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ORIGINAL ARTICLE

Ethnopharmacological Survey of Medicinal Plants in Albaha Region, Saudi Arabia

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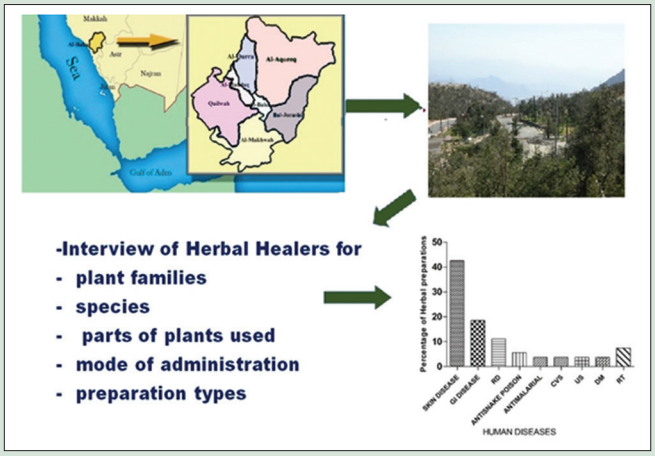
ABSTRACT

Background: Local natural medicinal resource knowledge is important to define and elaborate usage of herbs, in systematic and organized manner. Until recently, there has been little scientifically written document regarding the traditional uses of medicinal plants in Al Bahah region. **Objective:** This pilot study aims to collect the ethnobotanical information from native populations regarding the benefits of medicinal plants of Al Bahah region, and determine if the traditional usage is scientifically established (proved) from literature. **Materials and Methods:** The survey collected data for 39 plant species recorded by informants for their medicinal benefits. The recorded species were distributed among 28 plant families. *Leguminosae* and *Euphorbiaceae* were represented each by 3 species, followed by *Asteraceae* (2 species), *Lamiaceae* (2 species), *Apocynaceae* (2 species), and *Solanaceae* (2 species). All the medicinal plants were reported in their local names. Analysis of ethnopharmacological data was done to obtain percentage of plant families, species, parts of plants used, mode of administration, and preparation types. **Results:** Total 43 informants were interviewed, maximum number of species were used to cure skin diseases including burns (3), wounds (7), warts (1), *Leishmania* (7), topical hemostatic (2), followed by gastrointestinal system, rheumatism, respiratory tract problems, diabetes mellitus, anti-snake venom, malaria, and eye inflammation. **Conclusions:** The study covered Al Bahah city and its outskirts. Ten new ethnobotanical uses were recorded such as antirheumatic and anti-vitiligo uses for *Clematis hirsute*, leishmaniasis use of *Commiphora gileadensis*, antigout of *Juniperus procera*, removing warts for *Ficus palmata*.

Key words: Al Bahah, ethnopharmacology, folk medicine, medicinal plants, Saudi Arabia, survey

SUMMARY

- 39 plant species from 28 plant families are used for treating more than 20 types of diseases.
- Maximum number of species (23 species) was used for treating skin diseases (42.6%) including leishmaniasis, wound healing, dermatitis, psoriasis, vitiligo and warts.
- Ten ethnobotanical uses of 8 studied plants have not been previously reported.
- The most used medicinal plants, according to their Use Index (UI) were *Juniperus procera*, *Rumex nervosus*, and *Ziziphus spina-christi*.



Abbreviations Used: UI : Use Index, GI: Gastrointestinal tract, RD: Rheumatic disease, CVS: Cardiovascular diseases, UTI: Urinary tract infection, DM: Diabetes mellitus, RT: Respiratory infection, KSA: Kingdom of Saudi Arabia

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INTRODUCTION

Not <400,000 flowering plants are found on the earth.[1] About 12% of them are used in the traditional medicine.[2-4] About 10,000 of those plants have already been scientifically investigated and described. In Western medicine system, higher plant-derived substances constitute around 25% of prescribed medicines and 74% of the 121 bioactive plant-derived compounds were identified through research based on leads from traditional medicine.[5] The knowledge of medicinal plant uses was acquired by means of trial and error and transmitted from the older to the younger people, but this knowledge and transmission are in danger because transmission between older and younger generation is not always assured.[6,7]

Indigenous knowledge of Saudi traditional medicine ancient and still available among the tribal and local people and medicinal healers (Hakim). In KSA, more than 1200 (over 50%) of the total flowering plants (2250) are expected to be of medicinal importance.[8-15] This indigenous knowledge and traditional experiences have been passed verbally devoid of documentation and the traditional healers are dying without passing their knowledge. Besides, the urbanization of the

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indigenous customs results in more and more loss of the old knowledge of this human heritage. Therefore, there is an urgent necessity for documenting those vast stores of knowledge through ethnobotanical surveys, before their disappearance from the community, especially in Al Bahah. Al Bahah region is located in the Southwest of Saudi Arabia, enjoying with different geographical regions - mountainous, plains, coastal, and high biodiversity. Until recently, there has been little scientifically written documentation regarding the traditional uses of medicinal plants in Al Bahah region.[16,17] Therefore, we focused on our project on collecting and documenting the ethnobotanical knowledge in Al Bahah region.

MATERIALS AND METHODS

Study area

Al Bahah region is located in the Southwest of the Kingdom of Saudi Arabia between Makkah region and Aseer region [Figure 1]. The city is located in an area surrounded by natural tree and agricultural plateaus. The province is famous for beautiful forests, wildlife areas, valleys, and mountains. The area contains more than 53 well-known forests dominated by *Juniperus procera*, among them are Raghdan, Ghomsan, Fayk, Skaran, and Aljabal. Al Bahah region is divided geographically into three different parts: High mountainous Sarah region with temperate weather and rich plant diversity due to relatively high annual rainfall, Eastern Tehama lowland coastal area with very hot and humid weather and very little average rainfall and the Eastern hills with cool winters, hot summers, and sparse vegetation cover. Main cities of Al Bahah region are Baljurashi, Almandaq, Qilwah, and Al-Mikhwah. The main two tribes of this region are Ghamid and Zahran. Al Bahah city experiences mild climate with temperatures ranging between 12°C and 23°C (53.6°F–73.4°F). Due to its location at 2500 m (8200 ft), the climate is moderate in summer and cold in winter above sea level. Humidity ranges from 52% to 67%. The mountainous region, As-Sarah, the weather is cooler in summer and winter. Annual rainfall in the mountainous region ranges between 229 and 581 mm. The average rainfall of the Al Bahah region ranges between 100 and 250 mm.

Data collection

Information on medicinal plants was collected from Al Bahah and surrounding regions such as Baljurashi, Al Mandaq, and Miqwah from October 2015 to June 2016. Ethnomedicinal information was collected by ethnobotanical interviews with informants (43) (local users 18, knowledgeable persons in herbal shops (10), and traditional healers (15); ethnomedicinal properties (local name, parts of plants, ailments, the way of preparation, and administration) of plants were reported through informal, interviews, plants collected were taxonomically identified. Voucher specimens are preserved at the Department of Pharmacognosy, Faculty of Clinical Pharmacy, Al Baha University.

Data analysis

Descriptive statistical methods were applied to analyze and summarize the ethnomedicinal data such as percentage of families, species, administration types, preparation modes, and plant parts used.

RESULTS

The survey collected ethnomedicinal information of 39 plant species recorded by informants for their medicinal benefits. The recorded species were distributed among 28 plant families. *Leguminosae* and *Euphorbiaceae* were represented each by 3 species, followed by *Asteraceae* (2 species), *Lamiaceae* (2 species), *Apocynaceae* (2 species, and *Solanaceae* (2 species). All the medicinal plants were reported in their local names listed in Table 1, and used in more than 20 types of diseases. Maximum number of species was used to cure skin diseases (23 species; 42.6%) including leishmaniasis (8; 34.8%), wound healing (6; 26.1%), dermatitis (2; 8.7%), local hemostatic (2; 8.7%), inflamed gums (2; 8.7%), psoriasis (1; 4.3%), vitiligo (1; 4.3%), warts (1; 4.3%) [Figure 2] followed by the gastrointestinal system (10; 18.5%), rheumatism (6; 11.1%), anti-snake venom (3; 5.6%), antimalaria (2; 3.7%), cardiovascular diseases (2; 3.7%), urinary tract infection (2; 3.7%), diabetes mellitus (2; 3.7%),) and respiratory tract problems (4; 7.4%) [Figure 3].

The principal modes of preparation were paste (27.7%), oral raw consumption (23.4%), infusion (14.9%), decoction (8.5%), powder (6.4%), solutions (8.5%), and others (10.6%) [Figure 4]. Most preparations were drawn from a single plant, often plant parts (fresh or dried) were ingested orally. Some preparations of plant parts were mixed with honey, water, and milk to improve the palatability of remedies. Among various plant parts used (leaves, fruits, branch lets, roots, rhizomes, flowers, fruits, seeds, and latex), the most frequently used plant part was the leaf, constituting 49 % followed by fruit (11 %), roots (10 %), milky latex (10%), flowers (8 %), aerial parts (4 %), branches (4 %) and others (4 %) [Figure 5]. Twenty-three plant preparations obtained from

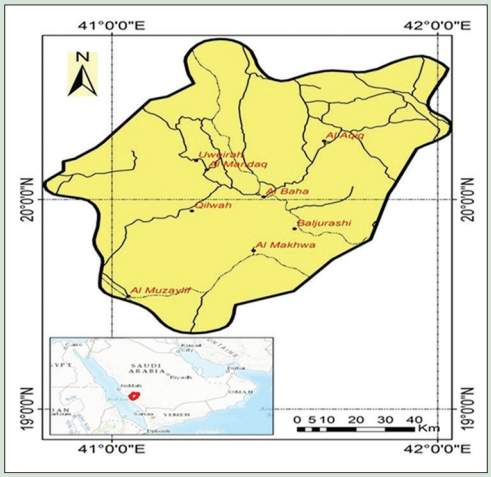

Figure 1: Map of Al Bahah region

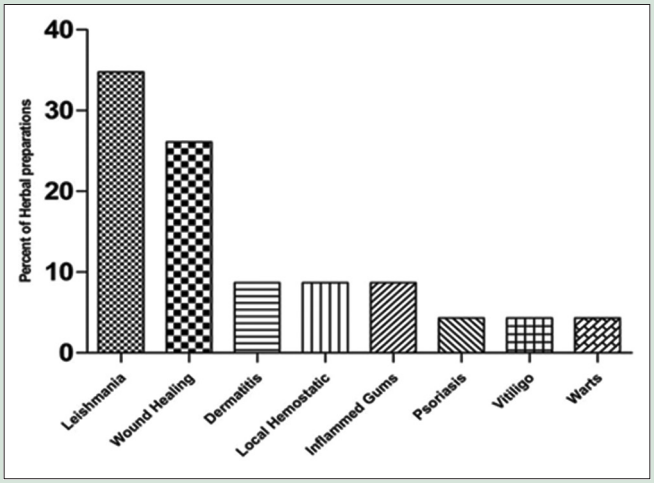

Figure 2: Percent of herbal preparations used to cure skin diseases

Table 1: Ethnobotanical plant species used as medicines in Albaha region

Family/scientific name	Local name	Parts used	Folk medicinal uses	Preparations	Administration	Use index, *n* (%)
Acanthaceae, B. edulis (Forssk.) Pers.	Al-saha	Flowers	Upper respiratory tract infection	Infusion	Oral	10 (23)
Amaranthacea, A. javanica (Burm. f.) Juss. ex J.A. Schultes	Al-R'a	Leaves, roots	As hemostatic and healing wounds	Powder	Topical	18 (42)
Apocynaceae, C. spinarum L.	Al-shaden	Roots	Cleaning the teeth	Teeth brush	Topical	5 (12)
Apocynaceae, A. obesum (Forssk) Roem. and Schult.	Algaraz	Red flowers	Sight of its red flowers excites the sexual desire in women			8 (19)
Apocynaceae, A. obesum (Forssk.)	Algaraz	Milky latex mixed with cool water	Skin disease	Solution	Topical	11 (26)
Asteraceae, A. biebersteinii Afan.	Aldefera	Aerial parts	Leishmania	Paste	Topical	6 (14)
Asteraceae, A. biebersteinii Afan.	Aldefera	Flowers	Insect repellent, flowers chewed for relieving toothache		Topical	10 (23)
Burseraceae, C. gileadensis (L.) C. Chr	Al-bisham	Tender twigs with leaves	Anti-snake poison	Maceration or decoction	Oral	4 (9)
Burseraceae, C. gileadensis (L.) C. Chr	Al-bisham	Transparent liquid exudated	Peptic ulcer	Solution	Oral	7 (16.0)
Burseraceae, C. gileadensis (L.) C. Chr	Al-bisham	Oleogum resin	Leishmaniasis	Paste	Topical	10 (23)
Capparaceae, C. tomentosa L.	Al-Iillb	Leaves and fruits	Abortifacient	Eaten raw	Oral	5 (12)
Celastraceae, G. parviflora (Vahl) Chiov.	Al-athrar	Tender branchlets	For treating urine retention	Tender branch is wrapped on the patient's waist	Topical	3 (6)
Chenopodiaceae, C. murale L.	A'tra	Aerial parts	Leishmaniasis	Paste	Topical	11 (26)
Ranunculaceae, C. hirsute L.	Al-dhian	Leaves	Antirheumatic	Paste	Topical	9 (21)
			Antivitiligo			11 (26)
Combretaceae, C. molle G. Don.	Althu'ab	Black bitter gum	Stomach ache	Eaten by some people	Oral	4 (9)
Asteraceae, A. yemenensis Podl.	Al-ik-hiwan	Flowers	Stomach ache vomiting	Infusion	Oral	5 (12)
Asteraceae, P. punctulata (DC.) Vatke.	Al-Tabak	Leaves	Antirheumatic	Paste	Topical	8 (19)
			Insect repellent	Smoke of leaves		13 (30)
Cupressaceae, J. procera Hochst. ex Endel.	Alar'ar	Leaves collected before sunrise	Antispasmodic	Infusion	Oral	25 (58)
Cupressaceae, J. procera Hochst. ex Endel.	Alar'ar	Leaves	Gout	Infusion	Oral	18 (41)
Cupressaceae, J. procera Hochst. ex Endel.	Alar'ar	Leaves	Cold, pharyngitis	Smoke of its leaves		12 (28)
Euphorbiaceae, E. cuneata Vahl	Al-baka	Antispasmodic	Poisonous, small branchlet used for brushing teeth may be fatal	Brush	Topical	3 (7)
Euphorbiaceae, E. fractiflexa S. Carter and Wood	Al-saab	Latex	Conjunctivitis	Wash (diluted with water)	Topical	2 (5)
Euphorbiaceae, E. schimperi C. Presl	Al-dehin	Milky latex	For healing cavernous stinking wounds	Solution	Topical	4 (9)
Lamiaceae, L. pubescens Decne.	Al-shiah	Leaves	Antispasmodic, antiseptic	Chewing leaves	Oral	13 (30)
Lamiaceae, O. fruticosa (Forssk.) Schweinf. ex Penzig	Alsharm	Leaves	Eye inflammation in livestock	Decoction	Topical	5 (12)

Contd...

Table 1: Contd...

Family/scientific name	Local name	Parts used	Folk medicinal uses	Preparations	Administration	Use index, *n* (%)
Leguminosae, A. tortilis (Forssk.) Hayne,	Alsomer	Roots	Cleaning teeth	Teeth brush	Topical	11 (26)
Leguminosae, A. tortilis (Forssk.) Hayne,	Alsomer	Its honey	Ulcers and deep wounds (gangrene)		Topical	7 (16)
Leguminosae, I. articulate L.	Al-khiter	Powder of leaves roots	Hemoststic	Powder	Topical	10 (23)
Leguminosae, R. raetam (Forssk.) Webb	AL-retem	fruits	hypoglycemic	Decoction	Oral	5 (12)
Moraceae, D. foetida Schweinf.	Om -Lakef	Milky latex	leishmaniasis	Lotion	Topical	7 (16)
Moraceae, F. palmata Forssk.	Al-hamat	Milky latex of tender branch	For removing warts		Topical	4 (9)
Moringaceae, M. peregrina (Forssk.) Fiori	Al-ban	Cooked seeds	Joints pains backache, sciatic pain	Eaten	Oral	13 (30)
	Al-ban	Powdered gum	Conjunctivitis	Wash	Topical	9 (21)
	Al-ban	Powdered branches	Incurable wounds	Paste	Topical	13 (30)
Moringaceae, M. peregrina (Forssk.) Fiori	Al-ban	Gums, seeds and its oil, small tender branches	Hypoglycemic and for treating burns	Oil of seeds		14 (33)
Myrtaceae, M. communis L.	Al-A's	Leaves	Asthma	Infusion	Oral	5 (12)
Myrtaceae, M. communis L.	Al-A's	Bark	Pharyngitis and cough	Chewing the bark of plant	Oral	12 (28)
Myrtaceae, M. communis L.	Al-A's	Leaves	Mouth ulcers, leishmaniasis, gangrene (deep wounds)	Paste	Topical	7 (16)
Oleaceae, O. europaea L.	Al-aotem	Under heating, small pieces of dried stems give different types of liquids, first liquid called semnah used as antirheumatic and for treating leishmaniasis	Antirheumatic Leishmaniasis		Topical	8 (19)
Oleaceae, O. europaea L.	Al-aotem	The 2nd liquid named almohel	Inflamed gums	Mouth wash	Topical	7 (16)
Oleaceae, O. europaea L.	Al-aotem	3rd liquid named katran (Tar)	Skin diseases of animals (camels)	Liniment	Topical	10 (23)
Oleaceae, O. europaea L.	Al-aotem	Leaves	Diabetes mellitus and hypertension	Chewing leaves	Oral	13 (30)
Polygonaceae, R. nervosus Vahl	Al-athrub	Leaves	Hypoglycemic Asthma Stopping diarrhea		Oral	21 (49) 5 (12) 8 (19)
Polygonaceae, R. nervosus Vahl	Al-athrub	Leaves	Wounds	Powder	Topical	15 (35)
Polygonaceae, R. vesicarius L.	Al-homad	Tender leaves	Antiemetic	Raw	Oral	9 (21)
Rhamnaceae, Z. spina-christi (L.) Willd.	Al-sider	leaves	Strengthening hairs (women)	Wash	Topical	19 (44)
Rhamnaceae, Z. spina-christi (L.) Willd.	Al-sider	Leaves	Antispasmodic	Infusion	Oral	6
Rosaceae, R. abyssinica R. Br.	Al-obal	Fruits	Pharyngitis, cough	Infusion	Oral	13 (30)
Rutaceae, R. chalepensis L.	alsithab	Leaves	Snake bites	As dressing	Topical	4 (9)
Salvadoraceae, S. persica L.	Al-Arak	Fruits	Antisnake painful rheumatism	Eaten by people	Oral	14 (32)
Sapindaceae, D. viscosa Jacq.	Shath	Leaves	Burns	Paste	Topical	3 (7)
		Leaves	Leishmaniasis	Paste	Topical	8 (19)
Solanaceae, S. incanum L	Al-hadak	Fruits	Leishmaniasis	Paste juice	Topical	10 (23)
Solanaceae, S. incanum L	Al-hadak	Roots	Malaria	Decoction	Oral	3 (7)
Solanaceae, S. incanum L.	Al-hadak	Leaves	As dressing for healing wounds	Paste	Topical	5 (12)
Solanaceae, W. somnifera (L.) Dun.	Alobeb	Leaves	Chronic dermatitis, psoriasis	Paste	Topical	7 (16)
Tiliaceae, Grewia tembensis Fresen.	Shohaat	Leaves	Gum inflammation	Eaten	Topical	3 (7)

Contd...

Table 1: Contd...

Family/scientific name	Local name	Parts used	Folk medicinal uses	Preparations	Administration	Use index, *n* (%)
Vitaceae, C. rotundifolia (Forsk.) Vahl.	Al-saleh	leaves	Antimalarial	Raw	Oral	6 (14)
Vitaceae, C. digitatum (Forssk.) Dessc	Al-halqa	Rhizomes	Nausea	Eaten	Oral	3 (7)

n: Total number of people interviewed; *B. edulis*: *Blepharis edulis*; *A. javanica*: *Aerva javanica*; *C. edulis*: *Carissa edulis*; *A. obesum*: Adenium obesum; *A. biebersteinii*: *Achillea biebersteinii*; *C. gileadensis*: *Commiphora gileadensis*; *C. tomentosa*: *Capparis tomentosa*; *G. parviflora*: *Gymnosporia parviflora*; *C. murale*: *Chenopodium murale*; *C. hirsute*: *Clematis hirsute: C. molle: Combretum molle; A. yemenensis*: *Anthemis yemenensis*; *P. punctulata*: *Psiadia punctulata*; *J. procera*: *Juniperus procera; E. cuneata*: *Euphorbia cuneata*; *E. fractiflexa: Euphorbia fractiflexa; E. schimperi: Euphorbia schimperi*; *O. fruticosa*: *Otostegia fruticosa*; *A. tortilis*: *Acacia tortilis*; *L. pubescens*: *Lavandula pubescens*; *I. articulate: Indigofera articulate; R. raetam: Retama raetam; D. foetida*: *Dorstenia foetida; F. palmate*: *Ficus palmata*; *M. peregrine*: *Moringa peregrine*; *M. communis: Myrtus communis; O. europaea: Olea europaea; R. nervosus: Rumex nervosus; R. vesicarius*: *Rumex vesicarius*; *Z. spina: Ziziphus spina*; *R. abyssinica: Rosa abyssinica*; *R. chalepensis: Ruta chalepensis*; *S. persica*: *Salvadora persica; D. viscosa*: *Dodonaea viscosa*; *S. incanum*: *Solanum incanum*; *W. somnifera*: *Withania somnifera*; *C. rotundifolia*: *Cissus rotundifolia*; *C. digitatum*: *Cyphostemma digitatum*

Table 2: Plant species with new ethnopharmacological uses

Family/scientific	Parts used	Folk medicinal uses	Preparations
C. gileadensis	Transparent liquid	Peptic ulcer and as anti-snake	Oral
C. gileadensis	Oleogum resin	Leishmaniasis	Topical
C. hirsute	Leaves	Antirheumatic, anti-vitiligo	Paste
C. molle	Black bitter gum	Stomach ache	Raw eaten
J. procera	Leaves	Gout	Infusion
E. fractiflexa	Latex	Conjunctivitis	Wash (diluted with water)
F. palmata	Milky latex	Removing warts	Topical
S. incanum	Roots	Malaria	Infusion

C. gileadensis: *Commiphora gileadensis*; *C. hirsute*: *Clematis hirsute*; *C. molle*: *Combretum molle*; *J. procera*: *Juniperus procera*; *E. fractiflexa*: *Euphorbia fractiflexa*; *F. palmate*: *Ficus palmate*; *S. incanum*: *Solanum incanum*

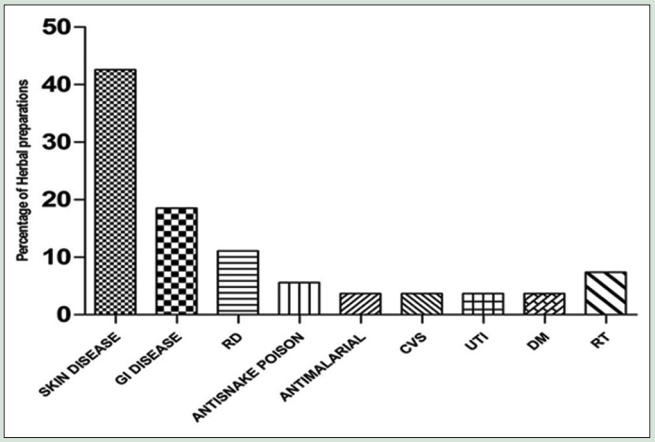

Figure 3: Percent of herbal preparations to cure human diseases; GI: Gastrointestinal tract; RD: Rheumatic disease; CVS: Cardiovascular diseases; UTI: Urinary tract infection; DM: Diabetes mellitus; RT: Respiratory infection

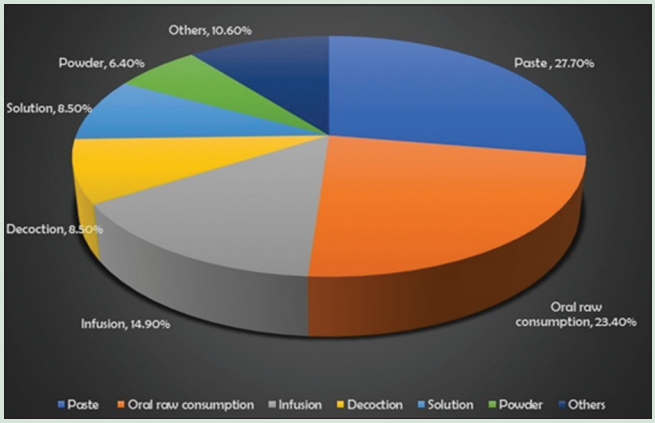

Figure 4: Percent of modes of herbal preparation

18 plants of the total reported medicinal plants are used externally or taken as a gargle), followed by 12 species which are taken orally and 8 other species which are used both externally and internally application. By comparing the literature review in the ethnobotanical studies in Saudi Arabia and neighboring countries (Arabian Peninsula) with the current study, it was observed that ten ethnobotanical uses of 8 studied plants have not been previously recorded [Table 2]. A use index (UI%) was calculated to determine the importance of the use of each medicinal plant. The used index formula is UI = (na/NA ×100), where na is the number of interviewers who cite the species as useful and NA is the total number of people interviewed.

DISCUSSION

Traditional herbal medicine has played a significant role currently as a topic for scientific research, particularly when the literature and field work data have been properly assessed. Such evaluation findings can offer several plants that can have the priority to be studied for specific biological activity based on the traditional herbal uses.[18] Ethnomedical uses of the plants can be utilized as an indicator for isolating bioactive compounds using bioactivity-guided fractionation method. This ethnomedicinal route provides positive activity in the order of 2–5 new compounds per 10,000 studied plants in comparison to the random route that gives positive activity in the order of one compound per 10,000 studied plants.[19-21] In this study, ethnomedicinal information was collected from 39 medicinal plants belonging to 28 plant families. There is no dominance of any plant family with a higher number of plant species. However, plant families with herbs are represented by *Leguminosae*,

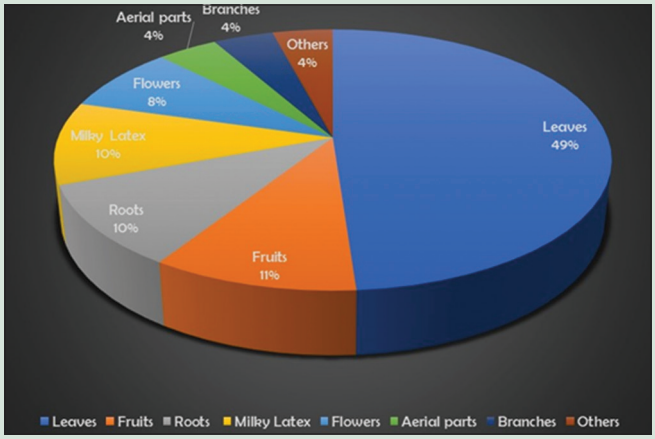

Figure 5: Percent of plant parts used for herbal remedies

Asteraceae, *Lamiaceae*, *Solanaceae*. Their use may be preferred because of their ready availability.

The most used medicinal plants, according to their UI [Table 1], were *J. procera, Rumex nervosus,* and *Ziziphus spina-christi.* Those three medicinal plants are widespread species in Al Bahah and available during the whole year. Different parts of the plants were used for preparing the herbal remedies. However, in the majority of the plants, the herbal preparations were obtained from the leaves (45%) and similar observation has been recorded for other forested communities with green vegetation and abundant leaves.[22] It is known that leaves form a key part of plant identification and are the most easily available part to collect by local people.[23]

In addition, the preference toward leaves may be because leaves are the main photosynthetic organ in plants and are responsible mainly for the biosynthesis of secondary metabolites that acts on the body as bioactive compounds.[24] Hence, leaves are the source for photosynthates or exudates[25] that are toxins against environmental hazards and this character provides medicinal value to the human body. Most herbalists give remedies for skin diseases and sometimes for rheumatism in the form of washes and pastes, and for gastrointestinal diseases orally in the form of infusion, decoction, and oral raw consumption. Skin diseases were the most treated ailments by about 43% of herbal preparations mainly pastes and *Leishmania* and wound healing constitute the main skin diseases treated by 8 and 6 herbal preparations successively. At present, leishmaniasis is common in the human population in different localities, including the Eastern and Southern Province of Saudi Arabia and in particular endemic in the Al-Hassa Oasis.[26] While the antileishmanial activity of *Myrtus communis*, *Achillea biebersteinii*, *Olea europaea,* and *Dodonaea viscosa* was proved,[27-31] further antileishmanial screening should be done in the future for the following plants *Commiphora gileadensis* and *Dorstenia foetida.*

Rheumatic diseases, in particular, rheumatic arthritis, affectalmost 1%–2% of the population globally and attack women thrice as commonly as men. The spectrum of rheumatic diseases seen in Saudi Arabia appeared to be broadly similar to that seen in the West. In KSA, the rheumatic diseases affect 19.28/100,000 inhabitants.[32] However, most of the Saudi patients tends to use the conventional medicines for managing such disease, some of them still use the medicinal plants, especially in rural areas and among the old people. In our study, six plants were reported to manage rheumatic diseases, *Clematis hirsute*, *Psiadia punctulata*, *Moringa peregrine*, *O. europaea*, *Withania somnifera*, and *J. procera*. The anti-inflammatory activity of *P. punctulata*, *M. peregrine*, *O. europaea*, *Salvadora persica,* and *W. somnifera* was reported, and therefore, their traditional uses in folk medicine are justified scientifically.[33-38] *C. hirsute* and *J. procera* should be tested for cyclo- and lipo-xygenase inhibitory activity and related bioassays to verify their uses in traditional medicine as anti-inflammatory agents. Reports were found to the hypoglycemic effect of *O. europaea* leaves, *Retama raetam* fruits and *M. peregrine,*[39-41] but there has been no report about the hypoglycemic of *R. nervosus* that has been used traditionally as hypoglycemic agent.

When the present study is compared to ethnobotanical contributions done in KSA and neighboring countries, our findings disclosed that ten ethnobotanical uses of eight medicinal plants have been recorded for the first time [Table 2].[7,8,10,12,15,42-46] Little or no reports have been found so far regarding the bioactivity-guided fractionation of *C. hirsute*, *J. procera*, *C. gileadensis,* and *D. foetida*; therefore, those plants can be a target for further bioactivity-guided isolation. Ethnobotanical use in particular of *C. hirsute* for managing vitiligo should be proved using melanocytes bioassay, vitiligo, a disease that affects about 0.5%–1% of the world's population that means about 60 million suffering from this disease. The average age of onset is in the mid-twenties, but it can appear at any age. The disorder affects both sexes and all races equally; however, it is more noticeable in people with dark skin. Moreover, traditional antigout use of *J. procera* should be proved pharmacologically and the plant can be utilized economically for managing gout because the plant occurs as forests. It was reported that hyperuricemia is present in a considerable proportion of the Saudi people.[47] Most of the plants used for treating wound healing showed antimicrobial activity.

CONCLUSIONS

In summary, this survey demonstrates that the culture of folk medicine is still practiced but on limited scale by the population in Al Bahah region. Pharmacological, toxicological, and phytochemical studies should be done for the promising medicinal plants mentioned in this research project, to assure their biological activity as well as their toxicity and then design therapeutic strategies based on the most effective and least toxic products in particular for *J. procera* and *R. nervosus*. *J. procera* can be utilized economically for medical purposes because it grows wild in vast areas in Al Bahah region.

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Conflicts of interest

There are no conflicts of interest.

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