

Phytochemical analysis of some medicinal plants used for the management of reproductive health care problems in the West Region in Cameroon

Abstract

Reproductive diseases are conditions that negatively affects human reproductive systems in many countries. Indeed this study was carried out to analyse chemical constituents of some medicinal plants used to treat reproductive organs, diseases in Bamboutos division, West of Cameroon. 45 plants samples were collected from their natural habitats in some villages of the above cited division. Study was conducted according to standard procedures in the laboratory of Organic Chemistry and Natural Substances of the University of Dschang. Polyphenols were revealed in all screening medicinal plant extracts, while, flavonoids were found in most of the studied plant extracts except for those obtained from *Dioscorea dumetorum*. Triterpens were present in 40 plants, saponins and sterols were respectively found in 33 and 32 plants ; whereas, alkaloids were only present in 15 plants. This work showed that the plants used to alleviate human reproductive ailments in some locality of the West Region in Cameroon are rich in bioactive compounds. These compounds are known to manage human reproductive diseases. Therefore, this finding supported the uses of these plant species for the treatment of human reproductive diseases. Furthermore, appropriate conservation of such valuable medicinal plant species is required.

Keywords : reproductive problems, west region Cameroon, phytochemical, medicinal plants

Introduction

Medicinal plants play an essential role in a healthy being of individuals, as they are used to treat different diseases all over the world and are a source of many effective and powerful drugs [1,2]. Drugs from plants are easily available, less expensive, safe, efficient and rarely have side effects [3]. Medicinal plants contain secondary metabolites like alkaloids, flavonoids, saponins, tannins and glycosides which are used against different diseases and relieve pain [2, 4, 5]. Many studies have shown the therapeutic activities of secondary metabolites obtained from medicinal plants [2, 6, 7, 8]. There are diverse documents which have reported the ethnopharmacological properties of the plants [2, 9, 10]. These plants are also contemplated as a rich source of ingredients that can be used in the synthesis and

production of modern drugs [11]. Plants consist of various kinds of chemical constituents known as phytoconstituents [12]. Moreover, plants derived substances have recently become of great interest due to their versatile use [13]. Indeed, the long term utilization of plants in traditional medicine is a sure indication of their value and usefulness in the future. In Africa like other developing countries, about 80% of the population depend on the use of herbal medicine for health care [14]. Therefore, such plants should be investigated to better understand their properties, safety and efficacy [14, 15]. According to Ndam *et al.* [14], the pharmacological and biological properties of organic substances from many indigenous plants have been well understood over the last few decades. For example, polyphenols have been associated with antioxydants [16, 17]; anticancer [18], antimicrobial (Louw, 2002); terpenoids exhibit anti-inflammatory, antiviral, antibacterial, anticancer and antimalarial activities [20, 21, 22]. Alkaloids are used as anaesthetic agents and are found in medicinal plants [23]. Much more, among the 120 active compounds currently isolated from the higher plants that are widely used in modern medicine today, 80% show positive correlation between their modern therapeutic use and the traditional employment of the plants from which they are derived [24].

In Cameroon, medicinal plants play a great role in human life. From ancient time medicinal plants have been used for various diseases. The medicinal value of these plants lies in its bioactive constituents [25]. Literature survey suggests that worldwide more than 50,000 plant species are successfully used for medicinal purposes [26]. Various active ingredients like alkaloids, glycosides, saponins, essential oils, tannins and mucilages have been isolated from various plant parts such as roots, stems, leaves, barks, fruits and seeds ; these phytochemicals determine a definite curing physiological response in the treatment of various human diseases [27], Such as reproductive ailments. In view of the important role of phytochemicals and their wide application for a variety of diseases, it is necessary to provide scientific data on phytochemical compounds of some plants used to manage reproductive problems in Cameroon.

Materials and Methods

Plant sample collection

Plant samples used to treat reproductive organs, diseases were collected from their natural habitats in some villages of Bamboutos Division, West of Cameroon during the month

of November 2009. They were identified and confirmed at the National Herbarium of Cameroon and voucher specimen were kept in the Department of Plant Biology, University of Dschang. The list of plants with the vernacular names, parts used, family and traditional uses are shown in table 1.

Different plant parts were washed with clean water, cut into small pieces and air dried under natural conditions for two weeks. The dry plant materials were powdered using a mechanical grinder and 200g of plant extracts were macerated with 500 ml of ethanol for 48 hours at room temperature. Maceration intends to soften and break the plant's cell wall to release the soluble phytoconstituents [28, 29]. The extracts were filtered through whatman No.1 filter paper and then concentrated under vacuum using a rotary evaporator at 68°C. Concentrated extracts were stored in sterile bottles at 4°C for further use. Laboratory activities were performed in the laboratory of organic chemistry and natural substances, University of Dschang.

Table 1 : List of plants with vernacular names, parts used and traditional uses [30]

Plant samples/Family	Vernacular names	Parts used	Traditional uses
<i>Acanthus montanus</i> /Acanthaceae	Megigoum, mounamenang, megigor	Wp	Irregular menstruation, male and female infertility, gonorrhoea, leucorrhoea, venereal diseases, vaginal cleansing
<i>Ageratum conyzoides</i> /Asteraceae	Tsomamou, tchouamou, nekouadar, soumomo	Wp	Vaginal cleansing, inflammation of vagina
<i>Aloe barbadense</i> /Asphodelaceae	Melan	L	Male and female infertility, male impotence, dysmenorrhoea, vaginal cleansing
<i>Bridelia scleroneura</i> /Euphorbiaceae	Mezene	B	Female infertility, dysmenorrhoea, amenorrhoea
<i>Bryophyllum pinnatum</i> /Crassulaceae	Nezouk, lezouk	L	Dysmenorrhoea, leucorrhoea, vaginal cleansing
<i>Cissus quadrangularis</i>	Djicmetsi	S	Male and female infertility, venereal diseases, vaginal

/Vitaceae			cleansing
<i>Crassocephalum mannii</i>	Neponlou, poupou	L	Helping delivery, leucorrhoea, dysmenorrhoea
/Asteraceae			
<i>Crinum natans</i>	Melan panguè,	Wp	Male infertility
/Amaryllidaceae	malan pazuè		
<i>Croton macrostachyus</i>	Tsam, tsa'a	B	Male and female infertility, dysmenorrhoea, venereal diseases
/Euphorbiaceae			
<i>Cyphostemma adenaucole</i>	Pioctè	S	Female infertility, dysmenorrhoea, venereal diseases, vaginal cleansing, ovarian and uterus cysts
/Vitaceae			
<i>Dioscorea dumetorum</i>	Neliock, zouck	L	Venereal diseases
/Dioscoreaceae			
<i>Dyschoriste perrottettii</i>	Mekonbi	Wp	Leucorrhoea, dysmenorrhoea
/Acanthaceae			
<i>Entada abyssinica</i>	Cessan, lou	B	Male and female infertility, leucorrhoea, venereal diseases, dysmenorrhoea, inflammation of the vagina, menstrual regulation
/Fabaceae			
<i>Elaeophorbia drupifera</i>	Machoir	L	Male and female infertility, viral and venereal diseases, vaginal cleansing, prostate inflammation, promoting lactation in women after giving birth, oligospermia
/Euphorbiaceae			

PU : Parts used, Wp: whole plant; L: leaves; B: bark; ; S: stem; SL: stem + leaves ; T : tubers ; Fr : fruits.

Table 1 : List of plants with vernacular names, parts used and traditional uses [30] (continued)

Plant samples/Family	Vernacular names	Parts used	Traditional uses
<i>Eremomastax speciosa</i>	Pankuzem,	L	Post-partum pain, male and female infertility, gonorrhoea, leucorrhoea, dysmenorrhoea, irregular menstruation
/Acanthaceae	panzemmok, piezeumok, kouokmegar		
<i>Euphorbia lateriflora</i>	Nepimou	S	Vaginal cleansing, male and female infertility, viral and venereal diseases, prostate inflammation, promoting lactation in women after giving birth, oligospermia
/Euphorbiaceae			
<i>Ficus exasperata</i>	Kokguème	L	Ovarian and uterus cysts, fibroids
/Moraceae			
<i>Ficus sur</i>	Gack	B	Venereal diseases
/Moraceae			

<i>Furcreae foetida</i> /Agavaceae	Melan	L	Male and female infertility, venereal diseases
<i>Gardenia ternifolia</i> /Rubiaceae	Metouc bouor, metobouo	B	Male and female infertility, viral and venereal diseases, vaginal cleansing, ovarian and uterus cysts, prostate inflammation
<i>Impatiens burtonii</i> /Balsaminaceae		Wp	Oligospermia, leucorrhoea, dysmenorrhoea, vaginal cleansing
<i>Ipomoea batatas</i> /Convolvulaceae	Kopgoua, voukope	SL	Venereal diseases
<i>Kigelia africana</i> /Bignoniaceae	Sacktare, vinvi	B/Fr	Vaginal cleansing, male and female infertility, inflammation of the vagina, venereal diseases, prostate inflammation
<i>Laggera alata</i> /Asteraceae	Depack-kenan	L	Venereal diseases, leucorrhoea, dysmenorrhoea
<i>Lippia multiflora</i> /Verbenaceae	Boukmondong	L	Female infertility, leucorrhoea, dysmenorrhoea

PU : Parts used, Wp: whole plant; L: leaves; B: bark; ; S: stem; SL: stem + leaves ; T : tubers ; Fr : fruits.

**Table 1: List of plants with vernacular names, parts used and traditional uses [30]
(continued)**

Plant samples/Family	Vernacular names	Parts used	Traditional uses
<i>Markhamia tomentosa</i> /Bignoniaceae	Warè, wate-kufo	B	Helping delivery
<i>Piper capense</i> /Piperaceae	Bepote-goo	SL	Female infertility, postpartum abdominal pain
<i>Polygonium nepalenses</i> /Polygonaceae		Wp	Female infertility
<i>Polyscias fulva</i> /Araliaceae	Kikiokdiore	B	Male and female infertility, venereal diseases, vaginal cleansing
<i>Psychotria viridis</i> /Rubiaceae		B	Venereal diseases

<i>Rauwolfia vomitoria</i> /Apocynaceae	Nepemo	B	Male and female infertility, viral and venereal diseases, leucorrhoea, oligospermia, dysmenorrhoea, vaginal cleansing
<i>Sansievieria liberica</i> /Dracaenaceae	Melan-nagoue, lack	L	Male and female infertility, venereal diseases
<i>Senna alata</i> /Fabaceae	Foupan	L	Inflammation of the uterus venereal diseases, vaginal cleansing
<i>Smilax kraussiana</i> /Smilacaceae	Bouk, bii	SL	Venereal and viral diseases
<i>Solanum torvum</i> /Solanaceae	Tchiè	L	Male and female infertility, abdominal pains, cleansing womb after childbirth
<i>Sonchus oleraceus</i> /Asteraceae	Kuku	L	Male impotence, oligospermia, venereal diseases
<i>Spathodea campanulata</i> /Bignoniaceae	Foukfougue	B	Dysmenorrhoea, male and female infertility, dysmenorrhoea, leucorrhoea, venereal diseases, vaginal cleansing
<i>Stereospermum accuminatissimum</i> /Bignoniaceae	Wate-fè, ware-fè	B	Viral and venereal diseases

PU : Parts used, Wp: whole plant; L: leaves; B: bark; ; S: stem; SL: stem + leaves ; T : tubers ; Fr : fruits.

Table 1: List of plants with vernacular names, parts used and traditional uses [30] (end)

Plant samples/Family	Vernacular names	Parts used	Traditional uses
<i>Thespesia populnea</i> /Malvaceae	Kepfou, tekue	L	Male and female infertility, venereal diseases, leucorrhoea, dysmenorrhoea, inflammation of the vagina
<i>Vernonia ambigua</i> /Asteraceae	Negi-gouan	L	Vaginal cleansing, male and female infertility, viral and venereal diseases, inflammation of the uterus
<i>Vernonia inulaefolia</i> /Asteraceae	Voungang, megoutsop	T	Vaginal cleansing, male and female infertility, viral and venereal diseases, dysmenorrhoea, leucorrhoea
<i>Vernonia sp</i> /Asteraceae	Depack-kenan	L	Venereal diseases, male impotence
<i>Vitellaria paradoxa</i> /Sapotaceae	Saloboué, sack-kouket	B	Promoting lactation in women after giving birth
<i>Vitex doniana</i> /Verbenaceae	Vounetane	B	Postpartum hemorrhage

<i>Zehneria scabra</i> /Cucurbitaceae	Liepliep, laplap, leliep	SL	Preventing abortion or spurious labour
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PU : Parts used, *Wp*: whole plant; *L*: leaves; *B*: barks; ; *S*: stems; *SL*: stem + leaves ; *T* : tubers ; *Fr* : fruits.

Phytochemical screening

Phytochemical screening to detect the presence of secondary metabolites such as polyphenols, flavonoids, saponins, alkaloids, triterpens and sterols was carried out following the standard procedures described by [31, 32, 33, 34, 35].

Test for saponins

Two grams of the extracts were dissolved in 80 ml of distilled water in a test tube and then warmed for 5 minutes. After cooling, the mixture was filtered and shaken vigorously for 2 minutes and allowed to stand for 30 minutes. The formation of stable foam indicated the presence of saponins [31, 32, 33, 34, 35].

Test for flavonoids

For the confirmation of flavonoid in the selected plants, 5 mg of each extract was dissolved in 5 ml of ethanol. The mixture was then treated with 0.5 g of magnesium chips and three drops of concentrated sulphuric acid (H₂SO₄). The appearance of pink or orange coloration within few minutes indicated the presence of flavonoid. Nevertheless, a pink-orange color indicates the presence of flavones ; whereas the presence of flavonols and flavanoneols were respectively indicated by pink-purple and red colors [31, 32, 33, 34, 35].

Test for alkaloids

For alkaloids determination, five milligrams of each extracts were placed in a test tube containing 3 ml of H₂SO₄ 1%. The mixture was then warmed in a water bath for 5 minutes and filtered. Five drops of Meyer's reagent were added to the filtrate extracts. The presence of white precipitates or a cloudy phase indicated the presence of alkaloids [31, 32, 33, 34, 35].

Test for sterols and triterpens

Five milligrams of each extracts were dissolved in 3 ml of chloroform, after that, equal volume of chloroform, acetic anhydride and concentrated sulphuric acid were respectively added to the mixture solution. The color change was observed immediately and later ; blue-green indicates steroids while pink, red or purple colour indicates the presence of triterpens [31, 32, 33, 34, 35].

Test for polyphenols

To determine the presence of polyphenols, 1 g of the powder of each plant was boiled with 15 ml of distilled water in a test tube for 15 minutes, then filtered. Two drops of iron cyanide were added to the filtrate solution ; the appearance of blue color reveals the presence of polyphenols [31, 32, 33, 34, 35].

Data analysis

The change of color was observed when the test reagent was added to the prepared sample for the phytochemical test. The result was recorded as more abundant (+++), abundant (++), present (+) or absent (-) depending on the outcome of the test. All experiments were done in triplicates.

Results

The result of the phytochemical analysis is tabulated in **table 2**. The phytochemical of selected medicinal plants investigation showed the absence or the presence of saponin, alkaloids, polyphenols, sterols, flavonoids and triterpens. Polyphenols were present in all screened medicinal plant extracts. Flavonoids were found in most of the studied plant extracts except for those obtained from *Dioscorea dumetorum*. Triterpens were present in 40 plants, saponins and sterols were respectively found in 33 and 32 plants ; whereas, alkaloids were only present in 15 plants (Table 2).

Table 2: Phytochemical analysis of screened medicinal plant species

Plantes	PU	Sap	Alk	Fla	Pol	Tri	Ste
<i>Acanthus montanus</i> / Acanthaceae	<i>PE</i>	++	-	+/-	+	-	-
<i>Ageratum conyzoides</i> / Asteraceae	<i>PE</i>	++	-	+	+	+/-	-
<i>Aloe barbadense</i> / Asphodelaceae	<i>F</i>	++	+	+	+	+	+/-
<i>Bridelia scleroneura</i> / Euphorbiaceae	<i>E</i>	+++	-	+	+++	+/-	-
<i>Bryophyllum pinnatum</i> / Crassulaceae	<i>F</i>	+	-	+++	+	++	+/-
<i>Cissus quadrangularis</i> / Vitaceae	<i>T</i>	+++	-	+++	+	+	-
<i>Crassocephalum mannii</i> / Asteraceae	<i>F</i>	+	-	++	+	+	+
<i>Crinum natans</i> / Amaryllidaceae	<i>PE</i>	-	+/-	+	+	+	+/-
<i>Croton macrostachyus</i> / Euphorbiaceae	<i>E</i>	+	-	+	+	++	+

<i>Cyphostemma adenaucole</i> / Vitaceae	<i>T</i>	+	-	+	+/-	+	+
<i>Dioscorea dumetorum</i> / Dioscoreaceae	<i>F</i>	+	-	-	++	-	-
<i>Dyschoriste perrottettii</i> / Acanthaceae	<i>PE</i>	+	+/-	++	+++	+	+/-
<i>Entada abyssinica</i> / Fabaceae	<i>E</i>	+	-	++	++	+	+
<i>Elaeophorbium drupifera</i> / Euphorbiaceae	<i>F</i>	+	-	+/-	+	+	+
<i>Eremomastax speciosa</i> / Acanthaceae	<i>F</i>	++	-	+	+	+	-
<i>Euphorbia lateriflora</i> / Euphorbiaceae	<i>T</i>	+	-	+/-	+	-	-
<i>Ficus exasperata</i> / Moraceae	<i>F</i>	-	+	+	+	+/-	+/-
<i>Ficus sur</i> / Moraceae	<i>E</i>	++	-	++	+/-	+	-
<i>Furcraea foetida</i> / Agavaceae	<i>F</i>	+	-	+	+	-	+
<i>Gardenia ternifolia</i> / Rubiaceae	<i>E</i>	-	+	+++	+++	+	-
<i>Impatiens burtonii</i> / Balsaminaceae	<i>PE</i>	+	-	+/-	+	+	++
<i>Ipomoea batatas</i> / Convolvulaceae	<i>TF</i>	-	-	+/-	+	++	++
<i>Kigelia africana</i> / Bignoniaceae	<i>E</i>	-	+	+	+++	+	+/-
<i>Laggera alata</i> / Asteraceae	<i>F</i>	+	+	++	+	+	+
<i>Lippia multiflora</i> / Verbenaceae	<i>F</i>	+	+	+	+++	+/-	+/-

PU : Parts used, *Wp*: whole plant; *L*: leaves; *B*: barks; ; *S*: stems; *SL*: stem + leaves ; *T* : tubers ; *Fr* : fruits ; *Alk* : alkaloids; *Fla* : flavonoids ; *Pol* : polyphenols ; *Tri* : triterpens; *Ste* : sterols ; *Sap* : saponins ; (+++) : high ; (++) : moderate ; (+) : low and (-) : absent.

Table 2: Phytochemical analysis of screened medicinal plant species (end)

Scientific names	Part used	Sap	alk	Flav	Pol	Tri	Ste
<i>Markhamia tomentosa</i> / Bignoniaceae	<i>E</i>	-	-	+/-	+/-	+++	+
<i>Piper capense</i> / Piperaceae	<i>TF</i>	+	+	+/-	+	++	+
<i>Polygonium nepalenses</i> / Polygonaceae	<i>PE</i>	+	-	+++	+++	+/-	+/-
<i>Polyscias fulva</i> / Araliaceae	<i>E</i>	+	-	+	+	+	+/-
<i>Psychotria viridis</i> / Rubiaceae	<i>E</i>	-	+/-	+	++	+	+++
<i>Rauvolfia vomitoria</i> / Apocynaceae	<i>E</i>	-	+	+	++	+/-	+/-
<i>Sansievieria liberica</i> / Dracaenaceae	<i>F</i>	++	-	+	+	++	-
<i>Senna alata</i> / Fabaceae	<i>F</i>	+	+	+	++	++	-

<i>Smilax kraussiana</i> / Smilacaceae	TF	-	-	+	++	-	-
<i>Solanum torvum</i> / Solanaceae	F	++	++	++	+	++	+
<i>Sonchus oleraceus</i> / Asteraceae	F	+	-	+	+	+	+/-
<i>Spathodea campanulata</i> / Bignoniaceae	E	+	-	+	+	+	+++
<i>Stereospermum accuminatissimum</i> / Bignoniaceae	E	++	-	+	+	+	+
<i>Thespesia populnea</i> / Malvaceae	F	-	-	+	+	++	+
<i>Vernonia ambigua</i> / Asteraceae	F	+++	-	+	+	+	+
<i>Vernonia inulaefolia</i> / Asteraceae	Tu	+++	-	+++	+++	+	+/-
<i>Vernonia sp</i> / Asteraceae	F	-	+	+	+	+/-	+/-
<i>Vitellaria paradoxa</i> / Sapotaceae	E	++	+	++	+	+	+
<i>Vitex doniana</i> / Verbenaceae	E	-	-	++	++	+/-	-
<i>Zehneria scabra</i> / Cucurbitaceae	TF	+	-	++	++	++	+

PU : Parts used, Wp: whole plant; L: leaves; B: barks; ; S: stems; SL: stem + leaves ; T : tubers ; Fr : fruits ; Alk : alkaloids; Fla : flavonoids ; Pol : polyphenols ; Tri : triterpens; Ste : sterols ; Sap : saponins ; (+++) : high ; (++) : moderate ; (+) : low and (-) : absent.

Discussion

Medicinal herbs have been discovered and used in traditional medicine practices since immemorial times. Plants synthesize hundreds of chemical constituents for defence against insects, fungi and diseases [36]. Chemical constituents of plants are highly divided into primary and secondary groups according to their activity in plants metabolism. Primary groups contain common proteins, amino acids, common sugars and chlorophylls pigments. Whereas, secondary metabolites are made of phenolic compounds, saponins, tannins, alkaloids and others [37, 38]. Medicinal value of plants specifically depend on the bioactive compounds which are found in parts of the plants. They give a precise physiological action on human body [37, 39]. The phytochemical screening of the 45 medicinal plants showed that these plants contained saponin, alkaloids, polyphenols, sterols, flavonoids and triterpens, and all these compounds were found to be present in *Aloe barbadense*, *Dyschoriste perrottettii*, *Laggera alata*, *Lippia multiflora*, *Piper capense*, *Solanum torvum* and *Vitellaria paradoxa*. The richness of the cited plants is in accordance with the findings of other researchers. For instance, this result agrees with the finding of Namadine *et al.* [40] who reported that stem barks extracts of *Vitellaria paradoxa* contains saponin, alkaloids, polyphenols, sterols,

flavonoids and triterpens ; the works of [41] in different organs of the genus *Lippia* (*L. nodiflora*, *L. graveolens*, *L. Citriodora*, *L. alba*, *L. javanica* et *L. scaberrima*) ; the study of [42] in *Solanum torvum* fruits ; the investigations of [43, 44, 45] in some species of the genus *Piper* (*P. capense*, *P. longum*, *P. nigrum*, *P. cubeba* etc.). Déléké Koko *et al.* [46] reported that the galactogenic properties of medicinal plants are not the result of only one or two chemical compounds, but the result of the synergetic interaction of chemical constituents. These authors sipulated that, saponins, tannins, alkaloids and flavonoids may be responsible for increasing prolactin content in blood, and may also contribute for lactation stimulation. The richness of these plants in chemical compounds, could justify their uses in the treatment of more than one affection of the reproductive system in the study area. For example, leaves of *Aloe barbadense* are used in the study locality to treat dysmenorrhoea, male and female infertility and vaginal cleansing. Leaves of *Dyschoriste perrottettii* are used to cure dysmenorrhoea and leucorrhoea. Leaves of *Laggera alata* are used for dysmenorrhoea, leucorrhoea and venereal diseases. Stems of *Piper capense* intervened for pelvic pains and postpartum haemorrhage treatment. *Lippia multiflora* leaves are used in the research area to treat female infertility, leucorrhoea and dysmenorrhoea. Multiple uses of plants may depend on their wealth in secondary metabolites. It has been demonstrated for many years by different researchers, that secondary metabolites exhibit biological activity such as antibacterial, antitumour, anthelmintic activity and effects on the central nervous system [47, 48, 49, 50, 51, 52, 53]. Polyphenols were present in all screened medicinal plants extracts. Flavonoids were found in most of the studied plants extracts except for those obtained from *Dioscorea dumetorum*. Triterpens were present in 40 plants, saponins and sterols were respectively found in 33 and 32 plants ; whereas, alkaloids were only present in 15 plants (Table 2). The presence of polyphenols in all the studied plants extracts may be explained by the fact that, they are found ubiquitously in plants and are generally involved in defense against ultraviolet radiation or aggression by pathogens ; in the last decade, there has been much interest in the potential health benefits of dietary plant polyphenols as antioxidants. Epidemiological studies and associated meta-analyses strongly suggest that long term consumption of diets rich in plant polyphenols offer protection against development of cancers, cardiovascular diseases, diabetes, osteoporosis and neurodegenerative diseases [54, 55]. Moreover, Mbosso *et al.* [18] have shown that polyphenols such as isoflavones, flavones, glucosides and anthocyanin inhibit the action of breast and prostate cancer cells. Louw [19] has shown that polyphenols originate from the extracts of *Piper capense* exhibited antimicrobial activity. Findings of Usang *et al.* [56] revealed that polyphenolic compounds

present in *Ficus exasperata* leaves extracts, inhibit activity of 17 α -hydroxylase involved in testosterone synthesis. However, polyphenols were reported to cause the constriction of the ductus arteriosus which may affect the fetus if used in excess [57, 58]. Thus pregnant women should avoid medicinal plants rich in polyphenols. Flavonoids were studied and found to contain antimicrobial, antioxidant and detoxification activities, and their antioxidant properties are due to their abilities to scavenge free radicals and to chelate metal ions [58]. Sharaibi *et al.* [59] revealed that, most diseases involved with some reproductive systems disorders are as a result of oxidative stresses caused by free radicals. This compound were identified in most of the tested plants extracts except *Dioscorea dumetorum*. This may justify the use of some of these plants for the treatment vaginal cleansing, male and female infertility, viral and venereal diseases, prostate inflammation, promoting lactation in women after giving birth, oligospermia. Flavonoids are also known to boost immunity by increasing white blood cell count [57, 58]; possesses alpha-glucosidase properties, antioxidant, anti-inflammatory, antiproliferative and anticarcinogenic activities [60, 61, 62, 63]. It has been also reported that flavonoids help to stop threatened miscarriage due to their biological function of protection against microbes [64]. Therefore, the presence of flavonoids in most of the studied plants may suggest the ability to act as antioxidant against the free radicals caused by reproductive disorders, the antimicrobial and anti-inflammatory capacities. The absence of flavonoids in *Dioscorea dumetorum* extracts is in contrast with the finding of Okoroafor and Iborida [65] in Nigeria. The difference might be due to soil content, geographical area, seasons of plant collection, plant parts, and growth stage of the plants [65].

Triterpens were found in 40 plants. It's a natural compound with various medical properties and found in both plants and animals [66]. Among natural products that mediate antagonistic and beneficial interactions within the organism, terpene play a variety of roles. They protects many living organisms like microorganisms, animals and plants from abiotic and biotic stresses [66]. Living organisms use terpene for multiple reasons like medicinal purposes and communications about food, mates, or enemies [66]. On the other hand, triterpenoids have been reported to be used as anti-inflammatory, analgesic, antipyretic, hepatoprotective, cardiogenic, sedative, tonic effects, antioxidant, antimicrobial, antiviral, antiallergic, antiangiogenic and spasmolytic [67, 68, 69, 70]. Moreover, triterpenoids have been reported to exhibit cytotoxicity against a variety of cancer cells without manifesting any toxicity in normal cells [68, 69, 70].

Oliver-Bever [72] (1986) and Okwu [73] had earlier reported that saponins have antibiotic properties and so help the body to fight infections and microbial invasion. Steroidal compounds are known to behave like hormones. Structurally they are similar. These compounds were respectively found in 33 and 32 plants screened. Sterols such as hormones oestrogen, testosterone and progesterone have been reported to improve lactation [47, 74], plays a crucial role in the menstrual cycle and helps to maintain pregnancy [64]. Thus, sterols identified in this study may perhaps involve in the treatment of oligospermia, male impotence, female and male infertility etc. in the study area. This work is also in affinity with the findings of Sharaibi *et al.* [59], who reported, the aphrodisiac, antiviral and antibacterial properties of steroids compounds. Moreover, Noguchi *et al.* [75] revealed that, diosgenin, a natural progesterone made from sterols, regulate hormonal imbalance and improves female hormones. Sterols identified in this study may perhaps be involved in the synthesis of hormones, such as progesterone.

Alkaloids were only found in 15 plants. It is reported that several drugs have been obtained from alkaloid-containing plants because of their pharmacological importance like antimicrobial, antiarrhythmic and analgesic, although higher doses can be toxic [76, 77]. Thus, alkaloids identified in this study may function to control some reproductive diseases such as dysmenorrhoea, abortion, leucorrhoea etc. According to Asiimwe and Savina [78] researchs, most plant species posses radical scavenging properties due to the presence of compounds like saponins, tannins and alkaloids. These chemical constituents boost immunity and fight fungal infections like *candida albicans*. It is known that dysmenorrhoea and leucorrhoea are almost due to fungal and bacterial infections.

Conclusion

Phytochemicals compounds present in the studied medicinal plants, justified their use in traditional medicine for the treatment of human reproductive organs diseases in the study area. They are widely used in traditional medicine to combat and treat various diseases. This research would increase the indigenous knowledge of traditional medicine in Cameroon. This work could also serve as precursors for the development of novel drugs for the management of reproductive health care in Cameroon. Secondary metabolites found in this study have been proven to be bioactive. However, alkaloids should be taken with precautions by pregnant women, because of their fetotoxic effects.

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