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Traditional knowledge and use of medicinal plants in the Eastern Desert of Egypt: a case study from Wadi El-Gemal National Park

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The inherited culture of the uses of medicinal plants by local inhabitants were documented in Wadi El-Gemal National Park, Eastern Desert, Egypt. A total of 70 plant species were recorded as sources of medicines. The inhabitants are currently using only 32 plant species for treating various diseases. About 40.2% of the recorded uses were for treating digestive tract disorders, 13.4% for nervous system related, 10.4% for urinary tract disorders, 7.5% for skin related disorders and 4.5% for respiratory diseases. Further, 26 plants were used to cure more than one ailment, while 6 plants were used for single therapeutic application. When considering the plant species used by inhabitants for curing different ailments, the most represented families are Leguminosae (7 species) and Compositae (6 species). More efforts are needed to enhance the awareness of the local inhabitants for the proper methods of using medicinal plants.

Keyword: Medicinal plants, traditional knowledge, conservation, Wadi El-Gemal.

1. Introduction

Large human population in developing countries is dependent on plant resources for healthcare because allopathic medicine can cure a wide range of diseases, but its high prices and occasional side-effects are causing many people to return to herbal medicines which tend to have fewer side effects^[1]. In last few decades, traditional knowledge on primary healthcare has been widely acknowledged across the world. It is estimated that 60% of the world population and 80% of the population of developing countries rely on traditional medicine, mostly plant drugs, for their primary health care needs^[2]. Therefore there is an urgent need to document the medicinal and aromatic plants associated traditional knowledge, because this knowledge orally passes on from one generation to the next; thus, have vulnerability to wiped out^[1]. The earliest recorded history of civilization from ancient

culture of Africa, China, Egypt and Indus valley revealed evidences in support of the use of herbal medicine by dweller of those regions^[3]. Use of plants as a source of medicine has been inherited and is an important component of the health care system in Egypt. Keeping the traditional inherent knowledge, nowadays, Egyptians still depend on medicinal plants for primary health care needs^[4]. The documentation of medicinal plants prioritized by the local people, as well as their understanding of possible biodiversity loss and strategies of conservation are some of the under-explored aspects in ethnobotanical studies^[5]. Medicinal plants are an integral component of ethnomedicine in Egypt and more than 342 species of medicinal plants are collected from wild. Studies involving on medicinal plants reveal decline of these resources^[6, 7, 8, 9]. Information on the utilization of plants for primary healthcare in Egypt has been documented

by several workers [10, 11, 6,12, 13, 4, 14]. It has been documented that a great amount of traditional knowledge about the uses of medicinal plant species is still carried and orally transmitted by indigenous peoples [15]. The documentation of traditional knowledge especially on the medicinal uses of plants has provided many important drugs of modern day [16, 17]. It is also felt that traditional knowledge on medicinal plants is under the threat of disappearing with current rate of modernization hence comprehensive studies are important to document medicinal plant uses and conservation. Keeping in view the above, present study is aimed to document and underlines the importance of traditional knowledge used for the treatment of different diseases in Wadi El-Gemal

National Park, Egypt.

2. Material and Methods

Wadi El-Gemal National Park (WGNP) was declared in 2003. WGNP includes an area of 4,770 km² of land and approximately 2,000 km² of marine waters (Figure 1). The rangers' station, main entrance and the visitor center of the park are about 50 km south of Marsa Alam, Egypt. WGNP falls within latitudes N 24° 5' and N 24° 53'. It is also a part of the hyper-arid region characterized by arid climate and dominated by hot, rainless summer and mild winter and supports a rich biodiversity, culture and tradition. So far, 140 plant species belonging to 44 families have been recorded from the Park [18].

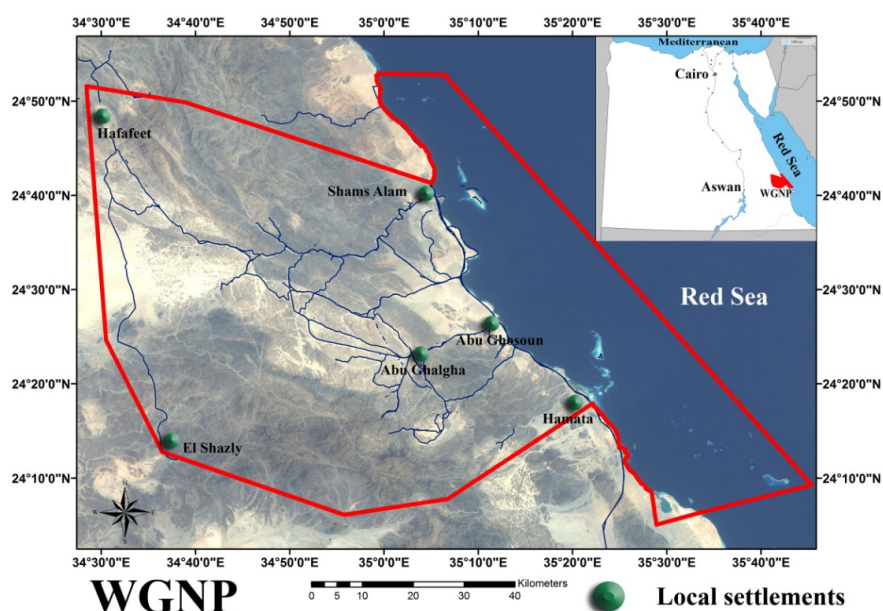


Fig 1: Map of the study area

Extensive field surveys were undertaken between the year 2005 to 2009 to gather data on medicinal plant species and their uses in different villages namely Abu Ghosoun, Abu Ghalgha, Hamata, Hafafect, Shams Alam and El Shazly in WGNP, Egypt (Figure 1). During the surveys, attempts were made to collect all possible information regarding the traditional use of medicinal plants, part(s) used and ailment cured. A semi-structured questionnaire survey, consultation and group discussion with local herbal practitioner were conducted. Direct interviews were conducted

with local people having knowledge about the medicinal plants and their uses. At first interviews were conducted using the 'specimen display' method. In this method, after collecting plant specimens for research, we showed these fresh specimens to the locals in order to elicit information. Later we also recorded photo of these plants and showed to the people to confirm the identity. The same plant specimens were shown to different people to confirm the accuracy of the results. When convenient to the participants, they were asked to accompany the

researchers for a walk, allowing for detailed information gathering. Several village headman, local healers, and shepherds were consulted to verify the information on indigenous use of plant species. The plant collections were identified with the help of Flora of Egypt [19, 20, 21, 22] and deposited/sourced in WGNP herbarium.

3. Results

A total of 70 species of medicinal plant species were recorded in the study area (Table 1). This indicates the high diversity of medicinal plants species in the WGNP. However, out of 70 species only 32 species are currently used by local inhabitants for medicinal purposes. The distribution of medicinal plants in the different

habitats indicated that 59.2% are present in wadis, 18.4% in coastal plains, 17.1% in the mountainous and 5.2% in the littoral habitats. Among medicinal plants, the recorded species of herbs, shrubs, trees are 27, 31 and 11, respectively. Only one fern species was recorded in present study (Figure 2). About 26% of the species were used for their leaves followed by fruit and root (12% each) and seeds (8%). The above-ground parts are used in most of the formulations of the medicines by local people. 9 different parts of plants were clearly reported to be used for medicinal purposes (Figure 3). The main problems treated by traditional medicine in the study area are stomach pain, fever, cough, wounds, diabetes and diarrhea, and there is also a consensus about the plants to treat these ailments.

Table 1. List of medicinal plants form Wadi El-Gemal National Park and their medicinal uses. Shaded rows represent plant species those are recorded to use by local inhabitants.

Species	Family	Growth habit	Used part	Use(s)/ailment treated
<i>Acacia etbaica</i> Schweinf.	Leguminosae-mim	Tree	Leaves and bark	Tanning hides, Stimulant, Gonorrhoea
<i>Acacia tortilis</i> (Forssk.) Hayne subsp. <i>raddiana</i> (Savi) Brenan	Leguminosae-mim	Tree	Gum	Stomach acidity, Ocular affections, jaundice
<i>Adiantum capillus-veneris</i> L.	Adiantaceae	Fern	Above-ground part	Asthma, chest colds, cough, edema, flu and urinary disorder
<i>Aerva javanica</i> (Burm.f.) Juss.	Amaranthaceae	Shrub	Roots and leaves	Acne-like conditions and against the 'evil eye'
<i>Amaranthus graecizans</i> L.	Amaranthaceae	Herb	Leaves	Constipation
<i>Anastatica hierochuntica</i> L.	Cruciferae	Herb	Above-ground part	Ease childbirth
<i>Arnebia hispidissima</i> (Sieber ex Lehm.) DC.	Boraginaceae	Herb	Root	Skin and hair diseases and anti-cancer properties
<i>Artemisia judaica</i> L.	Compositae	Shrub	Above-ground part	Stomachic, antihelminthic, expectorant, diaphoretic, analgesic, antispasmodic in case of intestinal colic and keeping snakes away from houses
<i>Asphodelus tenuifolius</i> Cav.	Asphodelaceae	Herb	Seed	Diuretic, applied externally to ulcers
<i>Balanites aegyptiaca</i> Del.	Zygophyllaceae	Tree	Fruits	Antidiabetic, antihelminthic
<i>Blepharis edulis</i> Linn.	Acanthaceae	Herb	Root	Against cataract, for feeble sight
<i>Calligonum polygonoides</i> L.	Polygonaceae	Shrub	Above-ground part	Fly repellent

<i>Calotropis procera</i> (Aiton) W.T.Aiton	Asclepiadaceae	Shrub	Leaves	For blisters and abscesses
<i>Capparis decidua</i> (Forsk.)	Capparaceae	Shrub	Leaves and fruits	Plaster for boils and swellings and acts as memory enhancer
<i>Capparis spinosa</i> L.	Capparaceae	Shrub	Fruits	For catarrh
<i>Chrozophora tinctoria</i> (L.) A.Juss.	Euphorbiaceae	Shrub	Above-ground part	Emetic, cathartic
<i>Chenopodium murale</i> L.	Chenopodiaceae	Herb	Above-ground part	Intestinal tract pains and fever
<i>Citrullus colocynthis</i> (L.) Schrad.	Cucurbitaceae	Herb	Leaves, root, fruit	Diuretic, Rheumatism, purgative, carminative and antiepileptic
<i>Cleome amblyocarpa</i> Barratte & Murb.	Capparaceae	Herb	Above-ground part	Antibacterial
<i>Cleome brachycarpa</i> Vahl ex DC.	Capparaceae	Herb	Leaves	Deodorant, appetizer, carminative
<i>Cleome chrysantha</i> Decne.	Capparaceae	Herb	Leaves, flowers seeds	Antimicrobial activity
<i>Cleome droserifolia</i> (Forssk.) Delile	Capparaceae	Shrub	Leaves	Urinary tract pains, diabetes, wounds, dermatitis and antimicrobial
<i>Convolvulus hystrix</i> Vahl	Convolvulaceae	Shrub	Whole plant	Anti oxidant activities
			Root	Purgative
<i>Cornulaca monacantha</i> Delile	Chenopodiaceae	Shrub	Leaves	Liver problems, jaundice purgative for camels
<i>Cotula cinerea</i> (L)	Compositae	Herb	Flower heads	Aroma, stomachic, against vomiting, nausea and scorpion bites
<i>Cuscuta</i> sp.	Convolvulaceae	Herb	Seeds	Impotence, premature ejaculation, frequent urination
<i>Cyperus conglomeratus</i> Rottb.	Cyperaceae	Shrub	Above-ground part	Pectoral, emollient, diuretic, stimulant, analgesic
<i>Echinops spinosissimus</i> Turra	Compositae	Shrub	Whole plant	Diuretic, nerve tonic and cough suppressant
<i>Echium horridum</i> Batt.	Boraginaceae	Herb	Aerial parts Above-ground part	Antimicrobial activity
<i>Euphorbia granulata</i> Forssk.	Euphorbiaceae	Herb	Latex	Internally for intestinal externally for snake-bites
<i>Fagonia mollis</i> Delile	Zygophyllaceae	Herb	Above-ground part	Psychological fears
<i>Ficus palmata</i> Forssk.	Moraceae	Tree	Fruit	Demulcent, emollient, laxative and poultice
<i>Frosskaolea tenacissima</i> L.	Urticaceae	Herb	Above-ground part	Cure for cough and headache
<i>Heliotropium bacciferum</i> Forssk.	Boraginaceae	Herb	Above-ground part	Snake bites
<i>Hyphaene thebaica</i> (L.) Mart.	Arecaceae	Tree	Fruit	Soft drink, Molasses

<i>Imperata cylindrica</i> (L.) Raeusch.	Poaceae	Shrub	Rhizome, flowers	Antipyretic, diuretic, hemoptysis, pulmonary diseases
<i>Indigofera spinosa</i> Forssk.	Leguminosae-pap	Shrub	Branches	Toothache analgesic
<i>Juncus rigidus</i> Desf.	Juncaceae	Shrub	Seeds	Diuretic and for diarrhea
<i>Lavandula coronopifolia</i> Poir.	Labiatae	Herb	Leaves	Stomach each
<i>Limonium axillare</i> (Forssk.) Kuntze	Plumbaginaceae	Shrub	Root and bark	Diabetes, wounds and inflammation
<i>Lindenbergia indica</i> (L.) Vatke	Scrophulariaceae	Herb	Leaves	Applied for skin eruption, oral for chronic bronchitis
<i>Lycium shawii</i> Roem. & Schult.	Solanaceae	Shrub	Root	Treat mouth sores, relieve backache, washing polio patients
<i>Maerua crassifolia</i> Forssk.	Capparaceae	Tree	Branches	Avert bad spell ritual
<i>Malva parviflora</i> L.	Malvaceae	Herb	Leaves, root, flower	For pyorrhea, astringent properties
<i>Moringa peregrina</i> (Forssk.) Fiori	Moringaceae	Tree	Seeds	Ben oil for cosmetics
<i>Neurada procumbens</i> L.	Neuradaceae	Herb	Whole plant extract	Increasing effect on blood pressure.
<i>Nitraria retusa</i> (Forssk.)	Nitrariaceae	Shrub	Fruits	Urinary tracts
<i>Orobanche cernua</i> Loefl.	Scrophulariaceae	Shrub	Spikes extract	Antibacterial
<i>Panicum turgidum</i> Forssk.	Poaceae	Shrub	Above-ground part	Toothache, treating wounds and removing eye spots
<i>Pergularia tomentosa</i> L.	Asclepiadaceae	Shrub	Above-ground part	Tanning, Hemorrhoids
<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	Poaceae	Shrub	Leaves	Bronchitis and cholera, applied to foul sores
<i>Pulicaria incisa</i> (Lam.) DC.	Compositae	Shrub	Above-ground part	Aromatic scent, carminative and stimulant
<i>Pulicaria undulata</i> (L.) C.A.Mey.	Compositae	Shrub	Fumes Above-ground part	Measles, insects expulsion
<i>Reichardia tingitana</i> (L.) Roth	Compositae	Herb	Above-ground part	Antifeedants
<i>Rhus tripartita</i> (Ucria)	Anacardiaceae	Tree	Fruits and leaves	Gastric, intestinal ailments
<i>Rumex vesicarius</i> L.	Polygonaceae	Herb	Leaves	High content of oxalic acid, constipation, bad digestion and as appetizer.
<i>Salvadora persica</i> L.	Salvadoraceae	Tree	Roots, branches, leaves, fruit	Tooth brush and mouth antiseptic, Urinary tract pain, diuretic
<i>Salvia aegyptiaca</i> L.	Labiatae	Herb	Above-ground part	Nervous disorders, dizziness, trembling, diarrhea and strong antimicrobial and antioxidant effects
<i>Senna alexandrina</i> Mill.	Leguminosae-caes	Shrub	Leaves	Stimulant laxative, bowel evacuation

<i>Senna italica</i> Mill.	Leguminosae-caes	Shrub	Leaves	Stimulant laxative, bowel evacuation and antibacterial and anti-tumor properties
<i>Solenostemma argel</i> Hayne	Asclepiadaceae	Shrub	Leaves	Cough, Gastro-intestinal cramps, stomachic and anticolic
<i>Suaeda monoica</i> Forssk	Chenopodiaceae	Shrub	Leaves	Ointment for wounds
<i>Tamarix nilotica</i> (Ehrenb.) Bunge	Tamaricaceae	Tree	Leaves	Hemorrhoids
<i>Taverniera aegyptiaca</i> Boiss	Leguminosae-pap	Shrub	Stem and root barks	Saponins are isolated Antibiotic, antifungal
<i>Tephrosia purpurea</i> (Dil.)	Leguminosae-pap	Shrub	Whole plant	Decoction against snake-bite and intestines inflammation
<i>Tribulus terrestris</i> L.	Zygophyllaceae	Herb	Fruits	Natural nutritional supplement, help impotence
<i>Zilla spinosa</i> (L.) Prantl	Cruciferae	Shrub	Hole dried plant	Urinary tract diseases
<i>Ziziphus spina-christi</i> (L.) Desf.	Rhamnaceae	Tree	Leaves	Colds, hypertension, astringent anthelmintic, antidiarrhoeal and demulcent
<i>Zygophyllum coccineum</i> L.	Zygophyllaceae	Herb	Fruits and seeds	Anthelmintic, diuretic
<i>Zygophyllum simplex</i> L.	Zygophyllaceae	Herb	Leaves and seeds	Anthelmintic, applied to eyes in cases of Ophthalmia and Leucoma

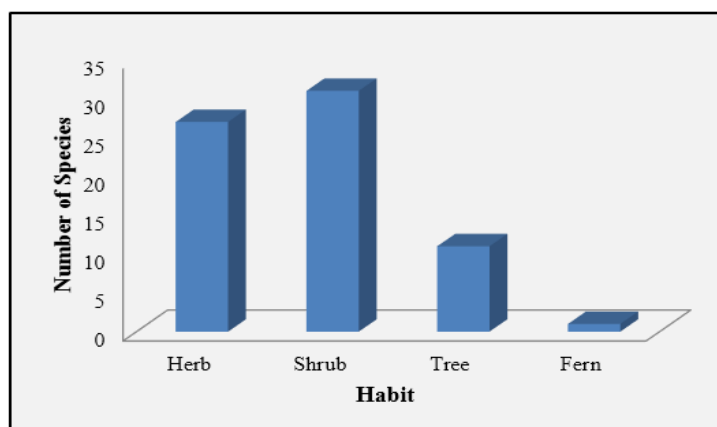


Fig 2: Growth forms (habits) of recorded medicinal plants species

4. Discussion

Wadi El-Gemal National Park is rich in plant diversity and local inhabitants are using medicinal plants traditionally for curing different ailments. So, preservation of the indigenous knowledge of plants used in traditional health care is very important. People utilize different parts of the plant for medicinal purposes. For

instance, the powder of leaves of *Cleome droserifolia* is used to treat urinary tract pains and diabetes. Similarly the above ground parts of *Salvia aegyptiaca* are used to treat nervous disorders, dizziness, trembling and diarrhea etc. The people of the area possessing good knowledge of herbal drugs but due to modernization, their knowledge of traditional

uses of plants may be lost in due course. So it is important to study and document the uses of plants by different local communities.

The substantial increase in the popularity of plant-based medicine for a variety of illnesses

and symptoms is reported recently which reflects that medicinal plants had continued to be used extensively as a major source of drugs for the treatment of many ailments.

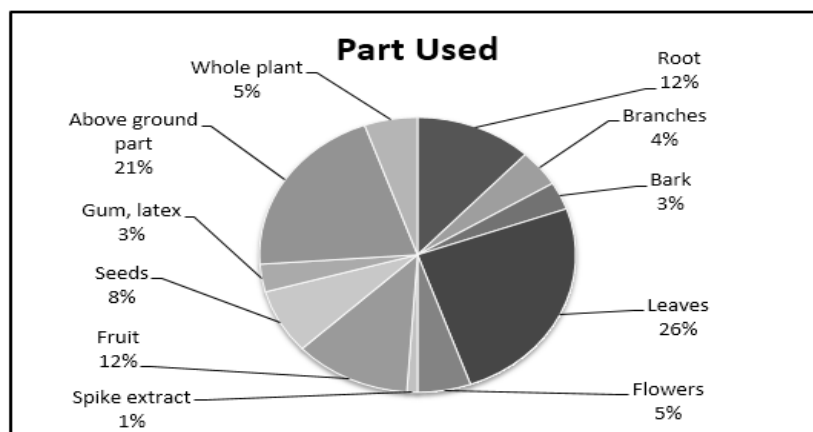


Fig 3: The part of medicinal plants used by the local inhabitant of the study area

Among plants parts, leaves were use substantially by local inhabitants. This result is consistent with the work of Caraballo *et al.* [23] conducted in South-eastern Venezuelan Amazon and Pierre *et al.* [24] work conducted in Cameroon, where they proved that the leaves were most frequently used plant part by local inhabitants. This probably because leaves are more available and accessible plant part and contain good amount of secondary chemicals which has potential to cure the target ailments. Furthermore, more extensive studies are needed to record medicinal plants diversity in the National Park, owing to its diverse habitats and topography. Even though most of the inhabitants have good accessibility to visit physicians or the clinics but they still use medicinal plants due to their efficacy and lesser side effects. This confirms the importance of these medicinal plants as renewable resources by local inhabitants in the study area. It was revealed that all of the informants of the study area use medicinal plants to treat at least some ailments and this shows dependency on the traditional primary healthcare practices among indigenous communities which is believed to be evolved over a long period of time based on necessities and experiences. However, it is evident that during the last few decades many people left the desert and inhabited

the coast where they can obtain new income resources in addition to the modern lifestyle. So it is believed that when they left the desert they also left their traditional knowledge behind which is clearly reflected by the present study. In this case, there is urgent need for enhancement and refreshing the traditional culture of medicinal plant uses by organizing workshops, meetings and conferences and ensuring the youth participation in such events. Also while conducting such sensitization programs, people needs to encourage to conserve medicinal plants by domesticating them in their home gardens, where possible. Because, at present the empowerment of local communities to conserve and sustainably use biodiversity is increasingly becoming an important policy shift as most of the local people in rural areas depend on natural resources for their livelihoods [25].

The most characteristic medicinal species include *Balanites aegyptiaca*, *Senna alexandrina*, *S. italica*, *Capparis spinosa*, *Salvadora persica*, *Solenostemma argel*, *Cleome droserifolia*, *Limonium axillare*, *Calotropis procera*, *Citrullus colocynthis* and *Artemisia judaica*. Hence, the above mentioned characteristic medicinal plants species could be prioritized for conservation and for further ethnopharmacological studies. Also it

is necessary to document the indigenous knowledge and protect such medicinally important species for future prospective and generations. In summary, the study sought to document the traditional medicinal plants based knowledge and establish the level of understanding among local communities in the area regarding species loss/decline. Capacity building and awareness regarding medicinal plants conservation status, domestication strategies as well as appropriate methods of propagation are crucial for sustainable utilization of these precious resources. Further studies can be done by interviewing more individuals from certain regions of Eastern Desert to compare the different uses for each plant species.

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