Phytochemical Constituents –and *in vitro* Antioxidant Capacity of Methanolic Leaf Extract of *Oxytenanthera abyssinica* (A.Rich Murno)

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ABSTRACT (ARIAL, BOLD, 11 FONT, LEFT ALIGNED, CAPS)


Study design: COLD EXTRACTION OF THE LEAF PARTS FOLLOWED BY QUANTITATIVE EVALUATION OF PHYTOCHEMICALS AND ANTIOXIDANT CAPACITY USING CHROMATOGRAPHIC AND SPECTROPHOTOMETRIC METHODS.

Place and Duration of Study: DEPARTMENT OF BIOCHEMISTRY, COLLEGE OF NATURAL AND APPLIED SCIENCES, MICHAEL OKPARA UNIVERSITY OF AGRICULTURE P.M.B.7267 UMUDIKE ABIA STATE, NIGERIA.

Methodology: THE ANTIOXIDANT PROPERTIES WERE DETERMINED USING THREE ASSAY MODELS: THE 2,2-DIPHENYL-1-PICRYLHYDRAZYL (DPPH), FERRIC REDUCING ANTIOXIDANT POWER (FRAP) COLORIMETRIC TEST AND A MODIFIED VERSION OF IN VITRO ANTIOXIDANT TBARS AFTER COLD EXTRACTION MACERATION. THE ACTIVITY WAS DETERMINED AT DIFFERENT CONCENTRATIONS (10MG/ML, 50MG/ML, 100MG/ML, 200MG/ML AND 400MG/ML) OF THE EXTRACT AND EXPRESSED AS % INHIBITION. PHYTOCHEMICALS WERE DETERMINED BY STANDARD DETECTION AND SPECTROPHOTOMETRIC METHODS.

Results: THE YIELD OF THE METHANOLIC LEAF EXTRACT OF *OXYTENANTHERA ABYSSINICA* WAS 3.92% W/W OF THE DRY MATTER. THE PRESENCE OF STEROIDS (STEROID GLYCOSIDE), ALKALOIDS, SAPONINS, TANNINS, CARDIAC GLYCOSIDES, FLAVONOIDS, PHLOBATANINS,
ANTHROQUINONE AND TERPENES WERE AS DETECTED WHILE CYANOGENIC GLY COSIDES WERE AS ABSENT. THE QUANTITATIVE ANALYSIS YIELDED (IN MG/100G): FLAVONOIDS (1.51±0.23), ALKALOIDS (1.40±0.02), SAPONINS (1.1±0.10), POLYPHENOLS (1.3±0.32), TANNINS (0.071±0.40) AND SAPONINS (1.2±0.10) IN MG/100G DRY MATTER. OXYTENANTHERA ABYSSINICA'S DPPH REDUCTION WAS HIGHEST AT 400MG/ML (82.10 ± 0.01%) CONCENTRATION WITH IC_{50} VALUE OF 56.2MG/ML. THE FÉRRIC REDUCING POWER OF THE EXTRACT AT 400MG/ML WAS 61±1.52% (FRAP:0.61) AND THAT OF THE INHIBITION OF LIPID PEROXIDATION (MEASURED AS TBARS) WAS 81.0±1.11%.

Conclusion: THERE IS AN INDICATION THAT OXYTENANTHERA ABYSSINICA HAVE CONTAINS IMPORTANT PHYTOCHEMICALS AND A WITH A RESULTANT ANTIOXIDANT CAPACITY PROPERTY COMPARABLE WITH STANDARD ANTIOXIDANT COMPOUNDS THAT MAY BE LINKED TO ITS THERAPEUTIC EFFICACY.

Keywords: Oxytenanthera abyssinica, Antioxidants, phytochemicals, flavonoids, medicinal plant, Nigeria.

1. INTRODUCTION

PHYTOCHEMICALS MAY BE DESCRIBED AS NON-NUTRITIVE PLANT CHEMICALS THAT HAVE PROTECTIVE OR DISEASE PREVENTIVE PROPERTIES. THEY ARE REGARDED AS NON ESSENTIAL NUTRIENTS (OKWU AND OKWU, 2004). NORMALLY, THEY ARE NATURALLY OCCURRING BIOACTIVE MOLECULES PRODUCED BY PLANTS FOR PROTECTION FROM THE ELEMENTS OF THE EARTH AND THE SUN'S HARMFUL RAYS. THESE AMAZING PHYTO-COMPOUNDS PROVIDE FOOD RESOURCES FOR THE BODY'S MANY HUMAN CELLS. CONSUMPTION OF PLANT FOODS BY HUMANS CONTAINING THESE COMPOUNDS HAS BEEN SCIENTIFICALLY VALIDATED TO HELP SLOWDOWN THE AGING PROCESS AND REDUCE THE RISK FACTORS OF MANY DISEASES INCLUDING; CANCER, HEART.


IT IS KNOWN THAT MANY HERBS, ESPECIALLY FROM TROPICAL AND SUBTROPICAL CLIMATES, HAVE ANTIOXIDANT ACTIVITY LINKED TO THEIR
ETHNOMEDICINAL VALUE. OXYTENANTHERA ABYSSINCA IS A TROPICAL
DROUGHT RESISTANT PLANT (BAMBOO) THAT GROWS IN OPEN
GRASSLAND, LOWLANDS AND HIGHLANDS, THOUGH MOSTLY ON HILLS
OR ALONG INTERMITTENT WATERCOURSES (SHARMA, 1987; BURKILL,
1994). THEY ARE DISTRIBUTED MAINLY IN THE TROPICS AND ALSO OCCUR
NATURALLY IN SUBTROPICAL AND TEMPERATE ZONES OF ALL
CONTINENTS, EXCEPT EUROPE. THE SPECIES IS ARE FOUND AT
LATITUDES 46° N TO 47° S AND FROM SEA LEVEL TO 4000M ELEVATION
(OHRNBERGER, 1999). IT IS OFTEN FOUND ON VERY POOR SOILS IN THE
SUB-SAHARIAN AFRICA (KIGOMO AND KAMIRI, 1985; 1987) AND CAN
SURVIVE FIRE IN ITS NATURAL HABITAT. EVIDENCE INDICATES THAT EACH
PLANT FLOWERS ONCE IN IT'S A LIFE TIME, IT DIES AND DOES NOT
REGROW SPONTANEOUSLY IN THE SAME REGION (PALGRAVE 1988;
INADA & HALL, 2003 AND 2008; MGENI, 1983). IN NIGERIA, THIS HERB IS
KNOWN ETHNICALLY BY THE FOLLOWING NAMES: NNYANYANGA (IN
EFIK), KEWAL (IN FULFULDE), KAWU (IN GWARI), GOORA (IN HAUSA),
ACHALA OYIBO OR OTOSI (IN IGBO), GAMARE (IN KANURI), EMAN (IN
LOKE), TAKARWA (IN NGIZIM) AND APAKO (IN YORUBA AND SHUWA
ARABIC).

IN SUB-SAHARA AFRICAN COUNTRIES, THE BAMBOO HAS VARIOUS USES
SUCH AS ROOFING AND FURNITURE CONSTRUCTION, SHELTERBELTS
AND WINDBREAKS (WHOLE PLANT), FUEL FOR COOKING AND HEATING
(CHARCOAL), SPLIT STEMS FOR BASKET WEAVING, FRESH/DRIED

GENERALLY, THE ECONOMIC POTENTIAL OF THIS HERB IN SUB-SAHARAN AFRICA HAS MASKED ITS ETHNOMEDICINAL VALUE, HENCE CURRENT
RESEARCH EFFORTS TEND TOWARDS *OXYTENANTHERA ABYSSINICA*’S POTENTIAL AS A POVERTY ALLEVIATION PLANT. THEREFORE, WE INVESTIGATED FOR THE FIRST TIME THE ANTIOXIDANT AND PHYTOCHEMICAL PROPERTIES OF THE NIGERIAN *OXYTENANTHERA ABYSSINICA* AS A PRELIMINARY INVESTIGATION IN DETERMINING ITS BIOACTIVE COMPOUNDS.

2. MATERIALS AND METHODS

2.1 COLLECTION AND IDENTIFICATION OF PLANT MATERIALS

LEAVES OF *OXYTENANTHERA ABYSSINCA* WERE PLUCKED FROM THE FOREST OF MICHAEL OKPARA UNIVERSITY OF AGRICULTURE, UMUDIKE, NIGERIA. THE LEAVES WERE IDENTIFIED AND CONFIRMED BY EXPERTS OF THE DEPARTMENT OF FORESTRY, COLLEGE OF NATURAL RESOURCES AND ENVIRONMENTAL MANAGEMENT, MICHAEL OKPARA, UNIVERSITY OF AGRICULTURE UMUDIKE, NIGERIA. A VOUCHER SPECIMEN WITH THE NUMBER IBEH 2010-59 WAS DEPOSITED IN THE UNIVERSITY HERBARIUM FOR FUTURE REFERENCE.

2.2 SAMPLE PREPARATION

THE LEAVES OF *OXYTENANTHERA ABYSSINCA* WERE FIRST WASHED WITH DISTILLED WATER TO REMOVE DEBRIS AND DUST PARTICLES, AIR-DRIED AT ROOM TEMPERATURE AND PULVERIZED INTO A UNIFORM MATERIAL USING A THOMAS-WILLEY MILLING MACHINE (BRAND?). PLANT EXTRACTION WAS DONE BY COLD MACERATION OF 300G IN 80% METHANOL WITH INTERMITTENT SHAKING AT 2 HOURS INTERVAL FOR 48
HOURS. THE EXTRACT WAS THEN FILTERED WITH WHATMAN FILTER PAPER NO. 1 AND THE FILTRATE WAS EVAPORATED TO DRYNESS AT 40°C. THE OBTAINED CRUDE EXTRACT WAS PACKED IN AIRTIGHT PLASTIC CONTAINERS AND STORED IN A REFRIGERATOR AT 4°C UNTIL FOR THE ANALYSIS.

THE PERCENTAGE YIELD OF THE EXTRACT WAS CALCULATED USING THE FORMULA:

\[
\text{% YIELD} = \frac{\text{weight of the extract}}{\text{weight of plant material}} \times \frac{100}{1}
\]

2.3 PHYTOCHEMICAL DETERMINATION

FOR THE PHYTOCHEMICAL DETECTION OF MAJOR CONSTITUENTS OF OXYTENANTHERA ABYSSINCA WAS DONE USING WE USED THIN-LAYER CHROMATOGRAPHY (TLC) ON SILICA GEL 60 F_254 WITH LAYER THICKNESS 0.25 MM (MERCK?? DARAMSTADT, GERMANY) AFTER DISSOLVING THE EXTRACT (2MG) IN 2ML OF THE SOLVENT (WHAT SOLVENT?). THE PLATES WERE DEVELOPED, THEN LEFT TO DRY FOR ABOUT 10 MINUTES BEFORE THEY WERE VIEWED UNDER UV FLUORESCENCE LIGHT AT WAVELENGTH 254 AND 366NM. SPRAYING WAS DONE WITH THE REQUIRED DETECTION REAGENT TO DETERMINE THE COMPOUNDS PRESENT, AND THE SOLVENT SYSTEM WHICH GAVE THE BEST OBSERVATION WAS IS DESCRIBED PRESENTED IN OUR RESULTS. FOR FLAVONOIDS, TLC WAS DEVELOPED IN N-BUTANOL/ACETIC ACID/WATER (4:1:5), THEN SPOTS WERE VISUALIZED WITH 1% ALCL\textsubscript{3} SOLUTION IN METHANOL UNDER UV ULTRAVIOLET LIGHT (366NM) LIGHT (SPECTROPHOTOMETER? BRAND?). ALKALOIDS,

2.4 ANTIOXIDANT ASSAY

2.4.1 INHIBITION OF LIPID PEROXIDATION

A MODIFIED VERSION OF THE THIOBARBITURIC ACID REACTIVE SUBSTANCES (TBARS) ASSAY WAS USED TO DETERMINE THE LEVEL OF LIPID PEROXIDES FORMED USING EGG YOLK HOMOGENATE AS LIPID-RICH MEDIA (ROBERTO AND BARRATA, 2000). EGG HOMOGENATE (0.5 ML, 10% V/V) WAS ADDED TO 0.1 ML OF EXTRACT (1MG/ML) AND THE VOLUME MADE UP TO 1 ML WITH DISTILLED WATER. THEN 0.05 ML OF FESO₄ WAS ADDED AND THE MIXTURE INCUBATED FOR 30 MINUTES. ACETIC ACID (1.5 ML) AND THIOBARBITURIC ACID (1.5 ML) IN SDS WERE AS SEQUENTIALLY ADDED. THE RESULTING MIXTURE WAS VORTEXED AND HEATED AT 95° C FOR 60 MIN. AFTER COOLING 5 ML OF BUTAN-1-OL WAS ADDED AND THE MIXTURE —CENTRIFUGED AT 3000 RPM FOR 10 MINUTES (BRAND?). THE ABSORBANCE OF THE ORGANIC UPPER LAYER WAS MEASURED AT 532 NM AND CONVERTED TO PERCENTAGE INHIBITION USING THE FORMULA:

\[
\text{INHIBITION OF LIPID PEROXIDATION} (\%) = (1 - \frac{E}{C}) \times 100
\]

WHERE \( C \) = ABSORBANCE OF FULLY OXIDIZED CONTROL AND \( E \) = ABSORBANCE IN THE PRESENCE OF EXTRACT.
2.4.2 FERRIC REDUCING ANTIOXIDANT POWER (FRAP) ASSAY

THE REDUCTIVE POTENTIAL OF OXYTENANTHERA ABYSSINCA WAS DETERMINED ACCORDING TO THE METHOD OF BENZIE AND STRAIN (1999) WHICH IS BASED ON THE CHEMICAL REDUCTION OF \( \text{Fe}^{3+} \) TO \( \text{Fe}^{2+} \).

AT LOW pH, WE MEASURED THE REDUCTION OF FERRIC \( \text{TRIPYRIDYL-2,4,6-TRI(2-PYRIDYL)-1,3,5-TRIAZINE (Fe}^{III} \text{TPTZ}) \) COMPLEX TO FEROUS FORM BY MONITORING THE CHANGE IN ABSORPTION AT 593NM. THE CALCULATION WAS DONE BY:

\[
\text{FRAP VALUE OF SAMPLE (µM)} = \frac{(\text{CHANGE IN ABSORBANCE OF SAMPLE FROM 0 TO 4 MIN}) \times \text{FRAP VALUE OF STANDARD (1000µM)}}{(\text{CHANGE IN ABSORBANCE OF STANDARD FROM 0 TO 4 MIN})}
\]

2.4.3 DETERMINATION OF DPPH RADICAL SCAVENGING ACTIVITY

RAPID THIN LAYER CHROMATOGRAPHY (TLC) SCREENING FOR ANTIOXIDANT ACTIVITY WAS CARRIED OUT BY SPOTTING A CONCENTRATED METHANOLIC SOLUTION OF THE EXTRACT ON SILICA GEL PLATES. THE PLATES WERE DEVELOPED IN METHANOL: ETHYL ACETATE (2:1) THEN AIR-DRIED AND SPRAYED WITH 0.2% W/V DPPH SPRAY IN METHANOL. THE PRESENCE OF YELLOW SPOTS WAS DETECTED. RADICAL SCAVENGING ACTIVITY OF EXTRACTS WAS PERFORMED ACCORDING TO THE DPPH SPECTROPHOTOMETRIC METHOD OF MENSOR ET AL. (2001) USING VITAMIN C (EMZOR PHARMACEUTICAL INDUSTRIES, NIGERIA) AS A REFERENCE ANTIOXIDANT. METHANOL (1.0 ML) PLUS EXTRACT SOLUTION (2.5 ML) WAS USED AS BLANK WHILE 1 ML OF 0.3 MM DPPH PLUS METHANOL (2.5 ML) WAS USED AS A NEGATIVE
CONTROL. THE FREE RADICAL SCAVENGING PROPERTIES OF THE EXTRACTS AGAINST 2,2-DIPHENYL-1-PICRYL HYDRAZYL (DPPH) RADICAL WERE MEASURED AT 518 NM, AS AN INDEX OF THEIR ANTIOXIDANT ACTIVITY. THE CONCENTRATIONS OF THE EXTRACTS AND VITAMIN C USED WERE 10, 50, 100, 200 AND 400 MG ML⁻¹ AND THE ASSAY WAS CARRIED OUT IN TRIPlicATES FOR EACH CONCENTRATION. IC50 VALUES (THE CONCENTRATION OF EXTRACTS REQUIRED TO SCAVENGE 50% OF DPPH FREE RADICALS) WERE ALSO OBTAINED. THE ABSORBANCE (ABS) OF THE RESULTING MIXTURE MEASURED AT 518 NM WAS CONVERTED TO PERCENTAGE ANTIOXIDANT ACTIVITY (AA %) AND THEREFORE CALCULATED BY THE EQUATION:

\[
AA\% = \left[100 - \left(\frac{ABS_{\text{SAMPLE}} - ABS_{\text{BLANK}}}{ABS_{\text{CONTROL}}} \times 100\right)\right] / ABS_{\text{CONTROL}}
\]

2.5 STATISTICAL ANALYSIS
THE STATISTICAL ANALYSIS WAS DONE USING ONE WAY ANALYSIS OF VARIANCE (ANOVA), USING SPSS® VERSION 17. THE DIFFERENCES BETWEEN THE MEANS WERE TESTED USING POST HOC LSD. A \(P\)-VALUE OF \(P<0.05\) WAS CONSIDERED TO BE STATISTICALLY SIGNIFICANT. WE PRESENTED RESULTS AS MEAN ± STANDARD DEVIATION. ASSAYS WERE DONE IN TRIPlicATES.

3. RESULTS AND DISCUSSION
3.1 EXTRACTION YIELD
THE YIELD OF THE METHANOLIC LEAF EXTRACT OF OXYTENANTHERA ABYSSINICA WAS 3.92% W/W OF THE DRY MATTER.
3.2 PHYTOCHEMICAL ANALYSIS

PRELIMINARY PHYTOCHEMICAL SCREENING OF OXYTENANTHERA ABYSSINICA SHOWS THE PRESENCE OF STEROIDS (STEROID GLYCOSIDES), ALKALOIDS, SAPONINS, TANNINS, CARDIAC GLYCOSIDES, FLAVONOIDS, PHLOBATANINS, ANTHRAQUINONES, AND TERPENES, WHILE CYANOGENIC GLYCOSIDES WERE ABSENT (TABLE 1). THE QUANTITATIVE ANALYSIS YIELDED THE FOLLOWING PHYTOCHEMICALS:

- FLAVONOIDS (1.51±0.23), ALKALOIDS (1.40±0.02), AND POLYPHENOLS (1.31±0.32), AND MODERATE LEVELS OF TANNINS (0.07±0.40), AND SAPONINS (1.2±0.10) (TABLE 2). ALL THESE FIGURES ARE INCLUDED IN

TABLE 1: PHYTOCHEMICAL SCREENING OF LEAF EXTRACTS OF OXYTENANTHERA ABYSSINICA

<table>
<thead>
<tr>
<th>PLANT METABOLITE</th>
<th>LEAF EXTRACT (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CYANOGENIC GLYCOSIDES</td>
<td>-</td>
</tr>
<tr>
<td>CARDIAC GLYCOSIDES</td>
<td>++</td>
</tr>
<tr>
<td>STEROID GLYCOSIDES</td>
<td>++</td>
</tr>
<tr>
<td>SAPONINS</td>
<td>+</td>
</tr>
<tr>
<td>TANNINS</td>
<td>++</td>
</tr>
<tr>
<td>ALKALOIDS</td>
<td>++</td>
</tr>
<tr>
<td>PHLOBATANINS</td>
<td>+</td>
</tr>
<tr>
<td>TERPENOIDS</td>
<td>++</td>
</tr>
</tbody>
</table>

TABLE 2: CHOOSE TEXT OR TABLES, DO NOT DUPLICATE RESULTS.
TABLE 2: PHYTOCHEMICAL COMPOSITION OF THE LEAVE EXTRACTS OF OXYTENANTHERA ABYSSINICA EXPRESSED AS (MG/100 G DRY WEIGHT)

<table>
<thead>
<tr>
<th>PLANT METABOLITE</th>
<th>COMPOSITION (MG/100G DRY WEIGHT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLYPHENOLS</td>
<td>1.31±0.32</td>
</tr>
<tr>
<td>SAPONINS</td>
<td>1.2±0.10</td>
</tr>
<tr>
<td>TANNINS</td>
<td>0.07±0.40</td>
</tr>
<tr>
<td>ALKALOIDS</td>
<td>1.40±0.02</td>
</tr>
<tr>
<td>FLAVONOIDS</td>
<td>1.51±0.23</td>
</tr>
</tbody>
</table>

Results are mean of triplicate determinations on a dry weight basis ± standard deviation.

L, = Leaf extract of Oxytenanthera abyssinica, + = Trace (insignificant amounts), +++ = Abundant, - = Absent

3.3 ANTIOXIDANT ACTIVITY IN VITRO ANALYSIS

THE PERCENTAGE INHIBITION OF DPPH BY OXYTENANTHERA ABYSSINICA AND VITAMIN C, THE FERRIC-REDUCING ANTIOXIDANT POWER (FRAP) AND
THE INHIBITION OF LIPID PEROXIDATION MEASURED AS TBARS OF THE EXTRACT SHOWED A CONCENTRATION-DEPENDENT ANTIOXIDANT ACTIVITY RESULTING FROM REDUCTION OF DPPH (TABLE 3), FRAP AND INHIBITION OF TBARS (FIG. 1) RADICALS TO NON-RADICAL FORMS. HERE THE LEAF EXTRACT OF OXYTENANTHERA ABYSSINICA HAD A COMPARABLE DPPH REDUCTION CAPACITY IN ALL THE EXTRACT CONCENTRATIONS MEASURED WHEN COMPARED WITH THE SCAVENGING ACTIVITY OF ASCORBIC ACID. IC₅₀ VALUES FOR OXYTENANTHERA ABYSSINICA AND ASCORBIC ACID WERE 56.2 AND 55.10 MG/ML RESPECTIVELY (TABLE 3). THE FRAP FERRIC REDUCING POWER OF THE EXTRACT AT 400MG/ML WAS 61±1.52% (FRAP:0.61) AND THAT OF THE INHIBITION OF LIPID PEROXIDATION (MEASURED AS TBARS) WAS 81±1.11% (FIG. 1).

TABLE 3: ANTIOXIDANT ACTIVITY MEASURED AS % REDUCTION OF DPPH

<table>
<thead>
<tr>
<th>CONCENTRATION (MG/ML)</th>
<th><em>Oxytenanthera abyssinica</em></th>
<th>ASCORBIC ACID</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>72.60 ± 0.01*</td>
<td>73.64 ± 1.82</td>
</tr>
<tr>
<td>50</td>
<td>73.85 ± 0.01*</td>
<td>74.10 ± 0.09</td>
</tr>
<tr>
<td>100</td>
<td>72.83 ± 0.01*</td>
<td>74.62 ± 3.46</td>
</tr>
<tr>
<td>200</td>
<td>79.97 ± 0.01*</td>
<td>77.16 ± 2.11</td>
</tr>
<tr>
<td>400</td>
<td>82.10 ± 0.01*</td>
<td>87 ± 0.11</td>
</tr>
<tr>
<td>-----</td>
<td>---------------</td>
<td>------------</td>
</tr>
<tr>
<td></td>
<td>56.2†</td>
<td>55.1†</td>
</tr>
</tbody>
</table>

*Showed no significant difference at ($P=.05$)

Use asterisks to show significant differences at $p<0.05$ only, delete from the Table if values are similar.

† IC$_{50}$ value measured at -μg/mL (concentration of sample required for 50% inhibition of DPPH radical activity).
FIGURE 1: FERRIC REDUCING POTENTIAL (FRAP) AND INHIBITION OF LIPID PEROXIDATION (TBARS) BY OXYTENANTHERA ABYSSINICA

SCIENTIFIC INVESTIGATIONS ON THE CONSTITUENTS OF THIS PLANT WITH RELEVANCE TO ITS ETHNO-MEDICINAL VALUE ARE SCANTY AND NOT WELL DOCUMENTED IN AFRICA.
ABSENCE OF CYANOGENIC GLYCOSIDES TEND TO SUPPORT ITS LOW OR NO-TOXICITY CONTENT AND CONSIDERABLE WIDE APPLICATION AS FODDER AND FAMINE FOOD SOURCES.

1) AND FRAP—REDUCTION—REACTION) CAPACITY WHEN WE COMPARED
THE —SCAVENGING STRENGTH OF OXYTENANTHERA ABYSSINICA
AND ASCORBIC ACID ON DPPH RADICAL. PLANT PHENOLICS THEREFORE
ARE A MAJOR GROUP OF COMPOUNDS ACTING AS PRIMARY
ANTIOXIDANTS OR —FREE RADICAL SCAVENGERS (KAHKONEN ET AL.,
1999). WE USED THE DPPH ASSAY BECAUSE IT IS PARAMETERS ARE
QUICK, RELIABLE AND REPRODUCIBLE TO SEARCH FOR THE IN VITRO
GENERAL ANTIOXIDANT ACTIVITY OF PURE COMPOUNDS AS WELL AS
PLANT EXTRACTS (KOLEVA ET AL., 2002). HOWEVER, THE DECREASE IN
ABSORBANCE BY THE DPPH RADICAL WITH CONCOMITANT INCREASE IN
THE CONCENTRATION OF THE EXTRACT (TABLE 3) MAY HAVE RESULTED
IN THE RAPID DISCOLOURATION OF THE PURPLE DPPH. THIS MAY
SUGGEST THAT THE—METHANOL—EXTRACT—OF—OXYTENANTHERA
ABYSSINICA—HAS—ANTIOXIDANT ACTIVITY OF THE METHANOLIC EXTRACT
OF OXYTENANTHERA ABYSSINICA IS DUE TO ITS PROTON DONATING
ABILITY. —THE DATA PRESENTED HERE—ALSO SHOWED THAT THE
ANTIOXIDANT ACTIVITY IS WERE CONCENTRATION DEPENDENT, HAVING
MAXIMAL EFFECT AT 400MG/ML. THE DPPH ACTIVITY OBTAINED SHOWED
THAT OUR—THE EXTRACT MAY HAVE A COMPARABLE ANTIOXIDANT
CAPACITY WITH THAT OF ASCORBIC ACID, REQUIRING 56.2, MG/ML (IC₅₀
VALUE) TO REACH -50% INHIBITION OF DPPH RADICAL ACTIVITY, THOUGH
THE VALUE IS HIGHER THAN ASCORBIC —ACID (55.1 —MG/ML). A LOWER
DPPH RADICAL-SCAVENGING ACTIVITY IS, HOWEVER, ASSOCIATED WITH
A HIGHER IC₅₀ VALUE. IT HAS BEEN SHOWN THAT THE REDUCTION
MECHANISM OF DPPH CORRELATES WITH PRESENCE OF HYDROXYL GROUPS ON THE ANTIOXIDANT MOLECULES (COTELLE ET AL., 1996) WHICH MAY SUGGEST THAT THE ANTIOXIDANT ACTIVITY OF OXYTENANTHERA ABYSSINICA IS PROBABLY DUE TO THE PRESENCE OF SUBSTANCES WITH AN AVAILABLE HYDROXYL GROUP SUCH AS FLAVONOIDS OR CONDENSED TANNINS. ALL EXTRACTS AT TESTED DOSES (100-400 MG ML\(^{-1}\)) REVEALED GOOD SCAVENGING ACTIVITY FOR DPPH, FRAP AND AN APPRECIABLE INHIBITION OF TBARS IN A DOSE DEPENDENT MANNER. MEIR ET AL. (1995) NOTED THAT THE REDUCING POWER OF COMPOUNDS COULD SERVE AS INDICATOR OF POTENTIAL ANTIOXIDANT PROPERTIES. IN THE FRAP REDUCING POWER ASSAY CONDUCTED, IT IS LIKELY THAT THE PRESENCE OF ANTIOXIDANTS IN THE EXTRACT REDUCED FE\(^{3+}\) COMPLEX TO THE FERROUS FORM WITH A REDUCTION OF ABOUT 61%. THIS SUGGESTS THAT THE LEAVE EXTRACT ACTS AS AN ELECTRON DONOR AND COULD NEUTRALIZE FREE RADICALS.

ANTIOXIDANTS ARE A WIDELY CONSUMED NUTRACEUTICAL SPECIES IN THE DIET, NATURALLY AND COMMON AS FOOD ADDITIVES AND ALSO CONSCIOUSLY TAKEN AS A THERAPEUTIC AGENTS IN THE FORM OF SUPPLEMENTS SUCH AS HERBS. ANTIOXIDANTS FROM NATURAL RESOURCES SUCH AS EXTRACTS OF GREEN TEA, ROSEMARY, OREGANO, LIQUORICE AND BAMBOO LEAVES ARE ALSO BEING WIDELY USED IN THE MARKETS. PHYTOCHEMICAL EXTRACTS EXHIBIT STRONG ANTIOXIDANT ACTIVITY WHICH MAY BE DUE TO FROM THE COMBINATION

4. CONCLUSION

OXYTENANTHERA ABYSSINICA HAS DEMONSTRATED TO POSSESS SIGNIFICANT ANTIOXIDANT ACTIVITY IN THE MODEL USED AND SHOWED STRONG PRESENCE OF A WIDE VARIETY OF PHYTOCHEMICALS. THE PLANT FUNDAMENTALLY POSSESS CONTAINS PUTATIVELY BIOACTIVE
COMPOUNDS AND BIOACTIVITY—THAT MAY BE RESPONSIBLE FOR ITS ETHNO-MEDICINAL USE, THUS SHOULD BE EXPLORED FURTHER. FURTHERMORE, DETAILED STUDIES ON THE ISOLATION AND CHARACTERIZATION OF THE PLANT PHENOLS AS WELL AS IN VIVO ASSAYS TO DESCRIBE DISCOVER NOVEL BIOLOGICAL ANTIOXIDANTS IS NEEDED.

COMPETING INTERESTS

NONE

AUTHORS' CONTRIBUTIONS

DR BARTHOLOMEW O. IBEH: CONCEPTUALIZED AND DESIGNED THE WORK, INTERPRETATION OF RESULTS, LABORATORY ANALYSIS AND DRAFTING OF THE ORIGINAL MANUSCRIPTS AND FINAL APPROVAL OF THE VERSION.

DR EZEAJA MAXWELL: INVOLVED IN THE PROJECT DESIGN, INVOLVED IN RESULT INTERPRETATION AND LABORATORY ANALYSIS. CRITICAL REVISION OF DRAFT ARTICLE FOR SUITABILITY AND INTELLECTUAL CONTENT AND FINAL APPROVAL OF THE VERSION.

HABU JOSIAH BITRUS: INVOLVED IN STATISTICAL ANALYSIS AND CRITICAL REVISION OF THE MANUSCRIPT. ALL AUTHORS READ AND APPROVED THE FINAL MANUSCRIPT.
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CONVERTER OF SOLAR ENERGY INTO ESSENTIAL GOODS AND SERVICES:
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