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Medicinal plants used in gynecological procedures in Uganda

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Distress and pains among other gynecological challenges mothers go through during childbirth result in mortality. This has compelled people particularly in developing countries to use traditional medicine to induce birth due to lack of more effective alternatives. In Uganda, from time immemorial most child birth and pregnancy related problems have been solved using medicinal plants as a primary alternative to conventional drugs. Although research has been done to document and validate effectiveness of these plants, it is not compiled for communication to the wider community. This study, therefore, reviewed the medicinal plants used in Uganda for easing childbirth. The study collated and documented medicinal plants used by Traditional Birth Attendants and Traditional Health Practitioners to induce labor and ease child birth in local communities in Uganda and show the gaps that need to be investigated. The available literature on medicinal plants used in Uganda for childbirth were selected from reputable journals using citation databases including Google Scholar, Institute for Scientific Information, PubMed, Scopus, Hinari, and Scientific Information Database among others. Asteraceae, Fabaceae, and Lamiaceae, respectively were the most cited for gynecological uses by various local communities in Uganda. The commonly reported species were Laggera alata Sch. Bip., Tagetes minuta L, Clitoria ternatea Linn and Ocimum lamiifolium Hochst ex Benth among others. Authors were also determined to ascertain scientific evidence against analgesic, anti-inflammatory, oxytocic and phytochemical properties of the selected plant species.

Key words: Childbirth, medicinal plant, gynecology, Uganda.

INTRODUCTION

The painful experience women go through during pregnancy and childbirth remains a nightmare for many despite being an essential part of human existence. In sub-Saharan Africa, high maternal mortality has offset high fertility rate whereby 1 out of 20 live births results in mortality yearly (Neema, 2002). This has immensely affected population growth rates in the region. In Uganda specifically, neonatal mortality rate (NMR) remains high...
at 27 deaths per 1000 live births (Kananura et al., 2016). There is paucity of data on factors associated with NMR in rural communities in Uganda (Kananura et al., 2016). Some of the mortalities could be due to the misuse of herbs due to insufficient scientific evidence. A World Health Organization (WHO) report indicated that about 80% of the world’s population depends on herbal medicines for treatment of various diseases (WHO, 2012) and to induce child birth. In Uganda, the Ministry of Health Statistics estimates that about 60% of Ugandans depend on Traditional Medicine for treatment of common diseases and conditions (MoH-UG, 2012). The inaccessibility and severe side effects of many allopathic pharmaceutical medicines could be major contributing factors as to why the rural people resort to the use of herbal medicine as an alternative to treatment of common diseases and conditions in Uganda (Kwesiga, 2002). Medicinal plants belonging to different families and species are used by birth attendants to induce labor, attain relatively painless delivery and hasten fetal delivery (Lipton, 1964; Ojewole and Elujoba, 1982). However, the information is scattered in different papers and repositories and cannot easily be a profitable reference. This study, therefore, collated and compiled the list of medicinal plants generally used in gynecological procedures at birth in Uganda.

METHODOLOGY

The available literatures on medicinal plants used in the management of gynecological conditions during child birth in Uganda were selected from reputable journals using citation databases including Google Scholar, Institute for Scientific Information, PubMed, Scopus, Hinari, Scientific Information Database, etc. A critical review of these medicinal plants was thereafter carried out to collate the information for scientific bases. Specific information sought included plants and parts used, method of preparation, mode of administration and ethno pharmacological use. Also recorded was the scientific evidence on the pharmacology and chemical constituents in the plants.

RESULTS

Twenty two plant families and forty two plant species were cited for review in this study. Seven plant parts were evidently used from the same plants and out of which five modes of administration were prescribed. Bathing as one of the most used modes of administration is mainly for energy boosting in pregnancy (Table 1). There are nine methods of preparation and water is used most during the preparation of the medicinal plants.

Herbal plants used to induce labor and ease childbirth in Uganda

Plant species belonging to different families used to induce labor, ease pain and solve other related gynecological problems during childbirth are presented. In addition, the distribution of the plants is presented in Table 1. The plant parts used, methods of preparation, different modes of administration and their traditional use by the local communities are provided. A summary of the plant parts and their preferred mode of administration are shown in Figure 1.

Forty two plant species belonging to twenty two different plant families were reviewed and recorded. The family Asteraceae had the highest number (21%) of plant species used to induce labor and ease childbirth, followed by Fabaceae (10%), Acanthaceae (7.4%), Basellaceae and Euphobiaceae (5%), respectively. Five different modes of administration were observed of which bathing (31.8%) was the most commonly used. Other modes include drinking (22.72%) and oral (22.72%) administration (could be by swallowing or gargling), chewing (15.9%) and topical application (6.81%), respectively.

The pharmacological and chemical compositions of the medicinal plants used by local communities during childbirth in Uganda are shown in Table 2. Most of the plants recorded have at least two chemical constituents that could be responsible for pain relief and associated gynecological activities.

A total of thirty two pharmacological activities were identified in this study. Anti-inflammatory activity was found to be the most common in the validated plants (44%) while antimicrobial (30%), antidiabetic (19%) and analgesic (13%) activities were also reported.

Most of the phytocompounds present in the different plants were: flavanoids (76%), saponins (52%), alkaloids (40%), terpenoids, and glycosides (36%) among other compounds.

Plant parts used in medicinal plant preparations

There are seven recorded plant parts commonly used in traditional treatments (Figure 1). The leaves are used in more than two ways: They are used for bathing (31.8%) and for drinking (22.72%).

Leaves are the most commonly used parts (59%) followed by roots (23%), bark (6%), vine (4%), and flower (4%). While fruits (2%) and seeds (2%) were the least used.

DISCUSSION

This review has documented a number of different plant species belonging to different families used in gynecological procedures in Uganda’s local communities. The families Asteraceae, Fabaceae, and Lamiaceae were the most cited for gynecological uses by various local communities in Uganda and the commonly reported
Table 1. Plants used in child birth with other ethno-medicinal use.

| Family        | Scientific name               | Parts used       | Method of Preparation         | Mode of administration | Ethno pharmacological use                                      | Reference                                      |
|---------------|--------------------------------|------------------|-------------------------------|------------------------|----------------------------------------------------------------|------------------------------------------------|
| Acanthaceae   | *Acanthus pubescens* L         | Root             | Decoction                     | Oral                   | Fasten up labor                                                 | Tugume et al. (2016)                          |
|               | *Justicia heterocarpa* L       | Leaf             | Juice                         | Bathe early in the morning | Energy booster in pregnancy                                   |                                                |
| Alliaceae     | *Justicia betonica* L         | Leaf             | Juice                         | Bathing                | Energy booster in pregnancy                                     | Kamatenesi-Mugisha and Oryem-Origa (2007)     |
|               | *Allium cepa* Linn             | Leaf             | Squeezing by hand             | Chewing                | Induction of labor                                              |                                                |
| Amaranthaceae | *Psilotrichum elliottii* Baker | Leaf             | Crush in cold water           | Bathing                | Energy booster in pregnancy                                     | Tugume et al. (2016)                          |
| Asteraceae    | *Vernonia auriculifera* Heim   | Leaf             | Leaves crush in water         | Bathing                | Delayed labor                                                   | Tugume et al. (2016)                          |
|               | *Mangifera indica* L           | Bark             | Decoction                     | Drinking               | Energy booster in pregnancy                                     |                                                |
|               | *Tagetes minuta* L             | Leaf             | Squeezing by hand             | Oral                   | Infertility in women                                            |                                                |
|               | *Acnella caulirhiza*           | Leaf             | Squeezing by hand             | Oral                   | Induction of labor                                              | Kamatenesi-Mugisha and Oryem-Origa (2007)     |
|               | *Laggera alata* Sch.Bip        | Leaf             | Squeezing by hand             | Oral                   | Induction of labor                                              | Kakudidi et al. (2016)                        |
|               | *Ageratum conyzoides* L        | Leaf             | Crush and mix with water      | Bathing                | Energy booster in pregnancy                                     | Kamatenesi-Mugisha and Oryem-Origa (2007)     |
|               | *Microglossa angolensis* L     | Leaf             | Pound and add water           | Oral                   | Energy booster in pregnancy                                     |                                                |
|               | *Vernonia lasiopus* Schreb     | Root             | Burn                          | Chew                   | Fasten Labor                                                    | Tugume et al. (2016)                          |
|               | *Vernonia amygdalina* Del      | Root             | Crush in cold water           | Bathing                | Energy booster in pregnancy                                     |                                                |
| Basellacea    | *Basella rubra* L              | Leaf             | Decoction from leaves         | Drinking               | Reduce hip pain during pregnancy                                | Kamatenesi-Mugisha and Oryem-Origa (2007)     |
|               | *Basella alba* L               | Leaf             | Dry, pound                    | Chewing                | Delayed in labor                                                | Tugume et al. (2016)                          |
| Bignoniacae   | *Kigelia africana* (Lam) Benth | Leaf             | Half teaspoon boiled          | Taken orally as tea    | Ease labor                                                      | Nalumansi et al. (2017)                       |
| Capparaceae   | *Clome gymnandra* L            | Root             | Chew the roots                | Chew                  | Ease delivery                                                   |                                                |
| Chenopodiaceae| *Chenopodium roserum* Hochst   | Leaf             | Squeezing leaves in water     | Bathing                | Energy booster during pregnancy                                 | Tugume et al. (2016)                          |
| Convolvulacea  | *Hewittia sebiobata* L         | Vine             | Tie in the waist              | Topical                | Pregnancy care (widens pelvic girdle)                           |                                                |
| Crassulaceae  | *Kalanchoe crenan ce* Adan      | Leaf             | Squeezing by hand             | Drinking               | Induction of labor                                              | Adjanohoun et al. (1993)                      |
| Euphostiacae  | *Jatropha curcas* L            | Leaf             | Crush in water                | Bath in cold water     | Energy booster in pregnancy                                     | Tugume et al. (2016)                          |
|               | *Recinus communis* L           | Leaf             | Pound, add to water           | Bathing                |                                                             |                                                |
|               | *Croton macrostachyus* L       | Vine             | Tie in the waist              | To clean the uterus after delivery and check the bleeding from the uterus | Kamatenesi-Mugisha and Oryem-Origa (2007) |
Table 1. Contd.

| Family     | Species                          | Part Used | Preparation                              | Mode of Administration | Use                                      | Reference                                      |
|------------|----------------------------------|-----------|------------------------------------------|------------------------|------------------------------------------|-----------------------------------------------|
| Fabaceae   | Senna absus Mill                 | Leaf      | Pound and add water                       | Oral                   | Delayed labor                            | Tugume et al. (2016)                          |
|            | Crotalaria spinosa L             | Leaf      | Crush and mix in water                    | Oral                   | Energy booster in pregnancy              |                                               |
|            | Dalbergia boehmii L F            | Root      | Decoction                                | Drinking               | Induction of labor                       | Pakia and Cooke (2003)                       |
| Lamiaceae  | Ocimum lamifolium Benth          | Leaf      | Squeezing by hand                         | Orally                 | Induction of labor                       | Kamatenesi-Mugisha and Oryem-Origa (2007)    |
|            | Tetradenia riparia Hochst L      | Leaf      | Pound, mix in water and bathe             | Bathing                | Energy booster in pregnancy              | Tugume et al. (2016)                         |
|            | Ocimum bacilicum L               | Leaf      | Crush and smear                           | Topical application     | Easing pain in pregnancy                 | Tugume et al. (2016)                         |
| Malvaceae  | Sida acuta Burm.F                | Leaf, root| Pound leaf and add water                  | Drinking               | Pain relief                              | Karou et al. (2003)                          |
|            | Gossypium herbeceum L            | Rook, bark| Decoction                                | Drinking               | Induction of labor                       | Maundu et al. (2001)                         |
| Minesparmaceae | Cissampelos mucronata A Rich | Leaf      | Pound and add water                       | Bathing                | Energy booster in pregnancy              |                                               |
| Moraceae   | Ficus natalensis Hochst          | Root      | Decoction                                | Drinking               | Ease labor and expel retained placenta   | Tugume et al. (2016)                         |
| Musaceae   | Musa Sapientum L                 | Root      | Burn the root                            | Chewing                | Induce labor                             |                                               |
|            | M. paradisiacaL                  | Flower    | Pound the sheath                         | Chewing                | Delayed labor                            |                                               |
| Myrsinaceae| Maesa lanceolata Forssk          | Leaf, bark| Squeezing by hand, chewing               | Chewing                | Induction of Labor                       | Kamatenesi-Mugisha and Oryem-Origa (2007)    |
| Poaceae    | Cynodon dactylon L               | Seed      | Decoction                                | Drinking               | Delayed labor                            | Tugume et al. (2016)                         |
| Portulacaeae| Talinum portulacifolium Forsk    | Leaf      | Squeeze leaf and add water                | Bathing                | Ease labor                               | Nalumansi et al. (2017)                      |
| Rosaceae   | Rubus pinnatus L                 | Fruit     | Eat fresh                                | Oral                   | Energy booster                           | Tugume et al. (2016)                         |
| Rubiaceae  | Catunaregam nilotica (Stapf) Tirveng | Root      | Decoction                                | Drinking               | Induction of labor                       | Chhebra et al. (1991)                        |

Species were *Laggera alata*, *Clitoria ternatea* and *Ocimum lamifolium*, respectively. While the most commonly observed plant parts are the leaves; followed by roots and bark. Leaves are commonly used in herbal preparations and this may be advantageous because there is a high benefit to plant conservation as compared to the harvesting of roots and other plant parts (Busia, 2016). Leaves also have high concentrations of secondary metabolites hence their effectiveness. Most herbal preparations in the local communities by traditional attendants are done by squeezing the plant materials by hand or using the plant part in its whole form. The administration is usually done at the onset of labor for the herbs that fasten labor (Kamatenesi-Mugisha, 2004). Most of the plants with oxytocic activity are labor inducing and when taken in wrong dosages or even before onset of labor; they may act as abortifacients (Kamatenesi-Mugisha, 2004) such as *Sida acuta* commonly used for labor induction but when taken in wrong dosages has abortifacients activities (Karou et al., 2003). The chemical constituents recorded in this study are of significance as they could be responsible for the pharmacological activities in these plants. Different plants were recorded to have various pharmacological activities. Plants such as *L. alata*, *C. ternatea*, and *O. lamifolium* were reported to have analgesic properties by 73, 29.7 and 23.8%, respectively (Wu et al., 2006; Panthong et al., 2007; Maity et al., 2012). *Sida acuta* was reported to have hepatoprotective and antiemetic activities (Kirti-lar and Basu, 1975).

Several chemical constituents such as essential oils, flavonoids, alkaloids, and saponins were reported to have analgesic, anti-inflammatory and oxytocic activities in the various listed plants. The presence of alkaloids in plants could be responsible for the oxytocic activities observed, for example, Ergot alkaloids (Bowman and Rand,
| Family name       | Plant name               | Part used | Pharmacology of the plant                                                                 | Chemical constituents                  | Reference                                                                 |
|-------------------|--------------------------|-----------|------------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------|
| Acanthaceae       | Justicia betonica L      | Leaf      | Antitumor, antiplatelet, cytotoxicity, anti-inflammatory, anti-diarrhea, antimalarial     | Alkaloids, flavonoids                  | Caprio et al. (2000), Day et al. (1999), Kanchanapoon et al. (2004), Subbaraju et al. (2004), Sridhar et al. (2006), Navarro et al. (2001a), Katuura et al. (1999), and Bossa et al. (2013) |
| Alliaceae         | Allium cepa Linn         | Leaf, Bulb| Antiplatelet, antidiabetic, anti-cancer, antimicrobial, anti-oxidant, hepatoprotective, anti-inflammatory | Flavonoids, terpenoids, volatile compounds, minerals (Calcium, Iron, Magnesium) and vitamins (A,E,K,B) | Yoichi Ueda et al. (1994), Wang et al. (2012), Kadan et al. (2013), Benmalek et al. (2013), Obioha et al. (2009), and Dorsch et al. (1990) |
| Asteraceae        | Vernonia auriculifera Hiern | Leaf, Root | Antibacterial                                                                          | Tannins, flavonoids, terpenoids, saponins | Prashant et al. (2011), Pradeep et al. (2014) and Dermarsh et al. (2011) |
| Asteraceae        | Vernonia amygdalina Del. | Leaf      | Oxytocic                                                                                | Saponins, alkaloids, tannins, flavonoids | Katuura et al. (2019)                                                     |
| Anacardiaceae     | Mangifera indica L       | Bark, Leaf, Fruit | Antioxidant, Antiuretic, Anti-inflammatory, Anti-parasitic | Flavonoids, triterpenoids, polyphenols, alkaloids, saponins, vitamins (A, B, Carotene) | Scartezzini and Speroni (2000), Shankarnarayanan et al. (1979), Ross (1999), Rocha et al. (2007), Sharma et al. (1997), Diplock Atel. (1998) and Das et al. (1989) |
| Asteraceae        | Tagetes minuta L.        | Leaf      | Antiseptic, antiplasmodic, anti-inflammatory, antispasmodic, antioxidant, cytotoxic, antibacterial, antimicrobial, diuretic, antispasmodic | Essential oils, flavonoids terpenoids   | Amat (1983), Tereschuk et al. (1997), Shirazi et al. (2014), Shirazi et al. (2014), Oliveira et al. (2016), Giarratana et al. (2017) |
| Asteraceae        | Lagera alata (D. Don) Sch.-Bip ex Olivier | Leaf      | Hepatoprotective, anti-inflammatory                                                      | Essential oils flavonoids              | Ekundayo et al. (1989) and Wu et al. (2006);                                  |
| Basellaceae       | Basella rubra L          | Leaf      | Hypoglycemic, larvicidal antibacterial, anti-hyperglycemic, anti-oxidant, anti-inflammatory cytotoxic antiangiogenic anti-proliferative | Phenolic acids, sterols, carotenoids, tannins flavonoid terpenoids, saponins | Das et al. (2007), Nimula et al. (2009), Murakami et al. (2001, 2013), Kumar et al. (2015), Priya et al. (2015), Kilari et al. (2016) and Kumar et al. (2018) |
| Bignoniaceae      | Kigelia africana (Lam)Benth | Leaf, Root, Bark | Cytotoxicity, anticancer, anti-ulcer, anti-inflammatory, and analgesic | Alkaloids, tannins, saponins, glycosides, and flavonoids | Saini et al. (2009), Olutunji and Atolani (2009), Picerno et al. (2005), Adoum (2007), Hussain et al. (2007), Owolabi and Omogbai (2007) and Gouda et al. (2003) |
| Caesalpinaeae     | Cassia fistula Linn      | Leaf/ Pod/ Root | Laxative, antiperiodic, depurative, anti-inflammatory antibacterial, antifungal             | Tannins, terpenoids, alkaloids, flavonoids saponin, steroids, glycosides, anthraquinone, proteins amino acids | Bhaldia and Shukla (2011), Seyyednejad et al. (2014) |
Table 2. Plants used for child birth, pharmacological effects and their chemical components.

| Family         | Species                          | Part Used | Pharmacological Effects                                      | Chemical Components                                                |References |
|----------------|----------------------------------|-----------|-------------------------------------------------------------|---------------------------------------------------------------------|-----------|
| Capparaceae    | *Cleome gynandra* L              | Root, Leaf| Anti-inflammatory, anti-Cancer, anti-diabetic                | Flavonoids, phenols, saponins, triterpenes,                         | Adhikari et al. (2014), Paul et al. (2012), Narendhirakannari et al. (2005), Nagpal et al. (2017) and Das and Ahmed (2017) |
| Euphobiaceae   | *Ricinus communis* L             | Leaf      | Antifertility, antinoceptive, antioxidant, Hepatoprotective, anti-inflammatory | Steroids, saponins, alkaloids, flavonoids, glycosides               | Sani and Sule (2007), Taur et al. (2011), Gupta et al. (2006), Shukla et al. (1992), and Saini et al. (2010) |
| Euphobiaceae   | *Croton macrostachyus* L         | Vine      | Anthelmintic activities, anti-convulsant, Antidiabetic, anti-diarrhea, anti-inflammatory, antioxidant | Alkaloids, cardiac glycosides, Flavonoids, coumarins, phenolic compounds, saponins, tannins | Eguale et al. (2006), Bum et al. (2012), Geyid et al. (2005), Kamanyi et al. (2009), Teugwa et al. (2013), and Arika et al. (2015) |
| Fabaceae       | *Clitoriaternatea* Linn. (CT)    | Leaf      | Antipyretic, anti-inflammatory analgesic, diuretic, local anesthetic, anti-diabetic, antimicrobial and insecticidal | Triterpenoids, flavonol glycosides, anthocyanins and steroids       | Parimaladevi et al. (2004), Kelemu et al. (2004), Mukherjee et al. (2008), Maity et al. (2012) |
| Lamiaceae      | *Ocimum lamiifolium* Benth       | Leaf, Flower| Antibacterial, antimicrobial, analgesic, epatoprotective, antioxidant, antimarial, anti-inflammatory, antifungal, insecticidal, antipyretic | Essential oils (Bromyl acetate, P-cymene,alpha-pinene, beta-pinene, Camphene) | Desta (1993), Makonnen et al. (2003), Mequanint et al. (2011), and Mukazayire et al. (2011) |
| Lamiaceae      | *Tetradenia riparia*             | Leaf      | Antimicrobial, antifungal, antiallergic, antispasmodic       | Alkaloids, saponins, flavonoids, phenols                            | Sultana and Ata (2008) and Farquar (1996) |
| Malvaceae      | *Sida acuta* Burm. f.            | Leaf, Root| Hepatoprotective anti-helminthic, antilemctic, analgesic, abortifacient, anthelminthic, diaphoretic, antipyretic, antimicrobial, antipiasmodial, antimarial | Alkaloids coumarins, flavonoids, terpenoids, steroids, glycosides and phenolics | Kirtikar and Basu (1975), Prakash et al. (1981), Karou et al. (2003), Karou et al. (2007), Banzouzi et al. (2004), Malairajan et al. (2006), Sreedevi et al. (2009), Ahmed et al. (2011); Konaté et al. (2012) |
| Malvaceae      | *Gossypium herbaceum* Linn       | Leaf, Root| Antioxidant                                                 | Glycosides, saponins, flavonoids                                  | Tiwar et al. (2011) |
| Myrsinaceae    | *Maesa, Lanceolata, Forssk.*     | Leaf      | Anthelmintic, larvicidal antiviral, molluscicidal antibacterial cytotoxic, antioxidant antileishmanial | Saponins, benzoquinones, flavonoids, glycosides, phenolic compounds, terpenoids, saponins, anthocyanins | Sindambiwe et al. (1999, 2000), Foubert et al. (2009) and Elisha et al. (2017) |
| Poaceae        | *Cynodon dactylon* L             | Seed      | Anti-diabetic, antibacterial, cardiovascular, antiparasitic, antioxidant, anti-inflammatory | Flavonoids, alkaloids, glycosides, terpenoids, saponins, tannins   | Paranjpe (2011), Kumar et al. (2011), Annapurna et al. (2013), Abhishek and Thakur (2012), Nafisi et al. (2012), Pranita et al. (2012), Kazembe and Makusha (2012), Saroja et al. (2012), Rajaretnam and Vincent (2012) and Garg et al. (2011) |
All plants have several chemical constituents which could be responsible for a number of pharmacological activities important during childbirth. Compounds such as flavonoids have a variety of different activities in the human body. They work as anti-inflammatory, anti-platelet, anti-hypertensive, antihepatotoxic, antiviral, antineoplastic, antiulcerogenic and antioxidant (Rodrigo et al., 2010). The appearance of anti-inflammatory activity in most of the plants could be justified by the presence of flavonoids in these very plants (Rodrigo et al., 2010). Coumarin derivatives exert anti-inflammatory and antioxidant activities (Casley-Smith et al., 1986). Terpenoids and essential oils occur as diterpenes, triterpenes and tetraterpenes. When they acquire oxygen, they change to terpenoids and examples are camphor, methanol, fernesol and artemisin. Artemisin is essential as an antimalarial. They also have antimicrobial, analgesic, sedative, anti-inflammatory, spasmylytic and locally anesthetic remedies (Al-Reza et al., 2010).

However, most of these chemicals have not been properly profiled. The need to quantify the active compounds for proper dosages to be derived is important. More so these compounds can be used as lead templates in production of effective medicines that can be used to relieve pain and other complications hence reduce mortalities associated with hard labor.

Conclusion

The study reviewed medicinal plants used in gynecological procedures in local communities in Uganda. Plants documented in this study have been established for their acclaimed ethno botanical use while others are still under investigation. Therefore, this study was able to generate information on their current state in order to guide users on their research status.

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CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

Abhishek B, Thakur A (2012). Anthelmintic activity of Cynodon dactylon. Journal of Pharmacognosy and Phytochemistry 1(3):1-3.
Adhikari PP, Paul SB, Choudhury MD, Choudhury S (2014). GC-MS studies on the steam-distillate of the medicinally important plant Cleome gynandra L. International Journal of Applied Research Studies 3:1-4.
Adoum OA (2008). Determination of toxicity effects of some savannah plants using brine shrimp test (BST). International Journal of Applied Science 2(3):1-5.
Ahmed F, Toume K, Ohtsuki T, Rahman M, Sadhu SK, Ishibashi M (2011). Cryptolepine, isolated from Sida acuta, sensitizes human gastric adenocarcinoma cells to TRAIL-induced apoptosis. Phytotherapy Research 25:147-150.
Alencar NMN, Oliveira JS, Mesquita RO, Lima M, Vale M, Etchell JP, Ramos M V (2006). Pro and anti-inflammatory activities of the latex from Calotropis procera (Alt.) R. Br are triggered by compounds fractionated by dialysis. Inflammatory Research 55:559-564.
Amat AG (1983). Pharmacological research for major taxons of Bonaerenses Compositae (in Spanish). Acta Farm Bonaerense 2:23-36.
Annapurna HV, Apoorva B, Ravichandran N, Purushothaman K, Brindha P, Swaminathan S, Vijayalakshmi M, Nagarajan A (2013). Isolation and in silico evaluation of antidiabetic molecules of Cynodon dactylon (L). Journal of Molecular Graphics and Modelling 39:87-97.
Giarratana F, Muscolino D, Ziino G, Lo Presti V, Rao R, Chiofalo V, Giuffrida A, Panenbianco A (2017). Activity of catmint (Nepeta catara) essential oil against Anisakis Larvae. Tropical Biomedicine 34(1):22-31.

Geyd A, Abebe D, Debbela A (2005) Screening of some medicinal plants of Ethiopia for their anti-microbial properties and chemical profiles. Journal of Ethnopharmacology 97(3):421-427.

Gouda YG, Abdel-baky AM, Darwish FM, Mohammed KM, Kasai R, Yamasaki K (2003). Iridoids from Kigelia pinnata DC. Fruits. Phytochemistry 63(8):887-892.

Gupta MK, Sharma PK, Ansari SH (2006). In-vitro antioxidant activity of the successive extracts of Ricinus communis leaves. International Journal of Plant Sciences 1(2):229-231.

Hao B, Wu Y, Wang J, Hu S, Jasmin D, Hu H, Zhao Y (2012). Hepatoprotective and antiviral properties of isochorogenic acid A from Lagagger alata against hepatitis B virus infection. Journal of Ethnopharmacology 144(1):190-194.

Hussain H, Krohn A, Ahmad UV, Miama GA, Green IR (2007). Lapachol: An overview, Arkivoc 2:145-197.

Iqbal Z, Lateef M, Jabbar A, Muhammad G, Nisar M (2005). Anthelmintic activity of Calotropis procera (Alit.) Ait. F. , flowers in sheep. Journal of Ethnopharmacology 102(2):256-261.

Jahurul MHA, Zaidul ISM, Ghafour K, Al-Juhami FY, Nyam K-L, Norulaini NAN, Sahena F, Mohd Omar AK (2015). Mango (Mangifera indica L) by-products and their valuable components: A review. Food Chemistry 183:173-180.

Kadan S, Saad B, Sasson Y, Zaid H (2013). In vitro evaluations of cytotoxicity of eight anti-microbial medicinal plants and their effect on GLUT4 translocation. Evidence Based Complementary and Alternative Medicine 549345.

Kakudidi E, Kirimuhuze C, Anywar G, Katura E (2016). Medicinal Plants Used in the Management of Noncommunicable Diseases in Medicinal Plants Used in the Management of Noncommunicable Diseases in Uganda. In Medicinal Plants-Recent Advances in Research and Development. Springer, Singapore pp. 397-418.

Kamanyi A, Mbiantcha M, Nguelfack TB (2009). Anticoagulative and anti-inflammatory activities of extracts from the stem bark of Croton macrostachyus (Euphorbiaceae) in mice and rats. Journal of Complementary and Integrative Medicine 6(1).

Kamatnesi-Mugiaha M, Oryem-Origa H (2007). Medicinal plants used to induce labour during childbirth in western Uganda. Journal of Ethnopharmacology 109(1):1-9.

Kanana R, Truel F, Mutebi A, Bua J N, Waiswa P, Kiwanuka SN, Makumbi F (2016). The neonatal mortality and its determinants in rural communities of Eastern Uganda. Reproductive Health 13:13.

Karou D, Dicko MH, Sanon S, Simpore J, Traore AS (2003). Antimalarial activity of Sida acuta Burm f. (Malvaceae) and Phyllanthus emblica L. (Euphorbiaceae). Journal of Ethnopharmacology 89:291-294.

Karou SD, Ndembea WMC, Ilboudo DP (2007). Sida acuta Burm f. A medicinal plant with numerous potencies. African Journal of Biotechnology 6:2953-2959.

Kazemba T, Makusha C (2012). Evaluation of mosquito repellencies of Capsicum frutescens, Carica papaya and Cynodon dactylon extracts and extract mixtures. Bulletin of Environment, Pharmacology and Life Sciences 1(7):34-40.

Kelemu S, Cardona C, Segura G (2004). Antimicrobial and insecticidal protein isolated from seeds of Cissiota ternatea, a tropical forage legume. Plant Physiology and Biochemistry 42(11):867-873.

Kiliari BP, Kotakadi VS, Penchalani J (2016). Anti-proliferative and Apoptotic Effect of Baselia rubra (L.) Against 1, 2-Dimethyl Hydrazine-induced Colon Carcinogenesis in Rats 17:73-80.

Kirtilir KR, Basu BD (1975). Indian Medicinal Plants. Reprint (Ed) Bishen Singh Mahendra Singh, Dehradun.

Konaté K, Bassolé IHN, Hilou A, Awoert-Samserry RR, Souza A, Barro N, Dicko MH, Datt JY, M’Batchi T (2012). Toxicity assessment and anagasiic activity investigation of aqueous acetone extracts of Sida acuta Burm F. and Sida cordifolia L. (Malvaceae), medicinal plants of Burkina Faso. BMC Complementary and Alternative Medicine 12(120):1-11.

Kumar AS, Gnananath K, Kiran D, Reddy AM, Rai Ch (2011). Antidiabetic activity of ethanolic extract of Cynodon dactylon root
stalks in streptozotocin induced diabetic rats. International Journal of Advances in Pharmaceutical Research 2(8):418-422.

Kumar BR, Anupam A, Manchamantila P (2018). Identification and characterization of bioactive phenolic constituents, anti-proliferative and anti-angiogenic activity of stem extracts of Basella alba and rubra. Journal of Food Science and Technology 55(5):1675-1684.

Kwesiga CJ (2002). Women's Access to Higher Education in Africa. Uganda's Experience. Fountain Publishers, Kampala, Uganda.

Lanzotti V (2006). The analysis of onion and garlic. Journal of Chromatography A 1112:3-22.

Lipton A (1964). Effects on anaesthetized animals of an oxytocic glycoside extracted from Albizia gumfyllera. Journal of Pharmacy and Pharmacology 16(6):369.

Mahadevan N, ShivaliKambo P (2009). Hibiscus sabdariffa Linn an overview. Natural Products Radiance 8(1):77-83.

Malty N, Nema NK, Sarkar BK, Mukherje PK (2012). Standardized Clitoria ternatea leaf extract as hyaluronidase, elastase and matrix-metalloproteinase-1 inhibitor. Indian Journal of Pharmacology. 44(5):584.

Makonnen E, Debella A, Abebe D, Teko T (2003). Analgesic properties of some Ethiopian medicinal plants in different models of nociception in mice. Phytotherapy Research 17:1108-1112.

Malairajan P, Gopalakrishnan G, Narasimhan S, JessikalaVenki K (2006). Antulcer activity of Sida acuta Burm. Natural Product Sciences 12:150-152.

Mequanint W, Makonnen E, Urga K (2011). In vivo anti-inflamatory activities of leaf extracts of Ocimum tenuiflorum in mice model. Journal of Ethnopharmacology 134:32-36.

Ministry of Health-Uganda - MoH-UG (2012). Estimated statistics dependence on Traditional Medicine

Mohd-Esa N, Hem FS, Ismail A, Yee CL (2010). Antioxidant activity in different parts of roselle (Hibiscus sabdariffa L.) extracts and potential exploitation of the seeds. Food Chemistry 122(4):1055-1060.

Mukaziyere MJ, Allays V, Buc Calderon P, Stëvigny C, Bigendako MJ, Duez P (2011). Evaluation of the hepatoprotective and hepatoprotective effect of Rwandese herbal drugs on in vivo (guinea pigs barbiturate-induced sleeping time) and in vitro (rat precision-cut liver slices, PCLS) models. Experimental and Toxicologic Pathology 62(3):289-299.

Mukherje PK, Kumar V, Kumar NS, Heinrich M (2008). The Ayurvedic medicine Clitoria ternatea: From traditional use to scientific assessment 120:291-301.

Murakami T, Hirano K, Yoshikawa M (2001). Medicinal food stuffs. XXIII. Structures of new oleannane-type triterpenoalloglycosides, Basellasaponins A, B, C, and D, from the fresh aerial parts of Basellaria L. Chemical and Pharmaceutical Bulletin 49:776-779.

Nalisi S, Nezhdadi MA, Asghari MH (2012). Comparative and mixture effect of Panax quinquefolius Linn. on anti-inflammatory activity of human cell cultures and antioxidants. Annals of Phytomedical Research 3(2):415-419.

Nair N, Sathish V, Marimuthu R, Matharu R, Sivakumar A, Prasath M (2007). In vitro anti-inflammatory, analgesic and antiplatelet activity of Sida acuta Linn root. Fitoterapia 74:345-349.

Picerno P, Autore G, Marzocco S, Meloni M, Sanoro R, Aquino RP (2005). Anti-inflamatory activity of verminoside from Kigelia Africana and evaluation of cutaneous irritation in cell cultures and reconstituted human epidermis. Journal of Natural Products 68:1610-1614.

Prajakta M, Cooke JA (2003). The ethnomedicine of the Midzichenda tribes of the coastal forest areas in Kenya; 2. Medicinal plant uses. South African Journal of Botany 69(3):382-395.

Prakash A, Verma RK, Ghosal S (1981). Alkaloidal constituents of Sida acuta, S. humilis, S. rhombifolia and S. spinosa. Indian Journal of Pharmaceutical Sciences 43:384-388.

Pranita K, Sawarker HA, Mishra KK (2012). Antibacterial evaluation of ethanolic extract of Cynodon dactylon(L). Pers. Global Journal of Research on Medicinal Plants and Indigenous Medicine 1(6):218-224.

Rajaretinam RK, Vincent SG (2012). Cynodon dactylon and Sida acuta dactylon extract impact on the function of the zebrafish embryos. Journal of Biomedical Research 26:90-97.

Rocha RSM Queiroz JH, Lopes RME, Campos FM, Pinheiro SHM (2007). Antioxidant in mango (Mangifera indica L) pulp. Plant Foods for Human Nutrition 62:13-17.

Rodrigo G, Ana LC, Adriano LSS, Helton CS, Claire L, Jacqueline A-L, Virginia SL, Mauro M (2010). Teixeira. The flavonoid dioscin decreases the production of pro-inflammatory mediators in vitro by inhibiting PDE4 activity and scavenging reactive oxygen species. European Journal of Pharmacology 633:85-92.

Ross JA (1999). New Jersey Totowa: Human Press. Medicinal plants of the world.

Roy S, Sehgal R, Padhy BM, Kumar VL (2005). Antioxidant and protective effect of Cynodon dactylon extract against staurosporine induced neurodegeneration. Journal of Ethnopharmacology 102:470-473.

Saini AK, Goyal R, Gautam VK, Kalia AN (2010). Evaluation of anti-inflammatory potential of Ricinus communis Linn. Leaves extracts and its flavonoids content in Wistar rats. Journal of Chemical and Pharmaceutical Research 2(5):690-695.

Saini S, Kaur H, Verma B, Ripudaman, Singh S (2009). Kigelia africana (Lam.) Benth. An Over view. Natural Product Radiance 8(2):190-197.

Sarkar J, Santhi R, Ammoncoparani S (2012). Antioxidant potential of ethyl acetate fraction of Cynodon dactylon against ELA implanted Swiss albino mice. International Journal of Pharmacy and Biological Sciences 3(2):415-419.

Sane UM, Sule MI (2007). Antiulcer activity of methanol extracts of three different seed varieties of Ricinus communis Linn. Journal of Pharmaceutical Sciences 6:78-83.

Sedghinejad SM, Malehmadaei M, Mirzaei, Tomambed 76. (2014). Antipruritic Activity of Prunus mahaleb and Parsley (Petroselinum crispum) Against Some Pathogen. Asian Journal Biological Science 1(1):51-55.
J. Med. Plants Res.

Scartezzini P, Speroni E (2000). Review on some plants of Indian traditional medicine with antioxidant activity. Journal of Ethnopharmacology 71:23-43.

Shahzadi I, Hassan A, Khan UW, Shah MM (2010). Evaluating biological activities of the seed extracts from Tagetes minuta L. found in northern Pakistan. Journal of Medicinal Plants and Research 4:2108-2112.

Shankarnarayanan D, Gopalakrishnan C, Kameswaran L, Arumugum S (1979). The effect of mangostin, mangostin-3, 6-di-O-glucoside and Mangiferin in carbon tetrachloride liver injury. Mediscope 22:65.

Sharma SR, Dwivedi SK, Swarup D (1997). Hypoglycemic effect of mangostin, mangostin-3, 6-di-O-glucoside and Mangiferin in carbon tetrachloride liver injury. Mediscope 22:65.

Sultana N, Ata A (2008). Oleanolic acid and related derivatives as medicinally important compounds. Journal of Enzyme Inhibition and Medicinal Chemistry 23:739-756.

Suresh KP, Suresh E, Kalavathy S (2013). Review on a potential herb Calotropsis gigantea(L) R. Br. Scholars Academic Journal of Pharmacy 2(2):135-143.

Stark TD, Mtui DJ, Balemba OB (2013). Ethnopharmacological Survey of Plants Used in the Traditional Treatment of Gastrointestinal Pain, Inflammation and Diarrhea in Africa: Future Perspectives for Integration into Modern Medicine. Animals (Basel) 3:158-227.

Taur DJ, Maruti GW, Rajendra SB, Patil RY (2011). Antinociceptive activity of Ricinus communis L. leaves. Asian Pacific Journal of Tropical Biomedicine 1(2):139-141.

Tereschuk ML, Riera MV, Castro GR, Abdala LR (1997). Antimicrobial activity of flavonoids from leaves of T. minuta. Journal of Ethnopharmacology 56:227-232.

Tilahun G, Gidey M, Mekonnen Y, Eguale T (2006). In vitro anthelmintic activities of four Ethiopian medicinal plants against Haemonchus contortus. Pharmacology online 3:153-165.

Wang Y, Tian WX, Ma XF (2012). Inhibitory effects of onion (Allium cepa L.) extract on proliferation of cancer cells and adipocytes via inhibiting fatty acid synthase. Asian Pacific Journal of Cancer Prevention 13(11):5573-5579.

Yoichi U, Takako T, Ryuichi M (1994). Composition of Sulfur-Containing components in onion and their flavor. Characters, Bioscience, Biotechnology and Biochemistry 58(1):108-110.