Ethnobotanical study on the use of medicinal plants among diabetic patients in the Rabat-Salé-Kénitra region, Morocco

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Research

Abstract

Background: *Diabetes mellitus* is a major health challenge in Morocco. This study aimed to provide ethnobotanical information on the use of medicinal plants (MPs) for managing diabetes in the Rabat-Salé-Kenitra region.

Methods: A semi-structured questionnaire was used, targeting diabetic patients from healthcare facilities in four cities (Rabat, Salé, Kenitra and Khemisset) of the study region. Quantitative ethnobotanical indices were used, including relative frequency of citation, fidelity level, and informant consensus factor. Chi-square tests were used to analyse socio-demographic data and ethnobotanical survey results.

Results: Among 2086 diabetic patients, 49.14% used medicinal plants with 85.17% having type 2 diabetes. A total of 82 MPs from 38 botanical families were recorded, with *Olea europaea* L., *Trigonella foenum-graecum* L. and *Salvia officinalis* L. being the most frequently used plants. Some plants were used specifically for type 1 diabetes or type 2 diabetes. A total of 59 plant mixtures were documented, with one specific mixture mentioned by five patients, all employing identical quantities and preparation methods. Leaves (47.32%) and seeds (30.50%) were the most used plant parts. MPs were mainly taken orally (99.41%) as infusions (47.37%).

Conclusions: This study is considered rare since it focuses on the ethnobotanical knowledge held by patients in healthcare facilities. Some plants were newly identified as plants used for diabetes, whether in Morocco or internationally, extending the list of known antidiabetic plants. Further pharmacological research is recommended to validate the antidiabetic properties and the safety of used plants.

Keywords: Ethnobotanical survey, Medicinal plants, Mixtures, Ethnobotanical Indices, Diabetes, Rabat-Salé-Kenitra region

Background

Considered as a major public health problem, diabetes is one of the fastest-growing global health emergencies of the 21st century (IDF 2021). A steady rise in diabetes cases and prevalence over recent decades has beed reported by the World Health Organisation (WHO) (WHO 2016). According to the latest edition of the International Diabetes Federation's (IDF) Diabetes Atlas, 537 million people had diabetes in 2021. The IDF foresaw this number to reach 643 million by 2030 and 783

million by 2045 (IDF 2021). In 2021, the Middle East and North Africa (MENA) region, including Morocco, had the most tremendous increase (86%) in the number of diabetes-affected people and saw the highest regional prevalence rate (16.2%) among all IDF regions (IDF 2021).

Moreover, despite the therapeutic advantages of conventional anti-diabetic drugs, they require frequent dosing and can cause more significant adverse effects and lead to a loss of treatment efficacy after prolonged use (Padhi *et al.* 2020, Alam *et al.* 2022).

Challenging economic circumstances and insufficient access to proper medical facilities have led to the reliance on herbal medicine (Iqbal *et al.* 2023). Additionally, the elevated costs of medications and the low socio-economic status are major obstacles to the access of conventional treatment, especially in low-income and middle-income countries (WHO 2011). The affordable costs of traditional herbal remedies make them appealing in an era of soaring healthcare expenses. These remedies also gain prominence in response to the relentless rise of non-communicable chronic diseases, including diabetes (WHO 2013).

Even in highly industrialised countries, traditional medicine is widely used since it is one of the most important pillars of culture and socialisation (Owuor *et al.* 2005). Currently, the search for more effective and affordable anti-diabetic agents with fewer adverse effects is one of the most important areas of investigation (WHO 2019, Alam et *al.* 2022).

According to the WHO, in 2019, traditional medicine is an important and often underestimated part of healthcare services (WHO 2019). Subsequently, in 2021, the WHO also highlighted that alongside the remarkable increase in the global use of medicinal plants (MPs), combining traditional medicine with conventional medicine has significantly risen in recent years (WHO 2021).

Around three-quarters of the global population relies on herbal remedies derived from medicinal plants for treating and preventing a variety of human ailments. Moreover, the modern pharmaceutical industry heavily relies on plants, with approximately one-fourth of the active compounds in drugs are sourced from plants (Ahmed et al. 2021, Saxena et al. 2018).

Medicinal plants can thus be used as complementary therapy, particularly for managing metabolic diseases such as diabetes. These plants could also be of interest for the development of new pharmaceutical drugs to treat diabetes (Jugran *et al.* 2021).

Ethnobotany involves the biological, economic, and cultural relationship between the people and the plants within a specific geographical area (Khan *et al.* 2018). The knowledge of plants by indigenous communities, dates back to the dawn of civilization. However, the term ethnobotany was used for the first time in 1896 by American botanist John W. Harsh Berger. He introduced this term to investigate the use of plants among primitive and indigenous communities (Khan *et al.* 2015).

Ethnobotanical surveys are effective methods for documenting and identifying plants used in traditional medicine (Mahwasane *et al.* 2013). The collection of knowledge regarding the ethnomedicinal significance of diverse local plants could be used as a baseline for future research, identifying new and highly targetable plant species for further evaluation, rigorous experimentation, and pharmacological activities aimed at validating their traditional usage. (Ijaz *et al.* 2017, Iqbal *et al.* 2023).

Rabat-Salé-Kenitra region, is known for its diverse botanical wealth comprising over 408 species and subspecies of vascular plants belonging to 261 genera and 62 botanical families, this abundance represents 9.3% of the Moroccan vascular flora, emphasizing the region's richness in local plant resources (Benabid 2000, Bouayyadi *et al.* 2015). Since Moroccan ethnobotanical studies conducted among patients in hospitals and health centres are very rare, this study aimed to provide ethnobotanical information on the use of MPs for managing diabetes among diabetic patients (DPs) from different healthcare structures in the Rabat-Salé-Kenitra (RSK) region.

Materials and Methods

Study area

The Rabat-Salé-Kenitra (RSK) region is one of the 12 regions of Morocco, established in 2015 following the new territorial division of the regions (Fig. 1). It is bordered to the north by the Tanger-Tetouan-Al Hoceima region, to the southeast by the Fes-Meknes region, to the south by the Casablanca-Settat and Beni-Mellal-Khenifra regions, and to the west by the Atlantic Ocean. This region covers a total area of 17,569 km², which represents 2.5% of the total area of Morocco (HCP 2015).

The climate of the region is Mediterranean, temperate and semi-arid (DGCL 2015). The average annual minimum temperature stands at 4 °C, while the average annual maximum reaches 40 °C, with annual precipitation fluctuating between 300 mm and 900 mm (Elhachimi *et al.* 2022). Abundant precipitation occurs due to the region's exposure to the Atlantic Ocean (Bouayyadi *et al.* 2015). The main economic sector in the region is agriculture, accounting for 56% of the regional useful agricultural area and 12% of the country's total useful agricultural area. (Elhachimi *et al.* 2021). The forests in RSK cover an area of 351 290 hectares. Natural forests, particularly the Maâmora forest, account for 70% (244 000 ha) of this total area (DGCL 2015).

With its many natural sites, this region plays a major role in biodiversity and ecosystem conservation (DGCL 2015). It must be noted that the study region was chosen for the traditional know-how of its local population (Ministry of agriculture 2023) and its floristic and ecological diversity (DGCL 2015).

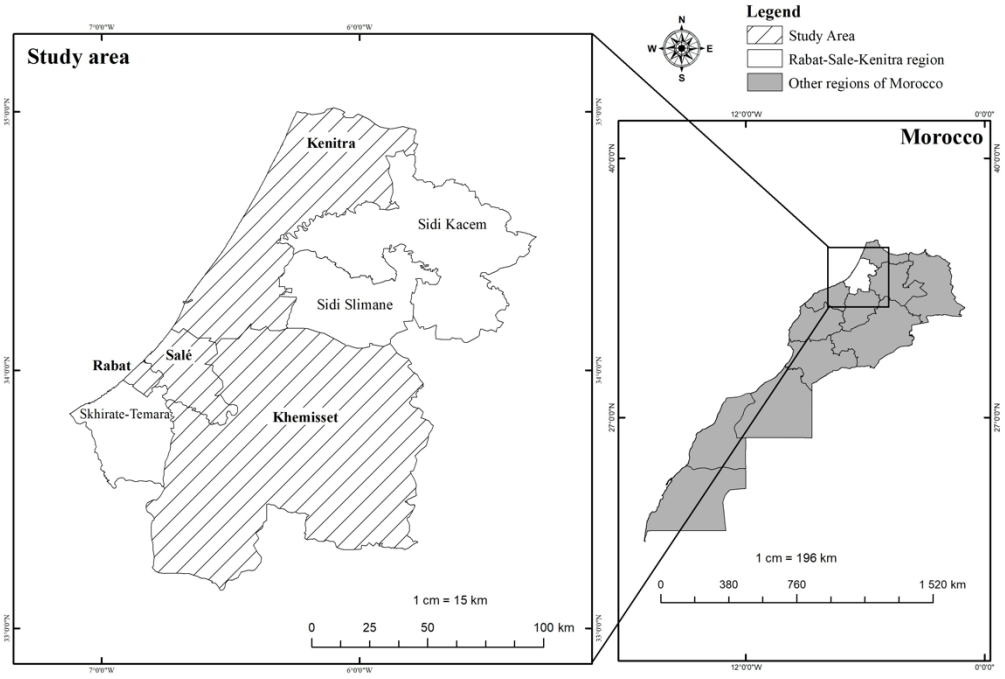

Figure 1. Cities in the Rabat-Salé-Kenitra region included in the ethnobotanical surveys (Map realised according to the administrative division of 2015, ArcGIS 10.7.1)

Study design

Ethnobotanical surveys were conducted among DPs for 12 months, with a frequency of 3 days per week, in various healthcare structures for adults in different cities of the RSK region, including Rabat, Salé, Kenitra, and Khemisset (Fig. 1). These surveys took place at the Ibn Sina University Hospital in Rabat, the Hay Essalam Health Center in Salé, the Rabat Salé Diabetes Aid Association, the El Idrissi Provincial Hospital Center and the Moulay El Hassan Urban Health Center in Kenitra, as well as the Khemisset Provincial Hospital Center and the Hay Salam Urban Health Center in Khemisset. Table 1 provides details on the cities where the surveys were conducted, the corresponding healthcare structures, as well as the specific periods and durations of the surveys (Table 1). It should be noted that ethnobotanical surveys were restricted in their geographical scope due to the COVID-19 pandemic. Thus, the cities of Temara, Sidi Kacem, and Sidi Slimane were not included in the study. Additionally, the survey conducted in the city of Khemisset lasted only one month before being interrupted due to the pandemic.

A semi-structured questionnaire (Appendix 1) was designed by Professor Souad Skalli, from the Faculty of Science, University Mohammed V in Rabat and WHO consultant in phytovigilance and validated by an expert in the field Pr Mamadou Aliou Baldé, from the Department of Pharmaceutical and Biological Sciences, Gamal Abdel Nasser University Conakry, Guinea and Director of the Institute for Research and Development of Medicinal and Food Plants of Guinea, Dubréka, Guinea.

This article will only present the results regarding the socio-demographic data of DPs, their medical data, and data related to the use of medicinal plants by DPs. While our ongoing research does include the study of adverse effects associated with

the use of MPs for diabetes treatment, this particular aspect will be addressed in an upcoming publication exclusively focused on this subject.

Table 1. Cities and healthcare structures concerned by the survey and duration of the survey.

Cities	Healthcare structures	Duration and periods of the surveys
Rabat	Ibn Sina University Hospital Center	4 months From January 8th to April 8th, 2018
Salé	Hay Essalam Health Center Rabat Salé Diabetes Aid Association (ARSAD)	3 months From May 1st to August 1st, 2018
Kenitra	El Idrissi Provincial Hospital Center Moulay El Hassan Urban Health Center	4 months From September 6th, 2018 to January 6th, 2019
Khemisset	Khemisset Provincial Hospital Center Hay Salam Urban Health Center	1 month From February 3rd to Marsh 2nd, 2020

Although the questionnaire is written in French, the oral interviews with the DPs were conducted in Moroccan dialect.
In addition to the survey, which involved filling out the dedicated questionnaire, more information was recorded for each day of the survey, including:

- The total number of inpatients;
- the total number of outpatients;
- the total number of patients who refused to participate in the survey;
- the total number of patients who participated in the survey but did not use plants to treat their diabetes;
- the total number of patients who participated in the survey and used plants to treat their diabetes but did not experience any adverse effects as a result of this usage;
- the total number of patients who participated in the survey, used plants to treat their diabetes, and experienced adverse effects as a result of this usage.

The patients who meet the inclusion criteria of the survey were:

- Diabetic patient (type 1, type 2 or gestational type), of all ages and both male and female sexes, were included;
- patient who has agreed to participate in the survey voluntarily;
- patient who uses medicinal plants individually or in mixtures with or without prescribed conventional treatments.

Children under 18 years of age, diagnosed with diabetes and accompanying their diabetic parents, were also included.

For socio-demographic data, the age groups used in this study were established by referring to the age groups classification provided by the WHO in its latest global report on diabetes (WHO 2016).

Study integrity

This study took place after obtaining authorisation (n°41/20) from the National Committee of Ethics for Biomedical Research at Mohammed V University in Rabat, which deemed that these anonymous surveys, conducted with a questionnaire that does not contain the respondent's identity, did not affect the patient's privacy. Approvals were also obtained from the respective department heads of each healthcare structure after reviewing the questionnaire and being informed about the study's objectives.
The participation of DPs in this survey was voluntary, following an oral explanation in a Moroccan dialect by the investigator regarding the questionnaire's content and the survey's objectives. A consent form was signed by the participants who agreed to take part in this study, available in both Arabic and French languages.

Patients could at any time withdraw from the interview. They received no incentives or compensation, and all cooperated voluntarily.

Medicinal plants identification

The scientific names of the plants mentioned by diabetic patients were obtained through direct translation of their vernacular names at the Laboratory of Botany and Valorisation of Plant and Fungal Resources at the Faculty of Sciences in Rabat. This translation was carried out based on references such as the traditional Moroccan pharmacopoeia (Bellakhdar

1997), "Flore pratique du Maroc" (Fennane *et al.* 1999) and the vascular flora of Morocco, inventory, and chorology (Fennane & Tattou 2005).

No plant samples were collected during the investigations because, evidently, the patients did not have any. Despite subsequent requests urging the patients to furnish plant samples, only a restricted quantity of fragmented plants was ultimately submitted. Unfortunately, such samples did not fulfill the criteria for issuing a voucher code, as they did not constitute whole plants.

To address this issue, the global database of the European and Mediterranean Plant Protection Organization (EPPO) was used. Thus, an EPPO code was assigned to each plant species, enabling efficient and accurate identification, regardless of linguistic and regional variations.

Furthermore, the MPs used by the DPs were classified based on their cultivation status in Morocco (wild plants, cultivated plants, or imported plants) using the databases of the Scientific Institute of Rabat.

Data Analysis

Descriptive analysis

The data reported in the questionnaire was recorded in a Microsoft Excel database and analysed to measure the proportions of different variables such as gender and age, parts of plants used, preparation methods, and routes of administration. These primary data were analysed descriptively and comparatively and presented transparently and comprehensibly based on recommended standards for conducting and presenting field studies in ethnopharmacology (Weckerle *et al.* 2018).

Ethnobotanical indices have also been used to analyse the obtained results and highlight their added value compared to other ethnobotanical studies. These include the relative frequency of citation (RFC), the level of fidelity (FL), and the informant consensus factor (ICF).

Relative Frequency of Citation (RFC)

This index reflects the local relative importance of each species. It is calculated by dividing the citation frequency (FC) by the population size (N) (Tardío & Pardo-de-Santayana 2008).

$$RFC = FC / N$$

The fidelity level (FL)

This index indicates the effective effects of a given plant species against a particular ailment. It is calculated using the following formula:

$$FL = IP / Lu \times 100$$

Where Ip is the number of informants who have used a specific species for a particular type of diabetes, and Lu is the total number of informants using medicinal plants (Sreekeesoon & Mahomoodally 2014).

Informant Consensus Factor (ICF)

This index demonstrates the homogeneity of the exchange of traditional knowledge among informants regarding the use of MPs to treat different categories of diseases. In our case, this index is used to verify the degree of agreement among the informants regarding the MPs used to treat each type of diabetes. It is calculated using the following formula:

$$ICF = Nur - NT / Nur - 1$$

Where Nur refers to the number of usage reports for each condition (type of diabetes) and Nt is the number of species used for the same condition. A high value (close to 1) of ICF indicates that the reported plants are predominantly recognized as antidiabetic agents by the informants, with ($0 < ICF < 1$) (Heinrich *et al.* 1998).

The indices have been used while acknowledging their limitations. Indeed, these indices quantify certain aspects of the primary data but do not adequately reflect the value or importance of plant usage. The reasons why plants are valued or

considered important to communities are much more complex than what the indices suggest. Therefore, it is crucial to prioritize a thorough understanding and careful analysis of the primary data (Leonti 2022).

Statistical analysis

The Chi-square test was performed using XLSTAT software to analyse the socio-demographic data of patients (Pearson 1900). The aim was to investigate whether there is a correlation between the use of MPs and the socio-demographic variables studied.

For this purpose, the respondents were grouped by gender (Male vs Female) and divided into nine age categories (<10, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, >80), four categories of education level (Illiterate, Primary level, Secondary level, Higher level), four categories of employment status (Employed, Unemployed, Retired, Student), and two categories distinguishing patients who had health insurance from those who had none (With insurance, Without insurance). Differences were considered statistically significant at $p<0.05$.

The Chi-square test for one variance also was performed using the XLSTAT software to analyse the statistical significance of certain data from ethnobotanical surveys, including the frequency of use of medicinal plants, plant parts, and use methods. Differences were considered statistically significant at $p<0.05$.

Literature data

The use of plants in this survey was compared to other studies focusing on plants traditionally used in the treatment of diabetes in Morocco and worldwide. Only one reference was required to determine if a plant had already been used for diabetes.

Results

Socio-demographic data of diabetic patients

This survey involved 2535 DPs. Among them, 948 were from Rabat, 468 were from Salé, 846 were from Kénitra, and 273 were from Khemisset. Out of all the individuals approached for the survey, 449 (17.71%) refused to participate. The participation rate was 82.29%. Among the 2086 DPs who agreed to participate in the survey, 1025 (49.14%) reported using medicinal plants to treat their diabetes.

Among the DPs who used MPs, there were 863 women (84.20%) and 162 men (15.80%), resulting in a male-to-female ratio of 0.19. The age of the DPs using MPs ranged from 6 to 92 years, with an average of 53.20±15.42 years. The age groups most observed were between 50 and 59 years (29.46%) and between 60 and 69 years (28.88%).

Regarding educational level, over half of the patients using medicinal plants were found to be illiterate (63.61%). The percentage notably decreases among patients with a primary (18.24%) or secondary education level (14.34%), reaching only 3.80% among patients with higher education.

Furthermore, 878 (85.66%) DPs were unemployed, and 519 (50.63%) DPs had health insurance, with over half (51.10%) benefiting from the Moroccan Medical Assistance Scheme (RAMED).

A significant statistical association was observed between the use of medicinal plants for diabetes treatment and each of the studied socio-demographic variables, with a p-value less than 0.0001 for each variable (Table 2).

Medical data of diabetic patients

Among DPs using medicinal plants, 873 (85.17%) were diagnosed with type 2 diabetes (T2D), with 559 (66.33%) falling within the age range of 50 to 69 years. Additionally, 141 (13.76%) patients had type 1 diabetes (T1D), with 76 (95.12%) falling within the age range of 10 and 29 years. Only 11 (1.07%) patients were diagnosed with gestational diabetes, with 6 (54.54%) falling in the age range of 30 to 39 years. In managing their diabetes, 975 (95.12%) patients underwent treatment with pharmaceutical medications alongside the use of MPs. Specifically, 355 (34.63%) patients relied on insulin, 356 (34.73%) primarily used oral antidiabetic treatment, and 264 (25.76%) combined insulin therapy with oral antidiabetic treatment. A smaller group of 46 (4.49%) patients, in the early stage of the diabetes, managed the disease through dietary adjustments and physical exercises. Four (0.39%) patients were unable to pursue any conventional treatment due to financial constraints.

Table 2. Socio-demographic data of diabetic patients using medicinal plants surveyed in different healthcare structures in the Rabat-Salé-Kenitra region.

Variable	Subgroup	Number	Percentage (%)	P Value
Gender	Male	162	15.80	< 0,0001*
	Female	863	84.20	
Age	< 10 years	11	1.07	< 0,0001*
	10 – 19 years	47	4.59	
	20 – 29 years	35	3.41	
	30 – 39 years	57	5.56	
	40 – 49 years	168	16.39	
	50 – 59 years	302	29.46	
	60 – 69 years	296	28.88	
	70 – 79 years	96	9.37	
	> 80 years	12	1.18	
	Not provided	1	0.10	
Educational Level	Illiterate	652	63.61	< 0,0001*
	Primary	187	18.24	
	Secondary	147	14.34	
	University	39	3.80	
Employment Status	Employee	61	5.95	< 0,0001*
	Unemployed	878	85.66	
	Retired	40	4.49	
	Student	46	3.90	
Health Insurance	With insurance	519	50.63	< 0,0001*
	With no assurance	506	49.37	

The values with ∗ indicate significant correlation between the number of patients using medicinal plants and various sociodemographic variables ($p<0.05$).

Ethnobotanical survey data

Among the 2086 patients surveyed in Rabat, Salé, Kenitra, and Khemisset healthcare structures, 1025 (49.10%) stated using MPs to treat their diabetes. This usage was reported either in combination with conventional medications by 975 (95.12%) DPs or as the sole treatment by 50 (4.88%) DPs.

Most of the DPs, specifically 952 (92.88%), consumed MPs in a single form (using one plant per use), while 42 (4.10%) opted for mixtures (combining two or more plants per use), and 31 (3.02%) patients consumed them in both single form and mixtures.

A total of 82 plants were recorded among the DPs. Out of these plants, 68 were documented in healthcare facilities in Rabat, 51 in Kenitra, 38 in Salé, and 25 in Khemisset. Furthermore, 17 plants were exclusively mentioned by patients from Rabat, 10 plants by those from Kenitra, 3 plants by those from Salé, and 2 plants by patients from Khemisset (Table 3).

Regarding the moroccan cultivation status of these MPs, 34.15% (28) are cultivated in Morocco, 31.71% (26) are wild species, 12.20% (10) are imported species, 12.20% (10) are cultivated and semi-wild species, 4.88% (4) are cultivated and imported species, 2.44% (2) are cultivated and naturalised species, 1.22% (1) are naturalised species, and 1.22% (1) are cultivated and wild species (Table 4).

These MPs belong to 38 botanical families, with the Lamiaceae family having the highest number of species with 10 plants, followed by the Apiaceae family with 8 plants, the Fabaceae family with 7 plants, and the Asteraceae family with 6 plants. Based on frequency of use, some plants were significantly ($p<0.0001$) more commonly used than others for diabetes management. *Olea europaea* L. was used by 482 (28.76%) DPs, *Trigonella foenum-graecum* L. by 354 (21.12%) DPs, *Salvia officinalis* L. by 125 (7.46%) DPs, *Origanum grosii* Pau & Font Quer by 99 (5.91%) DPs, and *Allium cepa* L. by 68 (4.06%) DPs. The remaining plant species were used by fewer than 50 patients.

The RFC values of the mentioned plant species ranged from 0.470 to 0.001. The highest value was observed for *Olea europaea* L. (0.470), followed by *Trigonella foenum-graecum* L. (0.345), and *Salvia officinalis* L. (0.122) (Table 3).

Table 3. Medicinal plants used by diabetic patients from the studied healthcare structures in the Rabat-Salé-Kenitra region, with details of the plant part used, method of preparation, dosage, route of administration, usage rate, frequency of use (%) and ethnobotanical indices (FL, FC, and RFC).

Family	Scientific name (EPPO Code)	Moroccan Vernacular name	Cities	Used part(s)	Method of preparation (n)	Dosage/ Route of administration, usage rate	Frequency of use (%)	FL (%)	FC	RFC
Aloeaceae	*Aloe vera* (L.) Burm.f. (ALFVE)	Sebbar	S	Pulp	Consumed in its natural state (2)	**30 ml of blended pulp** in a glass of water/Orally, twice to thrice a day	0.12	100 % T2D	2	0.002
Amaryllidaceae	*Allium cepa* L. (ALLCE)	Bessela	R; S; Kh	Bulb	Freshly ground (53)	**1/4 of a bulb to 2 bulbs**/Orally, once to twice a day; **1/2 bulb** in 1 glass of fermented milk/Orally, once a day	4.06	83.82 % T2D; 13.24 % T1D; 2.94 % GD	68	0.066
					Infusion (15)	**1/2 of a bulb to 2 bulbs** in 1 glass to 1 L of water/Orally, once a day				
	Allium porrum L. (ALLPO)	Leborrou	R; S; K	Bulb	Maceration in still water (3)/in sparkling water (5)/in fermented milk (1)	**1 to 3 bulbs** in 1 L of still water/Orally, once a day; **1 to 2 bulbs** in 1L of sparkling water/Orally, once a day; **2 bulbs** in 1L of fermented milk/Orally, 2 glasses a day	0.54	100 % T2D	9	0.009
	Allium sativum L. (ALLSA)	Touma	R; S; K	Bulb	Freshly ground (13)	**1 to 3 cloves**/Orally, once a day	1.07	94.44% T2D; 5.56 % T1D	18	0.018
					Maceration in fermented milk (1) / oil (2)	**3 cloves** in 1L of fermented milk/ Orally, 1 glass a day; **4 cloves** in 500 ml of olive oil/Orally, 1 spoonful a day				
					Decoction (2)	1 clove / Orally, once a day				
Apiaceae	*Ammi visnaga* L. (AMIVI)	Bechnikha	R; S; K	Flowering tops/Seeds	Decoction (4)	**1/2 umbel to 4 umbels** in water/Orally, 1 to 3 times a day	0.36	100 % T2D	6	0.006

					Maceration in fermented mil (1)	**3 umbels** in 5 L of fermented milk/Orally, several glasses a day				
					Ingestion of ground seeds with water (1)	**1 teaspoon** in a glass of water/Orally, once a day				
	Apium graveolens L. (APUGV)	Krafes	R; S; K	Aerial parts	Decoction (4)	**2 to 5 stems** in 1 glass to 2L of water/Orally, once to several times per day	0.42	85.71 % T2D; 14.29 % T1D	7	0.007
					Freshly ground (2)	**2 stems** in 1.5 L of water/Orally, 3 glasses a day; 1 stem/Orally, once a day				
					Maceration (1)	**1 bouquet** in 1L of water/Orally, once a day				
	Carum carvi L. (CRYCA)	Karwiya	K	Seeds	Decoction (2)	**1 handful** with water/Orally, once a day	0.18	100 % T2D	3	0.003
					Ingestion of ground seeds with water (1)	**1 teaspoon** with 1 glass of water/Orally, twice a day				
	Coriandrum sativum L. (CORSA)	Kusbor Kusbor hboub	R; S; K; Kh	Seeds / Leaves	Ingestion of ground seeds with water (17)	**1 teaspoon of ground seeds** with 1 glass of water/Orally, once to thrice a day	1.91	81.25 % T2D; 18.75 % T1D	32	0.031
					Infusion (8)	**1 spoonful of ground seeds** in 1 large glass of water/Orally, once a day; **6 leaves** in 1 glass of water/Orally, once a day				
					Decoction (3)	**1 spoonful of ground seeds** in water/Orally, once a day; **1 handful of leaves** in 500 ml of water/Orally, once a day				

					Ingestion of whole seeds with water (2)	**1 teaspoon of whole seeds** with 1 glass of water/Orally, once a day				
					Maceration (2)	**1 tablespoon of ground seeds** in 1L of water/Orally, once a day				
	Cuminum cyminum L. (CVUCY)	Kamoun Ikammen	K	Seeds	Ingestion of ground seed with water (1)	**1 pinch of ground seeds** in 1 glass of water/Orally, once a day	0.06	100 % T2D	1	0.001
	Foeniculum vulgare Mill. (FOEVU)	Besbas	Kh	Fruit	Infusion (1)	**250 g** in a teapot/Orally, once a day	0.06	100 % T2D	1	0.001
	Petroselinum crispum Mill. (PARCR)	Maadnus	R; S; K	Leafy stems	Decoction (3)	**3 to 6 leafy stems**/Orally, once a day; **1 handful of leaves**/Orally, several times a day	0.36	66.67 % T1D; 33.33 % T2D	6	0.006
					Infusion (1)	**1 handful of leaves**/Orally, once a day				
					Freshly ground leaves (1)	**Some leafy stems** with water/Orally, twice a day				
					Associated with nutrition (1)	**Some leafy stems**/Orally, once a day				
	Pimpinella anisum L. (PIMAN)	Habbat halawa	R; S; K; Kh	Seeds	Infusion (3)	**1 pinch**/Orally, once to twice a day	0.48	100 % T2D	8	0.008
					Decoction (2)	**1 spoon to 1 handful**/Orally, 1 to several times a day.				
					Ingestion of ground seeds with water (2)	**1 spoon to 1 handful**/Orally, once a day				
					Mixed with bread during kneading (1)	**Not provided**/Orally, once a day				
Apocynaceae	*Caralluma europaea* (Guss.) N. E. Br (CBQEU)	Daghmous	R; K	Aerial parts	Freshly ground with milk or fermented milk (8)	**1 teaspoon** in 1 glass of milk/Orally, once a day; **5 teaspoons** in 1L of fermented milk/Orally,	0.84	78.57 % T2D; 21.43 % T1D	14	0.014

						once a day; **3 leaves** in 500 ml of fermented milk/Orally, once a day				
					Maceration in honey (3)	**1 spoonful of honey** in a glass of water/Orally, once a day				
					Infusion (2)	**3 leaves to a handful** of leaves in water/Orally, once a day				
					Decoction (1)	**3 leaves** in 2 glasses of water/Orally, once a day				
	Nerium oleander L. (NEROL)	Defla	R; S	Leaves	Infusion (3)	**1 handful to 1 kg of leaves**/Topically applied, once a day; **Some leaves**/Orally, once a day	0.30	60 % T2D; 40 % T1D	5	0.005
					Maceration in water (2)	**3 leaves**/Orally, once a day; **4 leaves**/Topically applied, once a day				
Arecaceae	*Chamaerops humilis* L. (CMEHU)	Doum	Kh	Fruits	Consumed in its natural state (1)	**2 to 3 fruits**/Orally, once a day	0.06	100 % T2D	1	0.001
Asteraceae	*Artemisia absinthium* L. (ARTAB)	Chiba	R	Flowering tops	Infusion (4)	**1 small handful**/Orally, once a day	0.24	75 % T1D; 25 % T2D	4	0.004
	Artemisia herba-alba Asso (ARTHA)	Chih labiyed	R; S; K; Kh	Aerial parts	Infusion (32)	**1 teaspoon of ground plant**/Orally, once to twice a day; **1 handful of dried plant**/Orally, once to twice a day; **1 to 2 branches**/Orally, once to twice a day	2.45	87.80 % T2D; 9.76 % T1D; 2.44% GD	41	0.040
					Decoction (9)	**1 to 2 handfuls of dried plant**/Orally, once to twice a day				

	Chamaemelum mixtum (L.) Alloni (ANTMI)	Hellala	K	Flowers	Infusion (1)	**1 handful** in water/Orally, once a day	0.06	100 % T2D	1	0.001
	Chamaemelum nobile (L.) All. (ANTNO)	Babnouj Babounj	R	Flowering tops	Infusion (1)	**1 handful** in a teapot/Orally, once a day	0.06	100 % T2D	1	0.001
	Cynara cardunculus L. (CYUCA)	Khorchef	R; S; K	Stems	Decoction (5)	**1/2 kg** in 1L of water/Orally, 1 L a day; **1 handful** in 1L of water/Orally, once a day	0.36	100 % T2D	6	0.006
					Infusion (1)	**4 stems** in 1 glass of water/Orally, once a day				
	Cynara cardunculus subsp. scolymus (L.) (CYUSC)	Lqoq	R; Kh	Capitulum	Infusion (2)	**1 capitulum** in 1L of water/Orally, 2 to several glasses a day	0.12	50 % T1D; 50 % T2D	2	0.002
Brassicaceae	*Brassica oleracea* L. (BRSOX)	Kroumb	R	Leaves	Freshly ground (1)	**1 cabbage** with 1L of fermented milk/Orally, 3 glasses a day	0.06	100 % T2D	1	0.001
	Lepidium sativum L. (LEPSA)	Habb rchad	R; S; K; Kh	Seeds	Infusion (14)	**1 spoonful of seed**s in water/Orally, once to twice a day	1.55	96.15 % T2D; 3.85 % GD	26	0.025
					Ingestion of whole seeds with water or milk (8)	**1 to 2 spoons of seeds** with 1 glass of water or milk/Orally, once to twice a day				
					Ingestion of ground seeds with water (2)	**1 spoonful of ground seeds** in a glass of water/Orally, once to twice a day				
					Maceration (1)	**1 handful of whole seeds** in a glass of water/Orally, once a day				
					Decoction (1)	**1 spoonful of seeds** in 1L of water/Orally, once a day				

	Raphanus raphanistrum subsp. sativus (L.) (RAPSL)	Lefjel	R; K	Bulbe	Consumed in its natural state (3)	**1 to 3 bulbs**/Orally, once a day	0.30	40 % T2D; 40 % GD; 20 % T1D	5	0.005
					Maceration in sparkling water (1)	**1 handful** with 1L of sparkling water/Orally, once a day				
					Infusion (1)	**1 bulb**/Orally, once a day				
Burseraceae	*Boswellia sacra* Flueck. (BSWSA)	Louban dakar	R; Kh	Resin	Ingestion (1)	**1 piece** with 1 glass of water/Orally, once a day	0.12	100 % T2D	2	0.002
					Infusion (1)	**2 pieces** with 1 glass of water/Orally, once a day				
Cactaceae	*Opuntia ficus-indica* (L.) Mill. (OPUFI)	Zaaboul Lhandiya	S; K; Kh	Seeds / Fruits	Ingestion of ground seeds (1)	**1 pinch** in fermented milk/Orally, once a day	0.18	100 % T2D	3	0.003
					Maceration of ground seeds (1)	**1 handful** in 500 ml of fermented milk/Orally, once a day				
					Consumed in its natural state (1)	**Random amount of fruits**/Orally, once a day				
Cucurbitaceae	*Citrullus colocynthis* (L.) Schrad. (CITCO)	Lehdej	S	Seeds / Fruits	Ingestion of whole seeds (1)	**5 to 6 seeds** with a glass of water/Orally, once a day	0.12	100 % T2D	2	0.002
					Consumed in its natural state (1)	**1 fruit**/Orally, once a day				
	Cucumis sativus L. (CUMSA)	Lkhiyar	R; K	Fruit	Consumed in its natural state (2)	**1 fruit**/Orally, once to thrice a day	0.30	100 % T2D	5	0.005
					Freshly ground (2)	**1 fruit** with water/Orally, once a day; 1 fruit ground with 1L of fermented milk/Orally, 2 glasses a day				
					Maceration (1)	**1 fruit** in 1L of fermented milk/Orally, 1 glass a day				
	Cucurbita pepo L. (CUUPE)	Lgueraa	R	Fruit	Freshly ground (1)	**1 fruit** in 1L of water/Orally, once a day	0.06	100 % T2D	1	0.001

Cupressaceae	*Juniperus phoenicea* L. (IUPPH)	Al arar	R	Fruit/Bark	Infusion (2)	**1 handful of fruits** with water/Orally, once a day; 2 spoonfuls of ground bark with water/Orally, once a day	0.24	75 % T2D; 25 % T1D	4	0.004
					Maceration (2)	**1 glass of fruit** in 1 L of fermented milk/Orally,1 glass a day				
Euphorbiaceae	*Mercurialis annua* L. (MERAN)	Harigua el melsa	K	Leaves	Infusion (1)	**3 leaves**/Orally, once a day	0.06	100 % T2D	1	0.001
Fabaceae	*Ceratonia siliqua* L. (CEQSI)	Kharrub	R	Fruits	Consumed in its natural state (1)	**1 fruit**/Orally, twice a day	0.06	100 % T1D	1	0.001
	Glycine max (L.) Merr. (GLXMA)	Soja	R	Seeds	Ingestion of whole seeds with water (1)	**1 teaspoon** with water/Orally, once a day	0.06	100 % T1D	1	0.001
	Glycyrrhiza glabra L. (GYCGL)	Arq souss	R; S	Roots	Infusion (1)	**1 root** in water/Orally, twice a day	0.12	100 % T2D	2	0.002
					Decoction (1)	**1 root** in 500 mL of milk/Orally, twice a day				
	Lupinus albus L. (LUPAL)	Termas	R	Seeds	Mastication (1)	**1 seed**/Orally, once a day	0.06	100 % T2D	1	0.001
	Phaseolus vulgaris L. (PHSVX)	Loubia lbeda	S	Seeds	Ingestion of ground seeds with water (2)	**500 g** with 2L of water/Orally, twice a day; 1 spoonful with a glass of water/Orally, once a day	0.12	100 % T2D	2	0.002
	Trigonella foenum-graecum L. (TRKFG)	Helba	R; S; K; Kh	Seeds	Ingestion of whole seeds with water (150)	**1 to 2 spoonfuls**/Orally, once to thrice a day or once a week; 1 handful/Orally, once a day; 1 pinch Orally, once a day; 1 to 20 seeds/orally, once to twice a day	21.12	84.75 % T2D; 14.97 % T1D; 0.28 % GD	354	0.345
					Maceration in still water (69) or	**1 to 3 spoonfuls** with 1 glass to 1 L of				

					sparkling water (57)	water/Orally, once to several times a day; **1 handful** in 500 ml to 1.5L of water/Orally, once to several times a day; **1/2 glass to 1 glass of seeds** in 1 L of water/Orally, once a day; **1 to 20 seeds** with 1 glass to 1 L of water/Orally, once to several times a day				
					Ingestion of ground seeds with still water (37) or sparkling water (3)	**1 to 3 spoonfuls**/Orally, once to thrice a day; **1 handful**/Orally, once a day; **3 to 5 seeds**/Orally, once to several times a day				
					Infusion (23)	**1 spoonful of ground seeds**/Orally, once a day; 1 pinch/Orally, once to thrice a day; **1 handful of seeds**/Orally, once to twice a day; **3 to 10 seeds**/Orally, once to thrice a day				
					Maceration in fermented milk (7)	**1 handful of seeds** in 1L of fermented milk/Orally, 1 to several glasses a day; **1 spoonful** in 1L of fermented milk/Orally, once a day; **3 to 40 seeds** in 1L of fermented milk/Orally, once a day				
					Decoction (6)	**1 handful** in 1 glass to 1L of water/Orally, once a				

						day; **50 seeds** in 1L of water/Orally, once a day				
					Ingestion of ground seeds with milk (1) or fermented milk (1)	**1 spoonful**/Orally, once a day				
	Vicia faba L. (VICFX)	Foul	K	Seeds	Ingestion of whole seeds (1)	**Some seeds**/Orally, once a day	0.06	100 % T1D	1	0,.001
Fagaceae	*Quercus suber* L. (QUESU)	Belloute	K	Fruits	Decoction (2)	**1 kg of pericarps** in 2L of water/Orally, several glasses a day; **4 fruits**/Orally, thrice a day	0.12	100 % T2D	2	0,002
Iridaceae	*Crocus sativus* L. (CVOSA)	Zaafran	R; S	Stigmas (pistils)	Decoction (1)	**1 teaspoon** in 1 glass of water/Orally, once a day	0.18	100 % T2D	3	0003
					Infusion (1)	**1 teaspoon** in 1 glass of water/Orally, once a day				
					Maceration (1)	**2 pinches** in 2L of water/Orally, once a day				
Juglandaceae	*Juglans regia* L. (IUGRE)	Gouz Guerguaa	R	Seeds	Infusion (1)	**1 nut** in water/Orally, once a day	0.06	100 % T2D	1	0.001
Lamiaceae	*Lavandula angustifolia* Mill. (LAVAN)	Khouzama	R; S; K; Kh	Aerial parts	Infusion (5)	**2 stems** in water/Orally, once a day; **1 to 2 spoonfuls of dried plant** in water/Orally, once to twice a day; **1 handful of dried plant** in water/Orally, once a day	0.30	100 % T2D	5	0.005
	Marrubium vulgare L. (MAQVU)	Merriwet Merriwa	R; S; K	Leaves	Infusion (31)	**1 to 6 leaves**/Orally, once to twice a day; **1 handful**/Orally, once a day	2.74	86.96 % T2D; 10.87 % T1D; 2.17 % GD	46	0.045
					Decoction (15)	**2 to 10 leaves**/Orally or topically, once a day; **1 handful**/Orally, once to twice a day				

	Mentha pulegium L. (MENPU)	Fliou Fllioui	R; K; Kh	Leaves	Infusion (10)	**2 to 4 leaves**/ Orally, once a day; **1 handful**/Orally, once a day; **1 pinch of ground leaves**/Orally, once a day	0.60	90 % T2D; 10 % T1D	10	0.010
	Mentha spicata L. (MENSP)	Naanaa	R; S	Leaves	Infusion (3)	**Some leaves**/Orally, once a day; **5 leaves**/Orally, once a day	0.18	66.67 % T2D; 33.33 % T1D	3	0.003
	Mentha suaveolens Ehrh. (MENSU)	Mersita Timijja	R; K	Leaves	Infusion (4)	**3 to 4 leaves**/Orally, once a day; **1 handful**/Orally, once to twice a day	0.24	100 % T2D	4	0.004
	Origanum grosii Pau & Font Quer. (Unavailable)	Zaatar	R; S; K; Kh	Leaves	Infusion (82)	**1 handful** in a glass of water/Orally, once a day; **1 handful** in 500 mL to 1L of water/Orally, 1 to 2 glasses a day; **1 to 4 spoonfuls**/Orally, once to several times a day; **1 pinch**/Orally, once to several times a day	5.91	94.95 % T2D; 5.05 % T1D	99	0.097
					Decoction (13)	**1 to 2 handfuls**/Orally, once to twice a day; **1 pinch**/Orally, once to twice a day; **1 spoonful**/Orally, once a day1				
					Maceration (3)	**1 handful**/Orally, once a day				
					Ingestion of dried and ground leaves with water (1)	**1 handful**/Orally, once a day				
	Origanum morjana L. (Unavailable)	Mardedouch	R; S; Kh	Leaves	Infusion (6)	**1 to 2 spoons of dried and ground leaves**/Orally, several	0.36	83.33 % T2D; 16.67 % T1D	6	0.006

						times a day; **3 to 4 fresh leaves**/Orally, once a day				
	Rosmarinus officinalis L. (RMSOF)	Azir Yazir	R; S; K; Kh	Aerial parts	Infusion (25)	**1 to 2 handfuls**/Orally, once to twice a day; **1 to 2 branches**/Orally, once a day; **1 pinch**/Orally, once to thrice a day	2.21	91.89 % T2D; 5.41 % T1D; 2.70 % GD	37	0.036
					Decoction (11)	**1 handful**/Orally, once to twice a day; **1 pinch**/Orally, twice a day; **1 spoon**/Orally, once a day				
					Maceration (1)	**1 handful**/Orally, once to twice a day				
	Salvia officinalis L. (SALOF)	Salmiya	R; S; K; Kh	Leaves	Infusion (109)	**1 to 2 branches**/Orally, once to twice a day; **1 to 4 spoonfuls of dried and ground leaves**/Orally, once to twice a day; **1 to 2 handfuls**/Orally, once to twice a day; **1 pinch**/Orally, once a day; **1 to 10 leaves**/Orally, once to thrice a day	7.46	84 % T2D; 16 % T1D	125	0.122
					Decoction (12)	**1 to 2 branches**/Orally, 1 to 6 glasses a day; **1 handful**/Orally, once to twice a day; **3 to 7 leaves**/Orally, once a day				
					Maceration (4)	**1 spoon of dried and ground leaves**/Orally, once a day; **3 to 7 leaves**/ Orally, once to thrice a day				

	Thymus satureioides Coss. (Unavailable)	Zitra Azoukni	R; K	Leaves	Infusion (2)	**1 handful**/Orally, once day; **1 spoonful**/Orally, twice a day	0.18	100 % T2D	3	0.003
					Decoction (1)	**1 handful**/Orally, twice a day				
Lauraceae	*Persea americana* Mill. (PEBAM)	Avocat	R; K	Seeds/Fruits	Ingestion of ground seeds (2)	**3 spoonfuls** with milk/Orally, twice a day; **1 spoonful** with water/Orally, once a day	0.18	66.67 % T2D; 33.33 % T1D	3	0.003
					Freshly ground (1)	**1 fruit** with 1 glass of fermented milk/Orally, once day				
	Cinnamomum zeylanicum Blume (CINZE)	Qarfa	R; S; K; Kh	Bark	Infusion (15)	**½ teaspoon to 2 teaspoons of ground bark** in a glass of water/Orally, once or twice a day; **1 to 4 pieces of bark** in a glass of water/Orally, once or twice a day	2.51	85.71 % T2D; 14.29 % T1D	42	0.041
					Ingestion of ground bark (14)	**1 to 2 teaspoons of ground bark** with water/Orally, once a day				
					Maceration (10)	**½ to 1 teaspoon of ground bark** in a glass of water/Orally, once a day; **1 piece of bark** in 1L of water/Orally, once a day; **1 handful of bark** in 5L of water/1L a day				
					Decoction (3)	**1 teaspoon** in a glass of water/Orally, once a day; **2 pieces of bark** in a glass of water or coffee/Orally, once to thrice a day				

Linaceae	*Linum usitatissimum* L. (LIUUT)	Zerriat el kettan	R; S; K; Kh	Seeds	Infusion (9)	**1 to 2 spoonfuls of seeds** with 1 glass of water or milk/Orally, once or twice a day	1.37	86.96 % T2D; 13.04 % T1D	23	0.022
					Ingestion of ground seeds with water (7)	**1 spoonful of seeds** with 1 glass of water/Orally, once a day				
					Ingestion of whole seeds with water (4)	**1 to 2 spoonfuls of seeds** with 1 glass of water/Orally, once a day				
					Added for kneading the bread (3)	**1 tablespoon**/Orally, 1 to 3 slices of bread a day				
Lythraceae	*Punica granatum* L. (PUNGR)	Roummane	R; S; K	Fruits/Pericarp	Decoction (2)	**1 fruit**/Orally, once a day	0.30	100 % T2D	5	0.005
					Maceration (1)	**Pericarp of 1 fruit** with 500 ml of water/ Orally, once a day				
					Infusion (1)	**Pericarp of 1 fruit** with 1 glass of water/ Orally, once a day				
					Ingestion of the whole fruit (1)	**1 fruit**/Orally, once a day				
Malvaceae	*Abelmoschus esculentus* (L.) Moench (ABMES)	Mloukhiya	R; S; K	Fruits	Maceration in water (20)	**3 to 6 fruits** in 1L of water/Orally, once a day; **1 to 4 fruits** in 1 glass of water/Orally, once a day	1.25	85.71 % T2D; 14.29 % T1D	21	0.020
					Infusion (1)	**3 fruits** in 500 ml of water/Orally, once day				
Moraceae	*Ficus carica* L. (FIUCA)	El Karm	R; S; K	Leaves	Infusion (5)	**1 to 7 leaves** in 1 glass of water/Orally, once a day	0.30	100 % T2D	5	0.005
Myrtaceae	*Eucalyptus* sp (1EUCG)	Calyptus	R	Leaves	Infusion (1)	**1 handful of leaves** in 1L of water/Orally, once a day	0.06	100 % T2D	1	0.001

	Myrtus communis L. (MYVCO)	Rayhan	R; Kh	Leaves	Infusion (1)	**1 tablespoon**/Orally, once a day	0.12	100 % T2D	2	0.002
					Mastication (1)	**3 to 4 leaves**/Orally, once a day				
	Syzygium aromaticum (L.) Merr. & L.M.Perry (SYZAR)	Qrounfel	K	Bourgeon floral	Ingestion of ground plant (1)	**1 spoonful**/Orally, once a day	0.06	100 % T2D	1	0.001
Oleaceae	*Olea europaea* L. (OLVEU)	Zaytoune	R; S; K; Kh	Leaves / Fruits	Infusion (334)	**1 handful of leaves** in 250 ml to 1L of water/Orally, once to twice a day; **3 to 10 leaves** in 1 glass of water/Orally, once a day; **10 leaves** in 250 ml to 1L of water/Orally, once to twice a day	28.76	89.21 % T2D; 9.96 % T1D; 0.83 % GD	482	0.470
					Decoction (133)	**1 to 30 leaves** in 1 glass to 1L of water/Orally, once to twice a day; **1 handful of leaves** in 1 glass of water/Orally, once to twice a day; **1 handful of leaves** in 1 to 1.5L of water/Orally, 1 glass a day; **1 to 2 branches of leaves** in 1L of water/Orally, once to twice a day; **½ kg of fruit** in 2L of water/Orally, once a day				
					Maceration (15)	**3 to 10 leaves** in 1 glass of water/Orally, once to 4 times a day; **1 handful** in 1L of fermented milk/Orally, once a day;				

						10 leaves in 500 ml of fermented milk/Orally, once a day; **½ kg of fruit** in 1L of water/Orally, once a day				
Pedaliaceae	*Sesamum indicum* L. (SEGIN)	Jeljlan	R; Kh	Seeds	Ingestion of whole seeds with water (1)	**1 spoonful**/Orally, once a day	0.12	50 % T1D; 50 % T2D	2	0.002
					Infusion (1)	**250 g** in milk/Orally, once a day				
Poaceae	*Avena sativa* L. (AVESA)	Khortal	R	Seeds	Infusion (1)	**1 handful** in a glass of water/Orally, once a day	0.12	50 % T1D; 50 % T2D	2	0.002
					Mixed with bread during kneading (1)	**1 handful**/Orally, once a day				
	Hordeum vulgare L. (HORVX)	Chiir	R; K	Aerial parts	Infusion (2)	**1 handful of ground aerial parts** in water/Orally, once a day	0.24	100 % T2D	4	0.004
					Decoction (1)	**1 spoonful of ground aerial parts** in 1 glass of water/Orally, once a day				
					Maceration (1)	**1 spoonful of ground aerial parts** in water/Orally, once a day				
	Lolium rigidum Gaudin (LOLRI)	Zwan	R; S; K	Seeds	Ingestion of ground seeds (6)	**1 to 2 teaspoons of ground seeds** in 1 glass/Orally, once to thrice a day	0.42	100 % T2D	7	0.007
					Infusion (1)	**1 spoonful of ground seeds** in 1 glass of milk/Orally, once a day				
	Triticum aestivum L. (TRZAX)	Zraa	K	Seeds	Maceration (1)	**Not provided**	0.06	100 % T2D	1	0.001
Ranunculaceae	*Nigella sativa* L. (NIGSA)	Habba saouda Sanouj	R; S; K; Kh	Seeds	Ingestion of ground seeds with water (8)	**1 spoonful**/Orally, once a day	0.95	87.50 % T2D; 12.50 % T1D	16	0.016

					Infusion (4)	**1 to 2 spoonfuls** in 1 glass of water or milk/ Orally, once a day				
					Maceration (3)	**1 to 2 spoonfuls** in a glass of water/Orally, once a day				
					Ground seeds for kneading the bread (1)	**1 spoonful**/Orally, once a day				
Rosaceae	*Eriobotrya japonica* (Thunb.) Lindl. (EIOJA)	El mzah	R	Fruits	Decoction (1)	**2 fruits** in water/Orally, 1 glass a day	0.06	100 % T2D	1	0.001
	Malus domestica Borkh. (MABSD)	Teffah	R	Fruits	Freshly ground (1)	**1 fruit**/Orally, twice a day	0.06	100 % T1D	1	0.001
	Prunus amygdalus Batsch (PRNDU)	Louz	R; K; Kh	Fruits	Ingestion of ground fruits (1)	**3 tablespoons** with honey/Orally, once a day	0.18	100 % T2D	3	0.003
					Consumed in its natural state (1)	**1 fruit**/Orally, once a day				
					Infusion (1)	**2 fruits**/Orally, once a day				
	Rubus fruticosus L. (RUBFR)	Toute	R	Leaves	Infusion (1)	**1 handful of leaves**/Orally, once a day	0.06	100 % T2D	1	0.001
Rubiaceae	*Coffea arabica* L. (COFAR)	Qahwa	R; K	Seeds	Decoction (3)	**1 to 3 tablespoons of ground seeds** in water/ Orally, once a day	0.48	87.50 % T2D; 12.50 % T1D	8	0.008
					Infusion (5)	**1 tablespoon of ground seeds** in water/Orally, 1 to 2 glasses a day				
Rutaceae	*Citrus limon* (L.) Burm. (CIDLI)	Hammed	R; K	Fruits	Freshly ground (pressed fruit) (5)	**½ fruit to 2 fruits** in a glass of water/Orally, 1 glass a day; **1 fruit in 1L** of fermented milk/Orally, 1 glass a day	0.66	72.73 % T2D; 18.18 % T1D; 9.09 % GD	11	0.011
					Infusion (3)	**½ whole fruit** in 1L of water/Orally, 1L a day				

					Maceration (2)	**¼ of a fruit** in 1 L of water/Orally, 1 L a day				
					Freshly ground (whole fruit) (1)	**1 fruit** in 1 glass of water/Orally, 1 glass a day				
	Citrus ×paradisi Macfad (CIDPA)	Renj	R; S; K	Fruits	Freshly ground (pressed fruit) (5)	**½ fruit to 3 fruits**/ Orally, once a day	0.30	80 % T2D; 20 % T1D	5	0.005
Salvadoraceae	*Salvadora persica* L. (SVDPE)	Siwak	K	Bark	Maceration (1)	**1 piece** with 1 L of water/Orally, once a day	0.06	100 % T2D	1	0.001
Sapotaceae	*Argania spinosa* L. (ARJSI)	Argan	R; S; K	Seeds	Ingestion of whole seeds with water (9)	**1 to 3 seeds**/Orally, once to twice a day	0.72	83.33 % T2D; 16.67 % T1D	12	0.012
					Ingestion of ground seeds with water (3)	**1 teaspoon**/Orally, once to twice a day				
Solanaceae	*Solanum melongena* L. (SOLME)	Bdenjal	R; S; K; Kh	Fruits	Decoction (2)	**1 tablespoon of dried and ground fruit** with 1 glass of water/Orally, once a day; **1 to 2 fruits** with 1L of water/Orally, 1L a day	0.30	60 % T2D; 40 % T1D	5	0.005
					Infusion (2)	**2 tablespoons of dried and ground fruit** with 1 glass of water/Orally, twice a day; **½ fruit** with 1 glass of water/Orally, thrice a day				
					Freshly ground fruit (1)	**1 fruit** with 1L of fermented milk/Orally, once a day				
Theaceae	*Camellia sinensis* L. (CAHSI)	Atay	K	Seeds	Infusion (1)	**1 teaspoon** in a glass of water/Orally, once a day	0.12	100 % T2D	1	0.002
Thymelaeaceae	*Aquilaria malaccensis* Lam (AQAMA)	Taghriste	R; S; K	Bark	Maceration (5)	**1 to 7 pieces** in 1L of water/Orally, once a day	0.54	88.89 % T2D; 11.11 % T1D	9	0.009

					Infusion (3)	**2 to 6 pieces** in 500 mL to 1L of water /Orally, once to thrice a day				
					Decoction (1)	**2 pieces** in 1L of milk/Orally, once a day				
Verbenaceae	*Aloysia citriodora* Ortega ex Pers. (ALYTR)	Louiza	R	Leaves	Decoction (1)	**1 handful of leaves** in water/Orally, once a day	0.06	100 % T2D	1	0.001
Zingiberaceae	*Curcuma longa* L. (CURLO)	Kharqum	R; K	Underground stem in a dry state	Infusion (3)	**1 to 3 teaspoons of ground underground stem** in water/Orally, once a day; **1 teaspoon of ground underground stem** in a glass of milk/Orally, once a day	0.18	100 % T2D	3	0.003
	Zingiber officinale Roscoe (ZINOF)	Skenjbir	R; K	Roots	Maceration (2)	**1 piece** with honey/Orally, once to several times a day; **1 teaspoon** with honey/Orally, once a day	0.24	100 % T2D	4	0.004
					Infusion (2)	**1 piece** with 1L of water/Orally, once a day				
Unknown plants	-	-	R	Seeds	Infusion (1)	**½ bowl of seeds** with water/Orally, once a day	-	-	1	-
	-	-	R	Leaves	Decoction (1)	**6 to 7 leaves** with water/Orally, once a day	-	-	5	-

R: Rabat; S: Salé; K: Kenitra; Kh: Khemisset; T1D: Type 1 Diabetes; T2D: Type 2 Diabetes; GD: Gestational Diabetes; (n): Number of patients

FL: Fidelity level; FC: Frequency of citation; RFC: Relative frequency of citation

Table 4. Moroccan cultivation status of medicinal plants used by diabetic patients from the studied healthcare structures in the Rabat-Salé-Kenitra region, specifying the percentage of each status.

Plant species	Cultivation status in Morocco	Percentage (%)
Abelmoschus esculentus (L.) Moench *Allium cepa* L. *Allium porrum* L. *Allium sativum* L. *Apium graveolens* L. *Brassica oleracea* L. *Citrus ×paradisi* Macfad *Citrus limon* (L.) Burm. *Coriandrum sativum* L. *Crocus sativus* L. *Cucumis sativus* L. *Cucurbita pepo* L. *Eriobotrya japonica* (Thunb.) Lindl. *Hordeum vulgare* L. *Lavandula angustifolia* Mill. *Aloysia citriodora* Ortega ex Pers. *Malus domestica* Borkh *Mentha spicata* L. *Olea europaea* L. *Origanum majorana* L. *Petroselinum crispum* Mill. *Pimpinella anisum* L. *Phaseolus vulgaris* L. *Salvia officinalis* L. *Sesamum indicum* L. *Solanum melongena* L. *Trigonella foenum-graecum* L. *Vicia faba* L.	Cultivated species	34.15
Ammi visnaga L. *Argania spinosa* (L.) Skeels *Artemisia absinthium* L. *Artemisia herba-alba* Asso *Chamaemelum mixtum* (L.) Alloni *Caralluma europaea* (Guss.) N. E. Br *Chamaemelum nobile* L. *Chamaerops humilis* L. *Citrullus colocynthis* (L.) Schrad. *Foeniculum vulgare* Mill. *Juglans regia* L. *Juniperus communis* L. *Lolium rigidum* Gaudin *Marrubium vulgare* L. *Mentha pulegium* L. *Mentha suaveolens* Ehrh. *Myrtus communis* L. *Nerium oleander* L. *Origanum grosii* Pau & Font Quer L. *Prunus amygdalus* Batsch *Quercus suber* L. *Raphanus raphanistrum* subsp. *sativus* (L.) *Rosmarinus officinalis* L. *Rubus fruticosus* L. *Thymus satureioides* L. *Mercurialis annua* L.	Wild species	31.71
Aquilaria malaccensis Lam. *Boswellia sacra* Flueck. *Camellia sinensis* (L.) Kuntze *Cinnamomum zeylanicum* Nees *Coffea arabica* L. *Curcuma longa* L.	Imported species	12.20

Glycine max (L.) Merr. *Salvadora persica* L. *Syzygium aromaticum* (L.) Merr. & L.M.Perry *Zingiber officinale* Roscoe		
Avena sativa L. *Ceratonia siliqua* L. *Cuminum cyminum* L. *Cynara cardunculus* L. *Cynara cardunculus* subsp. *scolymus* (L.) *Ficus carica* L. *Lepidium sativum* L. *Linum usitatissimum* L. *Nigella sativa* L. *Punica granatum* L.	Cultivated and semi-wild species	12.20
Glycyrrhiza glabra L. *Lupinus albus* L. *Persea americane* Mill. *Triticum aestivum* L.	Cultivated and imported species	4.88
Eucalyptus sp *Opuntia ficus-indica* (L.) Mill.	Cultivated and naturalised species	2.44
Aloe vera (L.) Burm.f.	Naturalised species	1.22
Carum carvi L.	Cultivated and wild species	1.22

Among the 82 recorded medicinal plants, 4 were exclusively used for T1D, 42 were exclusively used for T2D, while none were exclusively used for gestational diabetes (GD). Also, 27 plants were used for both type 1 and type 2 diabetes. Only one plant was used for T2D and GD. Finally, there were 8 plants used for all types of diabetes (Table 5). The ICF (Informant Consensus Factor) values were 0.94 for T2D, 0.81 for T1D, and 0.38 for GD (Table 6).

Table 5. Distribution of plants used by diabetic patients in the Rabat-Salé-Kénitra region according to the types of diabetes.

	Scientific name
Plant species used exclusively for type 1 diabetes	*Ceratonia siliqua* L. *Glycine max* (L.) Merr. *Malus domestica* Borkh. *Vicia faba* L.
Plant species used exclusively for type 2 diabetes	*Allium porrum* L. *Aloe vera* (L.) Burm.f. *Aloysia citriodora* Ortega ex Pers. F *Ammi visnaga* L. *Boswellia sacra* Flueck. *Brassica oleracea* L. *Camellia sinensis* L. *Carum carvi* L. *Chamaemelum mixtum* (L.) Alloni *Chamaemelum nobile* (L.) All. *Chamaerops humilis* L. *Citrullus colocynthis* (L.) Schrad. *Crocus sativus* L. *Cucurbita pepo* L. *Cuminum cyminum* L. *Curcuma longa* L. *Cynara cardunculus* L. *Eriobotrya japonica* (Thunb.) Lindl. *Eucalyptus* sp. *Ficus carica* L. *Foeniculum vulgare* Mill. *Glycyrrhiza glabra* L. *Hordeum vulgare* L. *Juglans regia* L. *Lavandula angustifolia* Mill. *Lolium rigidum* Gaudin *Lupinus albus* L. *Mentha suaveolens* Ehrh.

	Mercurialis annua L. *Myrtus communis* L. *Opuntia ficus-indica* (L.) Mill. *Phaseolus vulgaris* L. *Pimpinella anisum* L. *Prunus amygdalus* Batsch *Punica granatum* L. *Quercus suber* L. *Rubus fruticosus* L. *Salvadora persica* L. *Syzygium aromaticum* (L.) Merr. & L.M.Perry *Thymus satureioides* Coss. *Triticum aestivum* L. *Zingiber officinale* Roscoe
Plant species used exclusively for gestational diabetes	-
Plant species used for type 1 and type 2 diabetes	*Abelmoschus esculentus* (L.) Moench *Allium sativum* L. *Apium graveolens* L. *Aquilaria malaccensis* Lam. *Argania spinosa* L. *Artemisia absinthium* L. *Avena sativa* L. *Caralluma europaea* (Guss.) N. E. Br *Cinnamomum zeylanicum* Blume *Citrus×paradisi* Macfad *Coffea arabica* L. *Coriandrum sativum* L. *Cucumis sativus* L. *Cynara cardunculus subsp. scolymus* (L.) *Juniperus phoenicea* L. *Linum usitatissimum* L. *Mentha pulegium* L. *Mentha spicata* L. *Nerium oleander* L. *Nigella sativa* L. *Origanum grosii* Pau & Font Quer. *Origanum morjana* L. *Persea americana* Mill. Petroselinum crispum Mill. *Salvia officinalis* L. *Sesamum indicum* L. *Solanum melongena* L.
Plant species used for type 1 and gestational diabetes	-
Plant species used for type 2 and gestational diabetes	*Lepidium sativum* L.
Plant species used for type 1, type 2 and gestational diabetes	*Allium cepa* L. *Artemisia herba-alba* Asso *Citrus limon* (L.) *Marrubium vulgare* L. *Olea europaea* L. *Raphanus raphanistrum subsp. sativus* (L.) *Rosmarinus officinalis* L. *Trigonella foenum-graecum* L.

Table 6. Types of diabetes and values of the Informant Consensus Factor (ICF).

Diabetes type	Nur	Nt	IFC
Type 1	201	39	0,81
Type 2	1460	78	0,94
Gestational	14	9	0,38

Nur: number of usage reports for each health condition (type of diabetes); Nt: number of species used for the same health condition.

A high value (close to 1) of ICF indicates that the reported plants are predominantly recognised as antidiabetic agents by the informants.

A total of 59 mixtures were recorded, ranging from two to six plant species per mixture (Table 7). Among these mixtures, 47.46% contained two species, 33.90% contained three species, 13.56% contained four species, 3.39% contained five species, and 1.69% contained six species. The mixture of *Lepidium sativum* L. associated with *Marrubium vulgare* L. has been mentioned by five DPs, including three from the Ibn Sina University Hospital in Rabat and two from the Moulay El Hassan Urban Health Center in Kenitra. They all used the same quantities (one to two tablespoons of ground *Lepidium sativum* L. seeds with one to two leaves of *Marrubium vulgare* L.) and the same preparation method (infusion) (Table 7). The most commonly mentioned plants in the mixtures were *Olea europaea* L. (16 mixtures), *Trigonella foenum-graecum* L. (15 mixtures), *Origanum grosii* Pau & Font Quer (13 mixtures), and *Salvia officinalis* L. (10 mixtures).

Table 7. Medicinal plant mixtures used by diabetic patients in the Rabat-Salé-Kenitra región

Mixtures	City	Plant part(s) used	Number of citation	Method(s) of use (n)	Quantity used/Rout of administration, usage rate
***Camellia sinensis* L.** ***Salvia officinalis* L.**	R	Leaves Leaves	1	Infusion (1)	1 handful leaves + 1 handful leaves in water/Orally, once a day
***Olea europaea* L.** ***Trigonella foenum-graecum* L.**	R	Leaves Seeds	1	Infusion (1)	1 handful of leaves + 1 handful of seeds in water/Orally, once a day
***Allium porrum* L.** ***Trigonella foenum-graecum* L.**	R	Leaves Seeds	1	Ground plant (1)	2 leaves + 1 and a half spoon of ground seeds in water/Orally, twice a day
***Coriandrum sativum* L.** ***Nigella sativa* L.**	R	Leaves Seeds	1	Infusion (1)	6 leaves + 5 seeds in 1 glass of water/Orally, once a day
***Origanum grosii* Pau & Font Quer *Thymus satureioides* L.**	R	Leaves Leaves	1	Infusion (1)	1 handful of leaves + 1 handful of leaves in 1 glass of water/Orally, once a day
***Cinnamomum zeylanicum* Blume** ***Olea europaea* L.**	R	Bark Leaves	1	Infusion (1)	1 spoonful of ground bark + 10 leaves in a large glass of water/ Orally, twice a day
***Apium graveolens* L.** ***Hordeum vulgare* L.**	R	Leaves Aerial parts	1	Decoction (1)	5 leaves + 1 spoonful of ground aerial parts in 1 glass of water/Orally, once a day
***Camellia sinensis* L.** ***Crocus sativus* L.**	R	Leaves Stigma	1	Decoction (1)	2 spoonfuls of leaves + 250 g of stigmas in a teapot filled with water/Orally, twice a day
***Linum usitatissimum* L.** ***Lolium rigidum* Gaudin**	R	Seeds Seeds	1	Infusion (1)	1 spoonful of seeds + 1 spoonful of seeds in a glass of fermented milk/Orally, once a day
***Mentha pulegium* L.** ***Mentha spicata* L.**	R	Leaves Leaves	1	Infusion (1)	A few leaves + a few leaves in water/ Orally, once a day

***Hordeum vulgare* L.** ***Trigonella foenum-graecum* L.**	R	Aerial parts Seeds	1	Maceration (1)	1 spoonful of aerial parts + 1 spoonful of ground seeds in water/Orally, once a day
***Olea europaea* L.** ***Salvia officinalis* L.**	R	Leaves Leaves	1	Infusion (1)	6 leaves + 3 leaves in 1 glass of water/ Orally, once a day
***Mentha spicata* L.** ***Salvia officinalis* L.**	R	Leaves Leaves	1	Infusion (1)	5 leaves + 6 leaves in 1 teapot filled with water/Orally, once a day
***Allium cepa* L.** ***Allium sativum* L.**	R	Bulb Clove	1	Freshly ground plants (1)	1 bulb + 1 clove in 1 liter of water/Orally, 1 glass a day
***Crocus sativus* L.** ***Trigonella foenum-graecum* L.**	R	Stigmas Seeds	1	Ground plants (1)	1 pinch of stigmas + 1 handful of ground seeds in 2 liters of water/Orally, once a day
***Artemisia herba-alba* Asso** ***Rosmarinus officinalis* L.**	R	Aerial parts Aerial parts	1	Infusion (1)	1 handful + 1 handful in water/ Orally, once a day
***Marrubium vulgare* L.** ***Olea europaea* L.**	R	Leaves Leaves	1	Decoction (1)	1 handful + 1 handful in 1L of water/Orally, once a day
***Carum carvi* L.** ***Pimpinella anisum* L.**	R	Seeds Seeds	1	Ingestion of ground seeds with water (1)	1 spoonful + 1 spoonful with water/ Orally, twice a day
***Ficus carica* L.** ***Trigonella foenum-graecum* L.**	R	Fruit Seeds	1	Maceration (1)	250g of fruit + 50g of seeds in ½ glass of olive oil/Orally, 1 spoonful a day
***Chamaemelum mixtum* (L.) Alloni** ***Lavandula angustifolia* Mill.**	R	Flower Aerial parts	1	Infusion (1)	1 handful + 1 handful in water/ Orally, once a day
***Olea europaea* L.** ***Coffea arabica* L.**	R	Leaves Seeds	1	Infusion (1)	4 leaves + 1 tablespoon of ground seeds in water/Orally, once a day
***Nigella sativa* L.** ***Triticum aestivum* L.**	R	Seeds Seeds	1	Maceration (1)	Quantity not provided/Orally, once a day
***Origanum grosii* Pau & Font Quer *Trigonella foenum-graecum* L.**	R	Leaves Seeds	1	Decoction (1)	Quantity not provided/Orally, once a day
***Lepidium sativum* L.** ***Marrubium vulgare* L.**	R; K	Seeds Leaves	5	Infusion (5)	1 to 2 tablespoons of ground seeds + 1 to 2 leaves in water/Orally, once a day
***Linum usitatissimum* L.** ***Trigonella foenum-graecum* L.**	R	Seeds Seeds	2	Infusion (1) Ingestion of ground seeds with water (1)	1 teaspoon of ground seeds from each plant with 1 glass of water/ Orally, once a day
***Olea europaea* L.** ***Rosmarinus officinalis* L.**	S	Leaves Aerial parts	2	Decoction (2)	5 to 6 leaves + 1 handful in water/ Orally, once to twice a day
***Rosmarinus officinalis* L.** **Salvia officinalis L.**	K	Aerial parts Leaves	3	Infusion (3)	1 pinch of aerial parts + 1 pinch to 1 handful of leaves in water/Orally, once a day
***Coriandrum sativum* L.** ***Trigonella foenum-graecum* L.**	K	Seeds Seeds	3	Ingestion of ground seeds with water (1) Maceration (1) Infusion (1)	1 spoon of ground seeds of each plant with 1 glass of water or macerated in 1L of sparkling water/ Orally, once a day

***Artemisia herba-alba* Asso** ***Coffea arabica* L.** ***Cinnamumum zeylanicum* Blume**	R	Aerial parts Seeds Bark	1	Infusion (1)	1 handful + 2 tablespoons of ground seeds + 1 teaspoon of ground bark in water/Orally, once a day
***Artemisia herba-alba* Asso** ***Marrubium vulgare* L.** ***Rosmarinus officinalis* L.**	R	Aerial parts Leaves Aerial parts	1	Infusion (1)	1 handful of each plant in water/Orally, twice a day
***Coriandrum sativum* L.** ***Olea europaea* L.** ***Salvia officinalis* L.**	R	Seeds Leaves Leaves	1	Infusion (1)	1 spoonful of seeds + 3 leaves + 3 leaves in water/Orally, once a day
***Glycine max* (L.) Merr.** ***Sesamum indicum* L.** ***Trigonella foenum-graecum* L.**	R	Seeds Seeds Seeds	1	Ingestion of whole seeds with water (1)	1 spoonful of each plant with water/ Orally, once a day
***Pimpinella anisum* L.** ***Origanum grosii* Pau & Font** **Quer *Rosmarinus officinalis* L.**	R	Seeds Leaves Aerial parts	1	Decoction (1)	1 spoonful of each plant in water/Orally, once a day
***Coriandrum sativum* L.** ***Olea europaea* L.** ***Linum usitatissimum* L.**	S	Seeds Leaves Seeds	1	Decoction (1)	1 spoonful + 6 leaves / 1 spoonful in 1 glass of water/Orally, once a day
***Olea europaea* L.** ***Allium sativum* L.** ***Allium cepa* L.**	S	Leaves Clove Bulb	1	Infusion (1)	½ teaspoon of ground leaves + 1 ground clove + 1 ground bulb in 1 glass of water/ Orally, once a day
***Trigonella foenum-graecum* L.** ***Coriandrum sativum* L.** ***Lolium rigidum* Gaudin**	S	Seeds Seeds Seeds	1	Ingestion of ground seeds with water (1)	1 spoonful of each plant with 1 glass of water/Orally, once a day
***Trigonella foenum-graecum* L.** ***Coriandrum sativum* L.** ***Vicia faba* L.**	K	Seeds Seeds Seeds	1	Ingestion of ground seeds with water (1)	Quantity not provided /Orally, once a day
***Pimpinella anisum* L.** ***Nigella sativa* L.** ***Trigonella foenum-graecum* L.**	K	Seeds Seeds Seeds	1	Ingestion of ground seeds with water (1)	1 teaspoon of each plant with water/Orally, once a day
***Linum usitatissimum* L.** ***Pimpinella anisum* L.** ***Nigella sativa* L.**	K	Seeds Seeds Seeds	1	Added for kneading the bread (1)	1 tablespoon of each plant/Orally, once a day
***Coriandrum sativum* L.** ***Allium sativum* L.** ***Olea europaea* L.**	K	Seeds Clove Fruit	1	Infusion (1)	1 teaspoon of seeds + 4 cloves + 1 handful of fruits in water/Orally, once a day
***Boswellia sacra* Flueck.** ***Nigella sativa* L.** ***Hordeum vulgare* L.**	Kh	Resin Seeds Seeds	1	Infusion (1)	Quantity not provided /Orally, once a day
***Artemisia herba-alba* Asso** ***Origanum grosii* Pau & Font** **Quer *Mentha pulegium* L.**	Kh	Aerial parts Leaves Leaves	1	Infusion (1)	1 pinch of each of the plants in water/Orally, once a day
***Salvia officinalis* L.** ***Lepidium sativum* L.** ***Rosmarinus officinalis* L.**	Kh	Leaves Seeds Aerial parts	1	Infusion (1)	1 pinch of each of the plants in water/Orally, once a day
Caralluma europaea **(Guss.) N. E. Br** ***Linum usitatissimum* L.** ***Pimpinella anisum* L.**	Kh	Aerial parts Seeds Seeds	1	Infusion (1)	1 handful of each of the plants in water/Orally, once a day
***Salvia officinalis* L.** ***Olea europaea* L.** ***Origanum majorana* L.**	S	Leaves Leaves Leaves	2	Infusion (2)	6 leaves + 3 to 4 leaves + 3 leaves in water/Orally, once a day

***Origanum grosii* Pau & Font Quer *Rosmarinus officinalis* L. *Salvia officinalis* L.**	R	Leaves Aerial parts Leaves	2	Infusion (2)	1 handful of each plant in 1L of water / 1 time per day 2 leaves + 1 branch + 1 handful in water/Orally, once a day
***Artemisia herba-alba* Asso *Origanum grosii* Pau & Font Quer *Marubium vulgare* L.**	K	Aerial parts Leaves Leaves	3	Infusion (3)	1 to 2 tablespoons of each plant in water/Orally, twice a day
***Olea europaea* L. *Citrus medica* L. *Zingiber officinale* Roscoe**	K	Leaves Fruit Roots	2	Infusion (2)	1 handful of leaves + ½ whole fruit + 1 piece or 10 g of grated root in water/Orally, once a day
***Olea europaea* L. *Juglans regia* L. *Origanum grosii* Pau & Font Quer *Lavandula angustifolia* Mill.**	R	Leaves Seeds Leaves Aerial parts	1	Infusion (1)	3 leaves + 3 seeds + 1 spoonful + 2 branches in water/Orally, once a day
***Marrubium vulgare* L. *Ammi visnaga* L. *Artemisia herba-alba* Asso *Thymus satureioides* L.**	R	Leaves Flowering tops Aerial parts Leaves	1	Decoction (1)	1 handful of leaves + 2 handfuls of flowering tops and aerial parts + ½ umbel in water/Orally, once a day
***Trigonella foenum-graecum* L. *Nigella sativa* L. *Lepidium sativum* L. *Punica granatum* L.**	S	Seeds Seeds Seeds Fruit (pericarp) fruit	1	Maceration (1)	1 handful of each ground plant in 1 glass of water/Orally, once a day
***Olea europaea* L. *Artemisia herba-alba* Asso *Origanum grosii* Pau & Font Quer *Lavandula angustifolia* Mill.**	S	Leaves Aerial parts Leaves Aerial parts	1	Infusion (1)	3 leaves + 1 spoonful + 1 spoonful + 1 spoonful in water/Orally, once a day
***Olea europaea* L. *Artemisia herba-alba* Ass *Salvia officinalis* L. *Rosmarinus officinalis* L.**	S	Leaves Aerial parts Leaves Aerial parts	1	Decoction (1)	Quantity not provided /Orally, once a day
***Olea europaea* L. *Rosmarinus officinalis* L. *Trigonella foenum-graecum* L. *Origanum grosii* Pau & Font Quer**	S	Leaves Aerial parts Seeds Leaves	1	Infusion (1)	A pinch of each plant in water/Orally, once to several times a day
***Origanum grosii* Pau & Font Quer *Lavandula angustifolia* Mill. *Mentha pulegium* L. *Mentha suaveolens* L.**	K	Leaves Aerial parts Leaves Leaves	1	Infusion (1)	1 handful of each plant in water/Orally, once a day
***Origanum grosii* Pau & Font Quer *Salvia officinalis* L. *Origanum morjana* L. *Aloysia citriodora* Ortega ex Pers.**	Kh	Leaves Leaves Leaves Leaves	1	Infusion (1)	1 tablespoon of each plant in water/Orally, once a day

***Salvia officinalis* L.** ***Rosmarinus officinalis* L.** ***Origanum morjana* L.** ***Origanum grosii* Pau & Font Quer** ***Mentha spicata* L.**	R	Leaves Aerial parts Leaves Leaves Leaves	1	Infusion (1)	1 pinch of each plant in water/Orally, once a day
***Nigella sativa* L.** ***Lepidium sativum* L.** ***Syzygium aromaticum* (L.) Merr. & L.M.Perry** ***Lolium rigidum* Gaudin** ***Marrubium vulgare* L.**	K	Seeds Seeds Flower bud Seeds Leaves	1	Ingestion of ground plants with water (1)	1 teaspoon of each plant with water/Orally, once a day
***Origanum grosii* Pau & Font Quer *Trigonella foenum-graecum* L.** ***Nigella sativa* L.** ***Foeniculum vulgare* L.** ***Lepidium sativum* L.** ***Sesamum indicum* L.**	Kh	Leaves Seeds Seeds Leaves Leaves Seeds	1	Infusion (1)	250g of leaves + 125g of seeds + 250g of seeds + 250g of leaves + 125g of leaves + 250g in seeds/Orally, once a day
Undetermined mixtures of powdered plants	R	-	5	Infusion (1)	1 to 2 teaspoons of powder with water/Orally, once to thrice a day
	R	-	1	Infusion (1)	1 glass of powder with water/Orally, once a day

R: Rabat; S: Salé; K: Kenitra; Kh: Khemisset; (n): Number of patients

Leaves were mentioned 796 times (47.32%), the seeds 513 times (30.50%), the aerial parts 108 times (6.42%), the bulbs 100 times (5.95%), and the remaining plant parts had citation numbers below 100 (Fig. 2). There were significant differences in plant parts frequency of use among the DPs ($p<0.0001$).

Infusion was mentioned 794 times (47.37%), decoction 246 times (14.68%), and maceration 230 times (13.72%) (Fig. 3). MPs were used orally in 99.61% of cases and topically in 0.39% of cases. Significant differences in preparation methods frequency of use were observed ($p<0.0001$). The MPs administered topically were *Nerium orlander* L. (3 cases) and *Marrubium vulgare* L. (1 case).

The plants used by the DPs were gathered from fields (41.10%) or personal gardens (2.80%). Others were purchased from hists (24.10%), grocery stores (17.40%), and traditional markets (14.60%).

The duration of treatment varied among the interviewed DPs, ranging from 1 day to 26 years, with an average of 1.77±3.45 years. Only 6.30% of the DPs informed their attending physician about their use of MPs, while 93.70% did not share this information. Among these patients, 72.80% reported that their attending physician did not inquire about it, 26.10% did not perceive the need to inform them, and 1.10% were concerned about their attending physician's reaction.

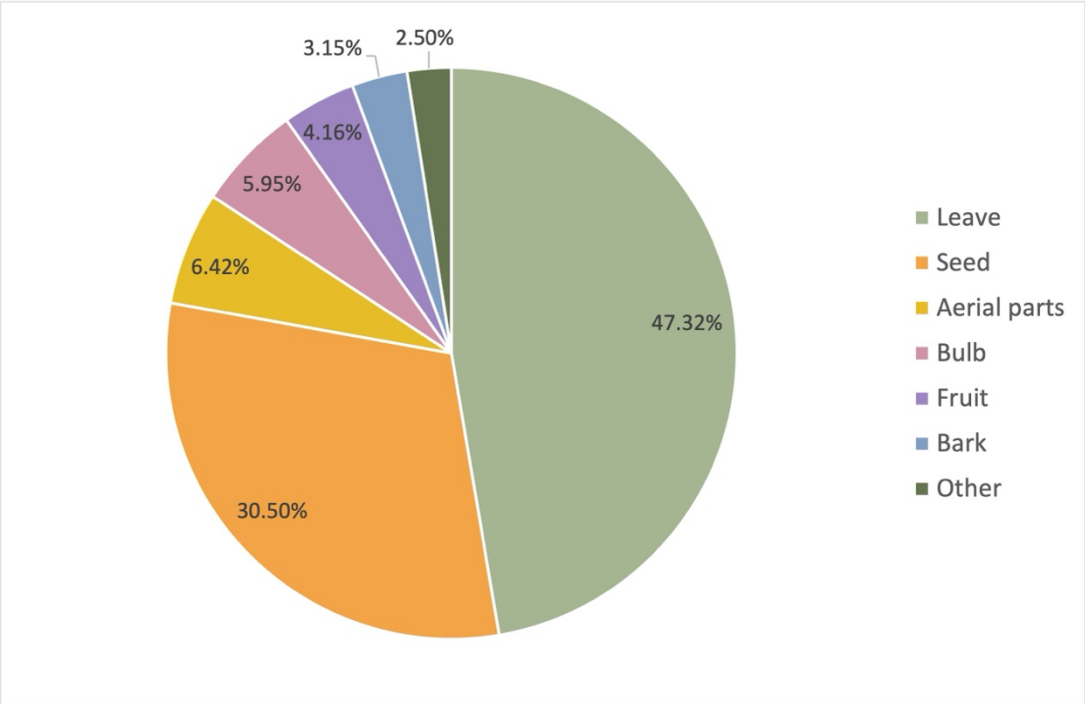

Figure 2. Frequency of plant parts used by diabetic patients in the Rabat-Salé-Kenitra region.

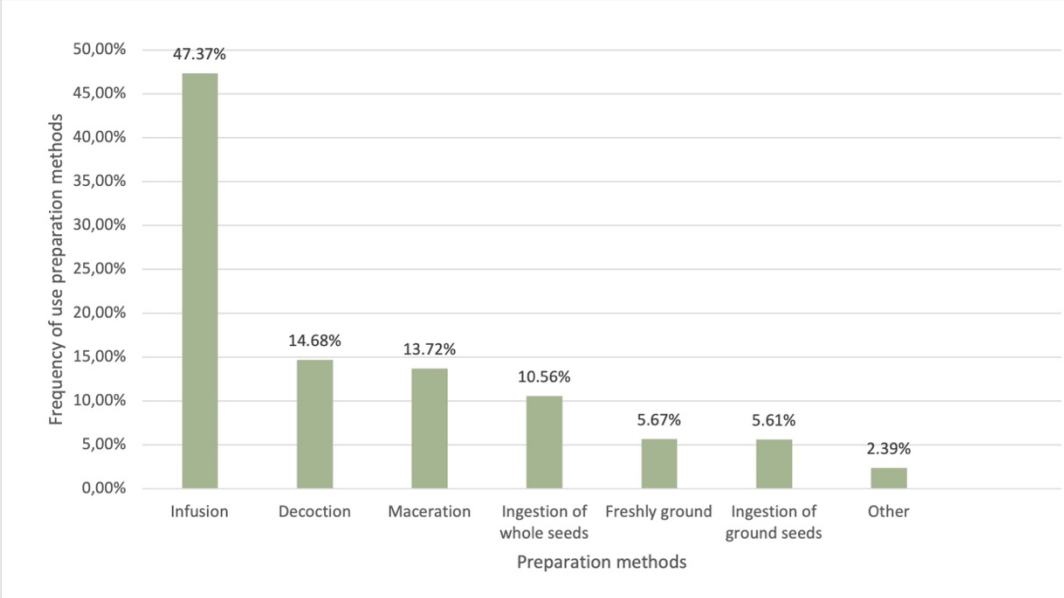

Figure 3. Frequency of preparation methods for plants used by diabetic patients in the Rabat-Salé-Kenitra region.

Regarding the efficacy of the MPs used, 40.54% DPs reported observing the antidiabetic effect through blood glucose level measurements or HbA1c analysis. However, 20.56% claimed to have experienced the antidiabetic effect but lacked medical evidence to support it. Additionally, 2.29% of the DPs noticed a positive impact on specific diabetes complications, such as polyuria, polydipsia, and genital itching. Nevertheless, 36.31% did not report any antidiabetic effect.

Among the DPs who used both MPs and prescribed conventional treatments, 268 reported their latest HbA1c results. In 77.61% of cases, HbA1c levels ranged from 6 to 7%, in 15.67% of cases it ranged from 7 to 8%, and in 6.72% of cases it exceeded 8%. Among the DPs who exclusively used MPs, 21 reported their latest HbA1c results, with HbA1c levels ranging from 6 to 7% in 100% of cases.

The primary sources of information regarding plant usage were predominantly through word of mouth (50.10%) and from relatives of diabetics (41.50%). Other sources included media and social networks (6.80%), healthcare professionals (1%), herbalists and traditional practitioners (0.20%), and self-medication (0.10%).

According to the DPs, the cost of purchasing MPs ranged from 1 to 9 Moroccan Dirhams per month. The majority of the patients (71.53%) justified their choice of plants based on their cost and availability in the market. Moreover, 20.66% of the patients stated that their decision was influenced by strong recommendations from their social circle. Other DPs mentioned selecting certain plants because they are easy to use (3.67%), mentioned in the Quran (2.30%), or have a tolerable or pleasant taste (1.56%). Some patients (0.28%) justified their choice of the plant *Lolium rigidum* L. by noting its harmless nature, as it is part of the diet of birds.

The available literature review has shown that all 82 listed plants have been described as plants used by diabetic patients or studied for diabetes treatment in at least one bibliographic reference.

In comparison to ethnobotanical studies conducted in other regions of Morocco, 78 species have been previously reported as plants used for diabetes. Four species have been mentioned for the first time in Morocco, including *Boswellia sacra* Flueck., *Coffea arabica* L., *Salvadora persica* L. and *Solanum melongena* L.

In the international literature, 79 species have been reported as plants used for diabetes. Three species have been mentioned in Moroccan literature as plants used for diabetes but have never been cited in international literature. These species are *Caralluma europaea* (Guss.) N. E. Br, *Chamaerops humilis* L., and *Thymus satureioides* L.

Discussion

The socio-demographic data revealed that women were more inclined to use MPs to treat their diabetes compared to men ($p<0.0001$). These results are consistent with data obtained from ethnobotanical studies carried out in diverse regions of Morocco (Mrabti *et al.* 2021, Mrabti *et al.* 2019). Indeed, women are generally familiar with phytotherapy as they have learned to value the role of plants as medicinal remedies in taking care of their families. A significant association between the age of the DPs and the use of MPs was observed ($p<0.0001$), with a higher frequency in the 50 to 69 years age group. Similar findings have been reported in other studies conducted in the Taza (Mrabti *et al.* 2021) and the Fez-Meknes regions (Mechchate *et al.* 2020). These results support the widespread belief in Morocco that the elderly hold valuable orally transmitted ancestral knowledge. Regarding the level of education, a significant association with the use of MPs was observed ($p<0.0001$). The highest frequencies of MPs users are found among illiterates. Similar results were noted in a study focusing on the use of MPs for cancer treatment (El Hachlafi *et al.* 2022). A significant proportion of DPs are unemployed, and nearly half lack access to any form of health insurance, with both of these socioeconomic parameters showing a significant correlation with the use of MPs ($p<0.0001$). These results are consistent with a previous ethnobotanical study conducted in the Rif region of Morocco (Chaachouay *et al.* 2019). Due to financial challenges in accessing costly modern healthcare, particularly for chronic diseases, patients often turn to MPs as a more economical alternative to conventional drugs.

The dominance of T2D can be justified by the age distribution of the patients, mostly ranging from 50 to 69 years in our study. Indeed, T2D is particularly prevalent among adults aged 45 years and above, and its increasing occurrence in Morocco is attributed to various factors, including sedentary lifestyle and obesity (Goyal *et al.* 2023, WHO EMRO 2022).

The interviewed DPs widely rely on MPs, with nearly half reported having used MPs to treat their diabetes. These findings highlight the trust and importance attributed to medicinal plants in diabetes management in Morocco.

Furthermore, most of these patients (95.12%) have reported using MPs in combination with prescribed conventional medications. A prevalence study conducted in Jamaica also reported that 83.2% of DPs combine the use of medicinal plants with conventional medications (Delgoda *et al.* 2010). Clearly, the patients are unaware that such combinations may give rise to potential plant-conventional drug interactions, which can impact treatment efficacy and potentially lead to severe adverse effects (Arora *et al.* 2022). This lack of knowledge is often left unaddressed, as most patients (93.70 %) fail to inform their treating physician about this usage. Thus, patients should be thoroughly aware of the significance of communicating their use of MPs to their physician.

The medicinal plants identified in this survey are mainly cultivated species or wild species, highlighting the richness of the RSK region in terms of plant resources. Another ethnobotanical study conducted in the eastern Anti-Atlas region also showed that wild or cultivated plants were the most commonly used for diabetes treatment (Barkaoui *et al.* 2017). This reflects the importance of local plant resources for the communities in the region.

In this study, DPs used medicinal plants from a wide range of botanical families. A total of 38 families were identified, which is notably higher compared to similar studies conducted in other regions of Morocco (Barkaoui *et al.* 2017, Mechchate *et al.* 2020, Mrabti *et al.* 2021, Mrabti *et al.* 2019).

The dominance of *Lamiaceae*, *Apiaceae*, *Fabaceae*, and *Asteraceae* can be attributed to their ubiquity in the study region's flora due to ecological factors that promote the growth and adaptation of the species within these families. These same botanical families were highlighted in a previous study focusing on the medicinal flora of the Gharb region in Morocco (Bouayyadi *et al.* 2015). The plant species belonging to these families could serve as a potential source of therapeutic agents for the management of diabetes. Within the *Lamiaceae* family, the most prominent family in our study, numerous classes of bioactive compounds derived from various plant species, such as flavonoids and diterpenes, have demonstrated anti-diabetic activity in various experimental models (Etsassala *et al.* 2021).

The study revealed the use of 82 MPs for treating diabetes. *Olea europaea* L., *Trigonella foenum-graecum* L., and *Salvia officinalis* L. appear to be the most well-known among local DPs, as indicated by their notably high frequencies of use and RFC values. In another ethnobotanical study conducted in the Fes-Meknes region of Morocco, *Trigonella foenum-graecum* L. and *Olea europaea* L. has similarly topped the list (Mechchate *et al.* 2020). However, our results are inconsistent with a similar ethnobotanical study conducted in the Moroccan region of Souss-Massa, where the most frequently used plants are *Allium sativum* L., *Salvia officinalis* L., *Marrubium vulgare* L., and *Lavandula dentata* L. (Barkaoui *et al.* 2017). Regional disparities in plant selection for diabetes management may arise from diverse factors, such as environmental conditions, cultural practices, and availability of medicinal plants. Recognising these variations emphasises the significance of considering regional context and indigenous knowledge when studying traditional medicinal practices for managing any disease.

Oleuropein, the primary phenolic compound found in *Olea europaea* L. leaves, has demonstrated the capacity to lower blood glucose levels (Zheng et al. 2021). Experimental studies suggest that its hypoglycemic effects are linked to modulation of intracellular signalling mechanisms regulating blood glucose concentration (Ahamad et al. 2019). Galactomannan, a fiber present in *Trigonella foenum-graecum* L. seeds, is known for its beneficial effect in reducing blood sugar levels by delaying carbohydrate absorption (Rehman *et al.* 2021). Pharmacological studies showed that *Salvia officinalis* L. can effectively decrease blood glucose levels and inhibit the activity of intestinal maltase and sucrase (Mahdizadeh *et al.* 2018).

This study distinguishes the plants used by patients with T1D, with T2D, and those employed for all types of diabetes, including gestational diabetes (Table 5), reflecting diverse mechanisms of action against various diabetes types. In this regard, a literature review pharmacologically and clinically categorised tested anti-diabetic plants based on specific mechanisms of action, such as inhibition of intestinal glucose absorption or stimulation of insulin secretion by the pancreas (El-Abhar *et al.* 2014). However, the challenge arises from the lack of differentiation between diabetes types in the reviewed studies, emphasising the need to distinguish plant usage in relation to different diabetes types for accurate assessments of efficacy and safety. Thereby, the distribution in Table 5 provides a basis for a more precise evaluation of plant effectiveness across diabetes types.

Our study revealed a noteworthy observation regarding the exchange of traditional knowledge among DPs regarding the use of MPs for treating type 1 or type 2 diabetes (Table 6). The ICF values for both types of diabetes were found to be close to 1, indicating a consistent and widespread consensus among DPs regarding the efficacy of specific MPs for managing each of these two types of diabetes. This may be attributed to the fact that T1D and T2D are more prevalent compared to gestational diabetes, leading patients to share informations about their traditional remedies. However, the lack of consensus regarding the use of MPs to treat gestational diabetes can be explained by the fact that this type of diabetes only affects some pregnant women, which consequently restricts the sharing of knowledge regarding plant usage. Additionally, concerns about bioactive compounds inducing miscarriage or uterine contractions during pregnancy, emphasise caution in using plants (Sarecka-Hujar & Szulc-Musioł 2022).

This study highlighted 59 mixtures used for the treatment of diabetes. Among these, a mixture of *Lepidium sativum* L. and *Marrubium vulgare* L. was used by five DPs from different cities, interestingly with the same quantities and preparation method (Table 7). The oral administration of *Lepidium sativum* L. seeds aqueous extract at doses ranging from 10 mg/kg to 40 mg/kg led to a decrease in blood glucose levels in alloxan-induced diabetic rats (El-Emary 2021). In addition, the basal plasma insulin concentrations remained unchanged, indicating that the mechanism of action of the aqueous extract from this plant is not dependent on insulin secretion (Eddouks *et al.* 2005). The oral administration of the aqueous extract from the aerial parts of *Marrubium vulgare* L. at doses ranging from 100 to 300 mg/kg in alloxan-induced diabetic rats led to a significant dose-dependent antidiabetic effect, comparable the effect of Glibenclamide, an anti-diabetic drug (Boudjelal *et al.* 2012). In contrast to *Lepidium sativum* L., the potential mechanism of action of *Marrubium vulgare* L. aqueous extract may involve the stimulation of insulin secretion by pancreatic β-cells (Elberry *et al.* 2015). Moreover, the *Brassicaceae* and *Lamiaceae* families, to which *Lepidium sativum* L. and *Marrubium vulgare* L. belong, are acknowledged for their antidiabetic potential (Etsassala *et al.* 2021, Piragine *et al.* 2022). The combination of these two plants can potentially induce a synergistic hypoglycaemic effect while stimulating insulin secretion. This particular mixture has been cited for the first time at both the national and international levels. Clearly, further studies are required to validate the effectiveness and safety of this plant combination for diabetes treatment.

Regarding plant parts, leaves are the most frequently used plant part ($p<0.0001$), which is consistent with previous studies in the field (Diop *et al.* 2022, Mrabti *et al.* 2021, Mrabti *et al.* 2019). This preference for leaves can be explained by their high abundance within the plant, making them more available. Additionally, leaves are very rich in flavonoids (Panche *et al.* 2016), which are known for their anti-diabetic properties (Etsassala *et al.* 2021).

Regarding the preparation methods, significant differences in usage frequencies are observed ($p<0.0001$). Infusions are favoured among DPs due to their quick and simple preparation, along with their pleasing and subtle taste. For certain plants such as *Olea europaea* L. or *Coriandrum sativum* L., the same plant has been used either in the form of infusion, decoction, or maceration, impacting the availability and concentration of active compounds within the medicinal plant. The preparation method choice hinges on thermal stability. Infusion is suitable for thermostable compounds from plant parts with thin cell walls, such as flowers, leaves, and aerial parts (Rodino & Butu 2019). Decoction is recommended for thermostable compounds from thicker plant parts like roots, bark, stems, and seeds, (Manousi *et al.* 2019, Rodino & Butu 2019). Maceration allows gentle extraction, ideal for thermolabile compounds from roots, stems, leaves, flowers, or seeds (Chabrier 2010, Rodino & Butu 2019). However, further research is needed to determine the most effective preparation methods for plant use in diabetes.

The oral route of administration is the most commonly used among the DPs who participated in this study, except for *Nerium orlander* L., *Citrullus colocynthis* (L.) Schrad., and *Marrubium vulgare* L., for which the topical route was employed. Diabetic patients may favour the topical route to avoid potential side effects that may occur with oral consumption, unaware that certain species can still be hazardous even through skin contact. For instance, oral consumption of *Nerium orlander* L. leaves can cause vomiting, nausea, and hyperkalemia (Farkhondeh *et al.* 2020), while applying the same plant topically may result in contact dermatitis (Pillay *et al.* 2019).

Furthermore, four MPs were mentioned for the first time for their potential in treating diabetes in Morocco. These MPs have already been reported as being used for diabetes in other international studies: *Boswellia sacra* Flueck. (Mehrzadi *et al.* 2018); *Coffea arabica* L. (Boonphang *et al.* 2021); *Salvadora persica* L. (Rabey *et al.* 2018); *Solanum melongena* L. (Yarmohammadi *et al.* 2021). These findings contribute valuable insights into the traditional knowledge of MPs' usage in Morocco. Additionally, *Caralluma europaea* (Guss.) N. E. Br, *Thymus satureioides* L. and *Chamaerops humilis* L. have been previously reported in Moroccan literature as plants used for diabetes, although they have not been cited in international literature (Dra *et al.* 2019, Kabbaoui *et al.* 2016, Lachkar *et al.* 2022).

Conclusion

This survey stands as one of the rare studies focusing on the ethnopharmacological knowledge held by patients in hospitals and healthcare centers using plants as a medical treatment. The results shed light on significant patterns within the demographic data of diabetic patients.

The participants of this study provided in detail how the plants were used. The wide variety of plant species used in diabetes treatment, along with their frequency of use among diabetic patients, underscores the important role that plants play within

the primary healthcare system of Moroccans in the Rabat-Salé-Kenitra region. The study also found differences in plant usage for different types of diabetes.

Importantly, the research identified 59 unique plant mixtures used for diabetes treatment. Four medicinal plants were newly identified for their potential in diabetes treatment in Morocco, while three plants had been mentioned for diabetes treatment in Moroccan literature but not in international literature.

This study revealed many medicinal plants with potential anti-diabetic properties, showcasing the depth of ethnobotanical knowledge. While these findings hold promise, it is crucial to underscore that further rigorous investigations are imperative to validate the efficacy and safety of these plants. Therefore, these documented information on the MPs used in Rabat-Salé-Kenitra region may be used as baseline data for future pharmacological and phytochemical studies.

Declarations

List of abbreviations: DPs: Diabetic patients; MPs: Medicinal plants; RSK: Rabat-Salé-Kenitra; T1D: Type 1 diabetes; T2D: Type 2 diabetes; GD: Gestational diabetes; FL: Fidelity level; FC: Frequency of citation; RFC: Relative frequency of citation; ICF: Informant consensus factor; R: Rabat; S: Salé; K: Kenitra; Kh: Khemisset.
Ethics approval and consent to participate: The study was approved by the National Committee of Ethics for Biomedical Research at Mohammed V University in Rabat, which deemed that these anonymous surveys, conducted with a questionnaire that does not contain the respondent's identity, did not affect the patient's privacy. Approvals were also obtained from the respective department heads of each healthcare structure after reviewing the questionnaire and being informed about the study's objectives.
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Availability of data and materials: Not applicable.
Competing interests: The authors declare no competing interest.
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Authors' contributions: Sekkat ZL: Carried out field survey, compiled the literature sources, analysed the data collected, interpreted the results and wrote the manuscript. Skalli S: Designed the research, identified the plant species, analysed and interpreted the data and reviewed the manuscript. Hassikou R: Analysed and interpreted the data and reviewed the manuscript. All the authors contributed to the writing process, provided feedback on the manuscript, and approved the final version.

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Appendix
Fiche-questionnaire des patients diabétiques
Diabetic patient questionnaire form

Fiche n° : Date :

Structure sanitaire :

Identité du patient diabétique

1) Initiales du nom et du prénom (xx xx) :..... 2) Sexe : F ☐ M ☐

3) Age (année) :.....

4) Lieu de Naissance :..... 5) Origine régionale :.....

6) Niveau de scolarisation : Analphabète ☐ Primaire ☐ Secondaire ☐ Supérieur ☐

7) Fonction :.....

8) Possession d'une assurance maladie : Oui ☐ Non ☐

Maladie du diabète

9) Date de diagnostic du diabète chez le patient :.....

10) Type de diabète : DT1 ☐ DT2 ☐ DG ☐

11) Traitement médical prescrit au diabétique :.....

12) Dose journalière du traitement médical :.....

13) Date de début de la prise du traitement médical après le diagnostic :.....

Traitement populaire à base de plantes

14) Est-ce que vous utilisez des plantes pour traiter votre diabète ? OUI ☐ NON ☐

15) Si oui, lesquelles ? Dénomination rapportée :.....

Forme simple ☐ Mixture ☐

Noms latins :.....

Famille (s) Botanique (s) :.....

Plante locale sauvage ☐ Plante locale cultivée ☐ Plante importée ☐ autre (préciser)

....

16) Partie de la plante utilisée : .....

17) Lieu de procuration de la plante : .....

18) Plante recommandée pour traiter le diabète, par : .....

19) Mode de Préparation : Décoction ☐ Infusion ☐ Macération ☐ Poudre ☐

Autre ☐ .....

20) Posologie, voie et mode d'administration :

Quantité utilisée = ...

Voie d'administration : Orale ☐ Rectale ☐ Cutanée ☐ Autres (préciser) ☐.....

Fréquence journalière de la prise de la plante :.....

Durée de traitement :.....

21) Pourquoi le choix de cette/ces plante(s) ?.....

.....

22) Associations (quand la plante suppose une association avec d'autres remèdes chimiques, autre plante ou autre produit de la pharmacopée traditionnelle et en cas de mixture) donner tous les détails de cette association :

.....

.....

23) Prix d'achat de la ou les plante(s) en Dhs et Fréquence d'achat par mois :

Prix d'achat =..... Fréquence d'achat=.....

24) Effet antidiabétique observé : OUI ☐ NON ☐

*Si oui, préciser comment ?.....

.....

25) Équilibre glycémique (HBA1c) après utilisation de la plante : .....

26) Utilisation des plantes en fonction du traitement médical :

Simultanément avec le traitement ☐ Après le traitement ☐

Avant le traitement ☐ Aléatoirement ☐

27) Avez-vous parlé à votre médecin de cet usage ?

OUI ☐ NON ☐

*Si non, pourquoi ? ……

*Si oui, quel a été son avis ? ……

Effets indésirables en relation avec la prise des plantes

28) Est-ce que vous avez observé des effets indésirables (EI) suite à cet usage ? OUI ☐ NON ☐

*Si oui, préciser les en détail ?.....

……

29) Précisez si ces EI ont conduit à :

Arrêt de la prise de la plante ☐ Traitement médical ☐ Hospitalisation ☐

30) Précisez l'évolution de ces effets indésirables :

Favorable ☐ Aggravation ☐ En cours de guérison ☐ Séquelles ☐

Si séquelles, (lesquelles) ……..

31) Précisez la conduite suivie après l'apparition des EI :

Arrêt de l'utilisation de la plante (préciser laquelle :……..) ☐

Substitution par une autre plante (préciser laquelle :……..) ☐

Plante(s) toujours utilisée(s) ☐

32) Avez-vous déclaré ces EI au Centre Anti-Poison et de Pharmacovigilance du Maroc (CAPM) ?

OUI ☐ NON ☐

Si non, pourquoi vous ne l'avez pas fait ?.....

33) Connaissez-vous le CAPM ? OUI ☐ NON ☐

34) Vous avez parlé de ces EI à votre médecin ? OUI ☐ NON ☐

*Si oui, quelle attitude a-t-il adoptée ?.....

Nom & Prénom de l'enquêteur :

Diplôme en cours :