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Research Article

Evaluation and Identification of Some Herbal Therapy Medicine Grown in Doan Valley (Wadi Doan), Hadhramout, Republic of Yemen

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Abstract

Background and Objectives: Herbal medicine is the use of plants to treat diseases and enhance general benefits and wellbeing for human beings. This study was conducted in Doan valley (Wadi Doan), Hadhramout, Yemen, to document medicinal plants and their diversity.

Materials and Methods: A field survey was carried out using the random stratified sampling method. Doan valley was divided into three main parts. A questionnaire was designed to assess the traditional uses of medicinal plants by the locals. **Results:** The flora survey identified 83 species belonging to 76 genera included in 37 families. Many life forms were detected in the studied species included phanerophytes, chamaephytes and therophytes with 41.6, 33.4 and 25.0%, respectively. The vegetation structure showed that the families Fabaceae and Zygophyllaceae represented 17% with the highest number of species followed by Acanthaceae and Apiaceae (9%). The questionnaire revealed that the number of plants used in traditional medicine was 12 species included in 10 families. The families Fabaceae and Zygophyllaceae occupied the first place. This study revealed that the leaves are the most used plant organs in traditional medicine followed with whole plant and seeds with 35.71, 21.45 and 14.30%, respectively. **Conclusion:** It was found that twelve herbal medical plants grow in Doan valley were used for the treatment of urinary tract and reproductive infections

Key words: Herbal therapy medicine, life forms, urinary infection, reproductive infection, traditional medicine, plant organs

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

The vegetation in Yemen is very rich and the herbal therapy medicine was traditionally used before thousands of years for treating diseases such as; *Anisotestri sulcus*, *Foeniculum vulgare* and *Phoenix dactylifera*¹. The various diversity of Yemen with different plants give the chance to the scientists to visit Hadhramout governorate, Republic of Yemen to collect these plants². Total of 375 species of plants belong to 60 families were collected by Boulos² in his visit to different governorates of Yemen (Aden, Lahaj, Abean, Saboah and Hadhramout) during 1988-1991, out of these 375 species, 24 newly species were classified and identified. Similarly, in the same governorates, 110 species were collected by Kilian *et al.*³ in the duration from 1997-2002. On the other hand, 134 plant species belong to 41 families were collected in delta Abean, Abean governorate, Yemen⁴. In addition, about 2836 plant species belong to 1065 genera and 179 families were collected in 2013⁵. Vegetation in Yemen is either full of endemic or near endemic plants which contain about 604 species⁶. The knowledge of these indigenous drugs, which has come through generations verbally, is the main subject of ethnobotany⁷. Yemen is known by some of these herbal plants, while others are used till today without identification and classifications⁸. The importance of some medicinal plants and its distribution was discussed by Al-Khulaidi and Al-Dubae⁹ and Martin¹⁰. On the other hand, the flora and the popular uses of herbal medicinal plants were reported in Encyclopedia of the Medicinal Plant¹¹.

The aim of this study was to document the presence of medicinal plants in Doan valley (Wadi Doan), Hadhramout, Yemen, to assess the plant diversity and collect local traditional information related to plants and their medicinal uses in the study area.

MATERIALS AND METHODS

The methodology in the current study was divided into three sections the first section was full screening for the area under study, in the same time the field survey was performed to collect the samples. The items used were a camera, plant scissors plastic bags and gloves. The samples were identified and classified¹²⁻¹⁸. The second part of the study was interviews conducted with 15 herbal therapists. The third part of the study was a questionnaire distributed to 200 persons. The survey was carried out to obtain information about traditional medicinal plants used for healing various diseases. The personal interview aims to collect the important information of traditional medicinal plants grown in Doan valley (Wadi Doan), Hadhramout governorate, Republic of Yemen from April, 2016-November, 2017.

Division of study area: The study was conducted by stratified random observation which divide Doan valley to three regions, every region has a start and an end. Table 1 showed the start and end point of each region, distance between start and end point by kilometers, number of sections in each region, number of stations in each region, distance of each region from the sea and finally the latitude (lat) and longitude (lon)¹⁹⁻²¹. This study was conducted in 108 points into 54 station, 24 sections belong to three regions. Figure 1 showed satellite image of the study area taken from google map.

Statistical analysis: Results were reported as mean \pm standard deviation (SD). Statistical analyses were performed by using Statistical Package for Social Sciences (SPSS) program. One-way analysis of variance (ANOVA) was used. The results were analyzed with the least significant difference of $p < 0.05$ as the cut off point for significant values between means of samples.

Table 1: Doan valley (Wadi Doan) regions, Hadhramout, Republic of Yemen

Region	SPR	EPR	Dist. between SPR and EPR (km)	No. of Sec. in each region	No. of sta. in each region	Dist. of SPR from sea (m)	Dist. of EPR from sea (m)	lat. and lon. of the SPR	lat. and lon. of the EPR
First	Al-Aiman	Quarht Ba Hameesh	24.5	8	17	900	1016	N: 15°15'886" E: 48°19'414"	N: 15°05'163" E: 48°18'179"
Second	Al-Aisser	Haeed Al-gzeel	16.6	6	12	900	979	N: 15°15'886" E: 48°19'414"	N: 15°10'154" E: 48°25'177"
Third	Al-wadi Al raesea	Al-Hagree	30.9	10	25	900	792	N: 15°15'886" E: 48°19'414"	N: 15°30'306" E: 48°19'826"

SPR: Start point of the region, EPR: End point of the region, D. between SPR and EPR: Distance between the start point of the region and the end point of the region, No. of Sec. in each region: Number of sections in each region, No. of St. in each region: Number of stations in each region, Dist. of SPR from sea (m): Distance of start point of the region from the sea (m), Dist. of EPR from sea (m): Distance of end point of the region from the sea (m), lat. and lon. of the SPR: Latitude and longitude of the start point of the region, lat. and lon. of the EPR: Latitude and longitude of the end point of the region



Fig. 1: Satellite image of Doan valley (Wadi Doan) regions, Hadhramout, Republic of Yemen taken from google map

RESULTS AND DISCUSSION

Field survey: The ethno-botanical survey revealed that 87 species belong to 37 families and 76 genes were collected and identified. Out of these 87 species, 12 species belong to 10 families and 12 genera were selected and used in the herbal therapy medicine for the treatment of urinary tract and reproductive infections. Table 1 showed Doan valley (Wadi Doan) regions, Hadhramout, Yemen. The highest similarity percentage of species was recorded in the lower site (87.5%), whereas the lowest similarity percentage was reported in the higher sites (71 and 63%) using statistical analysis, showed that there was no significant difference ($p < 0.05$) between the regions in Doan valley.

Table 2 showed families scientific names (genes and species) of the 12 herbal therapy medicines used in this study. The local people provided the local name, prospect and nature of the plant utilization according to experiences and ancestral prescriptions. The part of plant used and methods were summarized from the interview with herbal therapists. Figure 2 showed percentages of ethno-botanical data results of the 12 plants under study. It is clear that the leaves are the most commonly parts used followed by whole plant, seeds, fruits, roots, gum, thorn and pollen with 41.6, 25, 25, 8.3, 8.3, 8.3, 8.3 and 8.3% respectively. This result was in the same line with others^{22,23}. Other studies reported that *Tribulus terrestris*

from Zygophyllaceae family was used for the treatment of impotence. This result was in agreement with the findings of Lachure²⁴, Gavande *et al.*²⁵, Pattanayak *et al.*²⁶ and Panda and Luyten²⁷.

Figure 3 showed percentage of the families. It is clear from the Fig. 3 that Zygophyllaceae and Fabaceae were the most representative families. The result of this study was in the same line with others²³. Similarly, Devi *et al.*²⁸ reported that the percentage of Fabaceae used for herbal therapy was more than other families. Figure 4 showed many life forms, which were detected in the studied species, phanerophytes (trees and shrubs) represented by 41.6% chamaephytes (perennial herbs) 33.4% and therophytes (annual herbs) 25%. This result was in agreement with the result of Kanji which reported that phanerophytes in Amad valley (Wadi Amad) and Al-Ain valley (Wadi Al-Ain) were 33.3 and 29.1% respectively, while chamaephytes was 27.5 and 32.6% for both Amad and Al-Ain valleys respectively. From the result it's clear that single plant has activity in the treatment of various disease, similar results reported by Manzouq²⁹. *Iphiona scabra* and *Cymbopogon schoenanthus* have the activity as vaginal cleanser and urinary tract infections. This result was in the agreement with Hussein and Dhabe²² and Devi *et al.*²⁸. This study provided the chance to pharmacist and medicinal factories to prepare some types of formulation such as; vaginal cleanser with herbal therapy medicine.

Table 2: Herbal therapy medicine for the treatment of urinary tract and reproductive system infections from Doan valley (Wadi Doan), Hadhramout, Republic of Yemen

Family	Scientific names	Part used	Local name	Method of use	Herbal therapy effect
Acanthaceae	<i>Anisotestri sulcus</i> (Forssk) Nees.	Leaves	Madad	Leaves are crushed and drink, then the decoction drink orally	Kidney infections
Apiaceae	<i>Foeniculum vulgare</i> Mill.	Seeds	Shammar	Seeds boiled with water and drink orally	Diuretic
Arecaceae	<i>Phoenix dactylifera</i> L.	Pollen	Tale nakhl	Pollen mixed with honey and eat	Sperm stimulation
		Seed	Ealjum	Seeds with put on share coal, then the women stand on its smoke	Regular menstrual cycle
Asteraceae (compositae)	<i>Iphiaona scabra</i> DC	Leaves, whole plant	Dawila	Leaves/whole plant boil with water, the decoction used	Diuretic treatment for vaginal infections
Euphorbiaceae	<i>Ricinus communis</i> L.	Fruits	Khurue	Contraceptive fruits are dried and crushed then drink with milk once daily for three days	Contraception
Fabaceae (leguminosae)	<i>Acacia hamulosa</i> Benth	Gum	Kitad	Gum crushed, then the powder used orally	Kidney failure
Poaceae	<i>Indigofera oblongifolia</i> Forssk.	Leaves	Alhisar	Leaves boil with water, the decoction drink orally	Treatment of urine retention
	<i>Cymbopogon schoenanthus</i> L.	Leaves, whole plant	Alsakhbr	Leaves boil with water, the decoction drink orally for urine retention and as vaginal cleanser	Treatment of urine retention and used as vaginal disinfectant
Salvadoraceae	<i>Salvadorapersica</i> L.	Roots	Al'arak	Roots boil with water, the decoction drink orally	Treatment of urine retention
Solanaceae	<i>Solanum dubium</i> Dunal	Seeds	Albura	Seeds mix with milk and drink orally	Treatment of impotence
Zygophyllaceae	<i>Fagonia indica</i> Burm	Leaves, whole plant	Shawyakuk	Leaves/whole plant boil with water, the decoction drink orally	Urinary tract infections
	<i>Tribulus terrestris</i> L.	Thorn	Alqutb	Thorn boil with water, the decoction drink orally	Urine retention

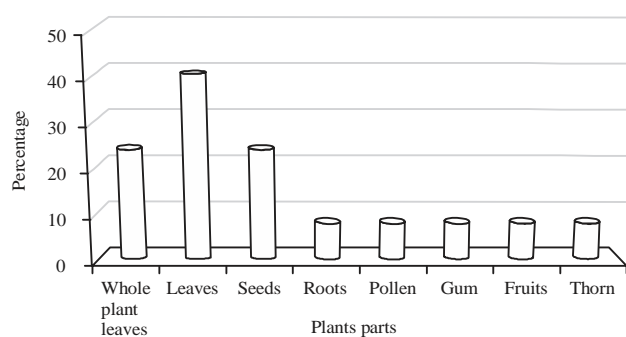


Fig. 2: Different plant parts (%) used in the herbal therapy medicine

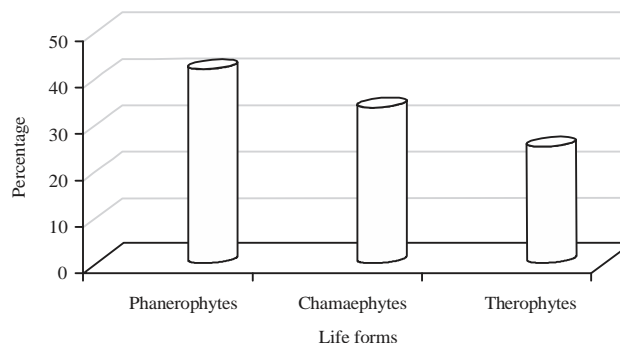


Fig. 4: Life forms (%) of herbal therapy medicine in Doan valley (Wadi Doan), Hadhramout, Republic of Yemen

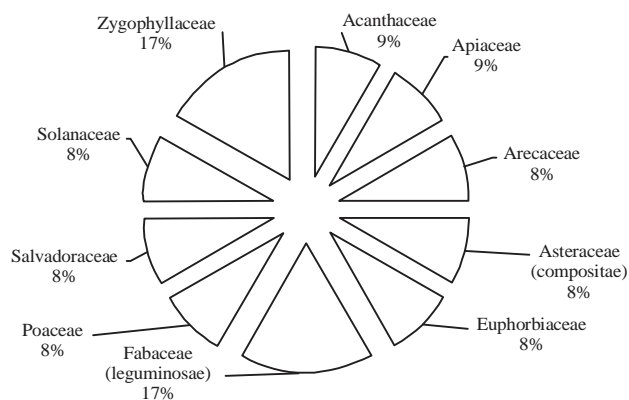


Fig. 3: Different families (%) in Doan valley (Wadi Doan), Hadhramout, Republic of Yemen

Further studies on Yemeni flora are recommended especially in Hadhramout governorate as the geological diversity of this area is so much different. On the other hand, it's also recommended to establish Herbarium in Hadhramout governorate, Republic of Yemen which will help the researchers for the identification of new species. There were no implications in this study, moreover; there were no side effects of using herbal therapy medicine for either the treatment of urinary tract or reproductive infections as reported by herbal therapists²⁹. It is clear that the field survey was costly and it was the main limitation of this study, so it's suggested that with high financial budget another study will be conducted in more than one valley in Hadhramout governorate, Republic of Yemen.

CONCLUSION

In this study, 37 plant families included 76 genes and 83 species were collected from Doan valley (Wadi Doan), Hadhramout, Yemen. The diversity of Doan valley included three types namely phanerophytes, chamaephytes and therophytes. The Zygophyllaceae and Fabaceae families were the most representative in Doan valley, Hadhramout, Yemen. Leaves are the most commonly parts used in the traditional medicine followed by whole plant and seeds.

SIGNIFICANCE STATEMENTS

This study discovered the effect of 12 herbal medicinal plants that were used for the treatment of urinary tract and reproductive system infections. These herbal medicinal plants grow in Doan valley (Wadi Doan), Hadhramout, Republic of Yemen. In addition, this was the first study to describe the diversity of Wadi Doan. This study will help the researchers to study, classify and identify the newly herbal plants in Yemen and its activities which are not studied before.

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