Traditional use of medicinal plants in Central Sudan

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Abstract:

Background: Traditional medicine is a folk medicine or herbalism practice based on the use of plants and plant extracts. The diversity of the climate of Sudan is responsible for its very rich flora.

Purpose: The aims of this work are to determine habitat, folkloric and current medicinal uses and the active constituents of the studied plants.

Study design: The type of study design used in this work is observational and descriptive study design.

Methodology: Method used is face-to-face interviews of herbal shops in Khartoum and Gezira state. The language used is Arabic language. The interviews involved 15 from 50 herbal shops; 10 in Khartoum state and 5 in Gezira state. The study also contains information about current uses and newly active constituents of some plants species therein were cited.

Conclusion: Eighty-six plants and herbs are reported in this study. They are distributed in Forty-three families. The popularly used species by natives were found to include *Solenostemma argel*, *Trigonella foenum-graecum*, *Acacia* spp, *Nigella sativa* and *Hibiscus sabdariffa*. All of which known to contain mixture of phenolic, flavonoids, terpenoids and sterols phytoconstituents. The highest numbers of plants are found belong to family Lamiaceae (Seven species), Fabaceae (Seven species), Apiaceae (Six plant species) and Asteraceae (Five plant species).

Key words: Ethnopharmacology, Traditional herbal medicine, Phytotherapy.

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Introduction:

Traditional medicine is a folk medicine or herbalism practice based on the use of plants and plant extracts. Traditional medicinal is also known as botanical medicine, medical herbalism, herbal medicine, herbology, and phytotherapy. The scope of herbal medicine is sometimes extended to include fungal and bee products, as well as minerals, shells and certain animal parts (Acharya and Shrivastava 2008).

Many plants synthesize substances that are useful to the maintenance of health in humans and other animals. These include aromatic substances, most of which are phenols or their oxygen-substituted derivatives such as tannins. Many are secondary metabolites, of which at least 12,000 have been isolated — a number estimated to be less than 10% of the total. In many cases, these substances (particularly the alkaloids) serve as plant defense mechanisms against predation by microorganisms, insects, and herbivores. Many of the herbs and spices used by humans to season food yield useful medicinal compounds (Lai 2004; Tapsell 2006). The use of herbs to treat disease is almost universal among non-industrialized societies (Edgar et al 2002). A number of traditions came to dominate the practice of herbal medicine at the end of the twentieth century.

Many of the pharmaceuticals currently available to physicians have a long history of use as herbal remedies, including opium, aspirin, digitalis, and quinine. The World Health Organization (WHO) estimates that 80 percent of the world's population presently uses herbal medicine for some aspect of primary health care (WHO 2013). Pharmaceuticals are prohibitively expensive for most of the world's population, half of which lives on less than $2 U.S. per day (Population Reference Bureau 2005; Kevin 2007). In comparison, herbal medicines can be grown from seed or gathered from nature for little or no cost. Herbal medicine is a major component in all traditional medicine systems, and a common element in Siddha, Ayurvedic, homeopathic, naturopathic, traditional Chinese medicine, and Native American medicine.

The use of, and search for, drugs and dietary supplements derived from plants have accelerated in recent years. Pharmacologists, microbiologists, botanists, and natural-products chemists are combing the Earth for phytochemicals and leads

that could be developed for treatment of various diseases. In fact, according to the World Health Organization, approximately 25% of modern drugs used in the United States have been derived from plants (WHO 2013).

Three quarters of plants that provide active ingredients for prescription drugs came to the attention of researchers because of their use in traditional medicine (Farnsworth 1990). Among the 120 active compounds currently isolated from the higher plants and widely used in modern medicine today, 80 percent show a positive correlation between their modern therapeutic use and the traditional use of the plants from which they are derived (Fabricant and Farnsworth 2001). At least 7,000 medical compounds in the modern pharmacopoeia are derived from plants (IENICA, 2005).

Sudan is the largest country in Africa with an area of 2 496 138 $km^{2.}$ It lies between latitudes $3^{\underline{0}}$ N and $23^{\underline{0}}$ N and longitudes $21^{\underline{0}}$ E and $39^{\underline{0}}$ E. it has common boundaries with nine countries, Egypt, Chad, central Africa, Uganda, Kenya, Ethiopia and Eritrea. After independence of South Sudan in 2011, Sudan became the second largest African country after Algeria.

The climate of Sudan ranges from completely arid to tropical zones with a wide range of bioclimatic regions, from the almost barren deserts in the north to the tropical rain forests in the extreme south of the country. The diversity of the climate of Sudan is responsible for its very rich flora. (Karan and Vishavjit 2004).

This an operational study type intended to investigate plants types used traditionally by local community in Central Sudan. It contains an authentication of local names with scientific names, plants habitat and active constituents, responsible for their pharmacological activities, distinct, approved medicinal uses throughout the world, and newly introduced have been included. The study considered as a guide for researchers and students who have interest in ethnopharmacology and medicinal plants research.

Objectives:

To determine habitat, folkloric and current medicinal uses and the active constituents of the studied plants. Also, for identifying some of Sudan's most important drugs.

Methods:

Method used is face-to-face interviews of herbal shops in Khartoum and Gezira state. The language used is Arabic language. The interviews involved 15 from 50 herbal shops; 10 in Khartoum state and 5 in Gezira state. The study also contains information about current uses and newly active constituents of some plants species there in were cited.

Results

As reported in Table (1), Eighty-six plants and herbs are reported in this study. They are distributed in Forty-three families. The popularly used species by natives were found to include *Solenostemma argel*, *Trigonella foenum-graecum*, *Acacia* spp, *Nigella sativa* and *Hibiscus sabdariffa*. All of which known to contain mixture of phenolic, flavonoids, terpenoids and sterols phytoconstituents. The highest numbers of plants are found belong to family Lamiaceae (Seven species), Fabaceae (Seven species), Apiaceae (Six plant species) and Asteraceae (Five plant species). Most of the studied plants are obtained from different parts of Sudan and several countries such as Egypt, South Sudan, and Greece. In Sudan, the fewest number of studied plants are obtained from Kassala state.

In Sudanese traditional medicine, plants are used extensively for several diseases and ailments including, constipation, malaria, gout, jaundice, etc. Most of the reported plants are used as anti-spasmodic, carminative, aphrodisiac, anti-hemorrhoid, anti-hypertensive and anti-diabetic agent. Apart from this, some of the reported plants have nutritive value such as anise and Abu-liali (*Detarium microcarpum*). Several clinical and pharmacological uses of the studied plants are reported in Table (1), such as anti-oxidant, antimalaria, anti-diarrhea, anti-microbial…etc. The antioxidant, anti-bacterial, anti-fungal and ant-inflammatory activities are the most studied uses of the plants. This may be due the current trend concerning utilization of natural products and herbal medicines.

Some of the reported plants have shown promising uses as pharmaceutical aids such as Hab ALaziz (*Cyperus rotundus*) and *Acacia* spp.

Table 1: Medicinal plants; habitat, traditional, current uses and active constituents:

Scientific name, family and plant part used*	Vernacular Name(s)	English Name(s)	Habitat and distribution	Medicinal uses (clinical and pharmacological)	Main folkloric and pharmaceutical preparation & dosage form	Active constituent(s)/class and references
Cymbopogon schoenanthus (Poaceae) H.	Maharib, Halfa bar المحريب، الحلفابر	Camel's hay	Northern and central Sudan	Antioxidant and antiacetylcholinesterase	Decoction of the whole plant used as diuretic and antigout.	Essential oils (limonene (10.5 27.3%), β-phellandrene (8.2–16.3%), δ-terpinene (4.3–21.2%) and α-terpineol (6.8–11.0%)- (Khadri *et al*. 2008)
Cyperus rotundus (Cyperaceae) S, R	Alseidaa السعدة	Nut grass	Sudan	Antimalarial	Herbal tea and powder of rhizome used as diuretic, antispasmodic, gum bleeding, antiemetic and hypotensive.	Sesquiterpene (patchoulenone, caryophyllene α-oxide, 10,12-peroxycalamenene and 4,7-dimethyl-1-tetralone)- (Thebtaranonth *et al.* 1995).
Haplophyllum tuberculatum (Rutaceae) H	Alhazza الحزا	Plant of the mosquito	Northern Sudan	Antibacterial and antifungal	Maceration of whole plant used for menstrual irregularities	Essential oils (β-phellandrene, limonene , (*Z*)-β-ocimene , β-caryophyllene, myrcene, and α-phellandrene) (Al-Burtamani *et al*. 2005; Pl@nt Use, 2020)
*Ziziphus spina-christi***.** (Rhamnaceae) L, B,S,R.	Sidr, Nabq السدر، النبق	Christ's thorn	Northern and central Sudan	Aqueous extract of root bark has an antinociceptive activity in mice and rats and a central depressant	Leave maceration used as hairdressing, antiseptic and antidandruff. Seed oil used for rheumatoid and	Leave contains saponin glycoside. Bark contain cyclopeptide alkaloid (Wallis, 2002) From butanol extract of the

				effect in mice. Stem bark has Antidiarrheal effects in rats	astringent.	leaves four triterpenoidal saponin glycosides were isolated and named christinin A-D. Different chemical compounds were identified in the stem bark (Ads *et al.* 2018)
Mentha sp (Lamiaceae) H.	Na'naa baladi النعناع البلدى	Spearmint	Several parts of the Sudan	Antifungal	Decoction of the whole plant used as carminative. vapour used in sinusitis (aromatic stimulant)	Essential oils (carvacrol, and thymol (Adam *et al.* 1998)
Carum carvi (Apiaceae) F.	Karawia الكراوية	Caraway	Sudan, Egypt	Antibacterial	Maceration used as antispasmodic, carminative and lactogoge	Esential oils (carvone, limonene, germacrene D, and *trans*-dihydrocarvone) (Iacobellis *et al.* 2005)
Pimpinella anisum (Apiaceae) F.	Yanson اليانسون	Anise	Several parts of the Sudan	Antifungal	Maceration of fruit used as carminative, antispasmodic and nutritive	Essential oil, anethole (Kubo and Himejima 1991)
Lavandula officinalis (Lamiaceae) Fl, H	Khuzama, Daram الخزامة، الضرم	Lavender	Sudan, Alsham	Bactericidal	Induce relaxation and calmness (aromatherapy). rheumatic pain	Volatile oils: broneol, linalol (Evans and Trease 2002a) euginol, 1,8-cineol and citronellol (Mohaddeseh *et al*. 2006).

Thymus vulgaris (Lamiaceae) H.	Zatar الزعتر	Thyme	Egypt, alsham	Antioxidant	Herbal tea used as carminative	Essential oils (Eugenol, thymol, carvacrol, linalool (0.471 mg/g), α-terpineol (0.291 mg/g), and 1,8-cineole and 4-allylphenol (Lee *et al.* 2005)
Lawsonia inermis (Lythraceae) L.	Henna الحناء	Henna	Several parts of the Sudan	Antifungal	Poultice used for skin and hair staining, febrifuge	2-hydroxy-1,4-naphthoquinone (Lawsone)-(Tripathi *et al.* 1978; Abdelrahman *et al.* 2020)
Eucalyptus globulus (Myrtaceae) L	Alban البلن	Eucalyptus	Wide spread	Pediculicide	Oil used as massage for joint pain, antiseptic and insect repellant	Monoterpenoids [1,8-cineole, *l*-phellandrene, (−)-α-pinene, 2-β-pinene, *trans*-pinocarveol, γ-terpinene, and 1-α-terpineol] and terpenoids (β-eudesmol and geranyl acetate) (Yang *et al.* 2004).
Eruca sativa (Brassicaceae) S.	Gergir, Kuthaa الجرجير, الكثأ	Arugula	Widely cultivated	Antioxidant	The seeds used as general tonic, to treat hair fall and aphrodisiac.	Carotenoids, vitamin C, fibers, flavonoids, Glucosinolates (glucoerucin) (Barillari *et al.* 2005a).
Cyperus esculentus (Cyperaceae) tuber.	Hab ALaziz, Hab Alzalom, Loz Alard حب العزيز، حب الزلم، لوز	Cyperus, Earth almond, Tiger nut	Kordofan Darfur	Protection against liver damage in rats. Antioxidant activity. Active against *Salmonella typhi.*	General tonic, aphrodisiac, stimulant and remove black spot from skin. Tuber starch has lower swelling power than	β-Sitosterol (Abu-Mustafa *et al.* 1960). Tuber contains vitamins A, C, and E as well as various amino acids. Tuber has low amount of antinutrients such as

	الارض			Reduce in growth of atherosclerotic lesion. Alleviates bone and joint pains	potato and maize, indicating tiger nut starch offer outstanding binding properties without conceding drug release characteristics and would be vital in pharmaceutical formulation	saponins, tannins, oxalates, phytate, and cyanogenic glycosides (Adenowo and Kazeem, 2020).
Raphanus sativus (Brassicaceae) S.	Alfegel الفجل	Radish	Wide and cultivated in Sudan	Antioxidant	General tonic, stomachic, asthma and bile stone	Glucosinolates (glucoraphasatin and glucoraphenin) (Barillari *et al*. 2005b).
Petroselinum crispum (Apiaceae) H.	Albagdonis البقدونس	Parsley	Several parts of the Sudan	Antioxidant	Maceration of the whole plant used as antispasmodic and diuretic.	Phenols (caffeic acid) (Kim *et al* 2008).
Zea mays (Poaceae) corn silk	Shawashi alzoraa شوشى الدرة	Corn silk	Several parts of the Sudan	Antioxidant	Decoction used as antispasmodic and diuretic	Volatile oil (*cis*-α-terpineol (24.22%), 6,11-oxidoacor-4-ene (18.06%), citronellol (16.18%), *trans*-pinocamphone (5.86%), eugenol (4.37%), neo-iso-3-thujanol (2.59%), and *cis*-sabinene hydrate (El-Ghorab *et al*. 2007).

Oscimium basilicum (Lamiaceae) Fl, S, L	Al reehan الريحان	Sweet basil	Wild plant in central and northern Sudan	Antioxidant	Aphrodisiac, insect repellant and carminative	Essential oils (linalool; 3.94 mg/g), (estragole; 2.03 mg/g), methyl cinnamate (1.28 mg/g), (eugenol; 0.896 mg/g), and 1,8-cineole (0.288 mg/g).) (Lee *et al*. 2005).
Elettaria cardamomum (Zingiberaceae) F.	Alhabahan, Hab Alhal, Heel الهبهان، حب الهال، هيل	Cardamon	India and Australia	Antifungal	Fruit maceration improve memory, aphrodisiac and vitiligo with olive oil and henna	Essential oil (1,8-cineole and α- terpinyl acetate) (Rahman *et al*. 1999).
Cinnamomum verum (Lauraceae) B.	Girfaa, Darseni القرفة، الدارسين	Cinnamon	China	Antifungal	General tonic	Cyclic monoterpene (β – phellandrene) and phenol (carvacrol) (Gourine *et al*. 2010).
Pistacia lentiscus (Anacardiaceae) V.oil (Resin)	Mistica, Mastaki المستكا، المصطكى	Lentisque	Greece	Antioxidant	Maceration used as expectorant and improve memory, diuretic, antidiahorrea in children.	Monoterpenes and sesquiterpenes (*α*-pinene/*α*-thujene, spathulenol, bicyclogermacrene and *δ*-3-carene (Gourine *et al*. 2010).
Coriandrum sativum (Apiaceae) F.	Kasbara الكسبرة	Coriander	Northern Sudan	Bactericidal	Fruit maceration Spicy and carminative	Aliphatic (2*E*)-alkenals and alkanals ((2*E*)-Dodecenal (C_{12}) and (2*E*)-undecenal (C_{11})) (Kubo *et al*. 2004).
Foeniculum vulgare (Apiaceae) F.	Shamar الشمار	Sweet fennel	Several parts of the Sudan	Antioxidant	Fruit maceration used as Carminative	Phenolic compounds (3-caffeoylquinic acid, 4-caffeoylquinic acid, 1,5-*O*-dicaffeoylquinic acid, rosmarinic acid, eriodictyol-

						7-*O*-rutinoside, quercetin-3-*O*-galactoside, kaempferol-3-*O*-rutinoside, and kaempferol-3-*O*-glucoside)- (Parejo *et al*. 2004).
Capsicum frutescens (Solanaceae) F.	Shataa الشطة	Hot pepper, chill	Several parts of the Sudan	Antioxidant	Febrifuge	Carotenoids (provitamin A), flavonoids, phenolic acids (capxanthin, lutein and zeaxanthin), ascorbic acid- (Howard *et al.* 2000). Capsaicin (Awad *et al* 2014).
Datura stramonium (Solanaceae) R, Fl, S	Saikaran السيكران	Stramonium, Jimsonweed	Central Sudan	Complete protection time (mosquito repellent). Analgesic and anti-asthamatic The boiled extract of seed has rapid onset of effects and may be useful for treatment of Organophosphorus poisoning.	Sedative and antispasmodic	Alkaloids (hyoscine, hyoscyamine, atropine) (Evans and Trease 2002b). Two new tropane alkaloids, 3-phenylacetoxy-6, 7-epoxynortropane and 7-hydroxyapoatropine were tentatively identified. Minor alkaloids are reported for the first times in *D. stramonium* are tigloidin, aposcopolamine, apoatropin, hyoscyamine N-oxide and scopolamine N-oxide17-20. 6 a-ditigloyloxytropane and 7-hydroxyhyoscyamine (Soni *et al.* 2012)
Lepidium sativum (Brassicaceae) S.	Al Rashad الرشاد	Garden-cress	Wild plant in central Sudan	Chemoprotective	Oral powder used for Peptic ulcer. Poultice used for abscess and Tinea	*G*lucotropaeolin (GT) and benzylisothiocyanate (BITC)- (Kassie *et al.* 2002)

					capitis	
Carthamus tinctorius (Asteraceae) Fl.	Osfur, Gurtom العصفر، القرطم	Safflower, false saffron	Saudi Arabia, Southern Asia, China, India, Iran, and Egypt	Menstrual cramps, post-partum hemorrhage, whooping cough and chronic bronchitis, rheumatism, and sciatica. Purgative, analgesic and antipyretic. Water extract of the flower is an anticoagulant, vasodilating, antihypertensive, antioxidative, neuroprotective, immunosuppressive, anticancer agent with inhibitory impacts on the synthesis of melanin.	Skin staining, diuretic, headache and oedema.	Flavanoids (carthamone) 2-safrole- (El Ghazali *et al.* 1998). Oilseed consists of 70% linoleic acid, 10% oleic acid, and mere amounts of stearic acid. Flavonoids, phenylethanoid glycosides, coumarins, fatty acids, and steroids identified from various parts of the plant (Delshad *et al.* 2018)
Tamarix aphylla (Tamaricaceae) H.	Tarfaa, Aathil الطرفة، الأثل	Tamarisk	Wild plant Nile bank in Sudan	All plant parts have antifungal, antimicrobial, antioxidant, cytotoxicity,	After burning ash used for burning wound and hemorrhoid	Polyphenols, tamarix ellagic acid, ellagatannin (El Ghazali *et al*. 1998). Rhamnocitrin, cyanidin 3-O-glycoside, cyanidin, delphinidin

				antipyretic, analgesic, anti-inflammatory and antihyperglycemic effect.		glycosides, kaempferol, quercetin, methylated flavonols, rhamnazin, rhamnetin, rhamnocitrin, kaempferide, tamarixetin, kaempferol 7,4'-dimethyl ether and dillenetin, Flavonols (Jasiem *et al.* 2019)
Origanum vulgare (Lamiaceae) H	Bardagosh, Mardagosh البردقوش، المردقوش	Sweet marjoram	Egypt	Antibacterial	The herbal tea used for weight loss. Vapour for migraine.	Essential oils (thymol (33%), gamma-terpinene (26%), and p-cymene (11%) (Faleiro *et al.*, 2005).
Piper nigrum (Piperaceae) F.	Filfil Abiet الفلفل الابيض	White piper	India	Antioxidant	Aphrodisiac, carminative	Essential oil and oleoresin (β-Caryophylline(29.9%),limonene (13.2%), β-pinene (7.9%) , sabinene (5.9%) and piperine (63%) (Kapoor *et al.* 2009).
Quercus sp (Fagaceae) S.	Baloat, Sendian البلوط، السنديان	Oak	Syria	Gastroprotective	Hemorrhoid, varicose vein, fistula, ulcer, enurises	Tannins (pedunculagin, castalagin, phillyraeoidin A, and acutissimin) (Khennouf *et al*. 2003).
Tamarindus indica (Caesalpinaceae) F.L	Aradeeb, Tamr hindi العرديب، تمر هندى	Tamarind	Northern and central Sudan	Antioxidant	Fruit maceration used as smooth laxative, antimalaria and jaundice.	Phenolic derivatives {2-hydroxy-3',4'-dihydroxyacetophenone(TA), methyl-3,4-dihydroxybenzoate (TA1,) 3,4-dihydroxyphenylacetate

						(TA2) and (-)-epicatechin (TA3)}(Tsuda *et al.* 1994).
Glycyrrhiza glabra (Fabaceae) R.	Erg Alsos عرق السوس	Licorice	Egypt	Antioxidant	Root maceration used to treat respiratory tract infections & ulcer.	Phenolic derivatives *(*hispaglabridin B , isoliquiritigenin and paratocarpin) (Chin *et al.* 2007).
Chamomilla recutita Matricaria recutita (Asteraceae) Fl.	Babong, Ein elget البابونج، عين القط	Roma chamomile	Mediterranean sea basin	Antiproliferative and Apoptotic	Flower maceration used as carminative, antigout and induce calmness	Glycoside (apigenin 7-*O*-glucoside) (Srivastava and Gupta 2007).
Punica granatum (Lythraceae) F.S,B	Roman الرمان	Pomegranate	Egypt	Antioxidant	Seed used as anthelmentic. Fruit juice used for ulcer healing. Fruit peal used in nasal bleeding	Juices contain (hydrolyzable tannins (punicalagin), anthocyanins, ellagic acid derivatives) (Gil *et al.* 2000).
Ruta graveolens (Rutaceae) H.	Al sazab السذاب	Rue	Mediterranean sea	Antifungal	Maceration of whole plant used as antiepileptic, UTI infection, aphrodisiac and back pain.	Furanocoumarins (hydroxycoumarin, and 7-methoxycoumarin). Alkaloid (1-methyl-2-[6‘-(3‘‘,4‘‘ methylenedioxyphenyl)hexyl]-4-quinolone) (Oliva *et al.* 2003).
Salvia officinalis (Lamiaceae) H.	Al Meremeia المرامية	Sage	Syria	Antioxidant	Maceration of whole plant used as skin staining, carminative	Glycoside (1-*O*-(2,3,4-trihydroxy-3-methyl)butyl-6-*O*-feruloyl-β-d-glucopyranoside, ethyl β-d-glucopyranosyl tuberonate, *p*-hydroxybenzoic acid, (−)-

						hydroxyjasmonic acid, caffeic acid, and 4-hydroxyacetophenone 4-*O*-[5-*O*-(3,5-dimethoxy-4-hydroxybenzoyl)-*β*-d-apiofrunosyl]-(1→2)-β-d-glucopyranoside)-(Wang *et al.*, 2000) "abietane diterpenoid(12-*O*-methyl carnosol) (Miura *et al.* 2002)
Rosmarinus officinalis (Lamiaceae) H.	Ecleel Algabal, Hasaleban اكليل الجبل، حصى البلن	Rosemary	Mediterranean sea	Anti-inflammatory	Memory stimulant, antibacterial and antifungal and headache.	Tritepenes, ursolic acid, oleanolic acid, and micromeric acid (Gianmario *et al.* 2007).
Detarium microcarpum (Caesalpiniaceae) F	Abu-laili ابولیلة	Sweet dattock	Nubba mountain Bahr el ghazal	Antifungal and inhibition of acetyl cholinesterase	Fruit's maceration used as antihypertensive (Sweet pulp used as sugar substitute)	Clerodane diterpenes (5α,8α (2-oxokolavenic acid) and 3,4-dihydroxyclerodan-13*E*-en-15-oic acid, 3,4-epoxyclerodan-13*E*-en-15-oic acid , 5α,8α(2-oxokolavenic acid) and 3,4-dihydroxyclerodan-13*Z*-en-15-oic acid) (Cavin *et al*. 2006; Pl@ntUse, 2020).
Hyphaene thebaica (Arecaceae) F.	Al doam الدوم	Palm tree, Gingerbread tree	Wild plant in northern and central Sudan	Antioxidant	Fruit's decoction used as antihypertensive	Flavanoids (quercetin glucoside, kaempferol rhamnoglycoside and dimethyloxy-quercetin) (Eldahshan *et al.* 2009).

Hagenia abyssinica (Rosaceae) S, F	Shaw makkada شاو مكادة ككوحبشى	African redwood, brayera, cussohagenia, or kousso	Sudan (Equatoria)	Anti-tumor	Powdered fruit used as purgative, anthelmintic and treatment of giardiasis	Kosins (alpha-kosin, kosotoxin and protokosin)- (Woldemariam *et al.* 1992).
Catharanthus roseus (Apocynaceae) H.	Winka وينكا	Madagascar periwinkle	Madagascar	Antioxidant	Whole plant maceration used in blood cancer	Alkaloids (vindoline, catharanthine, vinblastine and vincristine) (Ferreres *et al.* 2008). Flavonol glycosides (di- and trisaccharides of kaempferol, quercetin and isorhamnetin)- (Guo *et al*. 2007).
Boswelia sp (Burseraceae) V. oil (resin), stem bark	Murr hegazee, Luban gawee المر الحجازى، لبان البخور	Olibanum tree, Frankincense	Sudan (Kassala state), Somalia, Yaman	Inhibition of phosphodiesterase and xanthine oxidase inhibition. Prolylendopeptida	Antiseptic, anthelmentic, antitumor, abscess and hemorrhoid	Stem bark contain: triterpene (11-keto-β-boswellic acid , β-elemonic acid , 3α-acetoxy-11-keto-β-boswellic acid , and β-sitosterol). Two new stilbene glycosides

				se inhibition"		(*trans*-4',5-dihydroxy-3-methoxystilbene-5-*O*-{α-l-rhamnopyranosyl-(1→2)-[α-l-rhamnopyranosyl-(1→6)]-β-d-glucopyranoside (i), *trans*-4',5-dihydroxy-3-methoxystilbene-5-*O*-[α-l-rhamnopyranosyl-(1→6)]-β-d-glucopyranoside (ii)) New triterpene (3α-acetoxy-27-hydroxylup-20(29)-en-24-oic acid(i) and β-boswellic acid(ii) (Atta-ur-Rahman *et al.* 2005; Elfadil *et al.* 2015).
Tinospora bakis (Menispermacea) R.	Irg al-hagar عرق الحجر	-	Ingassana hill in East-south of Sudan.	Antidiabetic, Immunomodulatory effect	Maceration of root used for Wound healing. The macerated roots used for headache	The root contains alkaloids, including protoberberine type alkaloid palmatine, and 2–4% columbin, a diterpenoid furanolactone (Oyen, 2008; Farah *et al*. 2019).
Capparis decidua (Capparaceae) F.	Tundub الطنذب	-	Central Sudan	Antidiabetic, anthelmintic, antibacterial, antifungal, analgesic, anti-nociceptive, antirheumatic, hypolipid	Asthma, poultice used for treatment of headache	N-Acetylated Spermidine Alkaloids (14-N-acetylisocodonocaprine and 15-N- acetlycapparisine)-(Ahmad *et al*. 1992). Hygroscopic alkaloids isolated from roots

				emic, antiatherosclerotic, anti-tumor, antigiardial, antioxidant, anti-inflammatory, hepatoprotective, and anticonvulsant activities		(Capparine, Cappariline and Capparinine). Oxygenated heterocyclic(capparisesterpenolide (3-carboxy-6,17-dihydroxy-7,11,15,19-tetramethyleicos-13-ene-d-lactone) and deciduaterpenolides (d-lactone derivatives of1,3,3-trimethyl-1,4-cyclohexadien-6-one) (Neelkamal, 2009; Nazar *et al.*, 2020)
Hibiscus sabdariffa (Malvaceae) Fl, S, St, L	Kurkadai الكركدى	Red sorrel, hibiscus Roselle	Several parts of the Sudan	Antioxidant and Antimutagenic, hypotensive	Fruit maceration used to treat hypertension and scorpion sting .seed powder used for ulcer healing, general tonic, antimalarial. Cold cough.	Volatile oil (camphor and linalool) (Rosa *et al.* 2006). Vitamin E and some stigmasterol derivatives- (Jirovetz *et al.*, 1992; Nizar *et al.* 2014; Alsayed *et al.* 2020)
Linum usitatissimum (Linaceae) S.	Al ketan الكتان	Linseed, Flax	Mediterranean sea	Inhibit tumor metastasis	Poultice used as Febrifuge and for rheumatoid.	Phytoestrogen of lignan (secoisolariciresinol glycosides, matairesinol, isolariciresinol, and pinoresinol) (Sicilia *et al*. 2003a; Chen *et al*. 2006).
Abrus precatorius (Fabaceae) S.	Hub el-arous حب العروس	Jequirity, Crab's Eye, Rosary Pea, 'John Crow' Bead, Precatory bean, Indian	Bahar el ghazal	Immunomodulator	Female contraceptive	Flavonoids ; 6,4'-dimethoxy-7,3'-dihydroxyflavoiie; abrectorin and desmethoxycentaureidin 7-*O*-rutinoside (Bhardwaj *et al*. 1980) Agglutinin (Tripathi and

		Licorice, Saga Tree.				Maiti, 2005).
Citrullus colocynthis (Cucurbitaceae) F.S.	Hunzal الحنظل	Bitter melon, bitter apple and bitter cucumber	Wild plant in several parts of the Sudan	Antiallergic	Seed oil used as massage for rheumatoid, vitiligo, external pathogen, hemorrhoid and diabetes.	Glycoside (elaterin (cucurbitacin E), elatericin B (cucurbitacin I) and dihydroelatericin B (cucurbitacin L) (Lavie *et al*. 1964). Cucurbitane-type triterpene glycosides, cucurbitacin E 2-O-beta-D-glucopyranoside, its aglycon, cucurbitacin E and colocynthosides A and B (Yoshikawa *et al.* 2007).
Cucurbita maxima (Cucurbitaceae) S	Garaa القرع	Pumpkin	Several parts of the Sudan	Antioxidant	Seed used orally as anthelmentic. Seed's oil used for skin infection , hair nutrition, prostatitis and bening prostatic hypertrophy (BPH)	Phytoestrogen of lignin: secoisolariciresinol glycosides (Stevenson *et al.*, 2007). Tocopherol (α-tocopherol, γ-tocopherol, and δ-tocophe). Unsaturated fatty acid (stearic, oleic, linoleic, gadoleic acid) (Sicilia *et al*. 2003b).
Trigonella foenum-graecum (Fabaceae) S.	Helbaa الحلبة	Fenugreek	Several parts of the Sudan	Acetylcholinestera se inhibitor	Seed powder used orally as antispasmodic, antidiahorrea, treatment of dysentery, lactogoge. poultice used for treatment of tumors and hemorrhoid	Alkaloid, Trigonelline (SatheeshKumar *et al*. 2010).

Calotropis procera (Apocynaceae) Fl. latex	Oshar العشر	Sodom apple, milk weed	Wild plant in several parts of the Sudan	Antibacterial	Latex used externally to treat scorpion sting and rheumatoid.	Cardenolides: proceragenin (7β,14β-dihydroxy-5α-card-20(22)-enolide) (Akhtar *et al*. 1992).
Azadirachta indica (Meliaceae) L.B.S	Neem النيم	Neem, Margosa, Indian lilac	Several parts of the Sudan	Antimutagenic	Bark's maceration used as antimalaria & vitiligo. Leave's maceration used as anthelmentic and for measeles. Leaves used as insecticide.	Prenylated flavanones (5,7,4'-trihydroxy-8-prenylflavanone, 5,4'-dihydroxy-7-methoxy-8-prenylflavanone, 5,7,4'-trihydroxy-3',8-diprenylflavanone, and 5,7,4'-trihydroxy-3',5'-diprenylflavanone)-(Nakahara *et al*. 2003).
Balanites aegyptiaca (Zygophyllaceae) B, F	Hegleeg, La'loob, Balah alsahraa, Tamr el-abeed الهجليج، اللالوب، بلح الصحراء، تمر العبيد	Desert date	Wild plant in several parts Sudan	Antitumor	Bark used to treat vitiligo rheumatoid and gonohorrea. Fruits used for diabetes, constipation and giardiasis. Seed oil used for diabetes' wound.	Fruit contain: (spirostanol glycoside (balanitin-3, and a new sapogenol (6-methyldiosgenin) a new furostanol saponin (balanitoside) (Hosny *et al*. 1992). Steroidal saponins: (balanitin-6 (28%) and (72%) balanitin-7 (Gnoula *et al*. 2008).
Acacia nilotica (Fabaceae) Aerial parts	Garad, Sunut القرض، السنط	Acacia	Wild plant in several central and northern Sudan	Local anti-inflammatory	Fruit's maceration used to treat Malaria, hemorrhoid, cough. Dysentery and wound antiseptic.	Sex hormone (3beta-acetoxy-17 beta-hydroxy-androst-5-ene) (Chaubal *et al*. 2011).
Cassia	Sanamakaa	Senna, *Alexandrian*	Central and northern	Laxative	Leave and seed powder	Eight compounds were isolated from the leaves

angustifolia *Cassia italica* (Caesalpiniaceae) L, S	السنمكة	*Senna*	Sudan		used orally as laxative	(tinnevellin glycoside (I), isorhamnetin-3-O-beta-gentiobioside (II), apigenin-6,8-di-C-glycoside (III), emodin-8-O-beta-D-glucopyranoside (IV), kaempferol (V), aloe emodin (VI), D-3-O-methylinositol (VII), sucrose(VIII).) (Wu *et al*. 2007). Anthraquinone (sennosides A and B) (Hietala *et al*. 1987).
Solenostemma argel (Asclepiadaceae) L	Hargel الحرجل	Argel	Northern Sudan	Topical anti-inflammatory	Leave powder and maceration used as Carminative, antispasmodic, antidiabetes.	Pregnene glycoside (1, solenoside A) kaempferol-3-O-glucoside and kaempferol-3-O-rutinoside). 14 beta,15 alpha-dihydroxy Delta(4)pregnene-3,20 dione and kaempferol-3-O-rutinoside (Innocenti *et al.*, 2005).
Ambrosia maritima (Asteraceae) H.	Dimsissa, Afsenteen الدمسيسة، الافسنتين	Blood weeds Bitter weeds Rage weeds	Wild plant in central and northern Sudan	Molluscicide	Decoction of whole plant used to treat diabetes, hypertension. Powder used to treat renal pain and stones.	Sesquiterpene (damsin, ambrosin and hymenin) (Picman *et al*. 1986).
Artemisia annua (Asteraceae) H.	Sheeh الشيح	Sweet wormwood	Egypt and North	Antimalarial, anticancer, antiviral,	Whole plant used for treatment of Gardiasis, diabetes, athelmentic,	Sesquiterpene lactones: artemisinin and oil-soluble derivatives of artemisinin

			Africa	immunosuppressive, antibacterial and antioxidant, antifungal	headache and hypertension.	sodium artesunate and sodium artelinate (Klayman, 1993). Artemisinin (Firestone and Sundar 2009). Sterols: β-sitosterol and stigmasterol- (Abid Ali Khan *et al.* 1991; Noori *et al*., 2004). Essential oilS: camphor, germacrene D, *trans*-pinocarveol, β-selinene, β-caryophyllene and ketone (Juteau *et al*. 2002). Artemisinic acid, arteannuin, anhydrodihydro-artemisinin, β-arteether and α-arteether (Galal *et al*. 2005).
Ammi visnaga (Apiaceae) S.	Khella baladia الخلة البلدية	Visnaga	Egypt	Vasodilator and inhibit calcium oxalate nucleation	Decoction used as diuretic, anti ulcer and for renal stone.	Visnagin (4-methoxy-7-methyl-5*H*-furo [3,2-*g*][1]-benzopyran-5-one) (*Duarte et al*. 1995). Khellin (Abdel-Aal *et al*. 2009).
Nigella sativa (Ranunculaceae) S.	Kammon aswad الكمون الاسود	Black cummin	Northern Sudan and Ethiopia	Anti-inflammatory, antihyperglycemi, for lipid peroxidation and antihyperlipidimi, anticonvulsant, antioxidant, antibacterial, antimutagenic	Seeds used for weight gain and to treat diabetes hypertension, gardiasis, hair fall and ulcer.	Thymoquinone (Hosseinzadeh and Parvardeh 2004; Ahmed *et al.* 2006; Hosseinzadeh *et al.* 2007; Chehl *et al*. 2009 ; Pari and Sankaranarayanan, 2009 ; Al-Naqeep *et al.* 2009; Ragheb *et al.* 2009). Essential oil: p-cymene and thymoquinone (Kokoska *et al.* 2008).

						Phenolic principles: vanillic acid (Bourgou *et al.*, 2008).
Zingiber officinale (Zingiberaceae) Rh	Genzabeel الجنزبيل	Ginger	China, Nigeria	Antioxidant, anti-inflammatory, and antitumor, gastroprotective sffect, antifungal, antibacterial activity, anti-nociceptive	Maceration used as General tonic, expectorant, aphrodisiaic, anthelmentic and carminative.	Gingerols and shogaols - (Park *et al.* 2008; Sang *et al.* 2009; Jeong *et al.* 2009; Nigam *et al.* 2009), Gallic Acid and Cinnamic - (Nanjundaiah *et al.* 2011) Diarylheptenones: gingerenone A gingerenone B isogingerenone B and gingerenone C (Endo *et al.*, 1990). Paradols and zingerone (Kundu *et al.* 2009; Awad *et al.* 2012; Eisa *et al.* 2020; Osman *et al.* 2020).
Croton zambesicus (Euphorbiaceae) H.	Umm geliagla, Umm guleela امقليقلة، ام غليلة	-	Nubba mountain	Vasorelaxant	Herbal tea used to treat hypertension, diabetes. Dandruff, pulmonary infection and malaria	Trachylobane diterpenes (Baccelli *et al.* 2007)
Guiera senegalensis (Combretaceae) L.	Ghibaish الغبيش	Moshi medicine	Kordofan	Antifungal, antimalarial	Herbal tea used to treat hypertension, diabetes, spasm febrifuge. shower for muscle relaxation.	Methoxylated naphthyl butenone, guieranone A (Silva and Gomes, 2003). Beta-carboline alkaloids: harmalan (dihydroharman),

						harman and tetrahydroharman (Fiot *et al*. 2006)
Nauclea latifolia (Rubiaceae)H.	Karmadodaa كرمدودة	Smith	Nuba mountain	Anti-GST (Glutathione S-Transferases) and antifungal	Maceration used for hypertension and cold cough	Strictosamide, naucleamides A, naucleamide F, quinovic acid-3-O-beta-rhamnosylpyranoside, and quinovic acid 3-O-beta-fucosylpyranoside (Ata *et al*. 2009).
Kigelia africana (Bignoniaceae)F	Umm shotor لمشطور	Kigelia	Sudan	Anti-inflammatory	After burning, ash poultice used to treat Breast cancer	Verminoside, iridoid and polyphenols; verbascoside (Picerno *et al*. 2005).
Aristolochia bracteolata (Aristolochiaceae) H.	Um galagel لم جلاجل	Scorpion root	Wide spread in Sudan	Antibacterial, antifungal, anti-arthritis, hypotensive, hypothermia, antioxidant, anti-inflammatory, antihyperglycemic and antihyperlipidemic activities.	Poultice for tumor and scorpion sting	Aristolochic acids and esters, Naristolactams, aporphines, protoberberines, isoquinolines, benzylisoquinolines, amides, lignans, biphenyl ethers, coumarins, tetralones, terpenoids, benzenoids (Abdelgadir *et al.* 2015; Nandhini *et al.* 2017;

				antiplasmodial activity on chloroquine		Mathew *et al*. 2020).
Striga hermonthica (Scrophulariacea) H.	Al-buda البودا	Witchweed	Sudan (Parastic in sorgam)	Antimalarial	Maceration of whole plant used for cancer	Saponins, tannins, flavonoids, volatile oils and cardiac glycosides (Okpako and Ajaiyeoba, 2004).
Sterculia setigera (Sterculiaceae) B.	Tirtir and Baroat ترتر	Karaya gum tree	Sudan	Dichlormethane:Ethanol extract revealed remarkable tyrosinase inhibitory activity and high antiproliferative activity against human colon adenocarcinoma HT29	(i) Antihypertensive. (ii) Bark used in treating jaundice, and bilharzia	"Five known compounds namely; procyanidins as dimer B, trimer C1 and tetramer, 3,4-dimethoxyphenol ß-D-apiofuranosyl (1″→6″)- ß -D-glucopyranoside and (+)-catechin were identified, in addition to the isolation and characterization of lupeol"- (Al Safi, 2006; Alshambaty *et al*. 2020).
Salvadora persica (Salvadoraceae) St.	Arak الاراك	Tooth brush tree, chewing stick (miswak)	Central and Eastern Sudan	Antibacterial, antimycotic	Cleansing and mouth antiseptic	Volatile oil (benzyl nitrile, eugenol, thymol, isothymol, eucalyptol, isoterpinolene, and beta-caryophyllene), chlorine, trimethylamine, and alkaloid resin, and sulphur compounds (Al-Bagieh *et al*., 1994; Alali and Al-Lafi, 2003).

Lupinus termis (Fabaceae) S.	Turmos الترمس	Lupin	Several parts of the Sudan	Food protein supplement	Diabetes, skin infection	Lysine and Methionine (Gabrial and Morcos, 1976).
Adansonia digitata (Bombacaceae) F, R, S, B	Tabaldi, Gunglaiz التبلدى، القنقليز	Baobab	Kordofan	Food supplement	Fruit's juice used to treat diahorrea. Poultice of root used topically to increase penile size.	Proteins: valine (phenylalanine, tyrosine, isoleucine, lysine, arginine, threonine , cysteinem, methionine and tryptophan) and mineral (calcium, iron, potassium, magnesium, manganese, molybdenum, phosphorus, and zinc) (Yazzie *et al*. 1994)
Brassica nigra (*Brassicaceae*) S.	Khardal الخردل	Black Mustard	Mediterranean sea and several parts of the Sudan	Vasodilatation	Cold cough, vasodilator.	Mustard oil contains (allyl-isothiocyanate) (*Bánvölgyi et al.* 2004).
Ricinus communis (Euphorbiaceae) S.	Khairwi الخروع	Castor	Several parts of the Sudan	Purgative, antibacterial and antifungal, cytotoxicity, antioxidant, insecticidal, antiasthmatic, anti-inflammatory	Seed oil used as laxative, hair food. With same volume of fenugreek oil, castor oil used topically to increase buttock size.	Alkaloids, terpenoids, flavonoids, benzoic acid derivatives, coumarins, tocopherols, terpenoids and fatty acids (Ribeiro *et al.* 2016).
Aloe sp	Sabar	Aloe	India, South	Antioxidant, analgesics, anti-	Juice used topically for wound healing,	β- cumaric acid, Ascorbic acid, pyrocatechol and

(Aloaceae) H	الصبار		America, Central America, the Caribbean, Australia and Africa	bacterials, antivirals, anti-inflammatory.	hemorrhoid and orally to treat diabetes.	cinnamic acid. Anthraquinone Aloin and emodin, plant steroids; cholesterol, campesterol, β-sisosterol and lupeol, enzymes: aliiase, alkaline phosphatase, amylase, bradykinase, carboxy-peptidase, catalase, cellulase, lipase, and peroxidase. Minerals: calcium,chromium, copper,selenium, magnesium, manganese, potassium,sodium and zinc"- (Lawrence *et al.* 2009; Kar and Bera, 2018).
Eugenia caryophyllus (Myrtaceae) F.	Guronful القرنفل	Clove	India	Antioxidant, Anti-herpes simplex virus, antimicrobial, antifungal, antiviral activity, anti-inflammatory, cytotoxic, insect repellent and anaesthetic	Topical analgesic and carminative	Essential oils (eugenol, β-caryophyllene, cinnamaldehyde, carvacrol, thymol, α-humulene and eugenyl acetate) (Jirovetz *et al.* 2006; Chaieb *et al.* 2007; Tragoolpua and Jatisatienr, 2007).

Santalum album (Santalaceae)St.	Sandal الصندل	Sandal wood	India	Anti-Helicobacter pylori"	Scenting	Sesquiterpenes {(Z)-2beta-hydroxy-14-hydro-beta-santalol, (Z)-2alpha-hydroxy-albumol (2), 2R-(Z)-campherene-2,13-diol, (Z)-campherene-2beta,13-diol, (Z)-7-hydroxynuciferol, and (Z)-1beta-hydroxy-2-hydrolanceol, together with five known compounds, (Z)-alpha-santalol, (Z)-beta-santalol, (Z)-lanceol, alpha-santaldiol, and beta-santaldiol } (Ochi *et al.*, 2005).
Acacia seyal (Fabaceae) St. F	Talih الطلح	Gum Arabic	Sudan	Antioxidant, Attenuate the development of nephropathy in type I diabetes rat, Inhibits absorption of glucose in the intestine, reduce body weight.	Fume used for rheumatoid, Fruit's maceration used as antiseptic, Used as a carrier of drugs	Polysaccharides (rhamnose and glucuronic acid, arabinose and 4-O-methyl glucuronic acid), The amino acids (hydroxyproline and serine) (Williams and Phillips, 2009; Musa *et al.*, 2020)
Hordeum vulgare (Poaceae) F.	Shaeir baladi شعير بلدى	Barley	Several parts of the Sudan	Diuretic, Fatty acid synthase inhibition, glucose tolerance effect, Laxative, hypocholesterolemic, lower the fasting plasma glucose and glycosylated hemoglobin	Diabetes and renal stone	new cyanogenic glycoside(2-β- -glucopyranosyl-oxy-3-methyl-(2*R*)-butyronitrile)-(Erb *et al*. 1979; Rajesh *et al.* 2016).

				levels.		
Tribulus terrestris (Zygophyllaceae) H.	Dressa الضريسة	Puncture vine	Wild plant wide spread in Sudan	Cytotoxic	Maceration used as diuretic and astringent.	Furostanol saponins from fruits (terrestroside A, and terrestroside B, together with three known compounds, chloromaloside E , terrestrinin B and terrestroneoside A) (Wang *et al.* 2009).
Grewia tenax (Tiliaceae) F. R	Guddaim and Basham. (قضيم)	White Cross berry	Northern and Middle of Sudan	Fruit juice has Antioxidant activity	Fruit is used for malaria and anemia. Root is used to treat tonsillitis	Proximate composition of fruit is carbohydrate was 66.59%, while moisture, crude fiber, ash, crude protein and crude fat were 11.72%, 9.41%, 4.12%, 7.68% and 0.48%, respectively (Al Safi, 2006; Aboagarib *et al.* 2014; Suliman *et al*. 2018).
Prunus mahaleb (Rosaceae) S.	Mahlab (محلب)	Lucie cherry	Epirus (cultivated, not wild species)	Sedative and vasodilator, Cytoprotective and hypolipidemic effect.	Scenting, anti-diabetes, renal stone, gout, rheumatoid, cough.	Herniarin and herniarin glycoside, dihydrocoumarin, coumarin, amygdalin, prunasin, flavonoids, isoflavones, bioflavonoids, anthocyanins, proanthocyanins, vitamins, trace elements (Al-Said and Hifnawy, 1986; Ferramosca *et al.* 2019)

Terminalia brownii (Combretaceae)St.	Sobag, Darout, Shaf, Subaraya (صباغ، دروت، صبارية، شاف)	……	Wild plant wide spread in Sudan	Crude extract and its solvent fractions showed a significant antihyperglycemic activity in Streptozocin induced diabetic mice	Fume used for rheumatoid	Tannins, saponins, flavonoids, polyphenols, terpenoids, steroids, phytosterols and coumarins (Alema *et al.* 2020)
Cymbogon citratus (Poaceae) H.	Hashishut al-lemon حشيشة اليمون	Lemon grass	India and Kongo	Free Radical Scavengers and Antioxidants	Maceration of the whole plant used for renal stone, as lactogoge and antitumor.	Volatile oil (Isoorientin, isoscoparin, swertiajaponin, isoorientin 2‘ ‘-*O*-rhamnoside, orientin, chlorogenic acid, and caffeic acid) (Cheel *et al*. 2005; Warrag *et al*. 2014).
Anogeissus leiocarpus (Combretaceae)S. B.	Sahab (صهب)	African birch; Bambara: Ngálăma	Sudan [Southern Kordofan (Nuba mountain), Southern Darfur, and Blue Nile state].	Antifungal	Seed powder used orally for Giardiasis. Oral maceration of bark used for hemorrhoids	The root contains: Al, K, Fe, V, Na, Sc, Ca, Br, Zn, Mg, La, Cs, and C. The bark contains L, Sn, Co, Mn, Au and 3,3,4 trimethoxyflavellagic acid while the stem is reported to contain 4- O-β-D-glucoside (0.2 PPM) and fluoride

						(16.4) (Batawila *et al.* 2005)
Cinnamomum camphora (Lauraceae) V.oil	Kafur الكافور	Camphor	Egypt	Anti-inflammatory agent, antibacterial.	Oil used as massage for joint pain	sesquiterpene (cadinenol and epicubenol) (Takaoka, 1976; Chen *et al.* 2020)
Acacia Senegal (Fabaceae) Gum.	Hashab الهشاب	Gum Arabic	Wild plant wide spread in Sudan	Antioxidant, Inhibits absorption of glucose in the intestine, Reduce body weight and fat deposition	Gum used for ulcer, diahorrea, carminative, used as a carrier of drugs	Polysaccharides (rhamnose and glucuronic acid, arabinose and 4-O-methyl glucuronic acid), The amino acids (hydroxyproline and serine) (Williams and Phillips, 2009, Musa *et al.* 2020)

*__Abbreviations of Plant part used:__ B: bark, F: Fruit, Fl: Flower, H: entire herb, L.: Leaves, R: root, Rh: Rhizome, S: seed, St: stem, V. oil: volatile oil.

Discussion

In this study, the popularly used species by natives were found to include *Solenostemma argel* as antispasmodic (El Tahir *et al.* 1987), *Trigonella foenum-graecum* as nutrient and lactagogue (Shawahna *et al*. 2018), *Acacia* spp as tanning agent, incense of flue and antimicrobial, *Nigella sativa* as diuretic, antidiabetic and hypotensive agent (Ahmed *et al.* 2006) and *Hibiscus sabdariffa* which commonly used beverage drink and for hypertension (Alsayed *et al.* 2020). All of which known to contain mixture of phenolic, flavonoids, terpenoids and sterols phytoconstituents through which these group of natural products exhibit their wide range of therapeutic values. As mention in the text, sporadic use of different parts of some other medicinal plants are used to treat various health complains and symptoms. Aromatic herbs rich in volatile oils as *Mentha* spp (Adam *et al.* 1998), *Cymbopogon* spp (Warrag *et al*. 2014), Fennel (Parejo *et al*. 2004) Ginger (Awad *et al.* 2012; Eisa *et al.* 2020; Osman *et al.* 2020) find the top priority as spices and flavors with medicinal antispasmodic, expectorant, anti-inflammatory and antimicrobial activities. Traditional medicine based on knowledge, theories, beliefs and experiences indigenous to different

areas using various aspects of flora of the Sudan have been documented (Elghazali *et al,* 1987, 1994, 1997, 2004). Poisonous plants of the Sudan (Elghazali *et al.,* 2008) and scattered scientific research studies on medicinal and aromatic plants were conducted to have the rightful place in health care as herbal pharmaceutically produced medicine or nutraceutical and dietary supplements in country economy and trade as for export, culinary purpose, as spice, condiments, fruits and vegetables (Ahmed and Mirghani 2000; Ahmed *et al.* 2010; Khalid *et al.* 2012;). Medicinal plants (wilds or cultivated) such as Gum Arabic, Senna, Hibiscus, Lawsonia, Capsicum, Coriander, Nigella, Tamarindus and Adansonia are collected normally in small quantities for the domestic market and/or in large quantities for export purposes. (Eman, 2007). However, the interrelated issues of quality, safety and efficacy, the incorporation of medicinal plants in modern medical practices is quite rational since the integrated properties of such plants especially edible ones with their biological activity make their use for control and prevention of diseases possible and recommendable.

Conclusion:

Eighty-six plants and herbs are reported in this study. They are distributed in Fifty-one families. The popularly used species by natives were found to include *S. argel* as antispasmodic, Trigonella as nutrient and lactagogue, *Acacia* spp as tanning agent, incense for flue and antimicrobial, Nigella seeds as diuretic, antidiabetic and hypotensive agent and Hibiscus which commonly used beverage drink and for hypertension, *Mentha* spp, Cymbopogon, Fennel, Ginger as spices and flavours with medicinal antispasmodic, expectorant, anti-inflammatory and antimicrobial activities. All of which known to contain mixture of phenolic, flavonoids, terpenoids, sterols and volatile oils phytoconstituents through which these group of natural products exhibit their wide range of therapeutic values. The highest numbers of plants are found belong to family Lamiaceae, and Apiaceae. It could be concluded and recommended that, on considering quality, safety and efficacy of herbal products their specified use in combination with conventional therapy will no doubt produce an add-on therapeutic value to prevent or control diseases.

Declarations of Competing Interest

None.

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