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Ethnobotanical Study and Traditional Knowledge of Medicinal Plants in Ain Leuh Region (Middle-Atlas of Morocco)

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ABSTRACT

Objective: The present study aimed to analyse and evaluate the ethnobotanical and ethnopharmacological informations related to the use of plants for medicinal purposes by the native people of Ain Leuh region.
Methods: The ethnobotanical study of medicinal plants in the area of Ain Leuh is done firstly by a sampling plan and by using a questionnaire to get an overview on various local traditional uses and floristic diversity of traditional medicine in the region, with reference to other ethnobotanical studies in Morocco.
Results: A total of 123 medical plants belonging to 53 families were identified in the region. The most encountered medicinal plant families were Lamiaceae (11.4%), Rosaceae (8.94 %), Asteraceae (8.13 %), Apiaceae (6.5 %), liliaceae (4.9 %), Poaceae (3.25%).
Conclusion: The knowledge of medicinal plants used by the people of Ain Leuh seems to be well known. It is, therefore, urgent to save the cultural heritage of the natives, by confirming the therapeutical uses of the plants with scientific criteria.

Keywords: Ethnobotanical, Ain Leuh, Medicinal plants, Traditional medicine.

INTRODUCTION

Morocco is a Mediterranean country which is crossed from east to west and from south-west to north-east by four mountain ranges, the Rif, the Middle Atlas, the High Atlas and the Anti-Atlas. The Mediterranean Sea in the north, the Atlantic Ocean in the west and the desert in the south, have a strong climatic influence which divides the country into many bioclimatic strata.[1] Morocco, a producing country of medicinal and aromatic plants (PAM), has a potential medicinal flora very rich and diversified,

with a very pronounced endemism. But this heritage is still unknown and under-exploited,[2] and treatment with medicinal plants, among the therapeutic methods, presents a great interest. Several plants are used in medicine or food.[3-11]

Ain Leuh a landlocked town in the Middle Atlas; it has characterized by a high socio-cultural mixture and traditional therapeutics are mostly based on the contributions of several ethnics from different regions of Morocco (*Ait Mouly, Ait Ghriss, Ait Atta, Soussi, Ait Ouirra Arabic kalaat sraghna*.), and several foreign nations (Lebanese, French, Spanish and Jews). Therefore, this mixture of cultures offers a wealth of knowledge in uses of plants by the local population of Ain leuh region in health care.[1,12] Unfortunately, knowledges of plants used in traditional medicine were transmitted only orally from generation to generation.[13-17]

An ethnobotanical study in this way aims to highlight the role of herbal medicine in the traditional system of care in Ain Leuh region. A survey of 40 practitioners and informers of the local population, helped to inventory 123 medicinal and aromatic plants belonging to 53 families used by popuklation of Ain leuh.

METHODS

Study area

The rural town of Ain Leuh is located in the central Middle Atlas. Systemic exposure is dependent on the North Sebu watershed and subwatershed Oued Beht consisting of Zaouia Oueds Ifrane, Bouharch, Ain Leuh and Tigrigra. It represents 7% of the surface of the whole province and extends from north to south over 3423ha. Altitude varies between 1000 to 2200m. It consists of three locations extending from north to south:

L'azaghar: located on the central plateau consists of small valleys interspersed with hills, the climate is semi-arid upper temperate and the altitude ranges from 1000 to 1300m.

The Dir: Located on the plateau Middle Atlas, starting just at the upper limit of the central plateau to anchor massive tabular altitudes ranging from 1300 to 1600m.

The jbel: corresponding to the mountain itself, including heights, benches, bowls, sinkholes and lac. Altitudes ranging from 2200m to 1600A peak mountain Sidi Mguild. The climate varies from humid to fewer subs humid than fresh cold wet variant.[18]

Figure 1. Geographical location of the study area.

Ethnobotanical survey

To gather information relating to traditional uses of medicinal plants in the study area, multiple entry inquiry-forms have been randomly filled out with the local population to get an overview on various local traditional uses and floristic diversity of traditional medicine in the region.[6,19-25] and in other countries.[26-30] Samples of plants used locally were harvested on land and/or requested from herbalists.

The plants collected on land are identified using[31,32] and consulting databases [Base de données des plantes d'Afrique & http://fr.wikipedia.org]. The un-sampled plants and used by the local population were identified by combining to other works related to the study area.[33-35]

RESULTS AND DISCUSSION

The information gathered during this survey included the common name of the voucher specimen, its botanical name, the part of the plant used and the medicinal indication for which it is used. During the field study in Ain Leuh, 123 local plants belonging to 53 families were found to be used for medicinal purposes. The present

study concentrates on the first group of plants used in human medicine. The medicinal species and their use are detailed in Table 1.

In this study, we observed that women used more medicinal plants than men (respectively: 72.5% and 27.5%). Some previous studies have also shown this trend with percentages of 61 to 65% and 35 to 39% respectively.[36-40,15] Our study sample consists of 40 people who are either practitioners or from family practitioners or people demonstrating knowledge of a famous practitioner in the area. The age range of interviewees is from 43 to 114 years.

Botanical analysis

The medicinal species belong to 53 different botanical families, those with the highest number of species being Lamiaceae with 14 species (11.4%), Rosaceae with 11 species (8.94%), Asteraceae with 10 species (8.13%), Apiaceae with 8 species (6.5%), liliaceae with 6 species (4.9%), Poaceae with 4 species (3.25 %), Caryophyllaceae, Cupressaceae, Fagaceae, Moraceae, Solanaceae, Fabaceae had three species each (2.43 %) and Anacardiaceae, Lichens, Brasicacées, Cucurbitaceae, Malvaceae, Oleaceae, Pinaceae, Plantaginaceae, Rutaceae, Salicaceae, Verbenaceae had two species each (1.62 %).

The two first families are well represented in the study area as well as throughout Morocco and also constitute the major groups of medicinal flora in most of other Mediterranean countries.[6,1,22,41,42] Most of the families recorded are represented by two to eleven species which shows that the medicinal plants used are not concentrated only in a few families and genera. This result is in accordance with other ethnobotanical studies carried out in Morocco and in Mediterranean area.[20,35]

The most commonly used plant species were *Ajuga iva, lavendula stoechas, Marrubium vulgare, Melissa officinalis, Mentha piperata, Mentha spicata, Mentha suaveolens, Mentha pulgium, Ocimum basilicum, Salvia officinalis, Thymus hémilialis, Satureja sp, Teucrium polium and Salvia verbenaca.* Most of these species are widely used in other regions of Morocco. (See figure 1.)

Plant parts used

The plant parts used are listed in order of decreasing importance : the whole plant (25%), followed by leaves (20.73 %), fruits (20.73 %), flowers (7.31 %), seeds (6.70 %), roots (6.70 %) , bulbs (2.43 %), bark (1.82 %), stems (0.60 %) and other (13 %). The high frequency of use of the whole plant can be explained by the distribution of secondary metabolites in whole plant; followed by a frequency of use of the fruits and leaves near to the whole plant can be explained by the ease and rapidity of harvest.[43] But, also because it is the site of photosynthesis and of storage of secondary metabolites responsible for the biological properties of the plant.[44] (See figure 2.)

Therapeutic uses

The major illnesses which are treated by the indigenous people by plant include digestive disorders (25%), skin disease (21.3%), endocrinal and metabolic disorders (17.5%), respiratory system (5.7%), rheumatic diseases (5.7% 5). Gastro-intestinal disorders were also found to be the most common application of medicinal plants by ethnobotanical surveys carried out in other studies.[1,20,41,45]

Often, people use more than one plant either separately or mixed together. The plant products are consumed raw or in the form of a decoction, macerated material or as infusion for oral treatment and as burnt product, ointments or raw paste when applied

externally. The indigenous population also uses folk-medicines derived from mineral and animal origin. (See figure 3.)

CONCLUSION

Our study showed that medicinal plants continue to play an important role in the primary healthcare system for the local people living in the Imouzzer Ida Outanane region, southwestern Morocco. A great variety of plants was used by traditional healers for treatment of numerous diseases. An ethnobotanical catalogue composed by 123 plant species belonging to 53 families which resulted from 44 interviews. The current study represents a useful documentation, which can contribute to preserving knowledge on the use of medicinal plants in this region. Further systematic investigations into the chemical constituents, pharmacological actions, and toxicity of the plant materials will be needed to prove their medicinal worth. In addition, the cellular and molecular mechanisms of the recorded plants still need to be determined in animal models and detailed information on their usage, duration and dosage must be investigated before prescription in human healthcare.

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Table 1. Medicinal plants used in traditional medicine by population of Ain Leuh

Family	Scientific Name	French Name I	Local Name	Parts Used	Traditional Uses	Frequency of Citation
Apiaceae	*-Helosciadum Nodiflorum* *-Carum Carvi* *-Ammi Visnaga* *-Apium Graveolens* *-Coriandrum Sativum* *-Ferula Communis* *-Thapsia Garganica* *-Daucus Carota*	-Carvi -Khella -Ache -Coriandre -Férule -Thapsia -Carotte	.Tilgdamine =Ziyata .Kerouiya -Bechnikha .Krafesse -Kezbour -Lboubal -Bounefaa -Khizo	- Leaf - Fruit - Fruit - Whole Plant -Fruit - Inflorescence -Root -Root	-Cataplasm -Digestive -Galactogogue -Bloat -Tooth Care -Cough -Diabetes -Spasm Urinary -Anti-Diarrhea - Reheating - Female Infertility - Strengthening - Infection of Eyes -Cataplasm	6.50
Polypodiaceae	*-Adiantum Capillus-Veneris L.*	Capillaire	Kezbour Lakhla	Whole Plant	-Hair Care -Abscess	0.81
Ampélidaceae	*-Vitis Vinifera*	Vigne	Adel Asmom	- Leaf - Fruit	-Cataplasm for Fever. -Juice of Fruit for coloring Lhenna.	0.81
	-Pistacia	-Pistachier	-Ijj	-Gom, Leaf,	-stomach pain	

Anacardiaceae	*Atlantica* *-Pistacia Lentiscus*	De l'Atlas -Lentisque	-Dro	Fruit - Gom, Leaf, Fruit	- Intestinal pain	1.63
Lichens	*-Evernia Prunastri* *-Evernia Furfuracea*	-Mousse De Chêne -Mousse De Cèdre	Tamart Oumghar	Whole Plant	Cicatrizing,or Healling	1.63
Astéraceae	*-Anacyclus Pyrethrum* *-Arthemesia Absinthium* *-Cyanara Scolymus* *-Scolymus Hispanica* *-Arctuim Lappa* *--Calendula Officinalis* *- Echinops Spinosus*	-Pyrèthre d'afrique -Absinthe -Artichaut -Scolyme d'Espagne -Bardane -Souci - Echinops	-Iguendès -Chiba -Al Kherchouf - Al Guernina - Ouden Lfil -Louerd Lahmer - Echinops	-Root -Root - Whole Plant - Whole Plant -Leaf - Capitulates -Leaf - Leaf -Stem -Root	-Stomatology -Pain of Tooth -Stomatology - Appetiser - Anthelmintic - Jaundice - Hepatoprotective - Jaundice -Cataplasm -Cicatrization - Burns - Hepatoprotective - Abortive	8.13
	-Inula Viscosa *-Silybum Marianum* *-Taraxacum Sp*	-Aunée Visqueuse -Chardon Marie -Pissenlit	-Terehla -Chouk Lahmir, Tawra -Tilmaouin, Iouejdem	-Leaf -Root - Capitulates -Seed -Leaf -Root	-Cataplasm - feeding - Jaundice - Drain of liver	
Berbédaceae	*-Berbéris*	-Epine-	-Argis	-Root	-Khol	0.81

	Hispanica	Vinette				
Brassicaceae	*-Nasturtium Officinale* *- Capsella Burssa-Pastoris*	-Cresson De Fontaine -Boursse A Pasteur	-Guernounche -Akrab Nemeksaouen	- Whole Plant - Whole Plant	- Reheating - Cataplasme For Hemorrhoid,	1.63
Caryophyllaceae	*-Herniaria Hirsuta* *-Corrigila Telephiifolia* *-Saponaria Vaccaria*	-Herniaire Velue -Corrigiole -Saponaire	-Haraste Lahjer -Tawserghint -Tighighecht	- Whole Plant -Root -Leaf -Root	- kidney stones - Dermatitis -Cutaneous Infections.	0.81
Cistaceae	*-Cistus Salviaefolius*	-Ciste	-Touzalt, Irguel	-Leaf -Seed	-Digestive - Aphrodisiac .	0.81
Cucurbitaceae	*-Bryona Dioca* *-Cucurbita*	-Bryone Dioque -Citrouille	-Adéle Nouchéne, Dalia Lbida -Garaa Hamra	- Whole Plant - Pome	-Dermatological Diseases -Antianthelmintic	1.63
Cupressaceae	*-Cupressus Sempervirens* *-Juuniperus Oxycedrus* *-Teraclinis Articulata*	-Cyprés -Genevrier Oxycédre, Cadier -Thya De Berberie	-Tayda, Assipé -Ttaka -Alaaraar	-Leaf -Cone -Bay -Cade -Leaf and Cone	-Cicatrization - Reheating - Cicatrization - External And Internal Antiparasitic Veterinar Uses. -Fumigation -Digestive	0.43
Ericaceae	*-Arbutus Unedo*	-Arbousier	-Sasno, Bakheno	-Fruit -Leaf	-feeding -Antiseptic Urinary	0.81
Euphorbiaceae	*-Euphorbia Nicaensis*	-Euphorbe	-Tinuga, Molbina	-Latex	-Cors And Verrus.	0.81
Fagaceae	*-Castanea Sativa*	-Chataigner	-Belout n'ssara	-Fruit	-Astringent -Circulation	2.43
	-Quercus Faginea *-Querqus Ilex*	-Chêne Zen -Chêne Vert	-Tacht Akhledj,Alkerouche	- Oak Apple (Al Aafs) -Bark, Young branch -Fruit	- Astringent - Hair Tonic - Stomach pain -Cicatrization - feeding -Tanning	

Fumariaceae	*-Fumaria Officinalis*	-Fumeterre	-Ahchlaf Nesli	- Whole Plant	- Jaundice -Liver	0.81
Gentiaceae	*-Centaurium Spicatum*	-Petite Centaurée	-Kesat Haya	- Whole Plant	-Cataplasm For Fever. -Digestive - Diabetes Disease	0.81
Géraniaceae	*-Pelargonium Sp*	-Geranium	-Laatercha	-Leaf	-Digestive	0.81
Juglandaceae	*-Juglans Regia*	-Noyer	-Gargaa	-Fruit -Leaf -Walnut	- Aphrodisiac -Mouth Ulcer, Gingivitis, Stomatitis . -Tannage - Diabetes -Astringent.	0.81
Lamiaceae	*-Ajuga Iva*	-Ivette, Bugle	-Tof Telba, Chandgoura	- Whole Plant	-Antispasmodic - Hypoglycemic - Cough	11.40
	-Lavendula Stoechas	-Lavande	-Al Helhal	- Whole Plant	-Antispasmodic -Anti-Inflammatory -Antiseptic -For Diabetes Diseases	
	-Marrubium Vulgare	-Marrube Blanc	-Merrou	- Whole Plant		
	-Melissa Officinalis	-Melisse	-Mlilsa	- Whole Plant	-Anti-Diarrhea -Astringent - Febrifuge	
	-Mentha Piperata	-Menthe Poivré	-Naanaa Al Aabdi	- Whole Plant	- Cataplasm -Antispasmodic - Digestive Comfort	
	-Mentha Spicata	-Menthe	-Naanaa	- Whole Plant	-Fever -Antispasmodic - Refreshing - Aroma of Tea	
	-Mentha Suaveolens	-Menthe A Feuilles Rondes	-Merssita	- Whole Plant		
	-Mentha Pulgium	-Menthe Poliot	-Flio	- Whole Plant	-Fever of Typhoid -Fever of Typhoid - Reheating Mix With Bread	
	-Ocimum Basilicum	-Basilic	- Lehbak	- Whole Plant	-Digestive	
	-Salvia Officinalis	-Sauge	-Salmia	- Whole Plant	-Digestive -cough - Reheating	

	-*Thymus hyemalis* -*Satureja Sp* -*Teucrium Polium* -*Salvia Verbenaca*	-Thym -Satureja -Germandrée -Sauge Verveine	-Azokni -Tazoknit, Zaater -Azoukni -Al Khiyata	- Whole Plant - Whole Plant - Whole Plant - Whole Plant	-Digestive - mosquito hunting - ocular disease - Menopause - Antidiabetic -Digestive -Antispasmodic - Aerophagia - cough -Preservative of butter. -Stomach pain -Digestive -Antispasmodic -cough -Digestive -Antispasmodic - cough -Aerophagia -Cicatrization	
Lauraceae	-*Laurus Nobilis*	-Laurier Noble	-Aassa Sidna Moussa	-Leaf	-Digestive	0.81
Liliaceae	-*Asparagus Officinalis* -*Allium Cepa* -*Allium Sativa* -*Allium Porrum* -*Asphodelus Microcarpus* -*Ruscus Aculeatus*	-Asperge -Oignon -Ail -Poireau -Asphodele -Petit Houx	-Hmissou -Asalim, Besla -Touma -Asalim, Lfsel Lherif -Tiboaaochine Neghri -Deghmousse	- Whole Plant -Bulb - Bulb - Whole Plant - Bulb -Rhizome	-Pain -Liver -Hair Care (Juice) -Fever Typhoid -Cough - Anti- Diabetic -Hypertension -Hypertension -Otitis - Anti- Diabetic - Tinea -Anthelmintic -Cough -Abscess - Intestinal pain -Salade	4.90

					-Hypertension -Eczema -Otitis - Rheumatism	
Loranthaceae	-*Viscum Album*	-Gui	-Ouengouri, Hena Dial Admam	-Whole Plant	-Digestive	0.81
Malvaceae	-*Malva Sylvestris* -*Althaea Rosea*	-Mauve -Guimauve	-Al Bekoula -Tabensserte	- Whole Plant -Fruit -Leaf	-Laxative -Cough	1.63
Moraceae	-*Ficus Carica* -*Morus Alba* -*Morus Nigra*	-Figuier -Murier Blanc -Murier Noir	-Ikorane, Alkermousse -Atoute Lebied -Atoute Lekhel	-Latex -Fruit -Fruit -Fruit -Leaf	-Cors And Verrues -Laxative - Energizing - Energizing - Anti-Diabetic - Anemia	2.43
Myrtaceae	-*Eucalyptus Sp*	-Eucalyptus	-Al Kalitous	-Leaf	-Cough -Flu	0.81
Oleaceae	-*Olea Europa* -*Fraxinus Sp*	-Oleastre -Frêne	-Azitoune, Jebouje -Imtse	- Leaf -Seed	- Diabetes Diseases -Hypertension - Reheating	1.63
Papaveraceae	-*Papaver Rhoeas*	-Coquelicot	-Belaamane	-Petales Capsules: « Kherkhacha »	-Cosmetic -Sedative	0.81
Pinaceae	-*Cedrus Atlantica* -*Pinus Halpensis*	-Cèdre De l'atlas -Pin d'Alep	-Idgal, Larz -Tayda	-Cade -Essentiel Oil - Needle	-Antiseptic - Veterinar uses -Rhumatism - Rheumatism -Cough	1.63
Plantaginaceae	-*Plantago Major* -*Plantago*	-Plantain -Plantain	-Al Messassa -Al Messassa	-Leaf -Leaf	-Abscess	1.63

	Lanceolata					
Poaceae	*-Avena Sativa* *-Triticum Sp* *-Horedum Vulgaire* *-Zea Mays*	-Avoine - Blé -Orge -Maïs	-Al Khortal -Lekmeh -Chaaire - Dra	-Seed -Seed -Seed -Seed -Styles	- Fortifying Bread -Laxative - Mineralization of Bones - Urinary Infection -Diuretic	3.30
Polygonaceae	*-Rumex Acétosa*	-Rumex	-Tassemoumt, Lhemida	- Whole Plant	-Laxative	0.81
Punaceae	*-Punica Granatum*	-Grenadier	-Romane	- Fruit	-Astringent -Stomach -Tannage	0.81
Rhamnaceae	*-Zizyphus Lotus*	-Jujubier	-Nbeg, Cedra	-Fruit	-Urolithiasis	0.81
Rosaceae	*-Crataegus Monogyna* *-Malus Communis* *-Prunus Dulcis* *-Prunus Amara* *-Prunus Domestica* *-Prunus Cerasus* *-Prunus Persica* *-Pyrus Communis* *-Rosa Canina* *-Rosa Damascena*	-Aubépine -Pomme -Amandier -Prunes -Cerises -Pêcher -Poirier -Eglentier -Rose De Damas -Ronce	-Admame - Tefah -Louz -Berkouk -Hab Lemlouk -Al Khoukh -Bouaaouida - Taghmamoucht e -Louerd Lbeldi	- Flowers -Leaf -Fruit -Fruit - Vinegar -Amandes -Fruit -Fruit - Tail Cherries -Fruit -Fruit -Fruit -Petales -Fruit	-Hypertension -Astringent - Slim - Dandruff -Aphrodisiac -Cosmetic -Laxatif - Urinary Calculi -Diuretic -Cosmetic -Laxative -Astringent - Strengthening -Laxative -Laxative -Anti-edematous -Cataplasm - Moisturizer	8.94

	-Rubus Ulmifolius		-Tabgha	-Leaf	-Cosmetic - Diarrhea -Astringent -Cicatrization	
Rutaceae	*-Ruta Sp* *-Rubia Peregrina*	-Rue Sauvage -Garence	-Alfijel, Iouermi -Taroubia Al Foua	- Whole Plant - Whole Plant	-Bread -Rheumatism -Digestive - Diabetes Disease	1.63
Salicaceae	*-Populus Alba-Nigra* *-Salix Alba*	-Peuplier Noir Et Blanc -Saule	-Sefsaf - Aaoud Lma	-Leaf -Ecorce, Leaf	-Cataplasm For Rheumatism -Bread	1.63
Scrofuliaceae	*-Verbascum Sinuatum*	-Bouillon Blanc	-Aberdoud Izem	-Flower -Root	-Cough -Khol	0.81
Solanaceae	*-Atropa Belladona* *-Hyoscamus Albus* *-Datura Stramonium*	- Belladone -Jusguiame Blanche -Datura	-Zbib Laydour -Guenguitt, Sekrane -Tabourzegt, Chdek Jmel	-Fruit - Whole Plant -Seed -Leaf -Fruit -Seed	- Bracing -Sedative -Bread -Sedative	2.43
Taxaceae	*-Taxus Baccata*	-If	-Boulehrouz,Igné	-Oil : Cade	- Fracture	0.81
Thymeliaceae	*-Daphne Gnidium*	-Garou	-Alzaz	-Leaf	-Hair	0.81
Tiliaceae	*-Tilia Cordata*	-Tieulle	-Tieulle , Zayzafoune	- Bract And Flower Buds	- Sedative	0.81
Verbénaceae	*-Vitex Agnus-Castus* *-Verbena Triphylla*	-Gatttilier -Verveine Odorente	-Angarf -Louiza	-Fruit -Leaf	-Aphrodisiac - Reheating - Sedative -Antispasmodic - Bloating.	1.63
Aquifoliaceae	*-Ilex Aquifolium*	-Houx	- Abd Lisser	-Leaf	-Anti-Rheumatic	0.81
Araliaceae	*-Hydera Ilex*	-Lierre	-Tamnayt,Louaya	-Leaf	-Cataplasm	0.81
Fabaceae	*-Trigonella Foenum Graecum* *-Melilotus Sp* *-Medicago Sativa*	-Trigonnelle -Melilot -Luzerne	-Lhelba -Tazmort -Lfessa	-Seed - Whole Plant - Whole Plant	- Antianemic -Appetizer -Pain of Stomach - Diabetes Disease -Hair - Reminéralisante - Reconstruction	2.43

Apocynaceae	-*Vinca Major*	-Pervenche	-Tamnayt N Achal, Louaya	- Whole Plant	-Cataplasm	0.81
Acéraceae=Sapindaceae	-*Acer Sacharinum*	-Erable	-Lkikeb	- Leaf	-Cataplasm	0.81
Ulmaceae	-*Celtis Australis*	-Micocoulier	-Teghzaze	- Fruit	-Astringent - Diarrhea	0.81
Renonculaceae	-*Ranunculus Bullatus*	-Ranunculus	-Weden Lhelouf	- Whole Plant	-Rheumatism -Sedative	0.81
Urticaceae	-*Urtica Dioica*	-Ortie	-Heriga,Tesergmaz	- Whole Plant, - Root	-Hepatoprotective -Hair	0.81
Cypéraceae	-*Cyperus Longus*	-Souchet Odorant	-Tghda Nwaman	- Whole Plant	-Bracing	0.81
Boraginaceae	-*Borrago Officinalis*	-Bourache	-Ils Iziar	- Whole Plant	-Cataplasm -Antirheumatismic	0.81

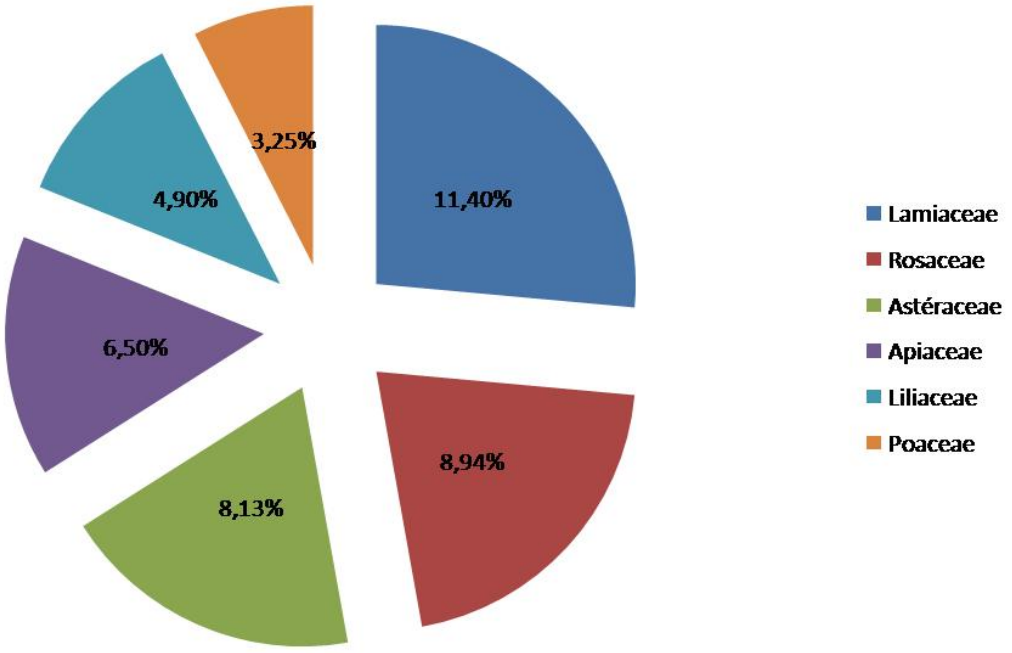

Figure 1. Medicinal uses per botanical family in the Ain Leuh area

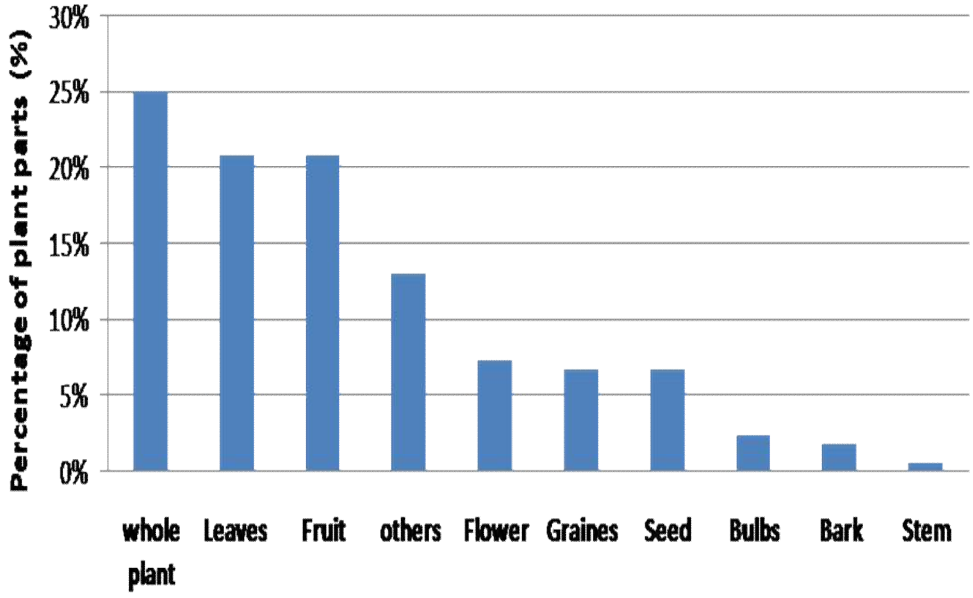

Figure 2. Frequency of plant parts used for medicinal preparations

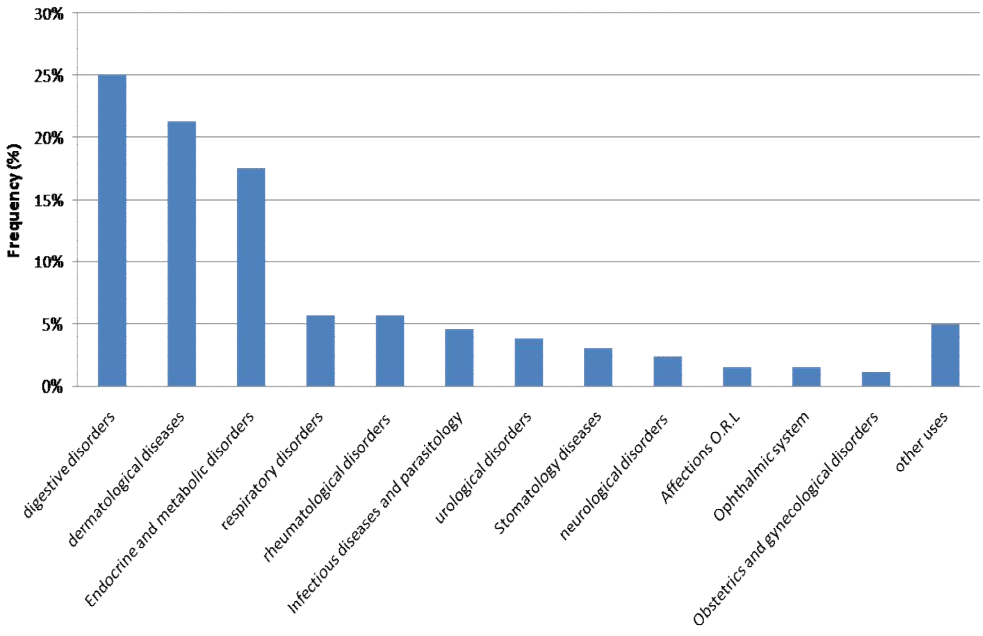

Figure 3. Importance of diseases treated by herbal medicine in the Ain Leuh area