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ORIGINAL ARTICLE

# Ethnopharmacological Survey of Medicinal Plants in Albaha Region, Saudi Arabia

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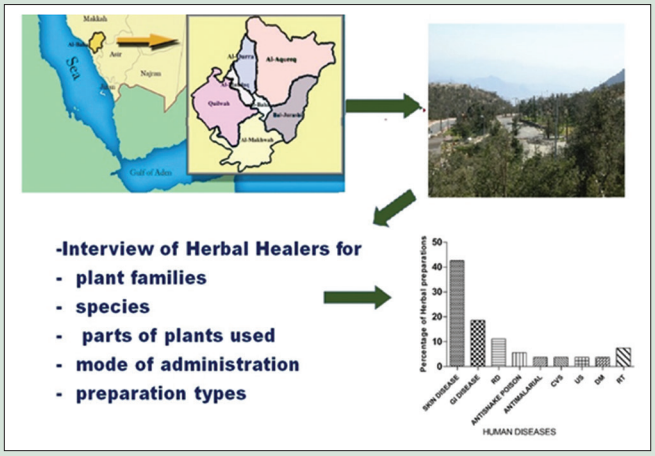
## ABSTRACT

**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

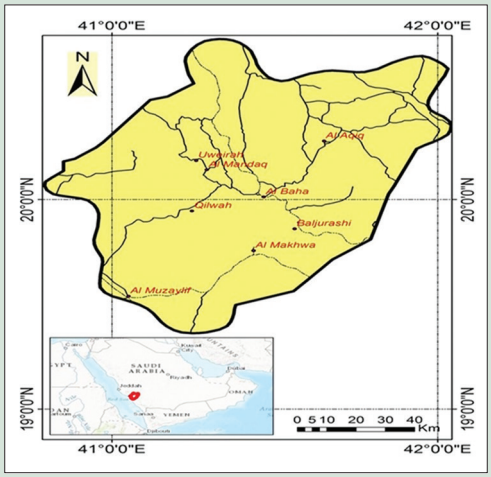


**Figure 1:** Map of Al Bahah region

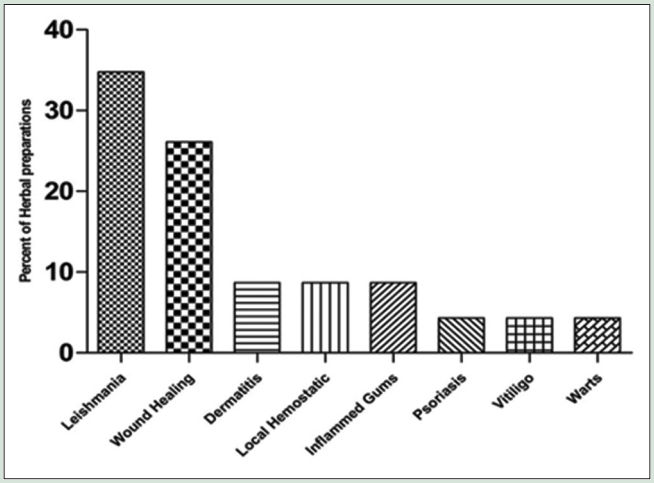


**Figure 2:** Percent of herbal preparations used to cure skin diseases

**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<br>Asthma<br>Stopping diarrhea | | Oral | 21 (49)<br>5 (12)<br>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*

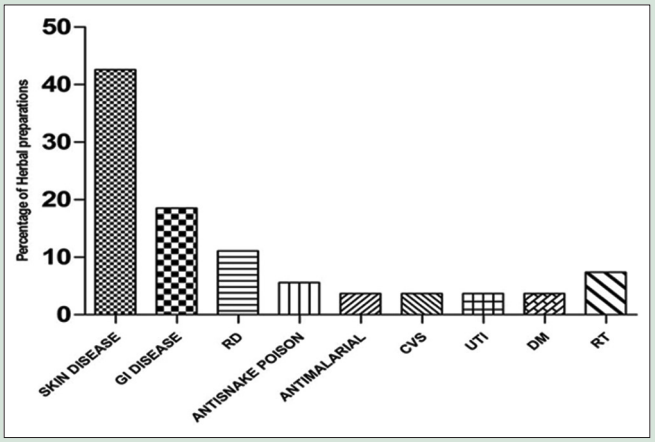


**Figure 3:** Percent of herbal preparations to cure human diseases; GI: Gastrointestinal tract; RD: Rheumatic disease; CVS: Cardiovascular diseases; UTI: Urinary tract infection; DM: Diabetes mellitus; RT: Respiratory infection

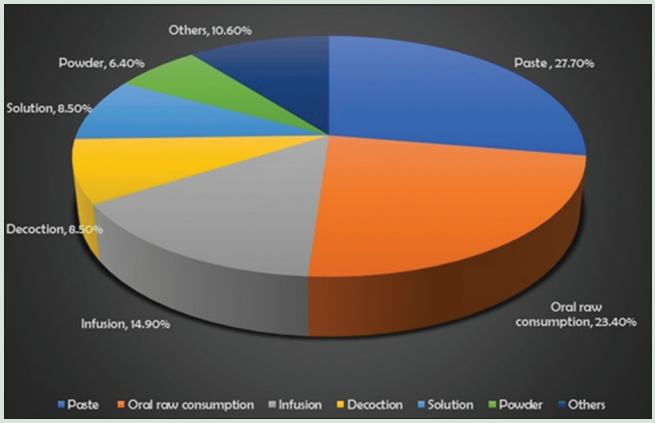


**Figure 4:** Percent of modes of herbal preparation

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*,

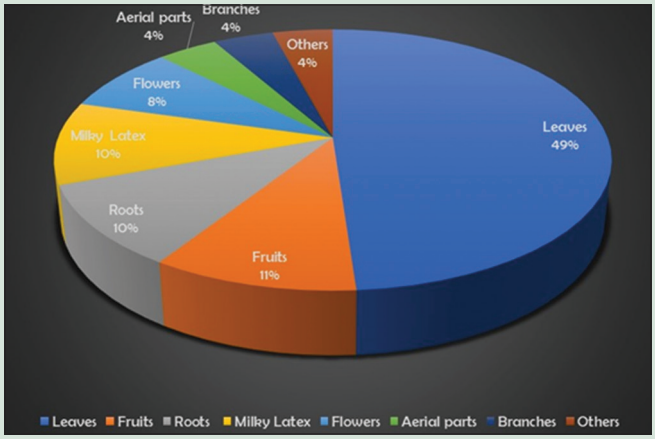


**Figure 5:** Percent of plant parts used for herbal remedies

*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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