

Ethnopharmacological survey of medicinal plants used for the treatment of diabetes mellitus, hypertension and cardiac diseases in the south-east region of Morocco (Tafilalet)

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Abstract

In this study, the medicinal plants used in the treatment of diabetes mellitus, hypertension and cardiac diseases were inventoried based on the ethnopharmacological survey in south-eastern Morocco: Tafilalet region. Seven hundred persons including 320 diabetic patients and 380 patients with hypertension and cardiac disorders and 20 traditional herbal healers were interviewed in different areas of Tafilalet. The results indicated that 80% of patients interviewed used medicinal plants to treat diabetes, hypertension and cardiac diseases because they state that phytotherapy is cheaper (58%), more efficient (40%) and better (65%) than modern medicine. In this ethnobotanic enquiry, about 92 medicinal plants were cited. A lot of them are cited for the first time in Morocco. Many parameters have been evaluated such as knowledge of the toxic plants, doses, parts used, etc. Also, we have reported that 75% of type 2 diabetic patients used medicinal plants in association with modern drugs, while 10% of type 1 diabetic patients regularly used medicinal plants combined with insulin treatment. Some toxic plants have also been reported. In conclusion Tafilalet region disposes of a large phytotherapy knowledge which must be scientifically investigated especially in treating diabetes mellitus, hypertension and cardiac diseases.

2. Material and methods

Ethnobotanic enquiry was performed in different areas of Tafilalet region including the following villages: Errachidia, Boudhib, Goulmima, Erfoud, Rissani and Rich. Ethnobotanic information was obtained from 20 local traditional herbal healers and 700 patients suffering from type 1 or type 2 diabetes mellitus, hypertension or cardiac diseases. This study was performed with the permission of the Public Health and local authorities. Medical collaboration was used to determine the precise pathology of each patient. All patients interviewed have been informed about the objective of this study.

The formulary of the survey included the following parameters ([Jouad et al., 2001](#)):

Name of the patients or herbalist with age, sex, cultural level, professional activity and their spoken language;

Date and place of gathering information;

Pathology of persons interviewed and frequency of medical consultations;

Name of the drug used: botanical and vernacular name;

Parts used: leaves, fruit, aerial part, root, seeds, etc;

The source of provisioning their medical plants; pharmacist, 'achab' (herbal healer), experience of the other (initiated) or 'fkih' (traditional healer).

The reasons for using medicinal plants (more effective, more cheap, or easy acquisition);

The results of their phytotherapy (good, average or variable);

The precision of doses (precise, not precise or little or sometimes precise);

Their knowledge of toxic plants;

The mode of preparation, administration and duration of administration;

Finally, the patients are questioned about any adverse effects experienced from the drugs used.

After compilation of all the data, plant materials were collected. Determination of the botanical names of the plants was done in collaboration with Pr Rejdali (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. This information is given in [Table 1](#).

Table 1. Medicinal plants used for the treatment of diabetes mellitus, hypertension and cardiac diseases in Tafilalet region

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AP, aerial parts; LE, leaves; FL, flowers; FR, fruits; SD, seeds; PE, pericarpe; RH, rhizome; BU, bulb; EX, extract; OI, oil; LA, latex; CD, cardiac disease; RO, root; H, hypertension; D, diabetes; ND, not determined.

3. Results and discussion

3.1. Frequency and percentage of medicinal plant use

In this study, 700 patients were questioned; 320 were diabetics and 380 had hypertension and/or cardiac disorders. The percentage of use of phytotherapy was 80%. This percentage is high compared with some other regions of Morocco ([Jouad et al., 2001](#)). This is in accordance with the reputation of Tafilalet region as being a great source of traditional medicine.

In previous studies, many authors have shown that the percentage of uses of plants oscillated between 55 and 90% according to the region where the survey was undertaken ([Bellakhdar, 1997](#); [Bendali, 1991](#); [El Beghdadi, 1991](#), [Jaouad, 1992](#); [Magoua, 1991](#), [Nabih, 1992](#); [Sekkat, 1987](#), [Ziyyat et al., 1997](#)). In Fez region, we have recently demonstrated that more than 75% regularly used phytotherapy in treating diabetes, cardiac and renal diseases. In this study, the percentage of plant users was 80%. Our observations suggest that the long-standing use of medicinal plants testifies to the medicinal efficacy and safety. Like in many regions of Morocco and other countries, medicinal plants are freely available to the public without prescription based on the experience of others (65%). Patients frequently consult a traditional herbal healer (49%) when compared with pharmacists (1%).

3.2. Use of plants according to sex:

In this study, we observed that women frequently used more (69%) medicinal plants than men (31%).

Some previous studies have also shown this trend with percentages of 61 to 65% and 35 to 39% respectively ([Jouad et al., 2001](#), [El Beghdadi, 1991](#); [Hamdani, 1984](#); [Jaouad, 1992](#); [Nabih, 1992](#); [Ziyyat et al., 1997](#)). As we have suggested in a previous survey, this could be explained by the relative frequency of analphabetism of women in our society, the attachment of the women to traditional knowledge ([Hamdani, 1984](#); [Jaouad, 1992](#); [Nabih, 1992](#)). Also, women were most often at home during the hours of the survey ([Jouad et al., 2001](#)).

3.3. Reasons for the use of medicinal plants

The results indicated that interviewed patients used medicinal plants to treat diabetes mellitus, hypertension and cardiac diseases because phytotherapy is cheaper (58%), more efficient (40%) and better (65%) than modern medicine. In addition, the patients included in this study were generally illiterate (63%) and professionally inactive (52%). In all groups, the number of plant users was very important and did not depend on sex, age or socio-cultural level. In addition, the patients did not respect both the precision of doses and duration of the use with the percentage of 70%. This could explain some accidental intoxication by medicinal plants.

3.4. Knowledge of toxic plants

In the present study, 25% of the total users of medicinal plants have only little information about toxic plants. In order to prevent the usage of toxic plants by the greater population, we have recorded the major toxic plants according to traditional herbal healers. Nine plants are known to be toxic. These were: *Nerium oleander*, *Citrullus colocynthis*, *Ferula assa foetida*, *Papaver somniferum* L., *Mandragora autumnalis*, *Zygophyllum geatulum*, *Ricinus communis*, *Peganum harmala* and *Datura stramonium*.

In Tafilalet region, phytotherapy is considered as a special field of old herbal healers. But we have observed that many younger healers exist in different areas of Tafilalet. The future of phytotherapy depends on the quality of transmitted knowledge between generations ([Weniger, 1991](#)).

3.5. Use of medicinal plants according to type of diabetes

As regards to diabetes pathology, interviewed patients suffered from type 1 or type 2 diabetes mellitus at 25% and 75%, respectively.

Among the type 2 diabetic patients, 25% used only medicinal plants while, 75% used phytotherapy associated with modern drugs. While 10% of type 1 diabetic patients frequently used medicinal plants, in addition to insulin treatment. Generally, the use of hypoglycaemic plants in treating diabetes mellitus is very dangerous, especially, type 1 diabetes mellitus. In this view, some medicinal plants have induced hypoglycaemic accidents in type 1 diabetic patients as in bad controlled type 2 diabetic patients.

3.6. Inventory of medicinal plants

In this study, 92 medicinal plants were inventoried for treating diabetes mellitus, hypertension and cardiac diseases ([Table 1](#)).

For treating diabetes mellitus, 37 plants were found ([Table 1](#)) of which, the most frequently cited were: *Ammi visnaga*, *Artemesia herba alba*, *Trigonella foeniculum-granum*, *Marrubium vulgare*, *Nigella sativa*, *Globularia alypum*, *Allium sativum*, *Olea europaea*, *Citrullus colocynthis*, *Aloe succotrina*, *Artemesia absinthium*, *Rosmarinus officinalis*, *Thymus vulgaris*, *Eucalyptus globulus*, *Mentha pulegium*, *Myrtus communis*, *Linun usitatissimum*, *Carum carvi* and 'El warguia'.

Some of these plants have been experimentally studied and their hypoglycaemic activity demonstrated, including *A. sativum* ([Chang and Johnson, 1980](#)), *A. herba alba* ([Al-Waili, 1986](#); [Al Khazraji et al., 1993](#)), *A. visnaga* ([Alaoui et al., 1992](#)), *N. sativa* ([Asdadi, 1993](#); [Al Hader et al., 1993](#); [Labhal et al., 1999](#)), *N. sativa* ([Ettab et al., 1994](#)), *Z. gaetulum* ([Jaouhari et al., 1999](#)), *R. officinalis* ([Erenmemisoglu et al., 1997](#)), For hypertension and cardiac diseases phytotherapy, 73 plants were reported ([Table 1](#)), of which the most often used were: *A. sativum*, *O. europaea*, *Pimpinella anisum*, *A. herba alba*, *G. alypum*, *A. absinthium*, *C. colocynthis*, *Fumaria officinalis*, *M. vulgare*, *M. pulegium*, *T. serphyllum*, *Satureia montana*, *Glycyrrhiza glabra*, *N. sativa*, *Origanum vulgare*, *R. officinalis*, *Carum carvi*, *Lippia citriodora*, *Foeniculum dulcis*, *M. communis*, *Rubia tinctorum* and *P. harmala*.

The anti-hypertensive activity of some plants have previously been demonstrated; *P. harmala* ([Aarons et al., 1977](#)), *A. sativum* ([Malik and Siddiqui, 1981](#); [Pantoja and Pantoja](#)), *O. europaea* ([Circosta et al., 1986](#)), *R. officinalis* ([Aqel, 1991](#)), *Herniaria glabra* ([Rhiouani et al., 1999](#)) and *N. sativa* ([Labhal et al., 1994](#)).

Among the 73 species known for use in hypertension and cardiac diseases, 16 were also used for treatment of diabetes mellitus. These were: *L. usititassimum*, *C. carvi*, *N. oleander*, *A. absinthium*, *Petroselinum sativum*, *A. herba alba*, *C. colocynthis*, *Origanum compactum*, *Anabasis aretiodes*, *Zygophyllum gaetulum*, *M. vulgare*, *M. pulegium*, *Lepidium sativum*, *Lavandula dentata*, *R. officinalis*, *M. communis*, *A. sativum*, *N. sativa*, *O. europaea* and *P. harmala*.

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.

Comparative analysis with our previous ethnobotanical survey in Fez-Boulmane region ([Jouad et al., 2001](#)) shows that the most frequently used plants for treatment of diabetes mellitus and cardiac disorders are comparable to the plants reported in this study. However, more than 45 medicinal plants were found to be used specifically in Tafilalet region, but not in Fez region. This observation indicates that despite the fact that some plants are widely used for the treatment of some pathologies across Morocco, each region also has very specific knowledge of phytotherapy. This can be explained by such factors as local climate, culture and ethnology.

We conclude that in Tafilalet region, phytotherapy of diabetes mellitus, hypertension and cardiac disorders is highly developed. It represents a part of the local heritage. We can thus confirm the reputation of Tafilalet as an important region of Morocco in which phytotherapy presents an integral part of the human healthcare system. The low socio-economic level of this region is one of many reasons for the development of phytotherapy. Many recorded species of plants are used specifically in Tafilalet region.

The identified medicinal plants may be shown to have therapeutic value once they have been experimentally and clinically tested. Awaiting such investigations, serious efforts must be made in order to sensitize the local population to the dangers of anarchic usage of phytotherapy, especially the use of toxic plants and hypoglycaemic medicinal herbs in the treatment of type 1 and bad controlled type 2 diabetes mellitus.