sources, such as plants. microbes and marine creatures (Cragg *et al*., 2016).

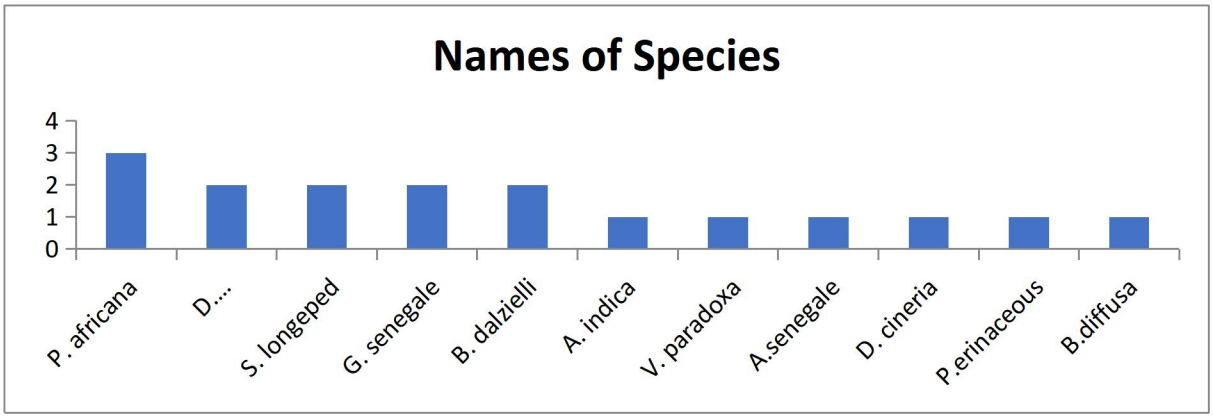


**Figure 2:** Species frequency in the recipes commonly used for treatment of various types of cancer by traditional medicine practitioners (TMPs) in Fika LGA, Yobe State, Nigeria. An evident from ethnobotanical survey (2022-2023).

## CONCLUSION

The plants utilize by the traditional medicinal practitioners in Fika and Fune LGA, Yobe State – Nigeria could be useful in drug development against cancer and its managements in general. It can be recommended that bio-quidded assay of the plants should be carried out to identify the metabolite responsible for the claims.

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