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Ethnobotanique

Ethnobotanical survey of medicinal plants used in the traditional treatment of depression and anxiety in Fez-Meknes region, Morocco

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Abstract

Depression and anxiety represent a major mental health problem in the world. The majority of Moroccan people use traditional medicine for their health needs, including various forms of depression and anxiety. The aim of this work is to make an inventory of plant species used in folk medicine for the management of depression and anxiety in Fez-Meknes regions.

Established questionnaires were administered to 243 interviews in 4 communities within Fez-Meknes region. With traditional health practitioners, herbalists and consumer. Plant species belonging to 31 families were reported. The most frequently cited families are Lamiaceae followed by Asteraceae, Apiaceae and Verbenaceae. Leaves were the major plant parts used forming 58% solely and 73 mixed with other parts. This was followed by seeds 17%, flowers 6%, roots 2% and fruits, bark (1% each). The current survey represents a useful documentation, which can use to preserving knowledge on the use of medicinal plants in this region and to explore the phytochemical and pharmacological potential of medicinal plants.

Key words: Ethnobotanical survey, anxiety, depression, medicinal plants, traditional medicine.

Enquête ethnobotanique des plantes médicinales utilisées dans le traitement de la dépression et anxiété dans la région Fès-Meknes

Résumé

La dépression et l'anxiété constituent un problème majeur de santé mentale dans le monde. La majorité des Marocains utilisent la médecine traditionnelle pour répondre à leurs besoins en matière de santé, y compris pour diverses formes de dépression et d'anxiété. Le but de ce travail est de faire un inventaire des espèces de plantes utilisées en médecine traditionnelle pour soigner la dépression et de l'anxiété dans les régions de Fès-Meknès. Des questionnaires établis ont été administrés lors de 243 entretiens dans 4 communautés de cette région, avec les guérisseurs, les herboristes et les consommateurs. 55 espèces de plantes appartenant à 31 familles ont été rapportées. Les familles les plus citées sont les Lamiaceae, suivies des Asteraceae, Apiaceae et Verbenaceae. Les feuilles constituent la partie principale utilisé, seule (58%), et mélangée avec d'autres parties (73 %).Viennent ensuite les graines (17%), les fleurs (6%), les racines (2%) et les fruits et l'écorce (1% chacun). L'enquête actuelle constitue une documentation utile, qui peut servir à préserver les connaissances sur l'utilisation des plantes médicinales dans cette région et à explorer le potentiel phytochimique et pharmacologique des plantes médicinales.

Mots clés : Enquête ethnobotanique, anxiété, dépression, plantes médicinales, médecine traditionnelle

Introduction

Anxiety and depression are tow disorders mental state characterized by several symptoms. These symptoms are excessive worrying, feeling agitated, restlessness, fatigue, difficulty concentrating, irritability, tense muscles and trouble falling or staying asleep for anxiety and sad, empty, helpless, worthless, irritable for depression.

Indeed, these disorders are among the most common mental disorders in the world [10,22] According to the World Health report (2001), 450 million people suffer from a mental or behavioral disorder. Therefore, 4,5 % of the population, suffer from anxiety and 5,5 % from depression [59].

In Morocco, the prevalence of major depressive disorder for lifetime was 26,5 % conforming to a Moroccan epidemiological study [3]. Additionally, the who's report mote that years lived with disability in Morocco amounted to 3,8 % and 7.4% respectively of total number of anxiety and depression [4].

However, the treatment of these disorders in this country is limited on condition of several factors as:

-the cost of treatment;

-the socioeconomic level of the population;

-the use of medicinal plants treatment, currently therapeutic properties are proved scientifically in many diseases such diabetes, cancer… [12].

So Morocco country is known for its biodiversity, their vegetation is estimed to 5200 species including vegetation, 900 species endemic plants [29] and the 600 species are the medicinal floral [66] .

The aim of this study was to find out the medicinal plant species commonly used to treat depression and anxiety by the population of Fez-Mekne region, which part of plants are used, how they are obtained, prepared and applied for the treatment of depression and anxiety.

Materials and methods

Study area

The study was conducted in the Fez-Meknes regions, situated in central Morocco (Fig. 1).

Fez-Meknes region cover a total land area of 40,075 km2, representing 5.7% of the whole land area of the Kingdom of Morocco. Indeed, this region is composed of diversified natural zones divided into several geographical units: the Rif and Pre-Rif in the North, the mountains

of the Middle Atlas, the highlands of Missour and the plain of Saïs. and it characterized by the diversity of its soils where we can identify three major types of soil. It should be noted that the Saïs plain is wel known by rich soils and is full of important agricultural potential. Regarding climate, the region is characterized by a continental climate in the North, cold and humid in mountain areas, and a semi-arid climate in the highlands of Missour. It should be noted that this variability of the climate leads to a diversity of crops that better adapt to the specificities of this region.

Ethnobotanical survey

An ethnobotanical survey was conducted from December 2016 to June 2017, in 5 stations: Fez, Ain Beida, Ain Taoujdate, Sefrou, Taounate. This survey was conducted in the form of an interview guided by a survey.

A total of 244 people was interviewed for this purpose. Interviews were designed in to record information about the plants used to treat antidepressant/anxiolytic and their local names, methods of preparation, parts of the plant used, administration of medicines and the social identity of the people interviewed (age, sex, ...).

Relative frequency of citation

The relative frequency of citation shows the local importance of each species and it's obtained by dividing the number of informants, who mention the use of the species, also known as the Frequency Citation (FC), by the number of informants participating in the survey[12]. RFC = FC\N (0< RFC<1).

Statistical study

Statistical analysis of obtained data was performed using IBM spss statistics 22.

Results and discussion

Demographic features

244 informants including traditional healers, herbalists and inhabitants, contributed to the survey.

About 21% of the respondents aged between 18 to 36 years, 36% between 37 to 54 years, and 43% between 55 to 71 years. This age distribution reflects an interesting finding in terms of ethno medicinal knowledge. As similar surveys in the same study region interviews show that elderly people were particularly competent and possess a much greater knowledge of native plants [2, 12]. Similar results have been observed in Niger where ethno-medicinal knowledge in the treatment of mental illness is mainly held by elderly people [3].

74% of respondents are women and 26% are men. Depression and anxiety are more prevalent in women than men [6, 43]. Some evidence suggests that serotonin synthesis in female brain bass than in the male brain [58].

About one third of the interviewed are illiterate (39%), primary education (7%), secondary education (27%) and university education (25%). This study affirmative with other ethnobotanical studies carried out in Morocco [4, 12, 27]. In which knowledge on the use of medicinal plants preseted by illiterate.

Knowledge on traditional medicine has largely been passed by orally from generation to generation. The Majority of the people who participate in this survey, acquired the traditional medical knowledge from members of their families mainly grandparents and parents.

Medicinal plants and floristic analysis

In this study we recorded information on a total of 55 medicinal plant species, belonging to 31 families. The plants where are summarized in alphabetical order by families and species. Information such as Relative frequency of citation is provided for each species, vernacular name of plants species, mode of preparation and used parts (Table 1, Table 2).

Most recorded species (12 species) were from the Lamiaceae family, Apiaceae (7 species each), Asteraceae (5 species) and Fabaceae (3 species). This finding is in agreement with previous reports where these families were the most represented families in mental illness treatment in Morocco [26]. Dominance of Lamiaceae could be attributed to their abundance in the flora of Morocco (Fennane and Ibn Tattou, 2012).

Ethnobotanical indices (Relative frequency citation)

The most frequently used plants to treat depression and anxiety based on RFC values are *Lippia citriodora* H.B & K. (42,4%), *Salvia officinalis* L (18,5%), *Anthemis nobilis* L. (17,3%), *Origanum Majorana* L. (9,1%), *Lavandula vera* D C. (5,3%). Our results are similar to those describe in Morocco in other surveys [26] where *Hypericum perforatum, Melissa officinalis, Origanum majorana, Rosmarinus officinalis, Salvia officinalis, Hibiscus esculens, Citrus aurantium, Tilia cordata* and *verbena officinalis* are the plant species most used to treat anxiety[40].

Effectively, the antidepressant-like effect of *Rosmarinus officinalis* L. has been reported in animals [7,50,69], due to its high ursolic acid content [52]. The results of other study showed an involvement of the acid ursolic in the serotonergic and noradrenergic systems [21]. Another, work suggested that carnosol and betulinic acid could be responsible for the antidepressant effect of R. officinalis extract [51].

Other results showed *Lavandula angustifolia* L. present an antidepressant-like effect in the forced swimming test (FST) after acute treatment and rosmarinic acid was suggested to be one of the active ingredients in this plant [41]. Furthermore, *Anthemis nobilis* L provides an important antidepressant effect with an anxiolytic property [9].

It is also reported that *Coriandrum sativum* L. seed oil contains linalool (60–70%) as the major essential oil component [53], which presented a significant anxiolytic activity [20, 53].

Pimpinella anisum L. has been widely used in traditional medicine to treat a variety of diseases, including the anxiety. This effect is resultant of trans-Anethole [40, 71].

Ginseng (*Panax ginseng*, C.A. Meyer, Araliacceae) has long been used traditionally for the treatment of mental diseases such as anxiety and depression. Ginseng saponins have been to play an important role in its anxiolytic effect [18]. As well *Artemisia absinthium* (Asteraceae) is widely used for depression treatment too. Its effects may be correlated with the presence of antidepressant compounds such as phenolic and flavonoid contents [54]. Additionally *Lactuca sativa* L. belonging to Asteraceae family is one of the most commonly and widely herbal medicines used in the several countries in treatment of insomnia, anxiety, dry coughs. Anxiolytic effect of *Lactuca sativa* is confirmed by some studies [26, 35, 37]. In this context, certain traditional healers have claimed the efficacy of *Glycyrrhiza* species for a variety of pathological conditions as a diuretic, choleretic, insecticide , coughs and painful swellings. *Glycyrrhiza glabra* L. plays a very important role in the treatment of depression and inhibiting the serotonin recapture [18, 25]. Likewise Trigonella *foenum graecum* L. (Fabaceae) has a long history of medical use in traditional and modern literature such as antidepressant treatment. This effect is due to 4-hydroxyisoleucine (4-HI), it constitutes about 80% of the total content of free amino acids in *Trigonella foenum graecum* L. seeds [31]. Saffron (*Crocus sativus* L). Contains several volatile compounds such as crocin, picrocrocin, and safranal. It contains also several non-volatile active components, many of them are carotenoids including zeaxanthin,various α- and β-carotenes and lycopene. Among these molecules, several studies have demonstrated their antidepressant effect [36, 63]. Moreover *Cuminum cyminum* L. is used for treatment of diabetes and prediabetes, muscle and stomach spasms, diarrhea, preventing nausea, cold, infections, and depression. To explore the traditional use of *Cuminum cyminum* L. in the anxiety treatment, a study has demonstrated anxiolytic activity of hydroethanolic extract [38]. Furthermore, the essential oil of *Mentha pulegium* L. is used for different applications such antiseptic, ovarian cancer, sedative and antidepressant like- effect [38]. Additionally, the aerial part of *Ocimum basilicum* L. has been acts mainly on the digestive and nervous systems, stomach cramps, flatulence, colic and

indigestion. It's an antispasmodic, digestive, aromatic, carminative, galactogogue, stomachic and tonic. In the mental disorders, *Ocimum basilicum* L. treated the depression by its essential oil and leaves [1, 64, 75]. Moreover, *Myrtus communis* has been suggested as a hypnotic in traditional medicine. Other previous studies have also indicated its sedative hypnotic-like and anxiolytic properties [34]. This anxiolytic and myorelaxant effects, are explained by involvement of alpha adrenergic pathway [15, 34]. Likewise the active components in *Nigella sativa* L and *Olea europaea* oil are demonstrated to be powerful in treatment of impaired mental. *Olea europaea* oil may produce psychostimulant-like effect. For this reason, this oil exerts an important pharmacological Modulation of dopamine and serotonin level [17]. Furthermore with over 3,000 varieties, tea is the most consumed beverage in the world after water. Tea can be divided into six categories: black, dark, yellow, oolong, white and green. The oral administration of tea extract in rat increased the dopamine and the serotonin [75,73]. However comparative literature analysis suggests 10 species are described in ethnobotanical survey [26, 33] and 20 species are reported for the first time for treating depression and anxiety.

Plant parts used

The obtained results showed that the plant parts such as leaves, stems, roots, bark, fruit, flowers, seeds, and wood were used in treatment. Or, the most commonly used parts are the leaves, solely or mixed with other parts, forming 73% of total users. This was followed by seeds (17%), whole plants (12%), flowers (6%), roots (2%), fruit and stems and bark (1%) (Fig.2).

Preparation methods

As shows the figure 3, the medicinal plants remedies are prepared as decoctions, infusions.
Indeed, the infusion (58%) and decoction (22%) preparations in this study are the frequently used methods (Fig. 3). This result is in agreement with other ethnobotanical studies where infusion and decoction are the most frequently modes of preparation [12,11,5,39,68,74].

The great most of the remedies were taken orally (98 %) usually drunk as teas. Similar types of results were obtained in other studies [14,12,70].

Conclusion

This investigation is first meant to focus on ethno-pharmacological knowledge of plants used in the treatment of depression and anxiety disorders in Morocco. The study revealed that traditional medicine continues to play an important role in the healthcare system in Morocco. 58 species belonging to 28 families are used for treating depression and anxiety in Fez-Meknes regions. The current survey represents a useful documentation, which can contribute

to preserving and keeping knowledge on the traditional and popular use of medicinal plants in Morocco.

Conflicts of interest

The authors declare no conflicts of interest.

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Fig.1 Geographical location of the study area. (Fez - Meknes Regional Directorate)

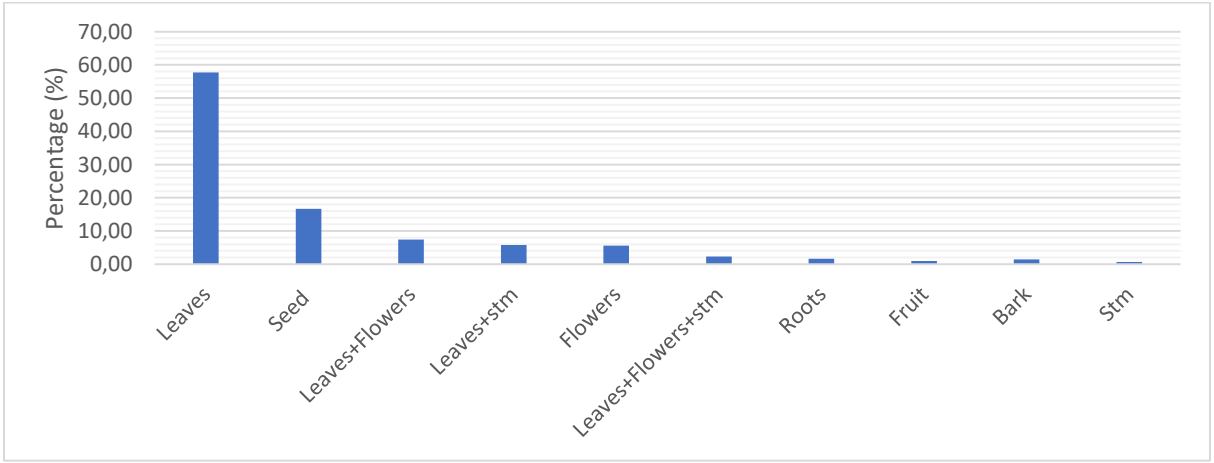

Figure 2: Plant parts used

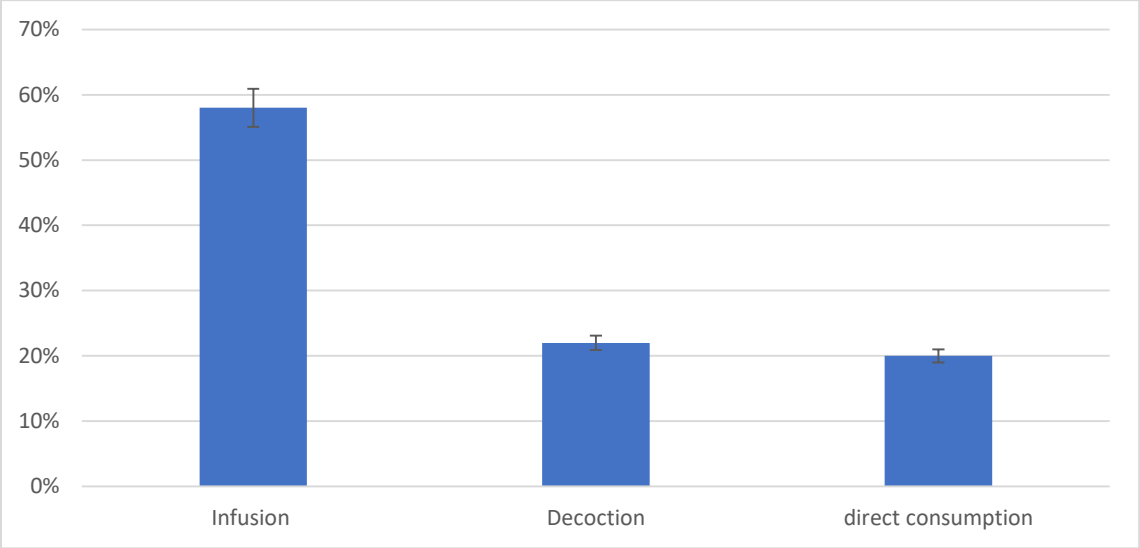

Figure 3: Percentage of types of administration

Table1: Plants use to treat depression/anxiety in Fez-Meknes areas.

Families and plants pecies	Vernacular name	Ecological distribution	Used parts	Preparation	Mode of administration	RFC (%)	Literature references in relationship of medicinal use of plants
Apiaceae							
Carum carvi L.	Karwiya	Cultivated	seeds	Decoction, Infusion	Oral	3,7	No
coriandrum sativum L.	qezbor	Cultivated	Seeds, Leaves	Decoction, Infusion	Oral	1,2	[28] [20,28,47,53]
Cuminum cyminum L.	kemmûn	Cultivated	Seeds	Infusion	Oral	4	[38]
Daucus carota L.	ḫizzu	Cultivated	Seeds	Raw, Infusion	Oral	1,2	No
Foeniculum vulgare P.Mill	Nâfaʹ	Cultivated	Seeds	Decoction, Infusion	Oral	4,9	[56]
petroselinum sativum Mill	maʹdnûs	Cultivated	Leaves	Decoction, jus,	Oral	3,3	No
Pimpinella anisum L.	Habbat halâwa	Cultivated	Seeds	Decoction	Oral	2,1	[32,40,71]
Apocynaceae							
Nerium Oleander L.	ddeflâ	Wild	Stem and leaves and flower	Raw	Nasal	0,4	[77]

Araliaceae							
Panax Ginseng C.A. Mey.	Gensing	Wild	Roots	infusion, Raw	Oral	0.8	[23,61,76, 78,79]
Palmaceae							
Phoenix dactylifera L.	Ttmer	Cultivated	Fruit	**Raw**	Oral	0,4	No
Astéraceae							
Anthemis nobilis L.	bâbnûj	Wild	Flower And Leaves	Infusion Decoction	Oral	17,3	[8]
Artemisia absinthium L.	šîba	Cultivated	Leaves	Infusion	Oral	0,8	[54]
Artemisia herba alba Asso Asso.	šîh	Wild	Stem and leaf	Infusion Decoction	Oral	4,1	No
Dittrichia viscosa L.	Magramane	Wild	Leaves	Infusion Decoction	Oral	1,2	No
Lactuca sativa L.	ḫoss	Cultivated	Raw	Raw	Oral	0,4	[26,35,37]
Brassicaceae							
Lepidium sativum L.	Habb er-ršâd	Cultivated	Seeds	Infusion	Oral	0,4	No
Caryophyllaceae							
herniaria hirsute L.	herstelhjer	Wild	whole plant	Infusion	Oral	0,4	No
Maranhtaceae							
Dysphania ambrosioide	Mkhniza	Wild	Leaves	Infusion	Oral	1,2	No

s L.							
Cupressaceae							
Tetraclinis articulata. Masters.	′ar′ar	Wild	Leaves	Row	Nasal	1,6	No
Fabaceae							
Glycyrrhiza glabra L.	′arq as-sûs	Wild and Cultivated	Stem	Decoction	Oral	0,4	[18,25]
Vicia ervilia L. Willd.	Kersenna	Wild and Cultivated	Seeds	Direct administration	Oral	0,4	No
Trigonella foenum graecum L.	l-halba	Cultivated	Seeds	Decoction, maceration and Mixed with honey	Oral	3,7	[31,42]
Irudaceae							
Crocus sativus L.	Za′afran	Cultivated	Flower	Infusion	Oral	0,8	[36,63]
Juglandaceae							
Juglans regia L.	l-gerga′	Cultivated	Fruit	Direct administration	Oral	0,4	[16,28]
Lauraceae							
Cinnamomum cassia Blume	qarfa	Imported	Bark	Decoction, Infusion	Oral	1, 2	[12,21]
Lythraceae							
Lawsonia inermis L.	l-hennâ	Cultivated	Leaves	Infusion	Oral	1,6	No
Lamiaceae							
Marrubium	merrîwa	Wild	Leav	Decoction	Oral		[33]

vulgare L.			es	, Infusion		0,8	
Mentha pulegium L.	fliyyo	Wild	Leaves	Infusion,	Oral	3,3	[65]
mentha suaveolens Ehr.	Marseta	Cultivated	Leaves	Decoction, Infusion	Oral	2,5	No
Origanum compactum Benth.	za′tar	Wild	Leaves	Decoction, Infusion	Oral	0,8	[26]
Origanum Majorana L.	Merded ûš	Cultivated	Leaves	Decoction, Infusion	Oral	9,1	[26]
Rosmarinus officinalis L.	âzîr	Cultivated	Leaves	Decoction, Infusion	Oral	16,5	[7,50,51,52,69]
Salvia officinalis L.	sâlmiya	Cultivated	Leaves	Decoction, Infusion	Oral	18,5	[26]
Satureja calamintha L. Scheele	Menta	Wild	leaves	Infusion	Oral	0,4	NO
Lavandula vera D C. / Lavandula abrialis	ḫuzâma	Cultivated	Stem and leaf	Decoction, Infusion	Oral	5,3	No
Mentha piperita L.	na′na′ abdî	Cultivated	leaves	Infusion	Oral	0,4	[11,49,71]
Mentha spicata L.	na′na′	Cultivated	leaves	Infusion	Oral	1,2	[26]
Ocinum basilicum L.	lahbaq	Cultivated	leaves	Infusion	Oral	0,8	[1,64,75]
Malvaceae							
Hibiscus sabdariffa L.	Karkadiya	Wild	Flower	decoction	Oral	0,8	[32,18]
Myristicaceae							
Myristica fragans houtt.	l-gûza	imported	Fruit	Infusion	Oral	0,4	No

Myrtacées							
Myrtus communis L.	rîhân	Wild	Leaves	Infusion	Oral	0,4	[15,34]
Oleaceae							
Olea europaea L.	zaytûn	Wild and Cultivated	leaves	Infusion	Oral	0,8	[17]
Papaveraceae							
Papaver rhoeas L.	bela′man	Wild	Flower	Infusion	Oral	0,4	[60]
Poaceae							
Saccharum officinarum L.	Qasab sakkuri,	Cultivated	Stem	Jus	Oral	0,4	No
Punicaceae							
Punica granatum L.	Qšûr rommân	Cultivated	Peel	decoction	Oral	0,4	[24,46, 66]
Ranunculaceae							
Nigella sativa L.	sânûj	Cultivated	Seeds	Direct administration	Oral	2,9	[62,17]
Rosaceae							
Rosa damascene Mill.	Werd	Cultivated	Flower	Infusion	Oral	0,4	[16]
Rubiaceae							
Coffea arabica L.	qahwa	Imported	Seeds	decoction	Oral	0,8	No
Rutaceae							
Citrus aurantium L.	Lâranj, lernej	Cultivated	Flower	Infusion	Oral	1,2	[30]

Citrus limon L.	Hâmmed	Cultivated	Fruit	Jus	Oral	0,8	[45, 48, 67]
Schisandraceae							
Illicium verum Hook.f.	Yansone	Cultivated	Seeds	Infusion	Oral	2,5	[19]
Theaceae							
Camellia sinensis L.	Atay	Imported	leaves	Decoction	Oral	0,8	[57,73]
Verbenaceae							
Lippia citriodora H.B & K.	lwîza	Cultivated	leaves	Decoction, Infusion	Oral	42,4	[26,44]
Zingibéraceae							
Elettaria cardamomum L.	Qa'qolla, hebb el-hal	Imported	grain	Infusé dans l'eau ou lait, Decoction	Oral	4,1	[55]
Zingiber officinale L.	Skenjbîr	Imported	Racine	Jus	Oral	0,8	[72]
Alpinia officinarum Hance	khoudenjal	Imported	Racine	Decoction	Oral	0,4	No

Table2: List of the species according to the different recipes, mode of preparation, used parts and mode of administration.

En-quête	Latin name	Solvents	Used parts	Posologie	Route of administration
1	*Lippia citri-odora* H.B & K.	Water	leaves	1/3 Tsp	Oral

	Salvia officinalis L.		leaves	1/3 Tsp	Oral
	Illicium verum Hook.f.		Seeds	1/3 Tsp	Oral
2	*Lippia citriodora* H.B & K.	Water	leaves	1/3 Tsp	Oral
	Anthemis nobilis L.		Flower	1/3 Tsp	Oral
	Myrtus communis L.		leaves	1/3 Tsp	Oral
3	*Illicium verum* Hook.f.	Water	Seeds	1/7 Tsp	Oral
	Lippia citriodora H.B & K.		leaves	1/7 Tsp	Oral
	Origanum Majorana L.		leaves	1/7 Tsp	Oral
	Pimpinella anisum L.		Seeds	1/7 Tsp	Oral
	Carum carvi L.		Seeds	1/7 Tsp	Oral
	Lavandula vera D C. / Lavandula abrialis		leaves+stem	1/7 Tsp	Oral
	Rosmarinus officinalis L.		leaves	1/7 Tsp	Oral
4	*Nigella sativa* L.	milk	leaves	1/10 Tsp	Oral
	Rosmarinus officinalis L.		leaves	1/10 Tsp	Oral

	Salvia officinalis L.		leaves	1/10 Tsp	Oral
	Origanum Majorana L.		leaves	1/10 Tsp	Oral
	Lippia citriodora H.B & K.		Leaves	1/10 Tsp	Oral
	Carum carvi L.		Seeds	1/10 Tsp	Oral
	Daucus carota L.		Seeds	1/10 Tsp	Oral
	Pimpinella anisum L.		Seeds	1/10 Tsp	Oral
	Anthemis nobilis L.		Flower	1/10 Tsp	Oral
	Apium graveolens L.		Seeds	1/10 Tsp	Oral
5	*Lippia citriodora* H.B & K.	water	Leaves	1/3 Tsp	Oral
	Salvia officinalis L.		Leaves	1/3 Tsp	Oral
	Mentha pulegium L.		leaves+ Flower	1/3 Tsp	Oral
6	*Lippia citriodora* H.B & K.	Water	Leaves	1/2 Tsp	Oral
	Salvia officinalis L.		Leaves	1/2 Tsp	Oral
7	*Illicium verum* Hook.f.	honey	Seeds	1/6 Tsp	Oral
	Lippia citri-		Leaves	1/6 Tsp	Oral

	odora H.B & K.				
	Nigella sativa L.		Seeds	1/6 Tsp	Oral
	Anthemis nobilis L.		Leaves+ Flower	1/6 Tsp	Oral
	Carum carvi L.		Seeds	1/6 Tsp	Oral
	Pimpinella anisum L.		Seeds	1/6 Tsp	Oral