

# Ethnobotanical survey of medicinal plants used for the treatment of diabetes, cardiac and renal diseases in the North centre region of Morocco (Fez–Boulemane)

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## 1. Introduction

Morocco has always a long medical tradition and the traditional learning of plant remedies persisted until now. The art of healing is a part of the musulman tradition that reigned in this country. In Fez region, traditional plant medicines had always held a strong position. The Quarawiyine University in Fez was the mean academic centre of Africa, and comprises a medical section ([Bellakhdar, 1985](#); [Bellakhdar, 1997](#)). Today, traditional medicines are a great part of modern health care systems in Morocco.

Many authors have studied the traditional pharmacopoeia in different areas of Morocco ([Claisse](#); [Bellakhdar](#) and [Sijelmassi](#)). [Ziyyat et al. \(1997\)](#) have scientifically studied the traditional pharmacopoeia in Oriental Morocco. However, very little informations are available on the traditional plants of the North centre region of Morocco. In order to record all these medical knowledge useful for the maintenance of health, easy to find and to use, and more adapted to the local diseases prevention and treatment ( [Fleurentin and Dos Santos, 1990](#)), we have proposed to enumerate the most prescribed herbal remedies for treating diabetes, cardiac and renal diseases in North centre region of Morocco (Fez).

## 2. Materials and methods

Ethnobotanical information was obtained from 25 local traditional herbal healers and more than 1500 patients suffering from diabetes, cardiac and renal diseases in four different areas of Fez–Boulemane region: prefecture of Zouagha Moulay Yacoub, prefecture Fes-Medina, prefecture Fes Jdid-Dar Dbibagh and prefecture of Sefrou. This ethnobotanical survey were performed with the permission of Public Health and local authorities. Medical collaboration was assumed to include patients with different diseases in this study. Patients interviewed have been informed about the objective of this study. All interviews were done by Dr H. Jouad as part of his doctoral studies.

For each patient, the following information was gathered and set on a identity card:

- name of the patients or herbalist with their age, sex, cultural level, professional activity and their usual language;
- date and place of gathering information;
- pathology of persons interviewed and frequency of medical consultations;
- name of the drug: botanical name and vernacular name;
- ecological distribution: local or imported, cultivated species or spontaneous;
- parts used: leaves, fruit, aerial part, root, seeds...
- the source of provisioning their medical plants; pharmacist, achab (herbal healer), experience of the other (initiated) or fkih (traditional healer);
- the reasons of using medicinal plants (more effective, more cheap, or easy acquisition);
- the results of phytotherapy (good, average or variable);

- the precision of doses (precise, not precise or little or sometimes recise);
- the knowledge of toxic plants;
- the mode of preparation and administration and the duration of administration;
- finally, the patients are questioned if they have observed any adverse effects of the drugs used.

After compilation of all the data, plants material were collected by Dr H. Jouad. Definite determination of the botanical names of the plants were done in collaboration with Pr A. Ouyahya (Scientific Institute, Rabat) and Pr A. Achhal Kadmiri (Institute of Agronomy and Veterinary Hassan II, Rabat).

Voucher specimens of each plant have been deposited at the herbarium of the Faculty of Sciences and Techniques Errachidia. Numbers of collections are given in [Table 1](#).

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|       |  |                |                  |  |
|-------|--|----------------|------------------|--|
| 01330 | <i>Apium graveolens</i> L.                   | Apiaceae       | kraffess         | H(034, 7) cardiac diseases, H(179) renal disease, fruit, RNS.  |
| 04330 | <i>Cuminum cyminum</i> L.                    | Apiaceae       | kamoun           | H(034,11) cardiac diseases, fruit, RNS.                        |
| 06060 | <i>Foeniculum vulgare</i> Mill.              | Apiaceae       | nafaâ            | H(171, 48) diabetes, H(179, 48) renal disease, fruit, RNS.     |
| 09040 | <i>Nerium oleander</i> L.                    | Apocynaceae    | defla            | H(171, 25) diabetes, toxic, leaves, RNS.                       |
| 08060 | <i>Lepidium sativum</i> L.                   | Brassicaceae   | hebb rchab       | H(171, 72) diabetes, H(179, 72) renal disease, seeds, RNS.     |
| 09250 | <i>Opuntia ficus-indica</i> (L.) Mill.       | Cactaceae      | hendiya, kermous | H(171, 86) diabetes, flowers, RNS                              |
| 02310 | <i>Cannabis sativa</i> L.                    | Cannabinaceae  | kiff             | H(092, 17) toxic, aerie part, RNS                              |
| 02400 | <i>Capparis spinosa</i> L.                   | Capparidaceae  | kebbar           | H(171, 39) diabetes, fruits, RNS.                              |
| 02900 | <i>Chenopodium ambrosioides</i> L.           | Chenopodiaceae | mkhinza          | H(171, 8) diabetes, flowers, leaves, RNS.                      |
| 01390 | <i>Artemisia herba-alba</i> Asso             | Asteraceae     | chih             | H(171, 191) diabetes, aerie part , RNS.                        |
| 02540 | <i>Carthamus tinctorius</i> L.               | Asteraceae     | zaâfran          | H(179, 9) renal disease, flowers, RNS.                         |
| 07760 | <i>Lactuca sativa</i> L.                     | Asteraceae     | khous            | H(171, 10) diabetes, H(034, 10), aerie part , RNS.             |
| 03180 | <i>Cucumis colocynthis</i> L.                | Cucurbitaceae  | hdejja, hantel   | H(171, 129) diabetes, fruit, RNS.                              |
| 04290 | <i>Cucumis</i> sp.                           | Cucurbitaceae  | faqqous          | H(179, 13) renal disease, fruit, RNS.                          |
| 04260 | <i>Cucumis melo</i> L.                       | Cucurbitaceae  | battikh          | H(179, 61) renal disease, fruit, RNS.                          |
| 12420 | <i>Tetraclinis articulata</i> (Vahl) Masters | Cupressaceae   | araâr            | H(171, 39) diabetes, aerie part , RNS.                         |
| 13250 | <i>Zea mays</i> L.                           | Poaceae        | dra              | H(179, 61) renal disease, stem, RNS.                           |
| 12450 | <i>Thymus vulgaris</i> L.                    | Lamiaceae      | zitra            | H(034, 113), leaves, RNS.                                      |
| 00860 | <i>Allium sativum</i> L.                     | Alliaceae      | touma            | H(171) diabetes, H(034, 146) cardiac diseases,, bulb, RNS.     |
| 00840 | <i>Allium cepa</i> L.                        | Alliaceae      | basla            | H(171, 142) diabetes, H(034, 142) cardiac diseases, bulb, RNS. |
| 05550 | <i>Eucalyptus globulus</i> Labill.           | Myrtaceae      | kalitoud         | H(171, 101) diabetes, leaves, fruits, RNS. (101)               |
| 11420 | <i>Sesamum indicum</i> L.                    | Pedaliaceae    | jenjlan          | H(171, 7) diabetes, seeds, RNS.                                |
| 13270 | <i>Zingiber officinale</i> Rosc.             | Zingiberaceae  | skingebir        | H(000, 9), rhizome, RNS.                                       |
|       |  |                |                  |  |
| 12600 | <i>Trigonella foenum-graecum</i> L.          | Fabaceae       | halba            | H(171, 173) diabetes, seeds, RNS.                              |
|       | <i>Olea europaea</i>                         | Fabaceae       | halba            | H(171, 173) diabetes, seeds, RNS.                              |

## 3. Results and discussion

### 3.1. Percentage of uses of medicinal plants and phytotherapy

In the present survey, 1527 patients were questioned. One thousand and ninety five (72%) from them were diabetics, 274 (18%) with renal diseases and 158 (10%) with cardiac disorders. Generally, the percentage of use of phytotherapy was greater than 50%. On the average, the percent of use was 76%. These data showed clearly that phytotherapy has always be practiced in this area.

### 3.2. Frequency of uses of medicinal plants

In Morocco, the traditional pharmacopoeia disposes of a wide arsenal of plant remedies, because of the diversity of its environment and flora. Many studies have demonstrated that traditional medicines are still used, and they should be scientifically studied. Many authors have shown that the percent of uses of plants, oscillated between 55 and 90% according to the region where the survey was undertaken ([Sekkat](#); [Bendali](#); [El](#); [Magoua](#); [Jaouad](#); [Nabih](#); [Bellakhdar](#) and [Ziyyat](#)). In all regions prospected, the majority of the persons interviewed dispose of low sources, and they could not summon up the costly modern health care. In our study, the percentage of plant users is 76%. From the above results, we can observed that phytotherapy is frequently practiced by Moroccan population in this region. In all regions of Morocco, there is a common tradition of folk medicine. All people stocked some traditional home remedies ( [Weniger, 1991](#)). The plant form the main ingredients of the home remedies.

In Morocco, even today, plant medicines are freely available to the public without prescription. Such many other countries, traditional herbal healers are frequently consulted (37%) by the majority of the public purchasing herbal preparations than pharmacists (1%). Generally, the prescription of phytotherapy and medicinal plants was frequently dispensed from the experience of the others (59%).

### 3.3. Use of plants according to sex

Women (63%) used medicinal plant more frequently than men (37%). The results of different survey, realized in many regions of Morocco, have showed that generally, women used the medicinal plant more than men with percentage (61–65 and 35–39%), respectively ([Hamdani](#); [El](#); [Jaouad](#); [Nabih](#) and [Ziyyat](#)). This could be explained by:

- Women are more attached than men to everything traditional.
- The relative frequency of analphabetism of women in our society could be at the behind of the credulity toward information and particularly to indication on the use of medicinal plants.
- The easiness of transmission of these information between women. This may explain their relative knowledge in this area ([Hamdani](#); [Jaouad](#) and [Nabih](#)).
- Women are often at home at the hours when we have made our inquiries.

### 3.4. Use of medicinal plants according to age

We have observed that the interviewed were adult (49%) or aged (45%). Earlier studies have shown that the use of medicinal plants was more important in age categories between 30 and 60 years ([El](#) and [Nabih](#)). [Ziyyat et al. \(1997\)](#) reported that these two age categories are more exposed to diabetes, cardiac and renal diseases.

### 3.5. Reasons of the use of medicinal plants

The reasons of the use of medicinal plants are that these natural remedies are less cheap (53%) and more efficient than modern medicines, but no more than 10% of the total persons interviewed used the medicinal plants because they are easy of acquisition than modern drugs.

On the contrary, about 72% are satisfied with the treatment and the use of phytotherapy and preferred the uses of medicinal plants than the synthetic drugs.

Overall, the interviewed persons were, generally illiterate (60%) and professionally inactive (69%).

However, in all groups, the number of plant users were very important and did not depend on sex, age and socio-cultural level.

The doses used were little or sometimes precise (64%), the patients used some measures that could defer according to each one of them. The doses frequently used were often more less than the therapeutic effective dose ([Nabih, 1992](#)).

The duration of the use of plants was badly defined. Then, the patients did not take into account the accumulation of some constituents in body after a prolonged use of plants, which could provoke severe-side effects and could also aggravate the disorder.

In almost all studies dealing with the inventory of medicinal plants, authors reported only the therapeutic plants without reporting the toxic plants known by the traditional herbal healer. The recording of these plants can provide useful information and should be taken into consideration by researchers.

In the present study, only 12% of the total users of medicinal plants have a little information about toxic plants. Nine plants are known as toxic plants. These were: *Atractylis gummifera* (addad), *Nerium oleander* (defla), *Citrullus colocynthis* (handel) coloquinthe, *Cannabis sativa* (kif), *Peganum harmala* (harmel), *Colchicum autumnale* L., *Lycium vulgare* Dun. (aoussaj), *Datura stramonium* (datura), *Atropa belladonna* (belladone).

Tribal plant medicines which are not prescription medicines are mostly used for auto-medication and they are frequently dispensed by ignorant people (Keller, 1991). It's then necessary to inform and heighten public awareness about toxic plants in order to keep off, at least, some accidental intoxication due to ignorance of plants. In the same way, the passing on of medical knowledge is done according to oral initiatory chain, which led to some impoverishment of doctrinaire knowledge. At present, the traditional medical knowledge transmitted from generation to generation is in danger, because transmission between old people and younger generation is not always assured (Weniger, 1991). That's why, the traditional practitioners of today are less instructed and organized than their predecessors.

### 3.6. Inventory of selected medicinal plants

About 90 plants were recorded as medicinal agents for treating diabetes, cardiac and renal diseases (Table 1).

For diabetes, 54 plants were cited (Table 1), of which the most cited (over 100 citations) were: *Artemisia herba alba*, *Trigonella foenum-graecum*, *Zygophyllum gaetulum*, *Marrubium vulgare*, *Nigella sativa*, *Globularia alypum*, *Centaureum erythraea*, *Allium sativum*, *Allium cepa*, *Olea europaea*, *C. colocynthis*, *Aloe succotrina*, *Artemesia absinthium*, *Rosmarinus officinalis*, *Ammi visnaga*, *Thymus vulgaris*, *Spergularia purpurea*, *Urtica dioica*, *Eucalyptus globulus*, *Mentha pulegium*, *Cynara cardunculus*, *Opuntia ficus indica*.

The hypoglycaemic activity of some plants cited (Table 1) has been experimentally demonstrated, such as *T. foenum-graecum* (Amin and Raghuram), *Ar. herba alba* (Al and Al), *Am. visnaga* (Alaoui et al., 1992), *A. sativum* (Chang and Johnson, 1980), *Ni. sativa* (Ettaiib et al., 1994), *Zy. gaetulum* (Jaouhari et al., 1999), *Ce. erythraea* (Alaoui et al., 1992), *A. cepa* (Alaoui et al., 1992), *R. officinalis* (Erenmemisoglu et al., 1997), *Ni. sativa* (Asdadi; Al and Labhal), *Op. ficus indica* (Enigbokan et al., 1996) and *S. purpurea* (Jouad et al., 2000).

As regards to hypertension, 19 plants were reported (Table 1), of which the most used were: *A. sativum*, *O. europaea*, *Arbutus unedo*, *U. dioica*, *Petroselinum sativum*, *R. officinalis*, *T. foenum-graecum*, *Lippia citriodora*, *Herniaria glabra*, *S. purpurea* (Jouad and Jouad).

The antihypertensive activity of some plants is demonstrated experimentally, such as *A. sativum* (Malik; Pantoja and Pantoja), *O. europaea* (Circosta et al., 1986), *P. harmala* (Aarons et al., 1977), *A. unedo* (Fitzpatrick and Abdalla), *R. officinalis* (Aqel, 1991), *Ni. sativa* (Labhal et al., 1994) and *H. glabra* (Rhiouani et al., 1999).

For renal diseases, 33 plants were cited (Table 1), of which the most used were: *H. glabra*, *Coriandrum sativum*, *Carum carvi*, *Daucus carota*, *Pimpinella anisum*, *Lepidium sativum*, *Silene* sp., *Cucurbita pepo*, *Cucumis melo*, *Zea mays*, *Crocus sativus*, *Ziziphus lotus*, *Pe. sativum*, *Punica granatum*, *Foeniculum vulgare*, *Glycyrrhiza glabra*, *Linum usitatissimum*, *Pirus communis*, *Prunus carasus*, *Rubia tinctorum*, *Ruta montana* and *S. purpurea*.

The renal effect of some plants have been scientifically demonstrated, such as: *H. glabra* (Rhiouani and Rhiouani), *F. vulgare* (Susplugas and Tanira), *Z. mays* (Dat et al., 1992), *Ce. erythraea* and *R. officinalis* (Haloui et al., 2000) and *S. purpurea* (Jouad and Jouad).

For cardiac diseases, 11 plants were cited (Table 1), the most used were: *A. unedo*, *Ammodaucus leucotrichus*, *Apium graveolens*, *Cuminum cyminum*, *Brassica oleracea*, *C. cardunculus*, *Lactuca sativa*, *T. vulgaris*.

The plants that have been scientifically studied from these used for the treatment of cardiac diseases is *A. unedo* by Ziyat and Boussairi (1998).

The mechanism of action of the pharmacological activity of these plants remains to be identified. While, the therapeutic properties of the other plant cited are not scientifically investigated, but they are well known in traditional folk medicine in Fez–Boulemane region. Among the 19 species known for hypertension, 16 plants were also used for diabetes treatment. These were *P. sativum*, *H. glabra*, *S. purpurea*, *Juniperus communis*, *Le. sativum*, *Arb. unedo*, *Lavandula dentata*, *Origanum compactum*, *R. officinalis*, *T. foenum-graecum*, *A. sativum*, *E. globulus*, *Eugenia caryophyllata*, *O. europaea*, *U. dioica*, *P. harmala*. Among the 11 plants for cardiac diseases, six plants were used for diabetes treatment. These were *B. oleracea*, *C. cardunculus*, *La. sativa*, *A. sativum*, *A. cepa*, *O. europaea*.

Among the 33 plants for renal diseases, ten plants were also used for diabetes: *F. vulgare*, *L. sativum*, *H. glabra*, *S. purpurea*, *Cucumis sativus*, *Z. lotus*, *Fragaria visca*, *Rubus idaeus*, *Rubus fruticosus*, *R. montana*. Another remarkable feature in the ethnopharmacopoeia of many African populations is the use of food substances as medicinal agents (20 edible plants), such as *D. carota*, *B. oleracea*, *Eruca sativa*, *O. ficus indica*, *C. cardunculus*, *L. sativa*, *C. sativus*, *C. melo*, *A. unedo*, *Z. mays*, *C. pepo*, *Lupinus albus*, *A. sativum*, *A. cepa*, *Ficus carica*, *O. europaea*, *P. granatum*, *Cydonia vulgaris*, *P. communis*, *P. carasus*. Many patients used more than one plant in order to treat the same disease.

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We can conclude that in Morocco, the traditional medicines are still used and constitute in fact a very rich heritage, which is obligatory to keep. Phytotherapy should not be a poor medicine, but a real tool of medicines for all people. That's why, we should study these drugs, in order to select the real therapeutic means and to ward off, if possible, the charlatanism, which could affect the public credulity.

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