

Ethnobotanical investigation of some spontaneous species of the lamiaceae family (*Ajuga iva* (L.) Schreber., *Phlomis crinita* Cav., *Sideritis incana* L., *Salvia argentea* L., *Rosmarinus officinalis* L.) in Sidi Bel Abbes (Western Algeria)

Abstract

The survey is carried out in 2017 in the city of Sidi Bel Abbes and the two municipalities of Sidi Khaled and Sidi Lahcene (Western Algeria) on five plants of the Lamiaceae family (*Ajuga iva* (L.) Schreber., *Phlomis crinita* Cav., *Sideritis incana* L., *Salvia argentea* L., *Rosmarinus officinalis* L.). The study validated traditional medicinal information and directions for the use and diseases treated for the five plants in the survey population of 600 people (70% are women), with a predominance in people of -20 to 35 years, with a rate of (75%). Based on the survey, we found that rosemary is the most used with a rate of 57%, and most of our plants are used in the form of herbal tea with the infusion method of dried leaves. The diseases most frequently treated by our studied plants are crapaudine for cholesterol and digestive tract conditions. Ivette is better for osteoarticular conditions while rosemary is better for respiratory ones and cholesterol, the sage is better for respiratory ones, and sage from Jerusalem is better for dermatological conditions.

Key words : Ethnobotanical survey ; medicinal plant ; lamiaceae family ; Sidi Bel Abbes.

Introduction

Medicinal plants are essential for pharmacological research and drug development and as raw materials for drug synthesis (Ameenah, 2006). The use of these plants in herbal medicine is antiquated and is currently of great interest to the public (Demmouche et al. 2022). According to the World Health Organization (W.H.O, 2000), about 65-80% of the world's population uses traditional medicine to meet their primary health care needs, and nearly 80% of people in developing countries in the African region use traditional medicine (Debaisieux and Polèse, 2009).

Traditional medicine practices vary highly from one country to another and from region to another. The ethnobotanical approach, a contraction of ethnology and botany is the study of the relationships between plants and man (Jourdain, 1997). It makes it possible to identify remedies and build a medicinal plants database to preserve ancestral knowledge that is essentially based on an oral tradition (Ait Ouakrouch, 2015 ; Cunningham et al. 2008).

The Lamiaceae family includes about 3000 species with an extremely wide range but with a predominance in the Mediterranean region (Spichiger et al. 2002). They are most often herbaceous plants, shrubs, and rare trees or lianas, producers of essential oils, widely spread around the world and in all types of environments (Zeghib, 2004).

North Africa, particularly Algeria, has a wide variety of medicinal plants (Abdelguerfi and Ramdane, 2003 ; Ghomid et al. 2022). The Tessala Mountains also contain many medicinal and spontaneous plants with their floristic and ecological diversity, which are threatened and are becoming scarce in areas where they were previously abundant. Notably due to the increase in commercial and or inappropriate collections (Baraka, 2008 ; Dif, 2015 ; Kechar, 2015 ; Saidi et al. 2015).

Our research work consists in carrying out an ethnobotanical study of some plants of the Lamiaceae family of Sidi Bel Abbes (*Ajuga iva* (L.) Schreber. *Salvia argentea* L., *Rosmarinus officinalis* L., *Phlomis crinita* Cav., *Sideritis incana* L.), and to reach an objective of knowing the traditional medicinal virtues for these plants in the riparian populations (city of Sidi Bel Abbes, and the two communes of Sidi Khaled and Sidi Lahcene).

Material and Methods

Study area

The Wilaya of Sidi Bel Abbes is located in northwest Algeria in North Africa. It has 604,744 inhabitants on a cadastral area of 915,063 km² and an average altitude of 710 m. It is a region with a strong agricultural vocation, with the main climate being semi-arid dry, and cold, with hot summer. The capital, Sidi Bel Abbes, is an important Algerian town. The municipality of Sidi Lahcene is

among the most populated in Wilaya. It is located 5 km from the city center of Sidi Bel Abbès, at an altitude of 500 m on the west bank of the Mekerra wadi. Sidi Khaled has located 11 km from the city center. The choice of locations is based on proximity to our university, and the three cities are home to a considerable number of herbalists and tradipraticians.



Figure 1. Location of the stations concerned by the ethnobotanical study (city of Sidi Bel Abbès and the two communes Sidi Lahcene and Sidi Khaled)

Sampling

Ethnobotanical surveys have made it possible to establish the list of species used also to determine the part of the plant used and its traditional mode of use. Regarding therapeutic use, the available literature has been of considerable use (Baba-Aïssa, 2011 ; Beloued, 2001 ; Debaisieux and Polèse, 2009). The survey is conducted during the three months of February, March, and April of 2017. It was carried out in several regions (Sidi Bel Abbès ; Sidi Khaled, and Sidi Lahcene), on the traditional use of medicinal plants of Lamiaceae family growing in the mountains of Tessala for this purpose, a questionnaire has been drawn up and sent to herbalists, pharmacists in the study area as well as to the local population.

Herbal Medicine Questionnaire (Modified Data Sheet) (Salhi et al. 2010) :

1/ The descent of the surveyed population:

- Municipality: Douar Village Ville Nomade ...
- Sex: Male Female
- Age: (20 / 35) (36 / 45) (46 / 60) (+ 61)
- Academic level: Illiterate Primary Secondary University
- The profession: Pharmacists Herbalists Other professions No professions

2/ Overview of the part and mode of use

- Plant condition: Fresh Dried
- Part used: Leaves Root Stem Flowers Fruits Seed Bark Rhizome Whole plant
- Form of use: Herbal tea Powder Essential oil Oily oil Extract (tincture, solution, capsule)
- Preparation method: Maceration Infusion Decoction Poultice Raw Cooked Other:
- Dose used: ▪ Pinch handle Spoonful
- Precise dose: ▪ Quantity in g/glass: ▪ Quantity in g/litre: ▪ Other :
- Mode of administration: Oral Massage Rinsing Brushing Others :
- Type of Disease Treated: ▪ Dermatological Conditions ▪ Digestive Tract Conditions ▪ Respiratory Conditions ▪ Gland Conditions ▪ Cardiovascular Conditions Appendices to the Digestive Tract ▪ Genito-urinary ▪ Neurological Conditions ▪ Osteoarticular Conditions ▪ Metabolic Conditions Other Conditions
- Dosage: number of doses taken per day.
- For children: 1x/day 2x/day 3x/day Other :
- For seniors: 1x/day 2x/day 3x/day Other :
- For Adults: 1x/day 2x/day 3x/day Other :
- Duration of use: (duration of treatment) One day One week One month Until recovery

Description of the plants concerned

Lamiaceae species are generally herbaceous, perennial, or annual, rarely succulent, but also for some, shrubs or see suffrutescent plants, and more unusually ivy and even trees (teak). Lamiaceae are generally aromatically formed of quadrangular aerial stems (referred to a four-sided geometric shape with a four-angled section), hairy or hairy, and more rarely with underground stems (Fig. 2).

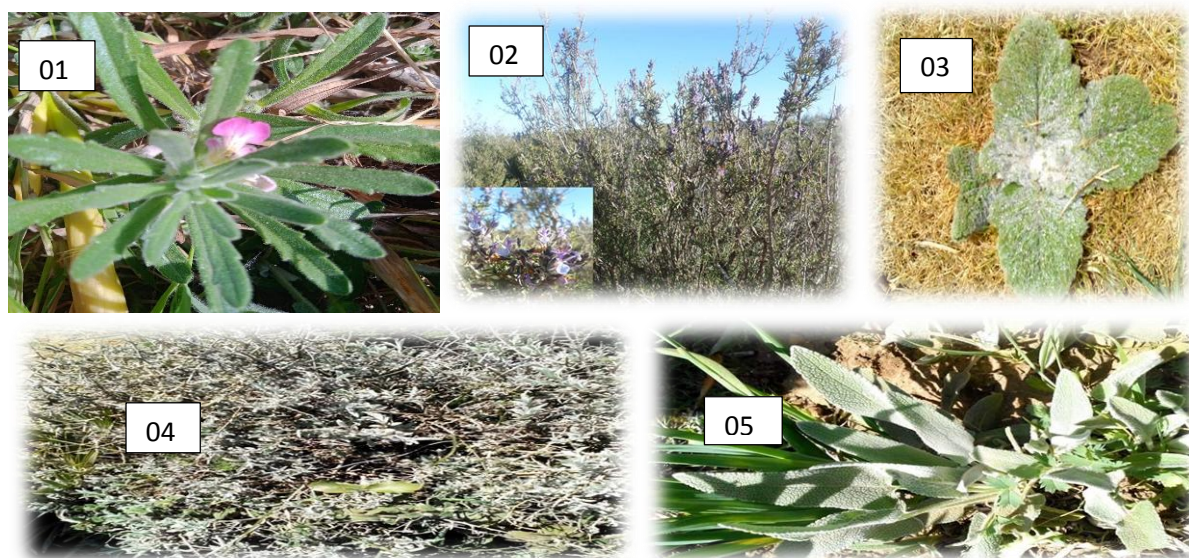


Figure 2. Morphological characteristics of the lamiaceae involved in the ethnobotanical study:

Scientific name/ Common name/ Arabic vernacular name/ Local name

01: *Ajuga iva* (L.) Schreber. ; Ivette ; Mesk el ghour ; Chnedgoura / 02 : *Rosmarinus officinalis* L. ; Romarin ; Iklil el djabel ; Halhal / 03 : *Salvia argentea* L. ; Sauge argentée ; Frach neda / 04 : *Sideritis incana* L. ; crapaudine ; katuba ; tizanat eldjbal / 05 : *Phlomis crinita* Cav. ; Sage of Jerusalem; khayata; khyatat ledjrah.

Results

The population and localities concerned by the survey

The population surveyed has more than 1000 people, but only 600 persons can answer us. The survey was conducted in the city of Sidi bel Abbes (43% of the population surveyed) and the two communes Sidi Khaled (27%) and Sidi Lahcene (30%). The populations surveyed are chosen according to the number of visitors found in several places in the localities concerned (Hospital, Faculty of Natural and Life Sciences, Market of Medicinal Plants, Herbalist, Pharmacy).

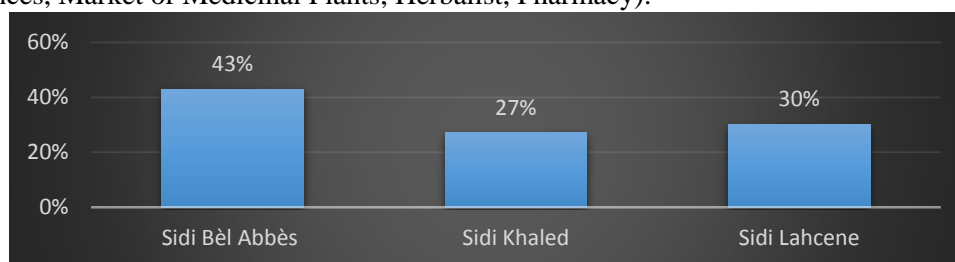


Figure 3. Use of medicinal plants by locality

Surveyed population (sex, age, educational attainment and occupation)

Depending on the sex, 70% are women compared to 30% of the population are men, that explains why the importance of the use of medicinal plants by women. On the other hand, the age groups predominate among people aged -20 to 35, with a rate of (75%). However, for the 36-45 age group, with a rate of (9%), in contrast, those aged 46 to over 60 years do not appear with a high frequency

because of their absence during the survey, with a rate of (16%). The data processing allowed us to obtain that 59% of people have a university level, then come illiterate, secondary and primary level, with a percentage respectively of 17%, 15%, 9%. 48% of the population studied are without occupations. While 35% have other professions, 11% are pharmacists, leftovers are herbalists with a percentage of 6%. These results are consistent with those obtained by (Benkhniue et al. 2011 ; Benlamdini et al. 2014 ; EL Hafian et al. 2014).

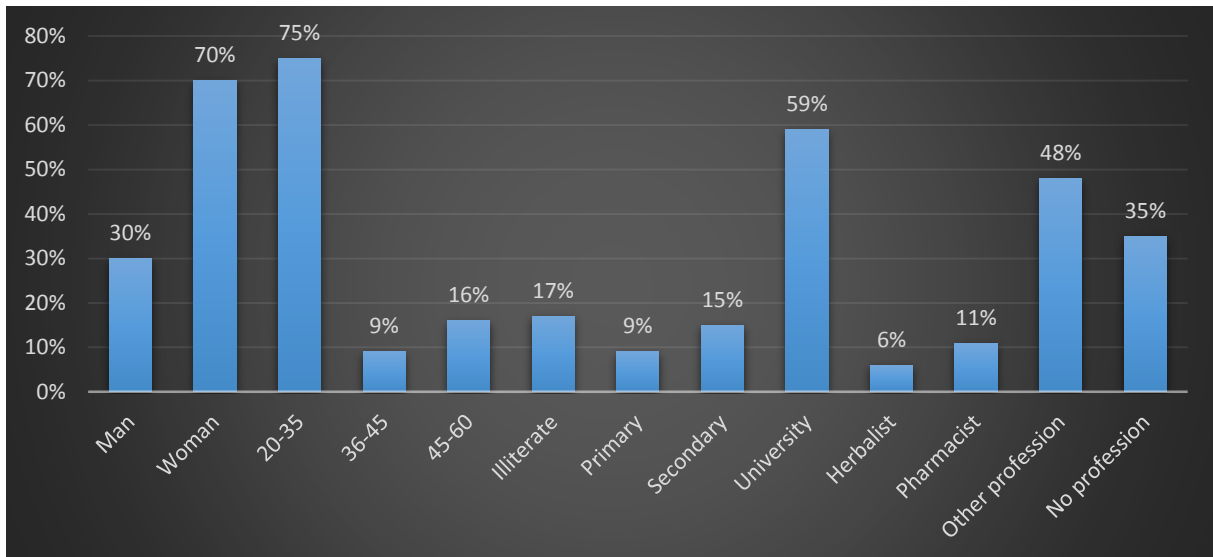


Figure 4. Survey population by sex, age, educational level and occupation

The most used plants

According to our survey results, the frequency of *Rosmarinus officinalis* L. is the highest with a rate of 57%, it proves that rosemary is the most used medicinal plant by the local population studied, followed by *Ajuga iva* (L.) Schreber., with 19%, *Salvia argentea* L. with 12%, *Phlomis crinita* Cav. 10%, *Sideritis incana* L. is the lowest species used with a percentage of 2%.

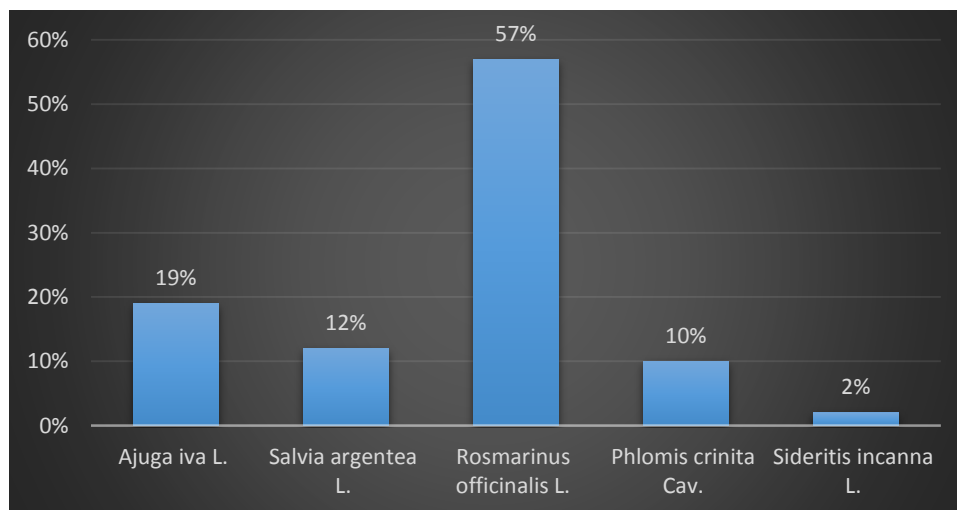


Figure 5. Frequency of use of selected lamiaceae medicinal plants.

Use of plants in disease care

1. *Ajuga iva* (L.) Schreber.

Condition of the plant : According to the survey, 57% of the surveyed population use *Ajuga iva* (L.) Schreber., in the dried state while others use it in the fresh one 43%. On the other hand, 40% use its leaves against the whole plant with a percentage of 32%, and the stem occupies an average place with a rate of 21%. All other used parts remaining namely with a cumulative rate of 7%.

Method of preparation : The survey results indicate that the plant's organs are used in the form of an herbal tea preparation with a high frequency of 64%, and the powder-based preparations are used with a frequency of 31%, and the other preparation modes have a rate of 5%. Most people surveyed use this plant in an infusion form, with a large percentage of 45%, decoction with a rate of 35%, and other herbal teas with a small percentage of 20%.

Mode of administration and dose used : Most prepared recipes are prescribed orally with a large percentage of 64% rinsing, brushing, and massage (39%) are applied to have a local effect, unlike the oral route which is applied to obtain a general one. The doses are not specified : 34% by pinch, 5% by spoon, and 61% by the handle, with the dosage and duration of use once a day after the meal until the cure.

The diseases treated : The results show that Ivette treats mainly osteoarticular diseases (34%), digestive tract and appendix diseases (25%), respiratory diseases (13%), dermatological diseases (7%) and other illnesses (Anti diabetic and hypertension) 21%. Our results are consistent with those obtained by (Bouchenak, 2006) ; Chenni et al. 2007 ; Saidi et al. 2015).

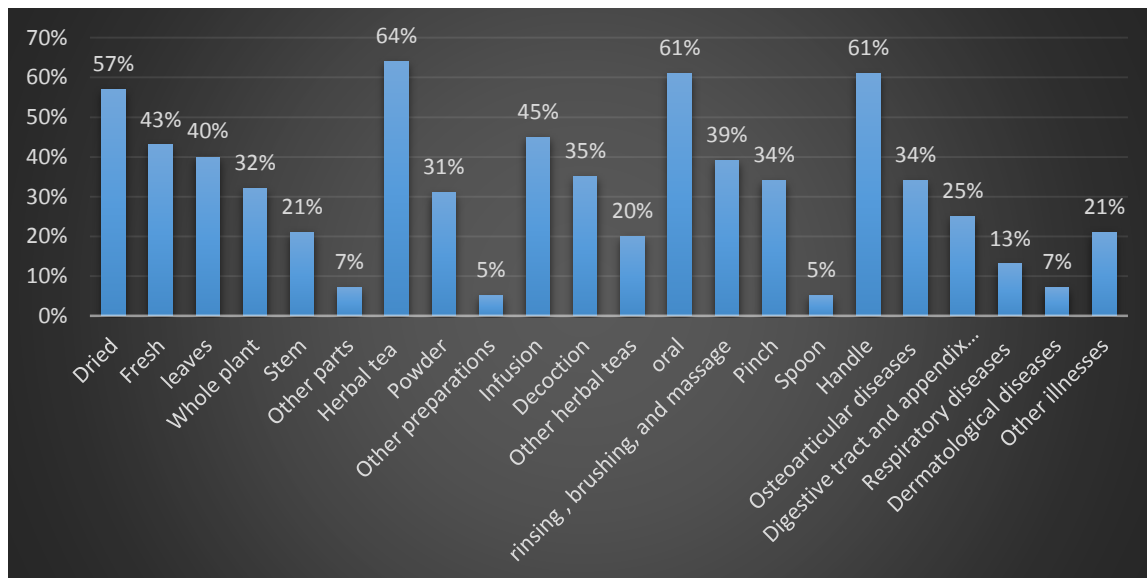


Figure 6. The traditional use of the species *Ajuga iva* (L.) Schreber.

2. *Salvia argentea* L.

Condition of the plant : The survey results indicate an almost closer frequency between dry and fresh conditions with percentages of 52% and 48%. According to the survey carried out : 56% of the population use *Salvia argentea* L. leaves, and the use of the whole plant at a percentage of 28%, and the stem with a rate of 12%. All other parts are used at a cumulative rate of 4%.

Method of preparation : Regarding the application of treatments of the various symptoms mentioned above, we encountered different forms of use, the most used of which is an herbal tea with 70%, followed by powder with 14% and 16% are applied in other forms. Infusion is the most common method of preparation (52%) like the work of (Raulescu et al. 2004), followed by the preparation in decoction (28%), and the poultice is used with a percentage of 10%. Similar work was done by (Chehma and Djebar, 2005 ; Ould El Hadj et al. 2003) with the same percentages.

Mode of administration and dose used : Most prepared recipes are prescribed orally with a large percentage of 86%, and rinsing, brushing, and massage (14%) are applied to have a local effect, unlike

the oral route to obtain a general one. Similar results are observed in a similar ethnobotanical study. Most of the people surveyed use sage in unspecified doses, of which 16% per pinch, 14% per spoon, and 70% per handle, with a dosage and use duration of one cup once a day until cured.

The diseases treated : The survey results obtained show that the most treated symptoms are respiratory diseases, with a rate of 31%, followed by digestive tract diseases with appendices and osteoarticular diseases (28% and 19% respectively), dermatological diseases 15%, and other diseases such as (cardiovascular, neurological, metabolic diseases, disorders of the glands, genitourinary diseases) by 7% (Hamidpour et al. 2004 ; Saidi et al. 2015).

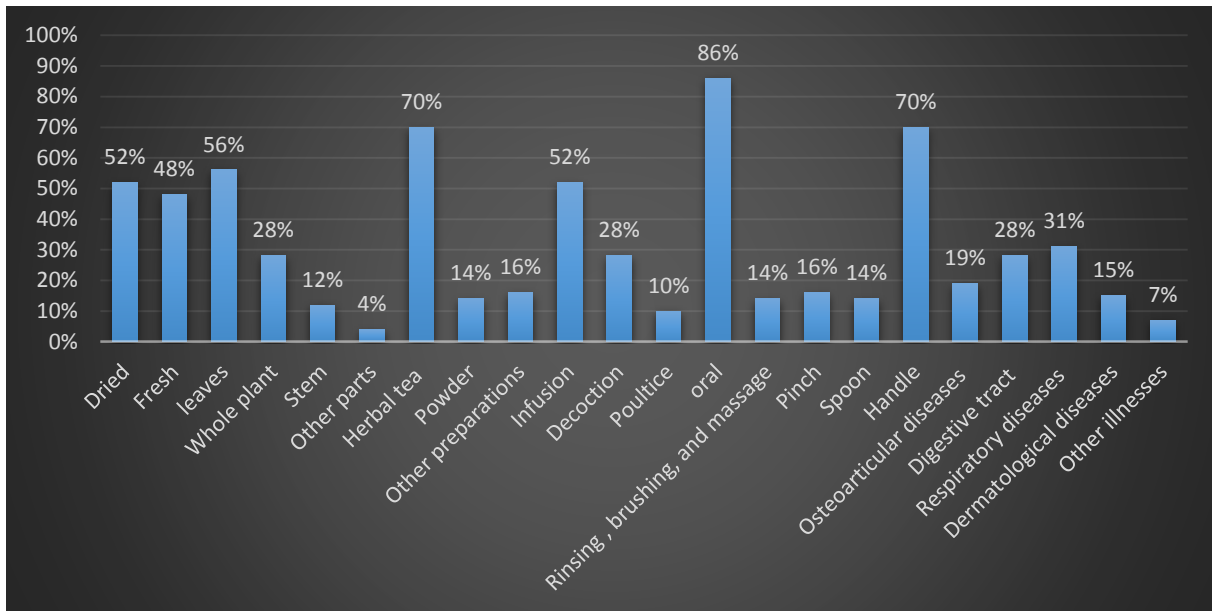


Figure 7. The traditional use of the species *Salvia argentea* L.

3. *Phlomis crinita* Cav.

Condition of the plant : According to the survey, 66% of the surveyed population use *Phlomis crinita* Cav., in the dried state ; while others use it in the pure state with a rate of 34%, also 60% of the population use the sage leaves of Jerusalem, on the other hand, the use of whole plant with a percentage (12%) and the stem with 13%. All the other parts used remaining namely are represented by a cumulative rate of 15%.

Method of preparation : The survey results indicate that the plant's organs are used in powder form with a high frequency of 45%, herbal tea with a rate of 13%, and other forms of employment with a rate of 42%. They also show that the plant's organs are used in the form of poultices at a higher frequency (70%), such as work (Rivera, 1993), or the plant is used in the form of pates in Spain, followed by infusion at a rate of 10%, and decoction 3%, on the other hand, other preparations with a rate of 17%.

Mode of administration and dose used : The people surveyed use the Jerusalem sage prepared in the form of poultices to rinse, brush and massage with 87% and the oral 13%. They use the plant *Phlomis crinita* Cav., with unspecified doses, of which 87% per tablespoon and 13% per handle, with dosage and duration of use for three hours once a day until cured.

The diseases treated : The results of the surveys obtained show that the most treated symptoms are dermatological conditions with a rate of 87% (Liolios et al. 2007), followed by digestive tract diseases and osteoarticular (Zhang et al. 1991) (8%, 5%) and other patients not included in the survey results. Similar results are observed in a similar ethnobotanical study by (Kabouche et al. 2004 ; Maamar Sameut et al. 2020 ; Saidi et al. 2015).

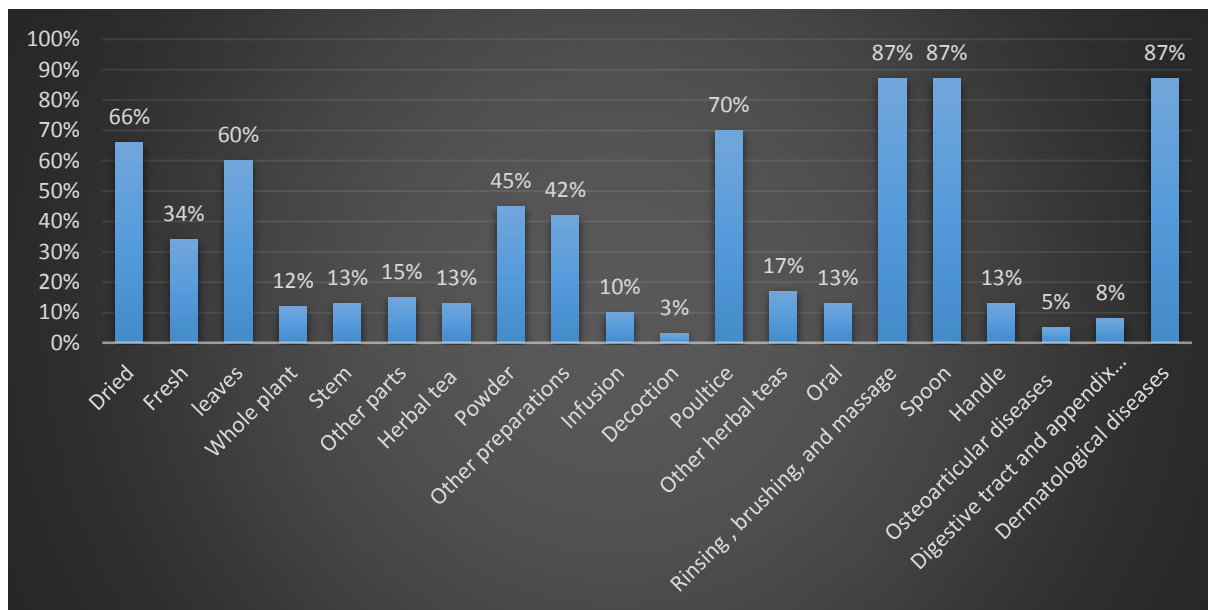


Figure 8. The traditional use of the species *Phlomis crinita* Cav.

4. *Sideritis incana* L.

Condition of the plant : According to the survey, 66% of the surveyed population use *Phlomis crinita* Cav., in the dried state while others use it in the fresh state 34%. 60% of the population use the sage leaves of Jerusalem, on the other hand, the whole plant with a percentage (12%), and the stem with 13%. All the other parts used remaining namely are represented by a cumulative rate of 15%.

Method of preparation : For the application of the treatments of the various symptoms mentioned above, we encountered different forms of use of bluegill, of which the most used is an herbal tea with 86%, followed by all forms such as (essential oil, oily oil, compress, plaster, syrup, solution) with 14%. The majority of the population surveyed takes the species *crapaudine* in the form of decoction (57%), followed by infusion (22%), and other preparations with (14%).

Mode of administration and dose used : The people surveyed use *Sideritis incana* L. orally with a large percentage of 92%, rinsing, brushing, and massage (8%). They use it in unspecified doses, of which 72% per tablespoon, 13% per handle, and 9% per pinch, with dosage and a duration use of one cup three times a day until cured.

The diseases treated : Our survey results show that the most treated symptoms are cholesterol diseases (70%), followed by digestive tract disorders with a rate of (30%). The dominance of digestive disorders is confirmed by several other authors. Indeed (Gonzlez-Burgos et al. 2011 ; Ould El Hadj et al. 2003 ; Saidi et al. 2015).

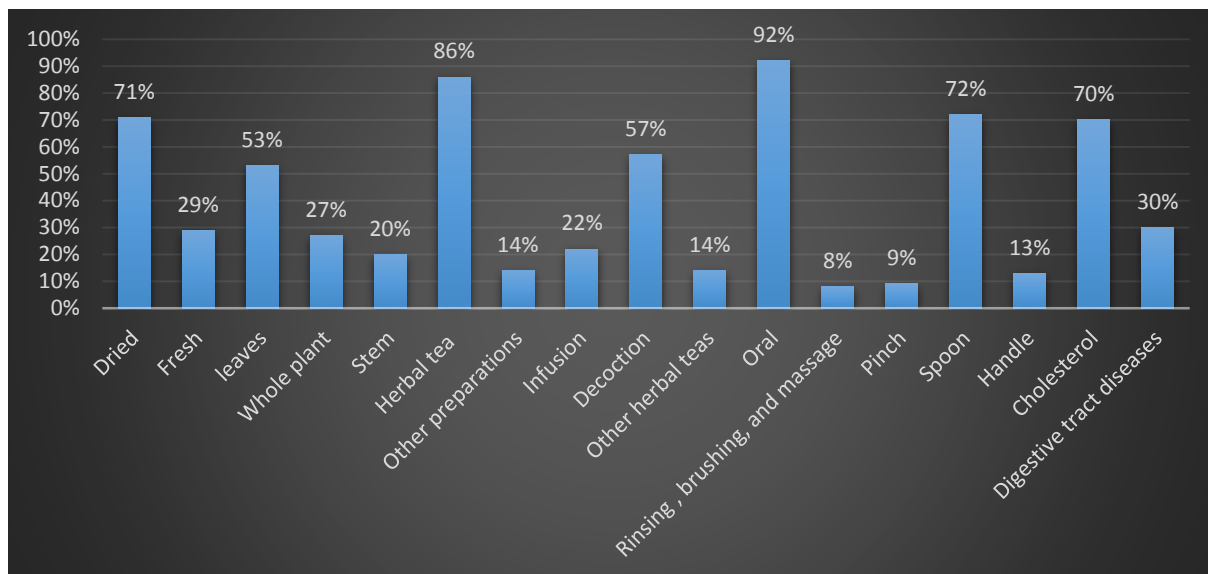


Figure 9. Traditional use of the species *Sideritis incana* L.

5. *Rosmarinus officinalis* L.

Condition of the plant : The majority of people surveyed used fresh rosemary 65% while 35% used the plant in dried form, which forms the basis of herbal teas, powders, and extracts. According to the results obtained, the most used part of *Rosmarinus officinalis* L. is the leaf, with a percentage of 57%, by cons the whole plant, the stem, and the other organs (27%, 8%, 8% respectively).

Method of preparation : For the application of treatments of the various symptoms, we encountered different forms of use, of which the most used is the herbal tea with 72%, followed by the powder with 17%, against 11% are applied in other forms (extracted with essential oil, oily oil, compress). The most common modes of use are classified as follows : infusion (40%) followed by decoction (33%), poultice (9%), and raw and cooked (18%).

Mode of administration and dose used : People surveyed use *Rosmarinus officinalis* L. orally with a large percentage of 77%, rinsing, brushing, and massage (13%). They use it in unspecified doses, of which 81% per tablespoon, 12% per handle, and 7% per pinch, with a dosage and a use duration of one cup twice a day until cured.

The diseases treated : The results obtained show that the most treated symptoms are respiratory diseases with a rate of 44%, followed by dermatological diseases, digestive tract (15% and 20% respectively), osteoarticular diseases (11%), metabolic diseases, genitourinary disorders, disorders of the glands, and finally cardiovascular disorders (11%). These results are similar to the ethnobotanical work of (Jdaidi and Hasnaoui, 2016 ; Kabouche et al. 2004 ; Salhi et al. 2010), and also confirmed by other in vivo and in vitro studies, such as (Athmena, 2009 ; Bernardes et al. 2010 ; Bozin et al. 2007).

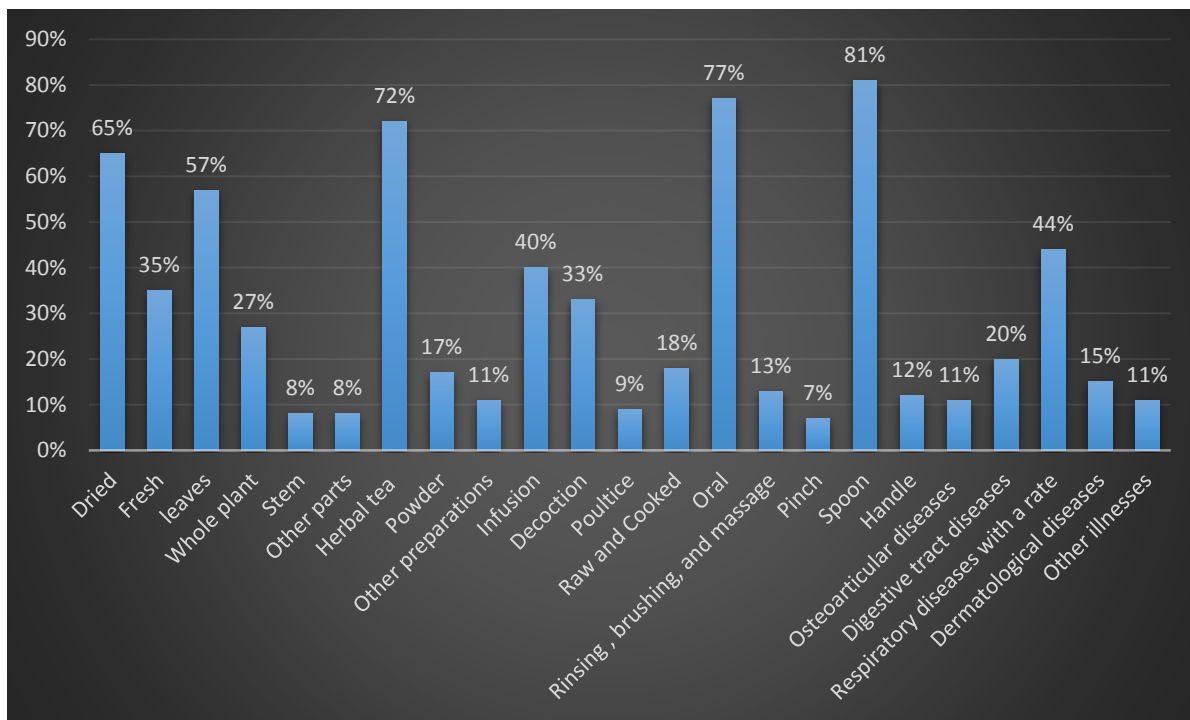


Figure 10. The traditional use of the species *Rosmarinus officinalis* L.

Discussions

Our ethnobotanical study is part of the framework to have traditional characteristics, and medicinal properties, of our studied plants of the lamiaceae family (Reguieg, 2011). The objective of studying the Lamiaceae family, because they contain a large number of the aromatic and medicinal species (Maamar Sameut et al. 2020). Our medicinal plants have proven their therapeutic evidence in our study area. The very large number of the surveyed population gives importance to confirm and safeguard the know-how of the local population (Lazli et al. 2019). In view the large area of the Sidi Bel Abbès, We have chosen the chief town and the two communes Sidi Lahecene and Sidi Khaled because of their proximity to different forests and different plant formations and landscapes (The Tessala Mountains, Forests of Bouhriz ; Forests of Telagh). According to sex, females are the most usable of our plants than males, this is explained by the spirit of responsibility and as a person with skills for the practice of traditional medicine. However, by age, we have seen a predominance of young people because of the composition of Algerian society. On the other hand, concerning the level of university study which is dominant, to get an idea by educating people. The majority of the surveyed population is unemployed, because of their lack of means for conventional medicine. These results are consistent with those obtained by (Benkhnigue et al. 2011 ; Benlamdini et al. 2014). The significant use of rosemary is due to its wide distribution in the region, on the other hand, the ivette is much better known in the arid and semi-arid regions of Algeria, silver sage comes third because of their rarity. Crapaudine in Spain and Jerusalem sage in Tunisia (Saidi et al. 2015). Our study shows, that the most used part is the leaves of our five different lamiaceae plants (Chermat and Gharzouli, 2015 ; Jdaidi and Hasnaoui, 2016). This is explained by the ease of harvesting and the richness in primary and secondary metabolites (Active substances) (Bigendako-Polygenis and Lejoly, 1990). However, the state of the plant varied between fresh and dried, because drying is a way to preserve them throughout the year, it also allows them to be picked at the right time, and consume them later. Some molecules are destroyed on drying, such as the aromatic essences of certain plants of the Lamiaceae family. In that case, in the optimal season, we can obviously prefer to make herbal teas from fresh plants. Several works confirm the mode of use herbal tea in the form of decoction and infusion (Benkhnigue et al. 2011 ; Chermat and Gharzouli, 2015 ; Jdaidi and Hasnaoui, 2016), to warm the body and disinfect it (Lahsissène et al. 2010), and reduces the toxicity and keep the majority of secondary metabolites and their biological activities (Salhi et al. 2010). The administration of herbal preparations should never be administered only by oral or ointments on the skin, with little doses (spoonful or handful). The analysis of the results obtained concerning the existing relationships between medicinal species and types of the diseases treated

showed that : Concerning *Ajuga iva* (L.) Schreber., our results are consistent with those obtained by (Bouchenak, 2006 ; Chenni et al. 2007 ; W.H.O, 2000). For *Salvia argentea* L., these results are similar to the work (Hamidpour et al. 2004 ; W.H.O, 2000 ; Reguieg, 2011). The species *Phlomis crinita* Cav., similar results are observed in similar ethnobotanical studies by (Kabouche et al. 2004 ; Maamar Sameut et al. 2020 ; Saidi et al. 2015). However *Sideritis incana* L., has shown a dominance of the treatment of digestive disorders confirmed by several other authors. Indeed, (Gonzalez-Burgos et al. 2011 ; Ould El Hadj et al. 2003 ; Saidi et al. 2015). The species *Rosmarinus officinalis* L., these results are similar to ethnobotanical work, (Jdaidi and Hasnaoui, 2016 ; Kabouche et al. 2004 ; Salhi et al. 2010), and also confirmed by other in vivo and in vitro studies, such as (Athmena, 2009 ; Bernardes et al. 2010 ; Bozin et al. 2007 ; Chenni et al. 2007).

Conclusion

The Sidi Bèl Abbes region is known for its floristic wealth of medicinal plants used by the inhabitants (Saidi et al. 2015). This study made it possible to highlight the relative importance of traditional medicine to the health system in the region of Sidi Bel Abbes and its surroundings, and confirm that the use of Lamiaceae in the therapeutic field persists despite the revolution in medical technology.

The wealth of his knowledge from our study is essential to preserve this precious legacy and to validate experimentally the medicinal virtues cited at the level of scientific laboratories.

The ethnobotanical survey that we conducted in Sidi Bel Abbes, Sidi khaled and Sidi lahcen could reveal that the predominant sex is women, the age of 20 to 35 is the most important questioned during the survey, the academic level and the profession in relation to the medicinal virtues of the plants are also taken into consideration, the spoken familiar knowledge in traditional medicine of these plants in transcribed knowledge.

For this purpose, the traditional use of plants (*Ajuga iva* (L.) Schreber., *Phlomis crinita* Cav., *Sideritis incana* L., *Salvia argentea* L., *Rosmarinus officinalis* L.) is as follows by the proposal of these notices ;

Ajuga iva (L.) Schreber. ; For osteoarticular disease, prepare a herbal tea of a handful of dried leaves of Ivette, in the form of infusions for a few minutes, and drink after the meal once a day.

Salvia argentea L. ; For the respiratory diseases treatment and the digestive tract and appendix, prepare a herbal tea of a handful of dried or fresh sage leaves in an infusion form for a few minutes, and drink a cup once a day.

Phlomis crinita Cav. ; For dermatological conditions treatment, prepare a handful of poultices of dried leaves of Jerusalem sage under rinsing, basting, and massage method for three hours once a day.

Sideritis incana L. ; For cholesterol, prepare a teaspoon of dried leaves as a decoction of a few minutes, and drink a cup three times a day.

Rosmarinus officinalis L. ; To improve breathing with a rate, prepare a teaspoon of dried rosemary leaves as an infusion for a few minutes, and drink a cup twice a day.

Despite the encouraging results of this survey concerning herbal medicine, the practice of the latter in the region of Sidi Bel Abbès remains limited. Medicinal plants, like drugs, must have strict standard rules that only the specialist in herbal medicine can meet. Thus, more importance should be given to culture, exploitation and marketing of these plants which can be an important source of external income.

Concerning the Perspectives and the recommendations, it is necessary to deepen the work of ethnobotanical surveys to better identify the medicinal species, in terms of quality and quantity, and followed these studies by others in the laboratories in the phytochemical, pharmacognosic and pharmacological fields.

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