

Phytotherapy of hypertension and diabetes in oriental Morocco

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Received 6 November 1995; received in revised form 3 July 1997; accepted 7 July 1997

Abstract

In order to select the main medicinal plants used in folk medicine to treat arterial hypertension and/or diabetes, a survey was undertaken in different areas of oriental Morocco. The patients (370 women and 256 men) were divided into three groups: diabetics (61%), hypertensives (23%) and hypertensive diabetic persons (16%). On average, 67.5% of patients regularly use medicinal plants. This proportion is perceptibly the same in all groups and does not depend on sex, age and socio-cultural level. This result shows that phytotherapy is widely adopted in northeastern Morocco. For diabetes, 41 plants were cited, of which the most used were *Trigonella foenum-graecum* L. (Leguminosae), *Globularia alypum* L. (Globulariaceae), *Artemisia herba-alba* Asso. (Compositae), *Citrullus colocynthis* (L.) Schrad. (Cucurbitaceae) and *Tetraclinis articulata* Benth. (Cupressaceae). In the hypertension's therapy 18 vegetal species were reported, of which the most used were *Allium sativum* L. (Liliaceae), *Olea europea* L. (Oleaceae), *Arbutus unedo* L. (Ericaceae), *Urtica dioica* L. (Urticaceae) and *Petroselinum crispum* A.W. Hill (Apiaceae). Among the 18 species used for hypertension, 14 were also employed for diabetes. Moreover, these two diseases were associated in 41% of hypertensives. These findings suggest that hypertension observed in this region would be in a large part related to diabetes. © 1997 Elsevier Science Ireland Ltd.

Keywords: Phytotherapy; Hypertension; Diabetes; Oriental Morocco; Survey

1. Introduction

Oriental Morocco is characterized by a climatic diversity which is favourable for growth and de-

velopment of medicinal plants. Nevertheless, this flora is subject to extinction because of excessive human exploitation and the extreme dryness that has persisted in this area for many years.

The population of northeastern Morocco have used plants since time immemorial to treat vari-

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Table 1
Distribution of sick people according to the pathology and use of phytotherapy

	Diabetic	Hypertensive	Diabetic and hypertensive	Total
Total number	386 (61%)	141 (23%)	99 (16%)	626
Plant users	263	95	64	423
% phytotherapy	68	67.5	64.5	67.5

ous types of diseases, including those of the cardio-vascular system. Throughout Morocco, studies have been carried out on the traditional pharmacopoeia and medical practices in general (Bellakhdar et al., 1991; Claisse, 1990; Sijelmassi, 1993). However, very little information is available on the medicinal plants of oriental Morocco. The aim of the present work was to identify species of plants which are used by the population to treat two relatively widespread diseases in this region, namely, arterial hypertension and diabetes.

2. Materials and methods

Interviews were carried out with people suffering both diabetes and high blood pressure (hypertensive). The study site was divided into three areas: (1) Oujda and the neighbouring towns (Ahfir, Berkane, ElAïoun); (2) Figuig; (3) Taza and their surroundings. About 60 students were recruited to participate in the investigation. Before sending these students for interviews, they were given instructions (trained) on methods and technics of the interview and the scientific basis of the investigation. These students were then divided into several small groups and assigned to their native localities, in order to overcome some difficulties, such as local dialects and financial requirements. A questionnaire was prepared and distributed to the students. The form contains data on sex, age, cultural level, profession, pathology of persons interviewed and the frequency of medical consultations. It also contains data on the used part of the plants, the modes of preparation and administration, the health state of the patients, as well as any secondary effects which may be observed after treatment with the medicinal

plants. It is noteworthy that this study was conducted with the permission of the Public Health Ministry and local authorities and abided by the medical ethics procedures, through the use of anonymous questionnaires.

Following interviews and data collection, the following statistics were compiled: number of patients for each pathology, number of plant users and local names of used plants. Only plants that had been mentioned for the same use (pathology) by at least three separate informants (interviewees) were considered as valid and hence included for purposes of analysis.

Taxonomic identification of the plants and definite determination of their botanic names were performed in collaboration with the Pr. Rejdali Mouh, Director of the Botany Laboratory of the Agronomic and Veterinary Institute of Hassan II at Rabat, where voucher specimens have been deposited. The plants were collected by Ziyat (Z) and Legssyer (L) and the collection number is given in Table 3.

3. Results and discussion

3.1. General data and phytotherapy

The survey identified 626 sick persons, of which 386 (61%) were diabetics, 141 (23%) hypertensives and 99 (16%) suffering from both diseases (Table 1). The latter figure represents 41%, namely, 99/240 of hypertensive people, which suggests that an important part of hypertension observed in this region is related to diabetes. On the average, 67.5% of patients regularly use medicinal plants. This proportion is perceptibly the same in the three groups (Table 1), namely, 68, 67.5 and 64.5% for the three groups.

Table 2

Distribution of patients according to sex, age, cultural level and professional activity and proportion of plant users in each category

	Sex		Age			Cultural level		Professional activity	
	Women	Men	Young	Adults	Aged	Illiterate	Educated	Inactive	Active
Percent	59	41	10	52	38	77	23	75	25
% of plant users	72	63	58	72	68	70	65	69	66

The patients were also categorized into sex, age, cultural level and professional activity (Table 2). Overall, the sample includes more women (59%) than men (41%); this is probably related to the fact that inquiry was made in general in places close to patient's residence, where women were often present. As to age, the interviewed persons were, in the majority, adult (52%) or aged (38%); these two age categories are in fact more exposed to cardiovascular diseases. As to other parameters, sick people are essentially illiterate (77%) and professionally inactive (75%).

In all categories, the proportions of the plant users remain high and appear to be independent of sex, age and socio-cultural level of the patients (Table 2). These results clearly show that phytotherapy is widely adopted by all classes of the oriental Moroccan society.

3.2. Inventory of selected medicinal plants

An inventory of 42 plants used in the therapy of hypertension and/or diabetes has been established. In Table 3, the following data are provided: botanical name of species, local vernacular name (arab or berber), the used part of the plant, the pathology and other medicinal uses and properties. As to references in Table 3, only selected references have been given for each plant, focusing on recent experimental work related to hypotensive and hypoglycemic effects.

For hypertension, 18 plants have been reported; the most used were *Allium sativum* (Liliaceae), *Olea europea* (Oleaceae), *Arbutus unedo* (Ericaceae), *Urtica dioica* (Urticaceae) and *Petroselinum scriptum* (Apiaceae). In fact, the hypotensive activity of some of these plants has indeed been experimentally demonstrated, such

as, *Allium sativum* (Malik and Siddiqui, 1981; Pantoja et al., 1991), *Olea europaea* (Circosta et al., 1986) and *Peganum harmala* (Aarons et al., 1977). For diabetes, 38 species have been reported; the most used were *Trigonella foenum-graecum* (Leguminosae), *Globularia alypum* (Globulariaceae), *Artemisia herba-alba* (Compositae), *Citrullus colocynthis* (Cucurbitaceae) and *Tetraclinis articulata* (Cupressaceae). The hypoglycemic effect of the following species has also been established: *Trigonella foenum-graecum* (Amin Riyad et al., 1988; Raghuram et al., 1994), *Artemisia herba-alba* (Al-Waili, 1986; Alkhazraji et al., 1993), *Ammi visnaga* (Alaoui et al., 1992), *Allium sativum* (Chang and Johnson, 1980), *Eriobotrya japonica* (Noreen et al., 1988), *Myrtus communis* (Elfellah et al., 1984) and *Nigella sativa* (Ettaib et al., 1994). Nevertheless, the mechanism of action for the biological activity of these plants remains unclear. As for the other species, their antidiabetic and/or antihypertensive effects are well known in oriental folk medicine, however, no references have been found that confirm experimentally this biological activity. Ivorra et al. (1989) have reviewed the relevant literature on the plants which have been used in folk medicine and for which hypoglycemic activity has been scientifically documented in clinics or by the use of experimental methods. Their review has mentioned four plants which are also used in oriental Morocco as antidiabetic, namely, *Artemisia herba-alba*, *Eriobotrya japonica*, *Myrtus communis* and *Trigonella foenum-graecum*.

Among the 18 species known for hypertension, 14 were also used for diabetes. These were: *Allium sativum*, *Arbutus unedo*, *Artemisia herba-alba*, *Eucalyptus globulus*, *Syzygium aromaticum*, *Lavandula dentata*, *Olea europaea*, *Origanum*

Table 3
Medicinal plants used for hypertension and diabetes in northeastern Morocco

Family and species	Collection no.	Local name	Part of plant	Disease treated	Other medicinal uses and properties ^c	Citation of use
Apiaceae <i>Armi visnaga</i> Lam.	ZL13	Bachnikha	FR	D	Hypoglycemic (1), dental hygiene, against headache, against vertigo (2), antispasmodic, for nephritic colic (15).	5
<i>Petroselinum crispum</i> A.W. Hill	ZL5	Maádnous	AP	H	Hypnotic (2), appetite stimulant diuretic, sedative, resolvent (15), condiment.	8
Apocynaceae <i>Nerium oleander</i> L.	ZL22	Defia	LF	D	Toxic, abortive, against vertigo, against itching and headache (2, 16).	23
<i>Psychotis verticillata</i> L.	ZL31	Núnkha	AP	D, H	Febrifuge, against influenza and aromatic.	8
Capparaceae <i>Capparis spinosa</i> L.	ZL41	Kebbar	FR	D	Antirheumatic, stimulant, appetite stimulant, diuretic, antispasmodic, tonic, against painful menstruation (2, 15, 16).	3
Chenopodiaceae <i>Chenopodium ambrosioides</i> L.	ZL28	Mkhinza	LF, FL	D	Antispasmodic, antiasthmatic, antitussive, digestive, vermifuge, Emmenagogue (15, 16).	4
Compositae <i>Artemisia absinthium</i> L.	ZL2	Chiba	AP	D	Tonic, antiseptic, digestive (15), vermifuge, emmenagogue, Febrifuge (16)	4
<i>Artemisia herba-alba</i> Asso.	ZL15	Shih	AP	D, H	Antimicrobial (17), anthelmintic, poison antidote, emmenagogue (2, 13, 16).	66
<i>Inula viscosa</i> (L.) Ait.	ZL39	Magraman	RT	H	Reconstituant (2).	4
Cucurbitaceae <i>Citrullus colocynthis</i> (L.) Schrad.	ZL27	Handal, Hdéjja Tijelt	FR	D	Toxic, laxative, aphrodisiac, antihelmintic, against gonorrhoea, antiepileptic, purgative, antirheumatic, antituberculous, antisyphilitic (2, 7, 9, 15)	33

Cupressaceae <i>Tetraclinis articulata</i> Benth.	ZL34	Arâar	AR	D, H	34	Magis, febrifuge, against vertigo, against headache, antiarrheal, astringent (2).
Ericaceae <i>Arbutus unedo</i> L.	ZL14	Sasnou	RT, LF	D, H	62	Diuretic, urinary antiseptic, astringent, anti-inflammatory, depurative, antidiabetic, hypotensive, antiarrheal against blennorrhagia (3, 8, 11, 15, 16, 20).
Globulariaceae <i>Globularia alypum</i> L.	ZL16	Ain Iarnab	LF	D	5	Laxative, cholagogue, stomachic, sudorific, purgative (2, 15, 16).
Gramineae <i>Sorghum vulgare</i> L.	ZL33	Bachna	SD	D	5	For digestive disorders (2).
Juglandaceae <i>Juglans regia</i> L.	ZL17	Guergae	FR	D	5	Hypoglycemic, tonic, antiseptic, astringent, vermifuge, depurative, cicatrizant, stomachic, anthelmintic and poison antidote (2, 12, 15, 16).
Lamiaceae <i>Ajuga iva</i> L.	ZL42	Chendgora	AP	D	21	Anthelmintic, against intestinal disorders, panacea (2).
<i>Lavandula dentata</i> L.	ZL26	Khzama	FL	D, H	8	Antiseptic, antispasmodic, carminative, cholagogue, diuretic, cicatrizant, stimulant, sudorific, antirheumatic, against headache, against vertigo and against bronchopulmonary infections (16).
<i>Marrubium vulgare</i> L.	ZL21	Marriva	AP	D	14	Against headache, febrifuge, sedative, diuretic, tonic, for broncho-pulmonary infections, expectorant, anthelmintic, stomachic, antiarrheal, emmenagogue, aortic palpitations, hair-care and against icterus (2, 3, 4, 15, 16).

Table 3 (continued)

Family and species	Collection no.	Local name	Part of plant	Disease treated	Other medicinal uses and properties ^c	Citation of use
<i>Mentha pulegium</i> L.	ZL19	Fliou	AP	D	Against bronchopulmonary infections, antitussive, antiseptic, mouth hygiene, antispasmodic, carminative, digestive, tonic, against headache and chill (2, 15, 16).	4
<i>Origanum compactum</i> Benth.	ZL23	Zaâtar	LF	D, H	Gastrointestinal antiseptic, mouth hygiene, antiaacid, stomachic, antispasmodic, expectorant, vulnery (2, 16).	28
<i>Rosmarinus officinalis</i> L.	ZL8	Azir	AP	D, H	Antiseptic, for gastrointestinal and liver disorders, emmenagogue, antispasmodic, against chill, diuretic, for alopecia, cicatrizant (2, 7, 15, 16).	24
<i>Salvia officinalis</i> L.	ZL9	Salmia	LF	D	For throat diseases, emmenagogue, diuretic, antiseptic, refreshing, stimulant, cholagogue, antispasmodic, carminative, choloretic and stomachic, vulnery (2, 15, 16).	6
Lauraceae <i>Laurus nobilis</i> L.	ZL18	Rend, Wraq sidna mûsa	LF	H	Condiment, sudorific, sedative, antiseptic, stimulant, against anorexia, stomachic, antirheumatic, febrifuge, against bronchitis, expectorant (15, 16).	3
Leguminosae <i>Trigonella foenum-graecum</i> L.	ZL35	Halba	SD	D, H	Hypoglycemic (14), appetite stimulant, tonic, reconstituant, hair-care, against aortic palpitations, laxative, emollient, blood cleansing (2, 12, 15, 16).	83
Liliaceae <i>Allium sativum</i> L.	ZL12	Toum	BU	D, H	Hypotensive (10, 13), hypoglycemic (5), antispasmodic, diuretic, urinary antiseptic, anthelmintic, antirheumatic, against pulmonary and digestive disorders, poison antidote, cholagogue, against alopecia, corn-killer (2, 12, 15, 16).	45

Moraceae <i>Ficus carica</i> L.	ZL4	Karma	FR, LF	D	Laxative, stimulant, against throat diseases, antitussive, emmenagogue, resolvent (2, 15, 16).	4
Myrtaceae <i>Eucalyptus globulus</i> Labill.	ZL25	Kalitûs	FL	D, H	Hair-care, comestic, anti-inflammatory, against speen disorders, antiseptic, antiasthmatic, febrifuge, astringent, stimulant and appetite stimulant (2, 12, 15, 16).	8
<i>Myrtus communis</i> L.	ZL30	Raihane	LF	D	Antiseptic, astringent, against gastrointestinal disorders, hair-care, antidiarrheal (2, 15, 16).	4
<i>Syzygium aromaticum</i> Merr. et Perry	ZL32	Qrûnfûl	LF, FR	D, H	Hair-care, against pulmonary diseases, febrifuge, antiseptic, mouth hygiene (2, 15, 16).	10
Oleaceae <i>Fraxinus angustifolia</i> Vahl	ZL38	Touzalt	LF, FR	D	Diuretic, antirheumatic, laxative, sudorific (16).	3
<i>Olea europaea</i> L.	ZL20	Zebbouj, Zitoune	LF	D, H	Hypotensive (9), hypoglycemic, choleric, cholagogue, antihelminic, antiseptic, mouth hygiene and against alopecia (2, 12, 15, 16).	24
Palmae <i>Phoenix dactyifera</i> L.	ZL6	Nakhla	SD, FR	D	Expectorant, against asthenia and throat diseases (15).	7
Ranunculaceae <i>Nigella sativa</i> L.	ZL29	Sanouj	SD	D	Toxic, abortive, hypotensive, antitussive, antiasthmatic, sinusitis, against broncho-pulmonary infections, carminative, against influenza, emmenagogue, antihelminic and poison antidote (2, 19, 21).	8

Table 3 (continued)

Family and species	Collection no.	Local name	Part of plant	Disease treated	Other medicinal uses and properties ^c	Citation of use
Rhamnaceae						
<i>Zizyphus lotus</i> (L.) Lamk.	ZL11	Sadra	LF	D	Urinary infections, hair-care (2).	4
<i>Eriobotrya japonica</i> Lindl.	ZL3	Mzah	LF	D	Antidiarrheal, against digestive disorders (2).	4
<i>Prunus amygdalus</i> Stokes var. amara CD.	ZL7	Louz mar	SD	D	Domestic, hypoglycemic, tonic (2).	17
Rutaceae						
<i>Ruta montana</i> L.	ZL37	Fidjel	AP	D	Abortive, antirheumatic, magic, against intestinal and hepatic diseases, male sterility, vitiligo (2, 7).	3
Thymelaeaceae						
<i>Daphne gnidium</i> L.	ZL40	Mathnane	SB, LF	D	Toxic, hair-care, purgative (3, 16).	12
Urticaceae						
<i>Urtica dioica</i> L.	ZL10	Harrigua	AP	D, H	Diuretic, astringent, cholagogue, galactagogue, depurative, hair-care, antirheumatic, antidiarrheal, antiabetic, against leucorrhoea, icterus and eczema (4, 15, 16).	11
Verbenaceae						
<i>Aloysia triphylla</i> Britt.	ZL1	Louiza	LF	H	Nervous diseases, against headache and cold, depurative, against asthma, stomachic, antispasmodic and antirheumatic (2, 15, 16).	4
Zygophyllaceae						
<i>Peganum harmala</i> L.	ZL24	Harmal	SD	D, H	Toxic, hallucinogenic, magic, hair-care, antirheumatic, nervous diseases, antalgic, antidiarrheal, bowel diseases, anthelmintic, antispasmodic, emmenagogue (2, 16), antimicrobial (18), hypotensive (19).	8
<i>Zygophyllum album</i> L. ssp. gae-tulum Emb. Maire	ZL36	Aggaya	LF	D	Antispasmodic, antieczema, stomach and liver pain (2).	9

AP, aerial part; AR, aril; BU, bulb; FL, flowers; FR, fruits; LF, leaves; RT, roots; SB, stem bark; SD, seeds; D, diabetes; H, hypertension.
^cReference: 1, Alaoui et al. (1992); 2, Bellakhdar et al. (1991); 3, Bruneton (1987); 4, Cecchini (1993); 5, Chang and Johnson (1980); 6, Circo et al. (1986); 7, Claisse (1990); 8, Garnier et al. (1961); 9, Goodmann and Hobbs (1988); 10, Malik and Siddiqui (1981); 11, Martin and Iserin (1992a); 12, Martin and Iserin (1992b); 13, Pantoja et al. (1991); 14, Raghuram et al. (1994); 15, Anonymous (1985); 16, Sijelmassi (1993); 17, Benouda et al. (1988); 18, Al-Shamma et al. (1981); 19, Aarons et al. (1977); 20, Ziyat and Boussairi (1994); 21, Labhal et al. (1994).

compactum, *Peganum harmala*, *Ptychotis verticillata*, *Rosmarinus officinalis*, *Tetraclinis articulata*, *Trigonella foenum-graecum* and *Urtica dioica* (Table 3). This result provides evidence to support the view on the close relationship between hypertension and diabetes in this region of Morocco.

Among the 42 plants reported, five are toxic species. These are: *Citrullus colocynthis* (Cucurbitaceae), *Daphne gnidium* (Thymelaeaceae), *Nerium oleander* (Apocynaceae), *Nigella sativa* (Ranunculaceae) and *Peganum harmala* (Zygophyllaceae) (Table 3). Despite their toxic properties, the injurious consequences among the population of oriental Morocco have not been seen. This indicates that the people may have been well informed and well-advised about the toxicity of these plants. As a result, they may have taken the requisite precaution by measuring appropriate doses using and appropriate methods in the preparation and administration of the plant extract.

The survey also showed that sometimes people used more than one plant, together or separately. The plants were frequently prepared as a decoction or an infusion and taken orally. The health state of the patients following phytotherapy was stated as varied. Some patients claimed an improvement, while others felt dissatisfied, probably because the treatment was not appropriate for them or probably because the patients did not follow accurately the herbalist's instructions.

Despite the prevalent practice of phytotherapy in oriental Morocco, a number of problems remain. One of these is diagnosis. Medical diagnosis continues to be an acute problem as long as herbalists and traditional healers assume this function, because this is not their specialty. Another problem is the bad packaging of the plants (crude drugs) at the stalls of the herbalists (*âchaba*). These plants are in fact exposed permanently to the sun, to dust and to other contaminations, which may damage the plants, with the resulting loss of efficacy, but also in an unknown toxicity.

In spite of these problems, phytotherapy will continue to be the means of primary health care in the country as a whole, due the high cost of medicaments and the fact that the efficacy of folk pharmacopoeia is well proven.

Acknowledgements

This research has been conducted as a response of the university to its socio-economic environment. Thanks are expressed to the help of Oujda Science Faculty Dean, to the encouragement of the Rector of the University Mohamed the First and to the administrative facilities provided by the Public Health Ministry and local authorities of the Wilaya of Oujda. Thanks are also expressed to Mr. Pr. M. Rejdali from the Agronomic and Veterinary Institute of Hassan II (Rabat), Drs B. Haloui and A. Hamal from the Biology Department (Oujda) and Dr A. Boutayeb from the Mathematic Department, for their precious help. Finally, thanks go to all students and other assistants who have contributed to this research.

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