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ANTIPROLIFERATION EFFECTS OF SELECTED TANZANIA PLANTS

Chun Whan Choi[1,†], Seok Bean Song[2,†] Joa Sub Oh[1,3,*] and Young Ho Kim[4,*]

[1]Natural Products Research Institute, Gyeonggi Institute of Science & Technology Promotion, Suwon 443-270, Korea.[2]Gyeongbuk Institute for Bio-industry (GIB), Andong City, Gyeongbuk 760-380, Korea.[3]College of Pharmacy, Dankook University, 119 Dandae-ro, Cheonan 330-714, Korea.[4]College of Pharmacy, Chungnam National University, Daejeon 305-764, Korea.

***E-mail:** jsoh@dankook.ac.kr, yhk@cnu.ac.kr

[†]Both authors contributed equally to this work.

Abstract

Background: Plants still remain a prime source of drugs for the treatment of cancer and can provide leads for the development of novel anticancer agents. Our screening of indigenous medicinal plants from Tanzania has led to the identification of the number of anticancer activity.
Material and methods: The current study investigates the cytotoxic activity of methanol extracts of one hundred and thirty seven Tanzania plants used locally for the traditional medicine herb using the MTS assay on the HepG2 cell lines.
Result 16% of the tested plant extracts showed moderate to strong inhibitory activity with IC_{50} values ranging from 17.1 ± 1.1 µg/ml to 79.2 ± 0.7 µg/ml ; meanwhile, ten extracts (7.3%) could demonstrate cytotoxic activity with IC_{50} values less than 27.6 ± 2.0 µg/ml; twelve extracts (8.8%) could demonstrate cytotoxic activity with IC_{50} values ranging from 30.4 ± 1.6 µg/ml to 79.2 ± 0.7µg/ml.
Conclusion : Especially, a methanol extract from the bark extract of Erythrophleum zimmermannii (Fabaceae) was found to be the most cytotoxicity against HepG2 cell lines (IC_{50} = 17.1 ± 1.1 µg/ml).

Keywords: Medicinal plants; Cytotoxicity; *Erythrophleum zimmermannii* (Fabaceae)

Introduction

Cancer is one of the most prominent human diseases which has stimulated scientific and commercial interest in the discovery of new anticancer agents from natural sources. Plants have formed the basis for the treatment of diseases in traditional medicine systems for many years, and continue to play a major role in the primary health care of about 80% of the world's inhabitants (Koduru *et al*, 2007). Research interest has focused on various plants that possess anticancer properties and this has led to the discovery and development of efficacious anticancer agents such as vinblastine and vincristine from *Catharanthus roseus*, and taxol from *Taxus brevifolia* (Noble, 1990). Although the use of ethnomedicines is widespread in Africa, many of these plants are yet to be investigated for their anticancer activity. This paper reports the cytotoxic activity of the methanol extracts of one hundred and thirty seven Tanzanian plants against HepG2 cells lines.

Materials and Methods

Plant material

All the tested methanol extracts of plants parcel out international biological material research centre, Korea Research Institute of Bioscience and Biotechnology (KRIBB), Daejeon, South Korea. Voucher specimens were deposited at the herbarium of the Research Institute of Bioscience and Biotechnology (KRIBB).

Cell culture and Cytotoxicity assay

Human hepatocarcinoma HepG2 cell lines were maintained in DMEM (Invitrogen, Carlsbad, CA) containing 10% heat-inactivated fetal bovine serum (FBS), 100 units/ml penicillin, 10 µg/ml streptomycin at 37℃ and 5% CO_2. Cell-Counting Kit (*CCK*)-*8* (*Dojindo*, Kumamoto, Japan) was used to analyze the effect of compounds on cell cytotoxicity. Cells were cultured overnight in 96-well plate (1×10^4 cells/well). Cell cytotoxicity was assessed after the addition of extracts in dose-dependent manner. After 24 h of treatment, 10µl of the CCK-8 solution was added to triplicate wells, and incubated for 1 h. Absorbance was measured at 450 nm to determine viable cell numbers in wells.

Statistical Analysis

All experiments were performed in triplicate. Statistical comparisons of results were made using analysis of variance (ANOVA). Significant differences between the means of control and sample treated cells were analyzed by Student's t-test.

Results

In our search for new classes of anti-cancer constituent from natural resources, we evaluated the anti-proliferative effects of one hundred

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and thirty seven Tanzania plants used locally for the traditional medicine herb extracts on HepG2 cell line *in vitro*. Out of the one hundred thirty seven plants tested, twenty-two plants exhibited cytotoxic activity with IC_{50} values below 80µg/ml (Table 2), the plants are listed in alphabetical order of their family name, followed by the scientific name, morphological part used, as well as ethnomedicinal used of extract (Table 1). Twenty two plant species which belonging to eleven families were selected. Total of twenty two extracts of Tanzania plants were investigated for their cytotoxic activity against human cancer cell lines such as HepG2. In the US NCI plant screening program, a crude extract is

Table 1: List of plants used in the cytotoxicity test.

Name of Plant	Family	Plant part used	Ethnomedicinal Use	Voucher numbers
Aerva lanata (L.) Juss. ex Schult.	Amaranthaceae	Whole	chest pain	FBM023-001
Ageratum houstonianum Mill.	Asteraceae	Whole	dry cough	FBM024-004
Alchornea hirtella Benth.	Euphorbiaceae	Stem	Diarrhea	FBM115-062
Allanblackia stuhlmannii (Engl.) Engl.	Clusiaceae	Root	Tonsillitis	FBM023-002
Aneilema aequinoctiale (P. Beauv.) Loudon	Commelinaceae	leaf, Stem	ringworms	FBM023-004
Angylocalyx braunii Harms	Papilionaceae	Root	Diabetes	FBM045-009
Aningeria pseudoracemosa J.H. Hemsl.	Sapotaceae	Root	skin disease	FBM045-010
Annickia kummerae (Engl. & Diels) Setten & Maas	Annonaceae	Root	diarrhoea	FBM039-095
Anthocleista grandiflora Gilg	Loganiaceae	Stem	Fever	FBM117-084
Antidesma membranaceum Mull. Arg.	Phyllanthaceae	Stem	Flu	FBM115-065
Antidesma venosum E. Mey. ex Tul.	Phyllanthaceae	Stem	backache	FBM115-061
Asystasia gangetica (L.) T. Anderson	Acanthaceae	Whole	skin rashes	FBM028-013
Barleria prionitis L.	Acanthaceae	leaf, Stem	stomach upset	FBM023-007
Begonia johnstonii Oliv. ex Hook. f.	Begoniaceae	Whole	vineral diseases	FBM023-010
Blighia unijugata Baker	Sapindaceae	Root	skin disease	FBM039-065
Bombax rhodognaphalon K. Schum.	Malvaceae	Stem	headache	FBM117-076
Bombax stolzii Ulbr.	Malvaceae	Stem	inflammation	FBM115-095
Bridelia atroviridis Müll. Arg.	Euphorbiaceae	Root	Fever	FBM045-011
Brillantaisia madagascariensis T. Anderson ex Lindau	Acanthaceae	Root	loose stool	FBM028-020
Calotropis gigantea (L.) W.T. Aiton	Asclepiadaceae	Stem	skin diseases	FBM028-023
Castilla elastica Sesse ex Cerv.	Moraceae	Stem	Joints	FBM135-027
Cecamone gracilis	Asclepiadaceae	leaf, Stem	appetizer for kids	FBM023-020
Cedrela odorata L.	Meliaceae	Root	Fever	FBM045-012
Celosia schweinfurthiana Schinz	Amaranthaceae	Root	fever in children	FBM023-022
Celtis durandii Engl.	Ulmaceae	Root	Hernia	FBM045-013
Celtis mildbraedii Engl.	Ulmaceae	Root	Stomach	FBM045-014
Celtis philippensis Blanco	Ulmaceae	Root	Ulcer	FBM045-015
Cephaloshaera usambarensis	Myristicaceae	Stem	heavy bleeding	FBM135-026
Chrysophyllum gorungosanum Engl.	Sapotaceae	Root	Swelling	FBM045-016
Chrysophyllum perpulchrum Mildbr. ex Hutch. & Dalziel	Sapotaceae	Root	Flu	FBM045-017
Cleome usambarica Pax	Capparaceae	Whole	sort of depression	FBM023-025
Coccinia grandis (L.) Voigt	Cucurbitaceae	Whole	Colds	FBM023-026
Cola clavata Mast.	Sterculiaceae	Root	bleeding	FBM039-066

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Cola usambarensis Engl.	Sterculiaceae	Root	Hernia	FBM039-067
Commelina imberbis Ehrenb. ex Hassk.	Commelinaceae	Whole	heavy mensturation bleeding	FBM023-028
Commiphora africana (A. Rich.) Engl.	Burseraceae	Stembark	Cough	FBM117-090
Conyza aegyptiaca (L.) Aiton	Asteraceae	Whole	loss of appetite	FBM024-032
Craibia elliottii Dunn	Fabaceae	Stem	Malaria	FBM117-086
Crassesia speciosa	Rubiaceae	Heartwood	Scabies	FBM028-029
Croton silvaticus Hochstetter ex Krauss-	Euphorbiaceae	Root	headache	FBM039-068
Cussonia arborea Hochst. ex A. Rich.	Araliaceae	Root	convulsions	FBM023-030
Cussonia spicata Thunb.	Araliaceae	Root	headache	FBM039-069
Cussonia zimmermannii Harms	Araliaceae	Root	dysentery	FBM039-070
Cyathea manniana Hook.	Cyatheaceae	Stembark	backache	FBM115-056
Cylicomorpha parviflora Urb.	Caricaceae	Root	loose stool	FBM023-031
Cymbopogon citratus (DC.) Stapf	Poaceae	leaf	Fever	FBM028-031
Cynanchum tetrapterum (Turcz.) R.A. Dyer ex Bullock	Asclepiadaceae	Whole	inflamation	FBM028-032
Cynometra brachyrrhachis Harms	Fabaceae	Root	fungal infections	FBM078-001
Cynometra webberi Baker f.	Fabaceae	Root	skin disease	FBM039-072
Dialium holtzii Harms	Fabaceae	Root	Fungus	FBM039-073
Dichapetalum stuhlmannii Engl.	Dichapetalaceae	Root	skin disease	FBM045-018
Diospyros amaniensis Gürke	Ebenaceae	Root	dysentery	FBM039-079
Diospyros kabuyeana F. White	Ebenaceae	Root	constipation	FBM045-025
Diospyros squarrosa Klotzsch	Ebenaceae	Root	veneral diseases	FBM045-026
Dombeya shupangae K. Schum.	Araucariaceae	Stem	colds, cough	FBM115-069
Dracaena laxissima Engl.	Asparagaceae	Root	Cough	FBM039-078
Drypetes gerrardii Hutch.	Putranjivaceae	Stem	Fever	FBM117-098
Englerodendron usambarense Harms	Fabaceae	Stembark	Fever	FBM117-088
Entada rheedei Spreng.	Fabaceae	Root	chest pain	FBM039-080
Erythrina abyssinica Lam.	Fabaceae	Stembark	backache	FBM117-092
Erythrophleum zimmermannii	Fabaceae	Root	joint pains	FBM050-006
Ethulia greenwayi M.G. Gilbert	Asteraceae	Whole	stomach ache	FBM028-035
Fernandoa magnifica Seem.	Bignoniaceae	Stem	childrens convulsions	FBM117-089
Ficus altissima Blume	Moraceae	Root	joint pains	FBM045-027
Ficus sycomorus L.	Moraceae	Root	veneral diseases	FBM039-081
Flueggea virosa (Roxb. ex Willd.) Royle	Phyllanthaceae	Stem	Malaria	FBM117-075
Funtumia africana (Benth.) Stapf	Apocynaceae	Root	diarrhoea	FBM024-048
Galinsoga parviflora Cav.	Asteraceae	Whole	Fatigue	FBM023-041
Gynura colorata Peter ex F.G. Davies	Asteraceae	Whole	dry cough	FBM023-043
Harungana madagascariensis Lam. ex Poir.	Hypericaceae	leaf	headache	FBM117-081
Helichrysum mechonianum var ceres	Asteraceae	Whole	loose stool	FBM023-044
Hevea brasiliensis (Willd. ex A. Juss.) Mull. Arg.	Euphorbiaceae	Stem	migrain headache	FBM135-049
Homalanthus populifolius Graham	Euphorbiaceae	Stem	bleeding	FBM115-054

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Hypericum roepericanum	Clusiaceae	Stem	appetitie	FBM023-047
Impatiens usambarensis Grey-Wilson	Balsaminaceae	Whole	prolonged labour	FBM024-053
Ipomoea wightii Var wightii	Convolvulaceae	Whole	itchy skin/ alergy	FBM023-049
Isolona heinsenii Engl. & Diels	Annonaceae	Stem	diarrhoea	FBM135-028
Juniperus procera Hochst. ex Endl.	Cupressaceae	Root	Strength	FBM023-051
Justisia diclipteroides subsp. usambarica	Acanthaceae	Whole	low abdominal pain	FBM023-052
Kalanchoe densiflora Rolfe	Crassulaceae	leaf, Stem	bleeding	FBM115-055
Khaya anthotheca (Welw.) C. DC.	Meliaceae	Root	Swelling	FBM045-003
Lagenaria sphaerica (Sond.) Naudin	Cucurbitaceae	leaf, Stem	Fungus	FBM023-055
Landolphia owariensis P. Beauv.	Apocynaceae	Stem	skin disease	FBM117-083
Lannea amaniensis Engl. & K.Krause	Anacardiaceae	Stem	pressure	FBM117-072
Leptonychia usambarensis K. Schum.	Malvaceae	Stem	bleeding	FBM117-100
Lettowianthus stellatus Diels	Annonaceae	Root	Nausea	FBM023-057
Liquidamber stylaciflua L.	Altingiaceae	Stembark	headache	FBM117-093
Lonchocarpus capassa Rolfe	Fabaceae	Stembark	headache	FBM117-087
Luffa cylindrica M. Roem.	Cucurbitaceae	leaf, Stem	Joints	FBM023-059
Margaritaria discoidea (Baill.) G.L. Webster	Euphorbiaceae	Root	inflamation	FBM039-061
Maytenus undata (Thunb.) Blakelock	Celastraceae	Root	skin diseases	FBM023-062
Mellera lobulata S. Moore	Acanthaceae	leaf, Stem	immune system	FBM023-060
Michelia champaca L.	Magnoliaceae	Stem	Stomache	FBM117-099
*Mikaniopsis usambarensis (*Muschl.) Milne-Redh.	Asteraceae	leaf, Stem	body ache	FBM023-063
Millettia oblata Dunn	Fabaceae	Root	skin disease	FBM117-094
Momordica boivinii Baill.	Cucurbitaceae	leaf, Stem	stomach problems	FBM023-064
Monanthotaxis fornicata (Baill.) Verdc.	Annonaceae	Root	skin disease	FBM039-060
Monodora grandidieri Baill.	Annonaceae	Root	skin diseases	FBM023-065
Morus mesozygia Stapf	Moraceae	Root	bleeding	FBM045-004
Myroxylon perviana	Fabaceae	Stem	Swelling	FBM117-085
Mystroxylon aethiopicum (Thunb.) Loes.	Celastraceae	Root	headache	FBM023-069
Newtonia paucijuga (Harms) Brenan	Fabaceae	Root	Labour	FBM039-062
Nymphaea caerulea Savigny	Nymphaeaceae	Flower	Flowers are taken and dried and used as a sedative	FBM028-064
Obetia radula (Baker) Baker ex B.D. Jacks.	Urticaceae	Root	chest pain	FBM045-005
Parinari excelsa Sabine	Chrysobalanaceae	Root	diarrhoea	FBM023-074
Parkia filicoidea Welw. ex Oliv.	Fabaceae	Root	fever in children	FBM045-006
Parquetina nigrescens (Afzel.) Bullock	Asclepiadaceae	leaf	flu/colds	FBM023-035
Pavetta amaniensis Bremek.	Rubiaceae	Root	sore body	FBM045-007
Polysphaeria multiflora Hiern	Rubiaceae	Root	convulsions	FBM039-074
Premna chrysoclada (Bojer) Gürke	Verbenaceae	Stembark	Fatigue	FBM050-005
Pupalia lappacea var. argyrophylla C.C. Towns.	Amaranthaceae	leaf, Stem, Flower	skin diseases	FBM024-079
Quassia undulata (Guill. & Perr.) D. Dietr.	Simaroubaceae	Root	Piles	FBM045-019
Rothmania manganjae (Hiern) Keay	Rubiaceae	Root	Hernia	FBM045-020

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Rytigynia amaniensis (K. Krause) Bullock	Rubiaceae	Root	constipation	FBM045-021
Rytigynia flavida Robyns	Rubiaceae	Root	loose stool	FBM039-075
Saba comorensis (Bojer ex A. DC.) Pichon	Apocynaceae	Root	hypertension	FBM023-085
Schizozygia coffaeoides Baill.	Apocynaceae	Root	headache	FBM045-022
Scorodophloeus fischeri (Taub.) J. Léonard	Fabaceae	Root	dysentery	FBM045-023
Senecio lyratus Forssk.	Asteraceae	Whole	diarrhoea	FBM028-081
Spondias lutea L.	Anacardiaceae	Stem	diarrhoea	FBM117-097
Tabernaemontana holstii K. Schum.	Apocynaceae	Root	impotence	FBM023-089
Thunbergia alata Bojer ex Sims	Acanthaceae	Whole	skin diseases	FBM024-094
Tipuana tipu (Benth.)Kuntze	Fabaceae	Stem	skin disease	FBM117-082
Toona ciliata M. Roem.	Meliaceae	Root	Wound	FBM045-024
Treculia africana Decne.	Moraceae	Stem	STD	FBM117-096
Turraea robusta Gürke	Meliaceae	Root	impotence	FBM039-076
Unidentified	Amaryllidaceae	Whole	migrain headache	FBM023-068
Uvaria leptocladon Oliv.	Annonaceae	Stem	swollen legs	FBM023-096
Uvaria tanzaniae Verdc.	Annonaceae	Root	Fever	FBM039-077
Uvariodendron pycnophyllum (Diels) R.E.Fr.	Annonaceae	Root	menstruation	FBM039-063
Voacanga lutescens Stapf	Apocynaceae	Stembark	Fever	FBM117-074
Voacanga thouarsii Roem. & Schult.	Apocynaceae	Root	headache	FBM039-064
Warbugia ugandensis	Lauraceae	Stembark	swollen legs	FBM023-099
Warszewiczia coccinea (Vahl) Klotzsch	Rubiaceae	Stem	dysentry	FBM117-091
Whitfieldia elongata C.B.Clarke	Acanthaceae	Root	nose bleeding	FBM028-098
Zantedeschia aethiopica (L.) Spreng.	Araceae	Whole	fever for adults	FBM023-100
Ziziphus pubescens Oliv.	Rhamnaceae	Root	diarrhoea	FBM045-008

generally considered to have in vitro cytotoxic activity if the IC_{50} value (concentration that causes a 50% cell kill) in human cancer cells, following incubation for 48 hr, is less than 20 mg/mL (Boik, 2001). As shown in Table 2, twenty-two methanol extracts exhibited potent cytotoxic activity in HepG2 cell lines with the IC_{50} values within 17.1 ± 1.1 - 79.2 ± 0.7 µg/mL.

The high potent cytotoxic activity was observed for the extracts of *Erythrophleum zimmermannii* (**8**) with IC_{50} values of 17.1 ± 1.1 µg/mL; *Warbugia ugandensis* (**22**) with IC_{50} at 20.6 ± 0.2 µg/ mL; *Entada rheedei* (**7**) with IC_{50} values of 21.7 ± 4.5 µg/mL; *Alchornea hirtella* (**1**) with IC_{50} value of 25.0 ± 4.0 µg/mL; *Khaya anthotheca* (**11**) with IC_{50} value of 25.1 ± 2.3 µg/mL; *Spondias lutea* (**17**) with IC_{50} at 25.8 ± 1.4 µg/ mL; *Englerodendron usambarense* (**6**) with IC_{50} values of 26.3 ± 1.3 µg/mL; *Cedrela odorata* (**3**) played marked strong with IC_{50} at 26.8 ± 6.4 µg/mL; *Commiphora africana* (**4**) with IC_{50} value of 27.2 ± 3.0 µg/mL; *Toona ciliata* (**18**) with IC_{50} values of 27.6 ± 2.0 µg/mL. Further studies concerning the cytotoxic constituents of *Alchornea hirtella* (**1**), *Bombax rhodognaphalon* (**2**), *Cedrela odorata* (**3**), *Commiphora africana* (**4**), *Entada rheedei* (**7**), *Erythrophleum zimmermannii* (**8**), *Ficus altissima* (**9**), *Hypericum roepericanum* (**10**), *Khaya anthotheca* (**11**), *Landolphia owariensis* (**12**), *Monanthotaxis fornicate* (**14**), *Newtonia paucijuga* (**15**), *Spondias lutea* (**17**), *Uvaria leptocladon* (**19**), *Uvaria tanzaniae* (**20**), *Voacanga thouarsii* (**21**) and *Warbugia ugandensis* (**22**) on which few or no phytochemical reports exist in the literatures, seem to be worthwhile.

Table 2: *In vitro* cytotoxic activity of the methanol extracts on the HepG2 cell lines measured by the MTS assay

Number	Name of Plant	Cytotoxicity Activity[a] (µg/mL)[b]
1	*Alchornea hirtella* Benth.	25.0 ± 4.0
2	*Bombax rhodognaphalon* K. Schum.	51.3 ± 2.4
3	*Cedrela odorata* L.	26.8 ± 6.4
4	*Commiphora africana* (A. Rich.) Engl.	27.2 ± 3.0
5	*Cynometra brachyrrhachis* Harms	79.2 ± 0.7

6	*Englerodendron usambarense* Harms	26.3 ± 1.3
7	*Entada rheedei* Spreng.	21.7 ± 4.5
8	*Erythrophleum zimmermannii*	17.1 ± 1.1
9	*Ficus altissim*a Blume	31.4 ± 1.0
10	*Hypericum roepericanum*	30.4 ± 4.2
11	*Khaya anthotheca* (Welw.) C. DC.	25.1 ± 2.3
12	*Landolphia owariensis* P. Beauv.	40.5 ± 0.5
13	*Liquidamber stylaciflua* L.	30.4 ± 1.6
14	*Monanthotaxis fornicata* (Baill.) Verdc.	70.9 ± 4.0
15	*Newtonia paucijuga* (Harms) Brenan	71.5 ± 6.1
16	*Parinari excelsa* Sabine	52.2 ± 0.7
17	*Spondias lutea* L.	25.8 ± 1.4
18	*Toona ciliata* M. Roem.	27.6 ± 2.0
19	*Uvaria leptocladon* Oliv.	31.9 ± 8.3
20	*Uvaria tanzaniae* Verdc.	72.6 ± 0.7
21	*Voacanga thouarsii* Roem. & Schult.	64.0 ± 3.3
22	*Warbugia ugandensis*	20.6 ± 0.2
Positive control	Paclitaxel	0.73 ± 0.1

[a]IC_{50} : the concentration that caused 50% cell growth inhibition; [b]Data are presented as mean±SEM of at least three distinct experiments
[*]Significantly different from control ($p<0.05$)**.**

Discussion and conclusions

Recently, there has been a global trend toward the use of natural phytochemical anticancer present in natural resources, such as herbs, vegetables, fruits and oilseeds (Mann, 2002). Herbs have begun as raw materials for finding new drugs (Lee *et al*., 2006). Herbal medicines derived from plants are increasingly being utilized to treat a wide variety of clinical diseases, even though relatively little is known about their modes of action. Until now, numerous plants and their constituents have already demonstrated cytotoxic activity (de Mesquita *et al*., 2009), illustrating that there is still potential for novel innovative cytotoxic activities to be identified from natural plant resources. Vincristine, irinotecan, etoposide, and paclitaxel are examples of plant-derived compounds that are being used in cancer treatment. The taxanes and the camptothecins are presently approved for human use in various countries (da Rocha *et al*., 2001). This study provides high potent cytotoxic activities of *Alchornea hirtella* (**1**), *Cedrela odorata* (**3**), *Commiphora africana* (**4**), *Englerodendron usambarense* (**6**), *Entada rheedei* (**7**), *Erythrophleum zimmermannii* (**8**), *Khaya anthotheca* (**11**), *Spondias lutea* (**17**), *Toona ciliata* (**18**) and *Warbugia ugandensis* (**22**) indicating their ultimate potential for pharmaceutical use among the test samples. Of those, three plants (**4**, **7** and **18**) exhibited considerable anticancer activity (Ma *et al*., 2005; Nzowa *et al*., 2010; Zhang *et al*., 2012).

Phytochemical studies revealed the presence of sesquiterpenoid constituents with bisabolane skeleton such as bisabolone and β-sesquiphellandrene, dihydroflavonol glucoside; phellamurin in *C. africana* (Avlessi *et al*., 2005; Ma *et al*., 2005), revealed the presence of phenylpropanoid glycosides, thioamide glycoside and oleanane-type triterpene oligoglycosides in *E. rheedei* (Sugimoto *et al*., 2011, 2012; Nzowa *et al*., 2010), and revealed the presence of diterpenoids, triterpenoids, neolignans, phenylpropanoid, steroids, polyynes and coumarins in *T. ciliate* (Liu *et al*., 2011; Ning *et al*., 2010; Lu *et al*., 2009). The extract of *C. africana* was found to mediate (Cu^{2+})-dependent relaxation of supercoiled plasmid DNA (Ma *et al*., 2005). Previous studies on *E. rheedei* also indicated the effects of its isolated saponins on the human cancer cell lines such as T98G, A431, PC3 and B16-F1 (Nzowa *et al*., 2010). The inhibitory effects of isolated triterpenoids from *T. ciliate* were evaluated on human cancer cell lines, such as K562 (leukemia), SMMC-7721 (hepatocellular carcinoma), MCF-7 (breast cancer), HL-60 (human myeloid leukemia), SW480 (colon cancer), A549 (lung cancer), and KB (oral epithelial cancer), as well as multidrug-resistant cell lines MCF-7/ADM and KB/VCR (Zhang *et al*., 2012). And neolignans and phenylpropanoid from the leaves and stems of *T. ciliate*, The antiproliferative activities of these compounds against four cancer cell lines A549, Colo205 (colon cancer), QGY-7703 (Human hepatoma), and LOVO (colon cancer) were also evaluated by MTT method. (Liu *et al*., 2011), polyynes from this plants exhibited potent cytotoxicity against the HL-60 cell lines (Ning., 2010). Steroid from *T. ciliata* was found cytotoxic in a brine shrimp lethality bioassay with LC50 of 9.9 µg/mL and it also showed significant antitumor activity with Ti50 value of 14.1 µg/mL in a potato disk bioassay (Chowdhury *et al*., 2004). Nevertheless, no report has been described for their effects on the HepG2 cell lines which were used in this study. The other plants (**3**, **11**, **17**, and **22**) presented significantly antimicrobial, antifeedant, antimalarial, antidiabetes and antirotavirus effects (Villanueva *et al*., 2009; Lee *et al*., 2008; Ei *et al*., 2000; Njoroge *et al*., 2005). The bark essential oil of *C. odorata* (**3**) exhibited antimicrobial activity. However no report related to cytotoxicity of this plant has been carried out. In 1997, de Paula *et al*. reported the presence of sesquiterpenes, triterpenoids, limonoids and flavonoids (de Paula *et al*., 1997).

Triterpenoids from *K. anthotheca* showed potent antimalarial activity against malaria parasites with IC_{50} values of 1.4 and 0.17 µM using two different assays (Lee *et al*., 2008). However no report related to cytotoxicity of this plant has been carried out. In 2000, El *et al.* reported that *S. lutea* extracts revealed the presence of a series of C16-32 hydrocarbons, cholesterol and stigmasterol. In addn. β-amyrin and lupeol were isolated from the unsaponifiable fraction. Twelve fatty acids were identified in the saponifiable fraction and quantitative determined by gas-liquid chromatography(GLC). Palmitic, linoleic, oleic, linolenic and stearic acids were the major components (84%). Four flavonoid compounds (quercetin, quercetrin, rutin, and most probably quercetin-7-O-glucoside) were isolated from fresh pericarp and leaves. The amount of total flavonoids was 0.52% in the fresh pericarp and 1.55% in leaves. In addition two triterpenoid saponin glycosides with ursolic acid as common aglycon were isolated from leaves. The percentage of total saponin in leaves was found to be (0.22%) (El., 2000). This plant extracts

(**17**) presented significantly anti-rotavirus effects (Goncalves *et al*., 2005). However no report toward the cytotoxic activity of the isolated compound to date. Until now, less cytotoxicity and phytochemical study have been reported to this plant, except for the significant antimicrobial activity of 7α-acetylugandensolide together with thirteen known drimane-type sesquiterpenes were isolated from *W. ugandensis* bark extract was investigated against fungi and bacteria (Opiyo *et al*., 2011). *A. hirtella* have not yet been assessed for *in vitro* cytotoxicity but phytochemical study was reported presence of tetrahydroimidazo [1,2-α] pyrimidine alkaloid alchornine. The other remained plants, *Bombax rhodognaphalon* (**2**), *Cynometra brachyrrhachis* (**5**), *Englerodendron usambarense* (**6**), *Erythrophleum zimmermannii* (**8**), *Ficus altissima* (**9**), *Hypericum roepericanum* (**10**), *Landolphia owariensis* (**12**), *Liquidamber stylaciflua* (**13**), *Monanthotaxis fornicate* (**14**), *Newtonia paucijuga* (**15**), *Parinari excels* (**16**), *Uvaria leptocladon* (**19**), *Uvaria tanzaniae* (**20**) and *Voacanga thouarsii* (**21**), have not yet been assessed for *in vitro* cytotoxicity and also phytochemical studies.

In conclusion, plants still remain a prime source of drugs for the treatment of cancer and can provide leads for the development of novel anticancer agents. Our screening of indigenous medicinal plants from Tanzania has led to the identification of the number of anticancer activity. Total methanol extracts of one hundred thirty seven plant species were screened for *in vitro* anticancer activity against HepG2 cell lines. Results showed that ten methanol extracts of plants as *Alchornea hirtella* (**1**), *Cedrela odorata* (**3**), *Commiphora africana* (**4**), *Englerodendron usambarense* (**6**), *Entada rheedei* (**7**), *Erythrophleum zimmermannii* (**8**), *Khaya anthotheca* (**11**), *Spondias lutea* (**17**), *Toona ciliata* (**18**) and *Warbugia ugandensis* (**22**) exhibited high cytotoxic activity against HepG2 cell lines.

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