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Review

A review on ethno-medicinal plants used in traditional medicine in the Kingdom of Saudi Arabia



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ABSTRACT

The traditional medicine based on medicinal plants in the Kingdom of Arabia Saudia presents a strong relationship belonging to natural remedies, health, diet, and folk healing practice recognized by a specific culture. The aim of the current study is to carry out an ethnobotanical review on medicinal plants used in traditional medicine in the Kingdom of Arabia Saudia including information on plant species, used parts, preparation method as well as medical uses. Earlier published data in journals, textbooks, periodicals, websites, and databases written in pharmacological evidence of Suadi medicinal plants were based on gathering information. The present review work reported that 96 species belonging to 47 families have been used in Saudi Pharmacopeia. Amaranthaceae has the highest number of plant species (7) Followed by Asteraceae, Apocynaceae, and Fabaceae with 5 plant species in each. The inventoried plant species in the current work are frequently used for the treatment of various illnesses and to ensure the medication safety of Saudi people. The biological analysis of plant form used in Saudi natural remedies showed the dominance of herb and subshrub form with a percentage of 43% and 30% respectively. The most used preparation method of plant drugs, which used in Saudi Alternative medicine was decoction and infusion. The whole plant, leaves, seeds, and aerial parts were the most useful plant parts in natural preparation in Saudi traditional medicine with a percentage of 29%, 28%, 7%, and 5% respectively as reported in the present review work. The present review work gives big data about medicinal plants used in traditional medicine in the Kingdom of Saudi Arabia including data about plant species, used parts, preparation method as well as medical uses.

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1. Introduction

Medicinal plants have become a worldwide topic drawing an impact on world health. Herbal medicine has played a crucial role in the maintenance of the healthcare system of the wide population throughout the world (Akerele, 1988). This is majorly enhanced in less-developed or developing countries, where the history use of traditional medicine interrupted. The knowledge and the progress of the medical benefits of herbs have grown in both, developing and developed countries (Organization, 1998). Medicinal herbs have constituted the basis of alternative medicine and lead to be the main pathway for conceptualizing new drugs (Newman et al., 2000). At an earlier time of the nineteenth century, more than 80% of Medicine was formulated from plants, and especially after the scientific revolution, the field of herbal medicine has conducted the evolution of the pharmaceutical industry where the synthesized drugs noticeable (Shinwari and Qaiser, 2011). The larger use of medicinal plants in the treatment of diseases is due to one hand that plants or their derivatives are considered as safe and effective drugs, as well as with fewer secondary effects and are low in cost (Odhav et al., 2013). The alternative medicine knowledge based on the use of plants in treatment represents an inheritance passed from generation to upcoming over centuries either verbally or in writing, taking into account that the traditional inheritance may be facing extinction if it is not transmitted to next generation and still limited to former only (Schulze, 2017).

Folk medicine took place in the Kingdom of Arabia Saudia by 1940 with less demand for traditional medicine. Meanwhile, since 1990 the Saudi people changed their thinking towards traditional medicine and have increased its use in common life (Organization, 2001). Numerous ethnobotanical surveys carried out in Saudi Arabia showed that a large proportion of Saudi citizens are dependent on traditional medicine whether alone or associated with modern medicine (Bodeker and Ong, 2005).

An ethnopharmacological survey targeted the use of medicinal plants belong Saudi citizens showed that 80% of the interviewed have used herbal medicine for medications. It was reported in another study that 20% and 70% of the asked people using the herbal medicine for chronic and acute conditions respectively (Alanzi et al., 2016).

The usage of herbal medicine belongs the Saudi patients in the treatment of diseases like cancer, asthma, neurological and hepatic diseases was reported around 55%, 80% and 42.3%, 90% respectively (Jazieh et al., 2012; Al Moamary, 2008; Mohammad et al., 2015). 81.2% of Saudi citizens living in Riyadh city were asked about their opinion regarding the use of herbal medicine, they consider that the use of this model of medicine in treatment is still safe and harmless as reported previously (Suleiman, 2014). Another study took place in Jeddah reported among diabetic patients 64% prefer to use herbs to control diabetes. In this study, it was reported that 55.1% of Jeddah citizens prefer the use of plants rather than synthesized drugs and around 75.2% simultaneously use both, herbs and prescribed drugs (Kamel et al., 2017).

The current review was conducted to gather information about the plants used by Saudi citizens in traditional medicine, such as to highlight the description of medicinal plants including local name, the parts used, the preparation methods as well as traditional uses.

2. Materials and methods

2.1. Study area

Saudi Arabia is the third biggest country in the Asian continent after China and India. Geographically the Kingdom of Saudi Arabia is found on the Arabian Peninsula in the Middle East, located east of the Red Sea and west of the Persian Gulf.

Its coordinates are defined as 2500N, 04500E. It covers most of the Arabian Peninsula area and is connecting Africa and Eurasia (Fig. 1).

2.2. Data collection

Previously published data in journals, textbooks, periodicals, websites, databases and folklore information written in pharmacological profile and traditional uses of Suadi medicinal plants were checked for collecting information

3. Results and discussion

3.1. Ethnomedicinal data about medicinal plants used in traditional medicine in the Kingdom of Saudi Arabia

The fruits of the present review of ethnomedicinal plants used in traditional medicine in the Kingdom of Saudi Arabia are summarised in Table 1.

The present survey reported that 96 species springing from 47 families have been used in Saudi Pharmacopeia (Table 1). Amaranthaceae has the highest number of plant species (7) Followed by Asteraceae, Apocynaceae, and Fabaceae with 5 plant species in each. The present data were in accordance with other previous literature (Alfarhan et al., 1998a), in which it was reported that these mentioned families were the mostly used in traditional medicine in Saudi Arabia.

Data presented in Table 1 shows several plant species, frequently used for the treatment of various illnesses associated with skin and stomach diseases, respiratory tract infections, tuberculosis antipyretic, inflammations, anasarca, cancer, astringent, convulsions, cough, cramps, diarrhea, dysentery, headache, hypertension, snakebite, sores decreasing thirst, enhancing hunger monitor of adverse outcomes, medication safety, diuretic, alterative, antiperiodic and purgative.

The most cited plant families in the present work were Asteraceae, Fabaceae, Lamiaceae, Amaranthaceae, Asteraceae, Asclepiadaceae, Apocynaceae, Acanthaceae, Apiaceae and Poaceae, Annonaceae, Zingiberaceae, and Brassicaceae. All these plant families, as well as others reported in the present review, have been previously investigated in Saudi's flora (Alfarhan et al., 1998a,b; Hostettmann et al., 2000)

It was reported that herbal medicine used traditionally for disease treatment, also used as a precursor for the development of several promising drugs (Balunas and Kinghorn, 2005; Hostettmann et al., 2000). The present work highlights these practices from an ethnopharmacological survey by targeting 96 medicinal plant species frequently used by almost all Saudi Arabian people (Table 1).



Fig. 1. Map of Saudi Arabia (study area).

3.2. Biological form of plants used in Saudi Arabia traditional medicine

The biological analysis of plants used in Saudi natural remedies showed the dominance of herb and subshrub forms with a percentage of 43% and 30% respectively. The shrub and tree were also reported with a low percentage of 6% and 21% respectively ([Table 2](#)). These results were in agreement with earlier found data which reported that the most biological form of plants used in traditional medicine was subshrub, shrub, and herb ([Bourhia et al., 2019](#)).

3.3. Preparation method of plant drugs

According to our review report, the commonly used preparation methods of plant drugs in Saudi alternative medicine were decoction and infusion. Maceration at room temperature, powder mixed with honey-milk-oil, cooked, uncooked plants and external use were also documented with lower values.

3.4. Plant parts used

Leaves, whole plant, seeds, and aerial parts were the commonly used parts in natural preparation in Saudi traditional medicine with a percentage of 29%, 28%, 7%, and 5% respectively as reported in the present review work. Roots, stem, latex, bulb, fruits, and bark were also presented with a low percentage ([Fig. 2](#)).

Desiring to contribute to the conservation priorities of herbal knowledge of various medicinal plants of Saudi Arabia and to make it easy and familiarized with disease treatment, the present compilation was carried out.

According to previously reported data, the knowledge of traditional medicine could be facing extinction if it is not inherited from the previous generation to the upcoming. Several factors inducing loss of this knowledge associated with local culture, physical and

Used part of plant

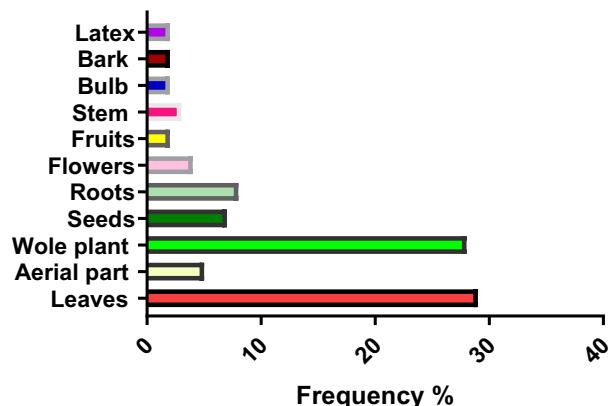


Fig. 2. Frequency of plant parts used.

biological environments such as lack of expertise of the modern people, acculturation, and rural exodus ([Bourhia et al., 2019](#)).

It was reported that ethnic and religious people throughout the world, to know the vegetal diversity of one another because a huge number of plant species have been facing extinction due to the pressure exercised by the consumers and environmental conditions. The phenomena of plant extinction could translate to lose at least one potential drug every two years ([Robertson, 2008a](#)). Each plant species lost due to extinction could represent not only the loss of healthcare saving cures for special diseases but also the loss of a probable primary metabolite like protein- or vitamin-rich foods ([Robertson, 2008b](#)).

In order to protect the germplasm of plants and to ensure sustainability, the public should learn the importance of herbal med-

Table 1

Summary of ethnopharmacological data about medicinal plants used in the Kingdom of Saudi Arabia.

Plant family	Plant species	Local name	Used parts	Medicinal uses/activities	References
Malvaceae	<i>Abutilon pannosum</i>	Verdc	Whole plant	Antimicrobial	(Akbar and Al-Yahya, 2011)
	<i>Malva parviflora</i>	Khobizza	Aerial plant	Boils, inflamed purulent wounds, and swellings	(El-Ghazali et al., 2010)
Fabaceae	<i>Acacia arabica</i>	Gum arabic tree	Whole plant	Haemorrhae, diarrhoea, scurvy, dysentery scurvy, and colds	(Al-Musayeib et al., 2012)
	<i>Rhazya stricta</i>	Harmal	Aerial parts	Skin and stomach diseases, Curative for chronic rheumatism and tumor	(Marwat et al., 2012)
Apocynaceae	<i>Carissa edulis</i>	Tome	Leaves and Roots	Regulate blood glucose, anthelmintic, antiscorbutic, astringent, stomachic and toothache.	(Kaunda and Zhang, 2017)
	<i>Adenium arabicum</i>	Adnah	whole herb and bark	Used in bones dislocations, wounds, skin infections, paralysis and painful joints	(Ghazanfar, 1994)
	<i>Nerium oleander</i>	Difla	Areal parts	Sthma, diabetes mellitus, corns	(Bokhari, 2009a)
	<i>Adenium obesum</i>	Adne	Areal parts	Headache	(Bokhari, 2009)
	<i>Catharanthus roseus</i>	Wenka	Flower, Leaves, Roots	Reducing blood glucose	(Al-Shaqha et al., 2015)
Mimosaceae	<i>Albizia lebbeck</i>	Lebbeck	Phloem	Anthelmintic night-blindness	(El-Ghazali et al., 2010)
Acanthaceae	<i>Blepharis aspatensis</i>	Heyne ex Roth	Leaves	Dysuria, headache	(Abdel-Kader et al., 2018)
	<i>Anisotes trisulcus</i>	Madh	Leaves	Diabetes Foot inflammation	(Abdel-Kader et al., 2018)
	<i>Aerva javanica</i>	Tourism	Whole plant	Toothache	(El-Ghazali et al., 2010)
Boraginaceae	<i>Alkanna orientalis</i>	—	Whole plant	Diuretic, antimicrobial effect, and central nervous system stimulation	(Akbar and Al-Yahya, 2011)
Amaranthaceae	<i>Arnebia hispidissima</i>	Kohael	Whole plant	Treatment of fever	(Srivastava et al., 1996)
	<i>Achyranthes aspera</i>	Mahwat	Whole herb	Diuretic, alterative, antiperiodic purgative, astringent stomachache, bowel complaints piles, boils and skin eruptions.	(Al-Asmari et al., 2017)
	<i>Aerva lanata</i>	Schult	Leaves	Antihyperglycaemic, -urolithic , astringent Purgative, diuretic and demulcent	(Adepu et al., 2013)
	<i>Achyranthes aspera</i>	Mahwat	Whole plant		(Bokhari, 2009)
	<i>Alternanthera sessilis</i>	Tamil	Leaves	Treating hepatitis, tight chest, bronchitis, asthma	(Saqib and Janbaz, 2016)
Annonaceae	<i>Amaranthus spinosus</i>	Qutaifa	Stem, Root	Emollient in scorpion sting	(Al-Asmari et al., 2017)
	<i>Amaranthus caudatus</i>	Kaf	Leaves	Diuretic, blood purifier, treatment of piles, strangury, and abortifacient used as an abortifacient	(Watt and Breyer-Brandwijk, 1962)
	<i>Amaranthus viridis</i>	Almehana	whole herb	antipyretic, diuretic, emollient, expectorant, stomachic, leucorrhoea and leprosy	(Chopra, 1956)
	<i>Chenopodium ambrosioides</i>	Errwa	Leaves	Diuretic and tonic, laxative	(Yadav et al., 2007)
	<i>Annona squamosa</i>	Qishda	Leaves, roots	Treatment of leukemia and cancer	(Champy, 2011)
Apiaceae	<i>Carum carvi</i>	Karawiya	Root	Neurological digestive, for gynaecological and urological problems, Infusion, ground	(Alqethami et al., 2017)
	<i>Conium maculatum</i>	Hemlock	Flower and stem	Analgesic	(Madaan and Kumar, 2012)
	<i>Petroselinum crispum</i>	Magdnus	leaves	Reatment of diseases of the prostate, liver, and spleen	(Al-Asmari et al., 2014)
Asclepiadaceae	<i>Anethum graveolens</i>	Dill	whole herb	Antimycobacterial, Antifungal, psychoactive, insecticides, hallucinogenic and insecticides	(Jirovetz et al., 2003)
	<i>Desmidorchis retrospiciens</i>	Ghlotha	Areal Parts	Chickenpox- smallpoxmeasles	(Abdel-Kader et al., 2018)
	<i>Monolluma quadrangula</i>	Gelf	Leaves	Influenza- diabetes	(Abdel-Kader et al., 2018)
	<i>Sarcostemma viminale</i>	Al Ashr	latex	Wounds	(Abdel-Kader et al., 2018)
Asteraceae	<i>Ceropegia variegata</i>	Drat Elkelb	Aerial part	Taeniafuge	(Abdel-Kader et al., 2018)
	<i>Artemisia judaica</i>	Beithran	Areal parts	Cough – cold	(Abdel-Kader et al., 2018)
	<i>Achillea fragrantissima</i>	Gaisom	Leaves	Used as anti-inflammatory, antimicrobial activity	(Saeidnia et al., 2011)
	<i>Artemisia herba-alba</i>	Chih	Leaves	Dental hygiene, abdominal pain, colic and liver failure	(Mohammed et al., 2018)

(continued on next page)

Table 1 (continued)

Plant family	Plant species	Local name	Used parts	Medicinal uses/activities	References
Loranthaceae	<i>Francoeuria crispa</i>	Gethgath	Whole herb	Antipyretic, treatment of inflammations, decreasing thirst, enhancing hunger	(Ahmad et al., 2016)
	<i>Anvillea garcinii</i>	nougd	Whole plant	Colds, digestive problems, gastro -intestinal troubles, pulmonary affections, and digestive problems	(El Hassany et al., 2004)
Loranthaceae	<i>Loranthus acaciae Zucc.</i>	Wiens	Leaves	Hypertension, cancer, obesity, gastrointestinal tract damage	(Norman et al., 2019)
Capparaceae	<i>Capparis spinosa</i>	Kuber	Fruits	Hypertension, inflammation, emmenagogue, anemia, rheumatism, dropsy, antidiabetic, analgesic; anthelmintic, rheumatism, paralysis, the treatment for spleen and tubercular glands	(Sher and Alyemeni, 2010)
Gramineae	<i>Oymbopogon citrates</i>	Lemon grass	Stalk and leaves	Treatment of bacterial infections	(Noor, 2016)
Verbenaceae	<i>Lantana camara</i>	Lantana	Leaves and flower	Respiratory tract infections	(Kirimuhuzya et al., 2009)
				Treatment of tuberculosis	
Labiate	<i>Ocimum basilicum</i>	Bobraii	Stem and leaves	Poor digestion, migraine, depression, kidney malfunction and skin infections	(Adtani et al., 2014)
Oleaceae	<i>Olea europaea</i>	azeiton	leaves	Gingivitis, otitis, icterus, cough, Aesthetic, liver diseases, thrush, dental caries, oesophageal swelling, ulcers, oedemas, wound demulcent, emollient, chologogue, calculi and diabetes.	(Hashmi et al., 2015)
Alliaceae	<i>Allium cepa</i>	Basar	Bulb	Assam, Mizoram, Nagaland, Meghalaya, Arunachal Pradesh and Sikkim	(Borbora et al., 2014)
Asphodelaceae	<i>Allium sativum</i>	Thom	Bulbuls	Anti-septic, anti-hypertensive	(Abdallah, 2017)
	<i>Allium ampeloprasum</i>	–	Leaves	Antimicrobial	(Alamri and Moustafa, 2012)
Cactaceae	<i>Aloe vera</i>	sebra	Whole plant	As laxative, peptic ulcers, in asthma, and diabetes	(Syed et al., 1996)
	<i>Asphodelus tenuifolius</i>	Broque	seeds	Colds, haemorrhoids and rheumatic pain	(Abdel-Mogib and Basaif, 2002)
Fabaceae	<i>Opuntia Ficus-indica</i>	Tin Shokai	Stems and Fruits	Antidiabetic Hypoglycemic	(Osuna-Martínez et al., 2014)
	<i>Lupinus albus</i>	Tirmees	Seeds	Diuretic, emmenagogue, hypoglycaemic and vermifuge	(Knecht et al., 2006)
Meliaceae	<i>Trigonella foenum-graecum</i>	Lhelba	Seeds	Anti-diabetic, antipyretic, diuretic, antiradica	(Mehrafarin et al., 2011)
	<i>Alhagi graecorum</i>	Aqool	Whole herb	Analgesic, Anti haemorrhoides, anti-tussine, Anti haemorrhoides, aphrodisiac, diuretic and laxative	(El-Shabasy, 2016)
Lamiaceae	<i>Alhagi maurorum</i>	Al -Aqool	Leaves	Antioxidant, antinociceptive, antiseptic, anthelmintic, expectorant, carminative, diuretic, emmenagogue and sedative, taken in whooping cough, bronchitis and colds	(Ahmad et al., 2000; Leung, 1980)
	<i>Astragalus spinosus</i>	kated	Whole plant	Used to treat leukemia, wound healing	(Bedir et al., 2000)
Acanthaceae	<i>Azadirachta Indica</i>	Neem	Whole plant	Used as antifungal	(Aly and Bafeel, 2010)
	<i>Teucrium polium</i>	Giadah	Leaves	Hypolipidemic, Hypoglycemic, treat liver disease, jaundice, diabetes, fertility problems and cancer.	(Djordjevic et al., 2018; Ljubuncic et al., 2005)
Lauraceae	<i>Salvia officinalis</i>	Meramiah	Leaves	Treatment of heartburn and bloating	(Ghorbani and Esmaeilizadeh, 2017)
	<i>Belpharis ciliaris</i>	Shok aldab	whole herb	Used to treat toothache and skin wounds	(El-Ghazali et al., 2010)
Capparidaceae	<i>Cinnamomum burmannii</i>	Gerfah	Bark	Analgesic, anti-diabetic, anti- antirheumatic, anti-thrombotic	(Al-Dhubiab, 2012)
	<i>Laurus nobilis</i>	Ghr	Leaves	Astringent, stomachic, stimulant and narcotic	(Chalumeau and Benito-espinal, 1984)
Lythraceae	<i>Cadaba farinose</i>	Asef	Whole herb	Used as a purgative, anthelmintic, emmenagogue, antisiphilitic, aperient, a remedy for dysentery, fever, cough and lungs problem	(El-Shabasy, 2016)
	<i>Capparis cartilaginea</i>	Shafallah	Whole herb	Antiseptic, laxative, antiseptic and anti-inflammatory	(Al-Shanwani, 1996)
Myrtaceae	<i>Capparis deciduas</i>	Tandhab	Whole herb	Analgesic, aphrodisiac carminative, laxative and diaphoretic, anthelmintic and emmenagogue	(Ageel et al., 1986)
	<i>Caralluma sinaica</i>	Did Elkalba	Whole plant	Antiprotozoal	(Al-Musayeb et al., 2012)
Pedaliaceae	<i>Punica granatum</i>	Roumon	Fruit	Cancer, cardiovascular disease, diabetes	(Bhowmik et al., 2013)
	<i>Syzygium aromaticum</i>	Kronful	Flower Buds	Treatment of toothache, mouth, throat inflammation and gastrointestinal disorders.	(Bhowmik et al., 2012)
Ranunculaceae	<i>Sesamum indicum L.</i>	Smsim	Seeds	Improve nutritional status prevention of diseases	(Moazzami and Kamal-Eldin, 2009)
	<i>Nigella sativa</i>	Hba souda	Seeds	Monitor of adverse outcomes, medication safety, patient compliance	(Al Jaouni et al.,

Table 1 (continued)

Plant family	Plant species	Local name	Used parts	Medicinal uses/activities	References
Rhamnaceae	<i>Ziziphus spina christi</i>	Sider	Leaves	Treatment of pulmonary ailments and fevers	2017) (Asgarpanah and Haghighat, 2012)
Zingiberaceae	<i>Curcuma longa</i>	Karcum	Roots	Relieving gas, improving digestion, regulating menstruation, relieving arthritis, antioxidant, anti-inflammatory, antiplatelet, antimicrobial and cholesterol lowering	(Benzie and Wachtel-Galor, 2011)
	<i>Zingiber officinale</i>	Zingabil	Rhizome	Treatment of heart diseases and lungs, relief cough and cold, throat infection and besides	(Kumar Gupta and Sharma, 2014)
Tamaricaceae	<i>Tamarix aphylla</i>	Athil	Leaves Rhizome	Infection of wound, Stomach ache	(El-Ghazali et al., 2010)
Liliaceae	<i>Asphodelus fistulosus</i>	Al-Himaar	Aerial parts	Stimulant, laxative, diuretic and crushed treatment of ulcer; used to make cakes of boiled, anthelmintic and Stomach ache	(Qureshi et al., 2010)
Poaceae	<i>Dactyloctenium aegyptium</i>	Behma	Whole herbs	Wound sepsis	(El-Ghazali et al., 2010)
	<i>Panicum turgidum</i>	Temam	Whole herb	Eye infection	(El-Ghazali et al., 2010)
	<i>Cynodon dactylon</i>	Thil	Whole plant	Treatment of anasarca, cancer, convulsions, cough, cramps, diarrhea, dysentery, headache, hypertension, snakebite, sores	(Nagori and Solanki, 2011)
Brassicaceae	<i>Farsetia aegyptiaca</i>	Jerbaa	Whole herb	Toothache, gingivitis and rheumatism	(Sakkir et al., 2012; El-Ghazali et al., 2010)
	<i>Eruca sativa</i>	Roucka	Seeds	Anticancer, antiulcer, diuretic	(JAAFAR and JAAFAR, 2019)
	<i>Anastatica hierochuntica</i>	Khaf	Whole herb	Anti-diabetic activity	(Rahman et al., 2002)
Papaveraceae	<i>Argemone Mexicana</i>	Maryam	Whole plant	Facilitate maternity	(Akbar and Al-Yahya, 2011)
	<i>Emex spinosa</i>	Hambaaz	Whole herb	Antimicrobial	
Polygonaceae	<i>Calligonum comosum</i>	Artaa	Whole herb	Appetizer, biliousness, and to stimulate appetite	(El-Ghazali et al., 2010)
Polygonaceae	<i>Calotropis procera</i>	Oshar	Latex	Anti-inflammatory and anti-ulcer effect	(Kamil et al., 2000)
Asclepiadaceae	<i>Anabasis setifera</i>	Hamd	Leaves	Used to treat psoriasis, leishmaniasis, and skin infections	(El-Ghazali et al., 2010)
Chenopodiaceae	<i>Cassia italica</i>	Sanamakka	Whole herb	Anti-inflammatory	(Abdou et al., 2013)
Caesalpiniaceae				Laxative and urinary tract purifier	(El-Ghazali et al., 2010)
Resedaceae	<i>Reseda muricata Presl.</i>	Danban	Fruit	Menstruation tonic	(El-Ghazali et al., 2010)
Euphorbiaceae	<i>Chrozophora oblongifolia</i>	Tannom	Roots	Heating	(Sher and Aldosari, 2013)
	<i>Acalypha fruticosa</i>	mchacha	root	Root in goat bone soup and drink the soup to treat liver problems	(Sripathi and Sankari, 2010)
	<i>Acalypha indica</i>	Anama	whole herb	Cure from bronchitis, and asthma, pneumonia	(Yusuf et al.)
Tamaricaceae	<i>Tamarix aphylla</i>	Cedaar	Leaves	Treating wounds	(Emad and Gamal, 2013)
Zygophyllaceae	<i>Tribulus terrestris</i>	Tikandu	Seeds	Tonic, diuretic, and aphrodisiac	(Al-Asmari et al., 2014)
Typhaceae	<i>Typha domingensis</i>	Pardey	Whole plant	Cardiac depression	(Akbar and Al-Yahya, 2011)
Tiliaceae	<i>Grewia tenax</i>	Aub	Aerial parts	Liver disorder	(Al-Said et al., 2011)

Table 2
Plant species and habits.

Plant species	Habit	Photograph
<i>Rhazya stricta</i>	Subshrub	
<i>Adenium obesum</i>	Tree	

Table 2 (continued)

Plant species	Habit	Photograph
<i>Nerium oleander</i>	Subshrub	
<i>Blepharis maderaspatensis</i>	Herb	

(continued on next page)

Table 2 (continued)

Plant species	Habit	Photograph
<i>Anisotes trisulcus</i>	Shrub	
<i>Aerva javanica</i>	Subshrub	
<i>Achyranthes aspera</i>	Herb	
<i>Aerva lanata</i>	Herb	
<i>Alternanthera sessilis</i>	Herb	
<i>Amaranthus spinosus</i>	Herb	
<i>Chenopodium ambrosioides</i>	Herb	
<i>Annona squamosa</i>	Tree	
<i>Carum carvi</i>	Herb	

Table 2 (continued)

Plant species	Habit	Photograph
<i>Conium maculatum</i>	Herb	
<i>Desmidorchis retrospiciens</i>	Subshrub	
<i>Petroselinum crispum</i>	Herb	
<i>Desmidorchis retrospiciens</i>	Subshrub	
<i>Monolluma quadrangula</i>	subshrub	
<i>Sarcostemma viminale</i>	Herb	
<i>Ceropogia variegata</i>	Herb	
<i>Artemisia judaica</i>	Herb	
<i>Achillea fragrantissima</i>	Subshrub	

Table 2 (continued)

Plant species	Habit	Photograph
<i>Artemisia herba-alba</i>	Subshrub	
<i>Francoeuria crispa</i>	Subshrub	
<i>Loranthus acaciae Zucc.</i>	Tree	
<i>Capparis spinosa</i>	Subshrub	
<i>Oymbopogon citrates</i>	Subshrub	
<i>Lantana camara</i>	Subshrub	
<i>Ocimum basilicum</i>	Herb	
<i>Allium cepa</i>	Herb	
<i>Opuntia Ficus-indica</i>	Shrub	

Table 2 (continued)

Plant species	Habit	Photograph
<i>Lupinus albus</i>	Herb	
<i>Trigonella foenum-graecum</i>	Herb	
<i>Teucrium polium</i>	Subshrub	
<i>Salvia officinalis</i>	Herb	
<i>Cinnamomum burmannii</i>	Tree	
<i>Laurus nobilis</i>	Shrub	
<i>Punica granatum</i>	Tree	
<i>Syzygium aromaticum</i>	Tree	
<i>Sesamum indicum</i>	Herb	

(continued on next page)

Table 2 (continued)

Plant species	Habit	Photograph
<i>Nigella sativa</i>	Herb	
<i>Ziziphus spina christi</i>	Tree	
<i>Curcuma longa</i>	Herb	
<i>Cassia italica</i>	Subshrub	
<i>Zingiber officinale</i>	Herb	
<i>Tamarix aphylla</i>	Tree	
<i>Asphodelus fistulosus</i>	Herb	
<i>Dactyloctenium aegyptium</i>	Herb	
<i>Panicum turgidum</i>	Subshrub	
<i>Cynodon dactylon</i>	Herb	

Table 2 (continued)

Plant species	Habit	Photograph
<i>Farsetia aegyptiaca</i>	Herb	
<i>Eruca sativa</i>	Herb	
<i>Emex spinosa</i>	Herb	
<i>Anabasis setifera</i>	Subshrub	
<i>Malva parviflora</i>	Herb	
<i>Reseda muricata Presl.</i>	Herb	
<i>Chrozophora oblongifolia</i>	Subshrub	
<i>Tribulus terrestris</i>	Herb	
<i>Grewia tenax</i>	Tree	

Table 2 (continued)

Plant species	Habit	Photograph
<i>Abutilon pannosum</i>	Subshrub	
<i>Acacia arabica</i>	Tree	
<i>Carissa edulis</i>	Tree	
<i>Olea europaea</i>	Tree	
<i>Adenium arabicum</i>	Subshrub	
<i>Catharanthus roseus</i>	Herb	
<i>Albizia lebbeck</i>	Tree	
<i>Alkanna orientalis</i>	Subshrub	
<i>Arnebia hispidissima</i>	Subshrub	

Table 2 (continued)

Plant species	Habit	Photograph
<i>Achyranthes aspera</i>	Herb	
<i>Amaranthus caudatus</i>	Subshrub	
<i>Amaranthus viridis</i>	Herb	
<i>Anethum graveolens</i>	Subshrub	
<i>Anvillea garcinii</i>	Subshrub	
<i>Allium ampeloprasum</i>	Herb	
<i>Asphodelus tenuifolius</i>	Subshrub	
<i>Alhagi graecorum</i>	Subshrub	

(continued on next page)

Table 2 (continued)

Plant species	Habit	Photograph
<i>Astragalus spinosus</i>	Subshrub	
<i>Azadirachta Indica</i>	Tree	
<i>Belpheoris ciliaris</i>	Subshrub	
<i>Cadaba farinosa</i>	Shrub	
<i>Capparis cartilaginea</i>	Subshrub	
<i>Capparis decidua</i>	Shrub	
<i>Anastatica hierochuntica</i>	Subshrub	
<i>Caralluma sinaica</i>	Herb	

Table 2 (continued)

Plant species	Habit	Photograph
<i>Argemone Mexicana</i>	Herb	
<i>Calligonum comosum</i>	Saushrub	
<i>Calotropis procera</i>	Shrub	
<i>Acalypha fruticosa</i>	Subrub	
<i>Acalypha indica</i>	Herb	
<i>Typha domingensis</i>	Herb	

medicinal plants in medication minimizes the high cost of treatment with modern medicine and minimizes the side effects due to the use of modern drugs ([Saganuwani, 2009](#)).

4. Conclusion

All the medicinal plants reported in the current review work have been used in Saudi traditional medicine for the treatment of different human diseases. However, the investigated plants in the present review need further studies covering specific screening of natural products, pharmacological and biological activities as well as a safety control. These Data Open window for Researches to use it and develop new molecules as well as, to continue studying the effects of extracts and isolated chemicals derived from these plants for their health benefits, in important diseases.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

icine and all tools should be serving this inheritance. The people need to become acquainted with the medicinal plant uses, not that only but to cultivate the plants on the farms, gardens even in their houses if possible for enriching the plant diversity. Rational use of

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References

- Abdallah, E.M., 2017. In vitro antibacterial evaluation of fresh garlic juice (*Allium sativum L.*) cultivated in sudan. *Acad. J. Life Sci.* 3, 89–93.
- Abdel-Kader, M.S., Hazazi, A.M., Elmakki, O.A., Alqasoumi, S.I., 2018. A survey on traditional plants used in Al Khobab village. *Saudi Pharm. J.* 26, 817–821.
- Abdel-Mogib, M., Basaif, S.A., 2002. Two new naphthalene and anthraquinone derivatives from *Asphodelus tenuifolius*. *Pharm.* 57, 286–287.
- Abdou, A.M., Abdallah, H.M., Mohamed, M.A., Fawzy, G.A., Abdel-Naim, A.B., 2013. A new anti-inflammatory triterpene saponin isolated from *Anabasis setifera*. *Arch. Pharm. Res.* 36, 715–722.
- Adepu, A., Narala, S., Ganji, A., Chilvalvar, S., 2013. A review on natural plant: *Aerva lanata*. *Int J Pharma Sci.* 3, 398–402.
- Adtani, P., Malathi, N., Chamundeeswari, D., 2014. Pharmacognostic evaluation of leaves of *Ocimum basilicum linn*: the Lamiaceae family. *J. Chem. Pharm. Sci.* 7, 250–253.
- Ageel, A.M., Parmar, N.S., Mossa, J.S., Al-Yahya, M.A., Al-Said, M.S., Tariq, M., 1986. Anti-inflammatory activity of some Saudi Arabian medicinal plants. *Agents Actions.* 17, 383–384.
- Ahmad, I., Mehmood, Z., Mohammad, F., Ahmad, S., 2000. Antimicrobial potency and synergistic activity of five traditionally used Indian medicinal plants. *Antimicrob. Potency Synerg. Act. Five Tradit. Used Indian Med. Plants.* 22, 173–176.
- Ahmad, W., Jantan, I., Bukhari, S.N., 2016. *Tinospora crispa* (L.) Hook. f. & Thomson: a review of its ethnobotanical, phytochemical, and pharmacological aspects. *Front. Pharmacol.* 7, 59.
- Akbar, S., Al-Yahya, M.A., 2011. Screening of Saudi plants for phytoconstituents, pharmacological and antimicrobial properties. *Aust. J. Med. Herbal.* 23, 76.
- Akerale, O., 1988. Medicinal plants and primary health care: an agenda for action. *Fitoterapia* 59, 355–363.
- Al Jaouni, S.K., Halawa, T., Hussein, A., Al Najjar, S., Almuhayawi, M.S., Harakeh, S., 2017. *Nigella sativa* and Saudi honey diminish infections and improve the survival in a kostmann's syndrome patient: Case report. *J. Appl. Hematol.* 8, 119.
- Al Moamary, M.S., 2008. Unconventional therapy use among asthma patients in a tertiary care center in Riyadh, Saudi Arabia. *Ann. Thorac. Med.* 3, 48.
- Alamri, S.A., Moustafa, M.F., 2012. Antimicrobial properties of 3 medicinal plants from Saudi Arabia against some clinical isolates of bacteria. *Saudi. Med. J.* 33, 272–277.
- Alanzai, A., Assiri, A., Aldayel, F., Allam, A., Bin-Bakheet, O., Alanzi, F., Alhaydhal, A., Alrasheed, L., 2016. Herbal medicine among saudis: awareness, uses, reasons and common herbs. *Int. J. Res. Med. Sci.* 1, 13–19.
- Al-Asmari, A., Manthiri, R.A., Abdo, N., Al-Duajji, F.A., Khan, H.A., 2017. Saudi medicinal plants for the treatment of scorpion sting envenomation. *Saudi J. Biol. Sci.* 24, 1204–1211.
- Al-Asmari, Abdulrahman K., Al-Elaiwi, Abdulrahman M., Athar, Md Tanvir, Tariq, Mohammad, Al Eid, Ahmed, Al-Asmary, Saeed M., 2014. A review of hepatoprotective plants used in saudi traditional medicine. *Evidence-Based Complementary Alternative Med.* 2014, 1–22. <https://doi.org/10.1155/2014/890842>.
- Al-Dhubiab, B.E., 2012. Pharmaceutical applications and phytochemical profile of *Cinnamomum burmannii*. *Pharmacogn. Rev.* 6, 125.
- Alfarhan, A.H., Chaudhary, S.A., Thomas, J., 1998a. Notes on the flora of Saudi Arabia. *J. -KING SAUD Univ. Sci.* 10, 31–40.
- Alfarhan, A.H., Chaudhary, S.A., Thomas, J., 1998b. Notes on the flora of Saudi Arabia. *J. KSU. Univ. Sci.* 10, 31–40.
- Al-Musayeb, N.M., Mothana, R.A., Al-Massarani, S., Matheeussen, A., Cos, P., Maes, L., 2012. Study of the in vitro antiplasmodial, antileishmanial and antitrypanosomal activities of medicinal plants from Saudi Arabia. *Molecules* 17, 11379–11390.
- Alqethami, A., Hawkins, J.A., Teixidor-Toneu, I., 2017. Medicinal plants used by women in Mecca: urban, Muslim and gendered knowledge. *J. Ethnobiol. Ethnomed.* 13, 62.
- Al-Said, M.S., Mothana, R.A., Al-Sohaibani, M.O., Rafatullah, S., 2011. Ameliorative effect of *Grewia tenax* (Forssk) Fiori fruit extract on CCl4-induced oxidative stress and hepatotoxicity in rats. *J. Food Sci.* 76, T200–T206.
- Al-Shanwani, M., 1996. Plants used in Saudi folk medicine. *Riyadh King Abdul Aziz City Sci. Technol.*
- Al-Shaqha, W.M., Khan, M., Salam, N., Azzi, A., Chaudhary, A.A., 2015. Anti-diabetic potential of *Catharanthus roseus* Linn. and its effect on the glucose transport gene (GLUT-2 and GLUT-4) in streptozotocin induced diabetic wistar rats. *BMC Complement. Altern. Med.* 15, 1–8.
- Aly, M.M., Bafeel, S.O., 2010. Screening for antifungal activities of some medicinal plants used traditionally in Saudi Arabia. *J. Appl. Anim. Res.* 38, 39–44.
- Asgarpanah, J., Haghight, E., 2012. Phytochemistry and pharmacologic properties of *Ziziphus spina christi* (L.) Willd. *Afr. J. Pharm. Pharmacol.* 6, 2332–2339.
- Balunas, M.J., Kinghorn, A.D., 2005. Drug discovery from medicinal plants. *Life Sci.* 78, 431–441.
- Bedir, E., Pugh, N., Calis, I., Pasco, D.S., Khan, I.A., 2000. Immunostimulatory effects of cycloartane-type triterpene glycosides from *Astragalus* species. *Biol. Pharm. Bull.* 23, 834–837.
- Benzie, I.F., Wachtel-Galor, S., 2011. *Herbal Medicine: Biomolecular and Clinical Aspects*. CRC Press.
- Bhowmik, D., Kumar, K.S., Yadav, A., Srivastava, S., Paswan, S., Dutta, A.S., 2012. Recent trends in Indian traditional herbs *syzygium aromaticum* and its health benefits. *J. Pharmacogn. Phytochem.* 1, 13–22.
- Bhowmik, D., Gopinath, H., Kumar, B.P., Kumar, K.P., 2013. Medicinal uses of *Punica granatum* and its health benefits. *J. Pharmacogn Phytochem.* 1.
- Bodeker, G., Ong, C.-K., 2005. WHO global atlas of traditional, complementary and alternative medicine (World Health Organization).
- Bokhari, F.M., 2009. Antifungal activity of some medicinal plants used in Jeddah, Saudi Arabia. *Mycopath.* 7, 51–57.
- Borborah, K., Dutta, B., Borthakur, S.K., 2014. Traditional uses of *Allium L.* species from North East India with special reference to their pharmacological activities. *Int. J. Med. Res. Rev.* 2, 1037–1051.
- Bourhia, M., Abdelaziz Shahat, A., Mohammed Almarfadi, O., Ali Naser, F., Mustafa Abdelmageed, W., Ait Haj Said, A., El Gueddari, F., Naamane, A., Benbacer, L., Khilil, N., 2019. Ethnopharmacological Survey of Herbal Remedies Used for the Treatment of Cancer in the Greater Casablanca-Morocco. *Evid. Based Complement. Alternat. Med.* 2019.
- Chalumeau, F., Benito-espinal, É., 1984. Deux Ctenuchidae (Lepidoptera) ravageurs du laurier-rose aux Antilles françaises. *Publ. Société Linn. Lyon.* 53, 175–182.
- Champy, P., 2011. Acetogenins from the Seeds of the Custard Apple (*Annona squamosa L.*) and their Health Outcomes. In *Nuts and Seeds in Health and Disease Prevention*. Elsevier, pp. 429–437.
- Chopra, R.N., 1956. Nayar SL Chopra IC Glossary of Indian Medicinal Plants. Counc. Sci. Ind. Res. New Delhi India, 186–187.
- Djordjevic, O.M., Jakovljevic, M.R., Markovic, A., Stankovic, M., Cirim, A., Marinkovic, D., Grbicic, D., 2018. Polyphenolic contents of *Teucrium polium L.* and *Teucrium scordium L.* associated with their protective effects against MMC-induced chromosomal damage in cultured human peripheral blood lymphocytes. *Turk. J. Biol.* 42, 152–162.
- El Hassany, B., El Hanbali, F., Akksira, M., Mellouki, F., Haidour, A., Barrero, A.F., 2004. Germacranolides from *Anvillea radiata*. *Fitoterapia* 75, 573–576.
- El-Ghazali, G.E., Al-Khalifa, K.S., Saleem, G.A., Abdallah, E.M., 2010. Traditional medicinal plants indigenous to Al-Rass province, Saudi Arabia. *J. Med. Plants Res.* 4, 2680–2683.
- El-Shabasy, A., 2016. Survey on medicinal plants in the flora of Jizan Region, Saudi Arabia. *Int. J. Bot. Stud.* 2, 38–59.
- Emad, A.M., Gamal, E.-G.E., 2013. Screening for antimicrobial activity of some plants from Saudi folk medicine. *Glob. J. Res. Med. Plants Indig. Med.* 2, 189.
- Ghazanfar, Shahina A., 1994. *Handbook of Arabian medicinal plants*. CRC Press, Boca Raton.
- Ghorbani, A., Esmaeilzadeh, M., 2017. Pharmacological properties of *Salvia officinalis* and its components. *J. Tradit. Complement. Med.* 7, 433–440.
- Kumar Gupta, S., Sharma, A., 2014. Medicinal properties of *Zingiber officinale Roscoe*-A review. *J. Pharm. Biol. Sci.* 9, 124–129.
- Hashmi, M.A., Khan, A., Hanif, M., Farooq, U., Perveen, S., 2015. Traditional uses, phytochemistry, and pharmacology of *Olea europaea* (olive). *Evid. Based Complement. Alternat. Med.* 2015.
- Hostettmann, K., Marston, A., Ndjoko, K., Wolfender, J.-L., 2000. The potential of African plants as a source of drugs. *Curr. Org. Chem.* 4, 973–1010.
- Jaafar, N.S., Jaafar, I.S., 2019. *Eruga Sativa LINN.:* Pharmacognostical and pharmacological properties and pharmaceutical preparations. *Asian J. Pharm. Clin. Res.* 12, 39–45.
- Jazieh, A.R., Al Sudairy, R., Abulkhair, O., Alaskar, A., Al Safi, F., Sheblaq, N., Young, S., Issa, M., Tamim, H., 2012. Use of complementary and alternative medicine by patients with cancer in Saudi Arabia. *J. Altern. Complement. Med.* 18, 1045–1049.
- Jirovetz, L., Buchbauer, G., Stoyanova, A.S., Georgiev, E.V., Damianova, S.T., 2003. Composition, quality control, and antimicrobial activity of the essential oil of long-time stored dill (*Anethum graveolens L.*) seeds from Bulgaria. *J. Agric. Food Chem.* 51, 3854–3857.
- Kamel, F.O., Magadmi, R.M., Hagrass, M.M., Magadmi, B., AlAhmad, R.A., 2017. Knowledge, attitude, and beliefs toward traditional herbal medicine use among diabetics in Jeddah Saudi Arabia. *Complement. Ther. Clin. Pract.* 29, 207–212.
- Kamil, M., Jayaraj, A.F., Ahmad, F., Gunasekhar, C., Samuel, S., Chan, K., Habibullah, M., Attas, A., 2000. Pharmacognostic and phytochemical standardization of *Calligonum comosum*. *J. Pharm. Pharmacol.* 52, 262.
- Kaunda, J.S., Zhang, Y.-J., 2017. The genus *Carissa*: An ethnopharmacological, phytochemical and pharmacological review. *Nat. Prod. Bioprospecting* 7, 181–199.
- Kirimuhuza, C., Waako, P., Joloba, M., Odyek, O., 2009. The anti-mycobacterial activity of *Lantana camara* a plant traditionally used to treat symptoms of tuberculosis in South-western Uganda. *Afr. Health Sci.* 9, 40–45.
- Knecht, K.T., Nguyen, H., Auken, A.D., Kinder, D.H., 2006. Effects of extracts of lupine seed on blood glucose levels in glucose resistant mice: antihyperglycemic effects of *Lupinus albus* (white lupine, Egypt) and *Lupinus caudatus* (tailcup lupine, Mesa Verde National Park). *J. Herb. Pharmacother.* 6, 89–104.
- Madaan, R., Kumar, S., 2012. Screening of an alkaloidal fraction of *Conium maculatum L.* aerial parts for analgesic and antiinflammatory activity. *Indian J. Pharm. Sci.* 74, 457.
- Marwat, S.K., Usman, K., Shah, S.S., Anwar, N., Ullah, I., 2012. A review of phytochemistry, bioactivities and ethno medicinal uses of *Rhazya stricta* Desne (Apocynaceae). *Afr. J. Microbiol. Res.* 6, 1629–1641.

- Mehrafarin, A., Rezazadeh, S.H., Naghdi Badi, H., Noormohammadi, G.H., Zand, E., Qaderi, A., 2011. A review on biology, cultivation and biotechnology of fenugreek (*Trigonella foenum-graecum* L.) as a valuable medicinal plant and multipurpose. 24–6 1 فصلنامه علمی پژوهشی گیاهان دارویی.
- Moazzami, A., Kamal-Eldin, A., 2009. Sesame seed oil. In Gourmet and Health-Promoting Specialty Oils. Elsevier, pp. 267–282.
- Mohammad, Y., Al-Ahmari, A., Al-Dashash, F., Al-Hussain, F., Al-Masnour, F., Masoud, A., Iradi, H., 2015. Pattern of traditional medicine use by adult Saudi patients with neurological disorders. *BMC Complement. Altern. Med.* 15, 102.
- Mohammed, A., Syed, S., Syed, M.Y., Ali, A.D., 2018. Use of herbal extract from *Artemisia herba-alba* (Shih) in pharmaceutical preparations for dental hygiene. *Saudi Pharm. J.* 26, 822–828.
- Nagori, B.P., Solanki, R., 2011. *Cynodon dactylon* (L.) Pers.: A valuable medicinal plant. *Res. J. Med. Plant.* 5, 508–514.
- Newman, D.J., Cragg, G.M., Snader, K.M., 2000. The influence of natural products upon drug discovery. *Nat. Prod. Rep.* 17, 215–234.
- Norman, O.M., Mothana, R.A., Al-Rehaily, A.J., Nasr, F.A., Khaled, J.M., Alajmi, M.F., Al-Said, M.S., 2019. Phytochemical analysis and anti-diabetic, anti-inflammatory and antioxidant activities of *Loranthus acaciae* Zucc. Grown in Saudi Arabia. *Saudi Pharm. J.* 27 (5), 724–730.
- Noor, S., 2016. Synergistic effect of the methanolic extract of lemongrass and some antibiotics to treat urinary tract bacteria. *J. Biosci. Med.* 4, 48.
- Leung, A.Y., 1980. Encyclopedia of Common Natural Ingredients Used in Foods, Drugs and Cosmetics. John Wiley and Sons, Inc.
- Ljubuncic, P., Azaizeh, H., Portnaya, Cogan U, Said, O., Saleh, K., Bomzon, A., 2005. Antioxidant activity and cytotoxicity of eight plants used in traditional Arab medicine in Israel. *J. Ethnopharmacol.* 99, 43–47.
- Odhav, B., Thangaraj, K., Khumalo, N., Baijnath, H., 2013. Screening of African traditional vegetables for their alpha-amylase inhibitory effect. *J. Med. Plants Res.* 4, 1502–1507.
- Organization, W.H., 1998. Regulatory Situation of Herbal Medicines: A Worldwide Review. Geneva: World Health Organization.
- Organization, W.H. 2001. Legal Status of Traditional Medicine and Complementary. Geneva: World Health Organization.
- Osuna-Martínez, U., Reyes-Esparza, J., Rodríguez-Fragoso, L., 2014. Cactus (*Opuntia ficus-indica*): A review on its antioxidants properties and potential pharmacological use in chronic diseases. *Nat. Prod. Chem. Res.* 2 (153), 2–8.
- Qureshi, R., Bhatti, G.R., Memon, R.A., 2010. Ethnomedicinal uses of herbs from northern part of Nara desert, Pakistan. *Pak. J. Bot.* 42, 839–851.
- Rahman, M.A., Mossa, J.S., Fahad, F.M.A., 2002. Notes on succulent plant species of Saudi Arabia. *Bangladesh J Plant Taxon* 9, 25.
- Robertson, E., 2008a. Medicinal plants at risk. Nature's pharmacy, our treasure chest: why we must conserve our natural heritage. *Cent. Biol. Divers.* Tucson AZ.
- Robertson, E., 2008b. Medicinal plants at risk. Nature's pharmacy, our treasure chest: why we must conserve our natural heritage. *Cent. Biol. Divers.* Tucson AZ.
- Saeidnia, S., Gohari, A.R., Mokhber-Dezfuli, N., Kiuchi, F., 2011. A review on phytochemistry and medicinal properties of the genus *Achillea*. *DARU J. Fac. Pharm. Tehran Univ. Med. Sci.* 19, 173.
- Saganwan, A.S., 2009. Tropical plants with antihypertensive, antiasthmatic, and antidiabetic value. *J. Herbs Spices Med. Plants.* 15, 24–44.
- Sakkir, S., Kabshawi, M., Mehairbi, M., 2012. Medicinal plants diversity and their conservation status in the United Arab Emirates (UAE). *J. Med. Plants Res.* 6, 1304–1322.
- Saqib, F., Janbaz, K.H., 2016. Rationalizing ethnopharmacological uses of *Alternanthera sessilis*: A folk medicinal plant of Pakistan to manage diarrhea, asthma and hypertension. *J. Ethnopharmacol.* 182, 110–121.
- Schulze, A., 2017. Cosmetic care of grey hair comprising melatonin. *Ger Offen 102015111123*, A 1, 20170112.
- Sher, H., Aldosari, A., 2013. Ethnobotanical survey on plants of veterinary importance around Al-Riyadh (Saudi Arabia). *Afr. J. Pharm. Pharmacol.* 7, 1404–1410.
- Sher, H., Alyemeni, M.N., 2010. Ethnobotanical and pharmaceutical evaluation of *Capparis spinosa* L. validity of local folk and Unani system of medicine. *J. Med. Plants Res.* 4, 1751–1756.
- Shinwari, Z.K., Qaiser, M., 2011. Efforts on conservation and sustainable use of medicinal plants of Pakistan. *Pak. J. Bot.* 43, 5–10.
- Sripathi, S.K., Sankari, U., 2010. Ethnobotanical documentation of a few medicinal plants in the Agasthiyamalai region of Tirunelveli District, India. *Ethnobot. Leafl.* 2010, 6.
- Srivastava, J.P., Lambert, J., Vietmeyer, N., 1996. Medicinal Plants: An Expanding Role in Development. The World Bank.
- Suleiman, A.K., 2014. Attitudes and beliefs of consumers of herbal medicines in Riyadh, Saudi Arabia. *J. Community Med. Health Educ.* 4, 269.
- Syed, T.A., Ahmad, S.A., Holt, A.H., Ahmad, S.A., Ahmad, S.H., Afzal, M., 1996. Management of psoriasis with *Aloe vera* extract in a hydrophilic cream: a placebo-controlled, double-blind study. *Trop. Med. Int. Health.* 1, 505–509.
- Watt, J.M., Breyer-Brandwijk, M.G., 1962. The medicinal and poisonous plants of southern and eastern Africa. E and S Livingstone Ltd. Edinb. Lond.
- Yadav, N., Vasudeva, N., Singh, S., Sharma, S.K., 2007. Medicinal properties of genus *Chenopodium* Linn.
- Yusuf, M., Chowdhury, J.U., Wahab, M.A., Begum, J., 1994. Chittagong Bangladesh Council for Science and Industrial Research (BCSIR). *Med. Plants Bangladesh*.