



## Medicinal Plants in Type 2 Diabetes: Therapeutic and Economical Aspects

Martin Diarra<sup>1</sup>, Hanan El Ouahabi<sup>1</sup>, Hanae Bouxid<sup>1</sup>, Saïd Boujraf<sup>2,3</sup>, Youssef Khabbal<sup>4,5</sup>, Farida Ajdi<sup>1,5</sup>

<sup>1</sup>Department of Endocrinology, Diabetology and Nutrition, University Hospital of Fez, Morocco, <sup>2</sup>Department of Biophysics and Clinical MRI Methods, Faculty of Medicine, University of Fez, Morocco, <sup>3</sup>The Clinical Neurosciences Laboratory, Faculty of Medicine, University of Fez, Morocco, <sup>4</sup>Department of Pharmacology and Pharmacovigilance, University Hospital of Fez, Morocco, <sup>5</sup>Medicines Sciences Team, Biomedical and Translational Research Center, Faculty of Medicine, University of Fez, Morocco

### Correspondence to:

Prof. Saïd Boujraf, Department of Biophysics and Clinical MRI Methods, Faculty of Medicine, University of Fez, Km 2.2 Sidi Hrazem Road, BP. 1893; Fez, Morocco. Email: sboujraf@gmail.com

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### DEAR EDITOR,

The use of medicinal plants or phytotherapy is widespread in Africa, especially in Morocco, the Mediterranean population of North Africa. This practice is orally and ritually transmitted from generation to generation. Type 2 diabetes is a chronic disease which is a major public health problem in the world in important socioeconomic impact. In Morocco, the prevalence of diabetes reaches 9% of the adult population over 20 years of which 50% remain undiagnosed.<sup>[1]</sup> Despite the development and availability of oral antidiabetics and insulin large fraction of Moroccan diabetic patients are still dependent treatment with medicinal plants. Hence, the interest of our study to determine the prevalence of herbal medicine in the diabetic population of type 2 (T2 diabetes mellitus) in Morocco in Fez-Boulemane region; to identify the medicinal plants used; and to know the motivations behind this therapeutic choice.

This was a prospective cross, including a Moroccan population of 199 type 2 diabetics, seen during medical consultations or hospitalizations in the Department of Endocrinology and Diabetology at the University Hospital of Fez in Morocco were included in the study of type 2 diabetic patients within formed consent. Data collection was conducted through a questionnaire on medicinal plants used and the contents of the medical record. For the accountability of adverse reactions by medicinal plants, we used the French method of accountability. Data were analyzed using SPSS Software (Statistical Package for the Social Sciences, Version 17.0). The values were as percentage for qualitative variables and as mean  $\pm$  standard deviation for quantitative variables.

Significant differences between groups were determined using the paired *t*-test.  $P < 0.05$  was considered as significant.

Our results were: The average age was  $56 \pm 10$  years, with extremes between 20 and 90 years; the sex ratio was 1.7 with a female predominance; the phytotherapy was found in 43.2% of our patients; the main reasons for this choice were therapeutic efficacy of medicinal plants in 90.6% of cases; 3% of cases for the high cost of conventional medical treatment; 40 medicinal plants were identified, included used parts of each plant and their preparation [Table 1]; the most commonly used plant was the Fenugreek (*Trigonella foenum-graecum*) in 88.3% of cases with 30.2% in monotherapy and 58.13% in combination with other plants; 30.2% had used the sage (*Salvia officinalis*); The phytotherapy was practiced by most diabetic women most of whom had unbalanced diabetes (glycated hemoglobin [HbA1c]  $>7\%$ ) with a  $P = 0.05$ ; adverse events were awarded in 75% of cases to the ingestion of preparations of several medicinal plants; In only 6% of cases the side effects were mild and disappeared rapidly after stopping the plant ingestion; The delay of occurrence of adverse effects is between 1 and 30 days; no significant correlation was found between this practice and the intellectual level of education, socioeconomic, history of diabetes and its complications.

In Morocco, the exploration of the hypoglycemic effect of medicinal plants has increased significantly. Hmamouchi *et al.*, have shown that the phytotherapy in the treatment of diabetes was common and ranged from 55% to 90% depending on the region of Morocco. In our study, most patients recruited lived in cities where access to modern

**Table 1: Medicinal plants reported by studied patients including the used components and preparation mode**

Scientific name of the plant	Vernacular name	Part used	Method of preparation	Number of patients cited
<i>Trigonella foenum-graecum L.</i>	Halba	Seeds	Decoction/maceration	53
<i>Salvia officinalis L.</i>	Salmia	Leaves	Decoction/infusion	37
<i>Olea europaea L.</i>	Zitoun	Leaves	Decoction	13
<i>Anethum graveolens L.</i>	Chebt	Leaves	Infusion	12
<i>Origanum vulgare L.</i>	Zâatar	Leaves	Decoction/infusion	7
<i>Artemisia absinthium L.</i>	Chiba	Aerial part	Infusion	3
<i>Rosmarinus officinalis L.</i>	Azir	Leaves	Decoction/infusion	6
<i>Thymus vulgaris L.</i>	Ezzitrâa	Leaves	Decoction/infusion	3
<i>Allium sativum L.</i>	Touma	Bulb	Raw or cooked	3
Onions	Besla	Bulb	Raw	2
Cinnamon	Karfa	Aerial part	Decoction	2
<i>Aloysia citriodora palau</i>	Louiza	Leaves	Decoction/infusion	3
<i>Cymbopogon sp.</i>	Louizaroumia	Aerial part	Decoction/infusion	1
<i>Origanum majorana L.</i>	Mardaddouch	Leaves	Infusion	1
<i>Syzygium aromaticum (L.)</i>	Quronfel	Fruit/leaves	Decoction	1
Cabbage	Kroumb	Aerial part	Decoction	2
<i>Pimpinella anisum L.</i>	Habbathlawa	Fruit	Decoction	1
<i>Ajugaiva (L.)</i>	Chendgoura	Aerial part	Decoction	2
<i>Argania spinosa L.</i>	Argane	Aerial part	Decoction	1
Coffee	Kahwa	Seeds	Decoction	1
Wheat	Kamh	Seeds	Decoction	1
<i>Laurus nobilis L.</i>	Dafla	Leaves	Decoction	2
Avocado	Avocat	Leaves/nucleus	Decoction/maceration	2
<i>Dacryodes excelsa</i>	Louban	Résin	Decoction/infusion	1
<i>Mentha pulegium L.</i>	Flyou	Aerial part	Decoction	1
<i>Aloe barbadensis Mill</i>	Sabar	Aerial part	Decoction	2
<i>Marrubium vulgare L.</i>	Merriwa	Aerial part	Decoction	2
<i>Aloe succotrina</i>	Sibr	Leaves	Decoction	1
<i>Cuscuta epithimum</i>	Zaïtra	-	-	1
<i>Herniaria hirsuta L.</i>	Tigheghecht	Aerial part	Decoction/infusion	1
<i>Tetraclinis</i>	Arrâar	Leaves	Decoction	1
<i>Rubus fructcosus</i>	Toutechaouki	Leaves/fruit	Decoction/infusion	1
<i>Artemisia vulgaris L.</i>	Chih	Aerial part	Decoction	1
<i>Myrtus communis L.</i>	Rayhane	Leaves	Decoction	2
<i>Citrullus colocynthis (L.)</i>	Hantel	Fruits	Maceration	1
<i>Laurus nobilis dentala</i>	Khzama	Aerial part	Decoction/infusion	1
<i>Ammi visnaga</i>	Bachnikha	Fruit	Decoction	1
<i>Globularia alypum</i>	Ainlarneb	Leaves	Decoction	1
<i>Lipidium sativum</i>	Hebb rchad	Seeds	Decoction	1
<i>Nigella sativa</i>	Sanoug	Seeds	Decoction	1

medical care is easier. This is what explains the low percentage in our context. Jouad *et al.*, published in 2001 the results of a study on the medicinal plants used in the treatment of chronic diseases including diabetes, where the low cost of medicinal plants was the main motivation for choosing this treatment. Another study conducted in Guinea found that 33% of diabetic patients have used the phytotherapy for reasons that the majority believed in its effectiveness (74%);<sup>[2]</sup> it is the

same main motivation in our series (90.6%). The female predominance in our study was mainly due to the high rate of illiteracy among women, but also that this are mainly related to traditional practices, routine exchanges between they of recipes herbal preparation. Herbal medicine was significantly involved in the imbalance of diabetes at our patients with HbA1c >7%. In our study, 40 plants were identified whose Fenugreek was the most used exclusively or in combination with other

plants. Fenugreek mechanisms of action in the control of blood glucose and insulin resistance unbalanced diabetics were studied; thus, 1 g/day hydro-alcoholic extract of Fenugreek seeds for 2 months, provides better control of blood glucose and a decrease in insulin resistance.<sup>[3]</sup> Studies have shown the hypoglycemic effects of Fenugreek using a dosage of 5–100 g/day.<sup>[4]</sup> Studies have shown the antioxidant effect of the sage.<sup>[5]</sup> and the effects on the cardiovascular system. Sage was the second most used plant while the olive tree (*Olea europaea*) was the third. Olive was judged the third most used plant by our patients. Oleuropein extract significantly lowers blood sugar through its antioxidant activity by reducing the oxidative stress that accompanies diabetes and its complications.<sup>[6]</sup> Absinth called “Chiba” in Morocco is a plant that has shown its hypoglycemic effect shown in the 1 h and maintained 4 h later.<sup>[7]</sup> Our study showed that all side effects are not really serious or irreversible. However, the aqueous extract of fenugreek prevents performance neurobehavioral changes in mice exposed prenatally. Furthermore congenital malformations including hydrocephalus, anencephaly and spin a bifida can occur.<sup>[8]</sup>

The application of phytotherapy is common in Morocco, because it is considered an effective therapeutic approach. The main motivation to use the medicinal plant includes easy access, at a lower cost, and the supposed effects. Therefore, it is necessary to develop a system of phyto-vigilance targeting to ensure the safe use of medicinal plants.

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