



Contents lists available at ScienceDirect

Saudi Journal of Biological Sciences

journal homepage: www.sciencedirect.com

Review

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

Riaz Ullah ^{a,*}, Ali S. Alqahtani ^{a,b}, Omar M.A. Noman ^a, Abdulaziz M. Alqahtani ^b, Samir Ibenmoussa ^c, Mohammed Bourhia ^c^a Medicinal Aromatic and Poisonous Plants Research Center (MAPPRC), College of Pharmacy, King Saud University, Riyadh, Saudi Arabia^b Department of Pharmacognosy, College of Pharmacy, King Saud University, Riyadh, Saudi Arabia^c Laboratory of Chemistry, Biochemistry Nutrition, and Environment, Faculty of Medicine and Pharmacy, University Hassan II, Casablanca, Morocco

ARTICLE INFO

Article history:

Received 5 March 2020

Revised 8 June 2020

Accepted 11 June 2020

Available online 20 June 2020

Keywords:

Medicinal plants

Saudi Arabia

Ethnopharmacology

Traditional medicine

Folk medicine

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 Saudi 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.

© 2020 The Author(s). Published by Elsevier B.V. on behalf of King Saud University. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Contents

| | |
|---|------|
| 1. Introduction | 2707 |
| 2. Materials and methods | 2707 |
| 2.1. Study area | 2707 |
| 2.2. Data collection | 2707 |
| 3. Results and discussion | 2707 |
| 3.1. Ethnomedicinal data about medicinal plants used in traditional medicine in the Kingdom of Saudi Arabia | 2707 |
| 3.2. Biological form of plants used in Saudi Arabia traditional medicine | 2708 |

* Corresponding author.

E-mail address: rullah@ksu.edu.sa (R. Ullah).

Peer review under responsibility of King Saud University.

<https://doi.org/10.1016/j.sjbs.2020.06.020>

1319-562X/© 2020 The Author(s). Published by Elsevier B.V. on behalf of King Saud University.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

| | |
|--|------|
| 3.3. Preparation method of plant drugs | 2708 |
| 3.4. Plant parts used | 2708 |
| 4. Conclusion | 2716 |
| Declaration of Competing Interest | 2716 |
| Acknowledgments | 2717 |
| References | 2717 |

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 evolvement 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 Saudi 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

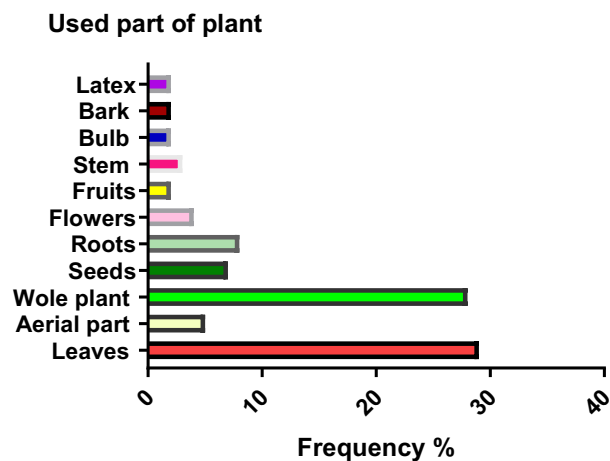


Fig. 2. Frequency of plant parts used.

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 liker 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 | Haemorrhage, diarrhoea, scurvy, dysentery scurvy, and colds | (Al-Musayeb 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, athelmintic, 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>Albizzia lebeck</i> | Lebeck | 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) |
| | <i>Arnebia hispidissima</i> | Kohaehl | Whole plant | Treatment of fever | (Srivastava et al., 1996) |
| Amaranthaceae | <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, -uroilithic, 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) |
| | <i>Amaranthus spinosus</i> | Qutaifa | Stem, Root | Emollient in scorpion sting | (Al-Asmari et al., 2017) |
| | <i>Amaranthus caudatus</i> | Kaf Almehana | Leaves | Diuretic, blood purifier, treatment of piles, strangury, and abortifacient used as an abortifacient | (Watt and Breyer-Brandwijk, 1962) |
| Annonaceae | <i>Amaranthus viridi</i> | Shae | 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) |
| | <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) |
| Asclepiadaceae | <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) |
| | <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 |
|---------------|----------------------------------|-------------|-------------------|--|--|
| | <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</i> Zucc. | Wiens | Leaves | Hypertension, cancer, obesity, gastrointestinal tract damage | (Noman 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 Alyemini, 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 Treatment of tuberculosis | (Kirimuhuzya et al., 2009) |
| Labiatae | <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, cholagogue, calculi and diabetes. | (Hashmi et al., 2015) |
| Alliaceae | <i>Allium cepa</i> | Basar | Bulb | Assam, Mizoram, Nagaland, Meghalaya, Arunachal Pradesh and Sikkim | (Borborah et al., 2014) |
| | <i>Allium sativum</i> | Thom | Bulbs | Anti-septic, anti-hypertensive | (Abdallah, 2017) |
| | <i>Allium ampeloprasum</i> | - | Leaves | Antimicrobial | (Alamri and Moustafa, 2012) |
| Asphodelaceae | <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) |
| Cactaceae | <i>Opuntia Ficus-indica</i> | Tin Shokai | Stems and Fruits | Antidiabetic Hypoglycemic | (Osuna-Martinez et al., 2014) |
| Fabaceae | <i>Lupinus albus</i> | Tirmees | Seeds | Diuretic, emmenagogue, hypoglycaemic and vermifuge | (Knecht et al., 2006) |
| | <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-tussive, Anti haemorrhoides, aphrodisiac, diuretic and laxative | (El-Shabasy, 2016) |
| | <i>Alhagi maurorum</i> | Al -Agool | 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) |
| Meliaceae | <i>Azadirachta Indica</i> | Neem | Whole plant | Used as antifungal | (Aly and Bafeel, 2010) |
| Lamiaceae | <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) |
| | <i>Salvia officinalis</i> | Meramiah | Leaves | Treatment of heartburn and bloating | (Ghorbani and Esmailzadeh, 2017) |
| Acanthaceae | <i>Belpharis ciliaris</i> | Shok aldab | whole herb | Used to treat toothache and skin wounds | (El-Ghazali et al., 2010) |
| Lauraceae | <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) |
| Capparidaceae | <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 cartilagnia</i> | Shafallah | Whole herb | Antiseptic, laxative, antiseptic and anti-inflammatory | (Al-Shanwani, 1996) |
| | <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-Musayeib et al., 2012) |
| Lythraceae | <i>Punica granatum</i> | Roumon | Fruit | Cancer, cardiovascular disease, diabetes | (Bhowmik et al., 2013) |
| Myrtaceae | <i>Syzygium aromaticum</i> | Kronful | Flower Buds | Treatment of toothache, mouth, throat inflammation and gastrointestinal disorders. | (Bhowmik et al., 2012) |
| Pedaliaceae | <i>Sesamum indicum</i> L. | Smsim | Seeds | Improve nutritional status prevention of diseases | (Moazzami and Kamal-Eldin, 2009) |
| Ranunculaceae | <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 | (Asgarpanah and Haghghat, 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>Cynadon 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) |
| Polygonaceae | <i>Emex spinosa</i> | Hambaaz | Whole herb | Appetizer, biliousness, and to stimulate appetite | (El-Ghazali et al., 2010) |
| Polygonaceae | <i>Calligonum comosum</i> | Artaa | Whole herb | Anti-inflammatory and anti-ulcer effect | (Kamil et al., 2000) |
| Asclepiadaceae | <i>Calotropis procera</i> | Oshar | Latex | Used to treat psoriasis, leishmaniasis, and skin infections | (El-Ghazali et al., 2010) |
| Chenopodiaceae | <i>Anabasis setifera</i> | Hamd | Leaves | Anti-inflammatory | (Abdou et al., 2013) |
| Caesalpiniaceae | <i>Cassia italica</i> | Sanamakka | Whole herb | Laxative and urinary tract purifier | (El-Ghazali et al., 2010) |
| Resedaceae | <i>Reseda muricata</i> Presl. | 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)

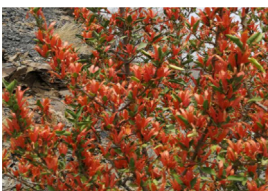








| Plant species | Habit | Photograph |
|---------------------------------|----------|---|
| <i>Anisotes trisulcus</i> | Shrub |  |
| <i>Aerva javanica</i> | Subshrub |  |
| <i>Achyranthes aspera</i> | Herb |  |
| <i>Aerva lanata</i> | Herb |  |
| <i>Alternanthera sessilis</i> | Herb |  |
| <i>Amaranthus 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 viminalis</i> | Herb |  |
| <i>Ceropegia 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</i> Zucc. | 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 roseu</i> | Herb |  |
| <i>Albizzia 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 viridi</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 |  |

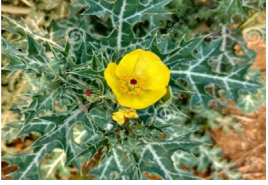





(continued on next page)

Table 2 (continued)

| Plant species | Habit | Photograph |
|---------------------------------|----------|---|
| <i>Astragalus spinosus</i> | Subshrub |  |
| <i>Azadirachta Indica</i> | Tree |  |
| <i>Belpharis ciliaris</i> | Subshrub |  |
| <i>Cadaba farinose</i> | Shrub |  |
| <i>Capparis cartilagnia</i> | Subshrub |  |
| <i>Capparis deciduas</i> | Shrub |  |
| <i>Anastatica hierochuntica</i> | Subshrub |  |
| <i>Caralluma sinaica</i> | Herb |  |

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

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 (Saganuwan, 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.

Acknowledgments

The authors extend their appreciation to the Deanship of Scientific Research at King Saud University, Riyadh, Saudi Arabia for funding this work through research group No. 1441-341.

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 Khobah 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., Chamundeswari, 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.
- Akerele, 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., Almuhyawi, 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.
- Alanzi, A., Assiri, A., Aldayel, F., Allam, A., Bin-Bakheet, O., Alanzi, F., Alhaydhali, 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-Duaiji, 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 Tanwir, Tariq, Mohammad, Al Eid, Ahmed, Al-Asmari, 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., Matheussen, 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., Haghigat, E., 2012. Phytochemistry and pharmacologic properties of *Ziziphos 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, Kps, 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., Ciric, A., Marinkovic, D., Grujicic, 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., Akssira, 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. *Eruca Sativa* LINN.: Pharmacognostical and pharmacological properties and pharmaceutical preparations. *Asian J. Pharm. Clin. Res.* 12, 39–45.
- Jazieh, A.R., Al Sudaury, 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., Hagra, 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.
- Kirimuhuzya, C., Waako, P., Jobola, 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 alkaloidal fraction of *Conium maculatum L.* aerial parts for analgesic and anti-inflammatory 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 Decsne* (Apocynaceae). *Afr. J. Microbiol. Res.* 6, 1629–1641.

- Mehrafarin, A., Rezaizadeh, 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 1
- 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., Jradi, 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.
- Noman, 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., Azaizah, 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.
- Saganuwan, 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 Agasthiayamalai region of Tirunelveli District, India. *Ethnobot. Leafl.* 2010, 6.
- Srivastava, J.P., Lambert, J., Viemeyer, 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*.