



## RESEARCH PAPER

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## Traditional use of medicinal plants in the region of Mostaganem, Algeria

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### Abstract

Medicinal plants are since antiquity used to relieve and cure human diseases. In fact, their therapeutic properties are due to the presence of hundreds even thousands of natural compounds bioactive called secondary metabolites. In Mostaganem one of the most important cities in Algeria the appeal to the herbalist to cure diseases which resist to the conventional medicine became recurring. An ethnobotanical study was conducted to put in evidence the place of the phytotherapy in the traditional care system in the city of Mostaganem. This study consists of inventoried medicinal plants and identifying different ways of using and exploiting these plants in traditional medicine. Using 500 survey cards, the ethnobotanical survey was conducted in a period of 3 months (from August to October 2018), we used Excel for data analysis. The survey allowed us to identify 54 species belonging to 27 botanical families. The family of Lamiaceae is the most dominant followed by Apiaceae. In addition, the leaves are the most used part (36%). Furthermore, the infusion was the major mode of preparation (65%). In terms of diseases treated, digestive disorders are first (51%), followed by respiratory diseases (17%). The results obtained will be a very valuable source of information for the region studied. This study could be a database for further research in the fields of pharmacology to prove the efficacy of medicinal plants.

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## Introduction

Plants have been used as a medicinal agent since ancient times, first only on a folkloric basis and later developed on a scientific way into a single agent drug (Shuvasis *et al.*, 2012). Medicinal plants have provided modern medicine with numerous plant derived therapeutic agents (Hudaib *et al.*, 2008). They have always been used as medicines and are considered to be less toxic and mild compared to pharmaceutical drugs. Pharmaceutical industries are increasingly interested in the ethnobotanical study of plants (Tahari *et al.*, 2012).

The World Health Organization (Who, 2000) defines the traditional medicine as the sum total of the knowledge, skills and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness (Hudaib *et al.*, 2008). Traditional herbal therapy is particularly important in the daily lives of the population, and has also reported that about 80% of the world's population mainly depends on traditional medicine, and the use of plant extracts is mainly involved in the traditional treatment (Beverly *et al.*, 2011). According to the WHO statistics, about 80% of African populations use traditional medicine for their primary health care. In recent years, there has been a remarkable rise of medicinal plant's use, probably due to their local abundance, cultural significance and inexpensive procurement (Thomford *et al.*, 2015). They are valuable resources for the vast majority of rural populations in Africa (Jiofack *et al.*, 2009; Jiofack *et al.*, 2010) because Africa has a significant diversity of medicinal plants (Dibong *et al.*, 2011).

Algeria a country of North Africa, with its large area and diversified climate has a varied flora, which is a source of rich and abundant medical matter. On the other hand, Algeria with its history and its strategic location has benefited from different cultures: Berber, Greco-Roman and Islamic. Important knowledge of plant medicine, currently used in traditional Algerian

medicine, originated in the medical heritage of different civilization, transmitted from generation to generation (Chériti *et al.*, 1995; Bellakhdar, 1997).

Medicinal plants have been used in Algeria for centuries to treat different ailments. Although Algeria is one of the richest Arab countries with 3164 plant species (Vasisht and Kumar, 2014), and more particularly the region of Mostaganem presents a broad range of climatic stages inducing a biodiversity with an avalanche of much of plants used like grass, natural food and for therapeutic aims. Among the scientific disciplines interested in traditional herbal medicine, ethnobotanics is considered as a science that translates popular knowledge into scientific knowledge. The objective of ethnobotanical surveys was to find information related to traditional herbal therapy, identification of medicinal plants, identification of the types of diseases treated, contribute to complement the previous studies carried out in the region of Mostaganem.

In this sense, we proposed an ethnobotanical study to put in evidence the place of phytotherapy in the traditional care system at the level of the city of Mostaganem. This study consists of inventoried medicinal plants and identifying the different ways of using and exploiting these plants in traditional medicine, with the objectives of establishing the catalogue of medicinal plants used by the population of Mostaganem. Collect all information on local therapeutic and traditional applications to determine all the diseases treated.

## Material and methods

### Study area

Mostaganem is located on the western coast of the country, Mostaganem is characterized by a semi-arid to temperate winter climate, rainfall ranges from 350mm to 400mm. The area covered by the forest is 30,767 hectares which means 13.56% of the total area. Flora consists mainly of Mediterranean species with the predominance of the Aleppo pine (Kies and Kerfouf, 2014).

*Ethnobotanical survey*

To improve knowledge on the use of medicinal plants an ethnobotanical survey in the city of Mostaganem was conducted during the period of three months (from August to October 2018). The information on herbal medication was gathered through interviews with the inhabitants who hold a significant knowledge using questionnaire (Salhi *et al.*, 2010), comprising following information: vernacular name, part used, traditional posology, the use mode (decoction, infusion, etc) and ailment treated. We interviewed 500 people of different ages, gender and intellectual levels, who informed us about the most medicinal plants used in the city of Mostaganem. We used excel for data analysis.

**Results**

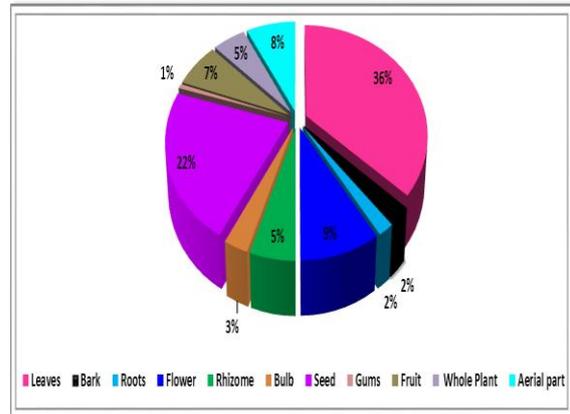
*The ethnobotanical survey results*

Generally the use of plants in the region of Mostaganem is spread at all the ages, people aged from 20 to 40 years old are in the first place with 61% followed by those aged from 40 to 60 years with a 25%, followed by the age bracket more than 60 years old with 11%, however most low rate is noted at the age bracket less than 20 years old with a 3% rate. We noticed that women use more frequently medicinal plants than men, 80% and 20% respectively.

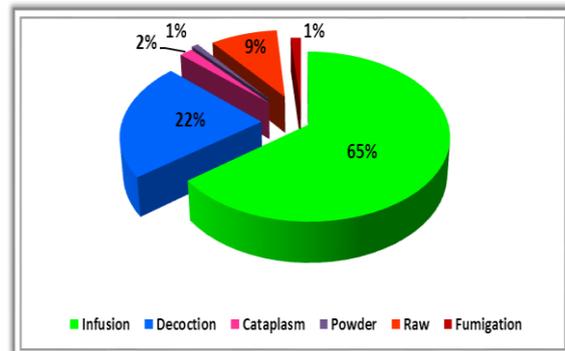
As for the family situation most of the people interrogated are married 65% while the single's represent only 35%. Besides, 13% of the respondents have a primary educational level, 10% medium, 22% have a secondary level and only 4% are illiterate also an important rate was noted at people with a university level which is 61%, We were interested in the parts of the plants most used for medicinal purposes, we discovered that the leaves and seeds are the most used followed by flowers and aerial parts as shown in the graphic representation of (Fig. 1).

In our study, infusion and decoction are the most preparation mode used as illustrated in (Fig. 2). About the posology, adults use herbal plants once a day with a 15% percentage, twice a day with a 70% percentage and three times a day with a percentage of

15%. As for the elderly 17% use plants once a day, 69% use them twice a day and 14% use herbal plants three times a day And for children 14% of the people use medicinal herbs once a day while 64% of the informants use them twice a day while 22% of people use them three times a day for children.

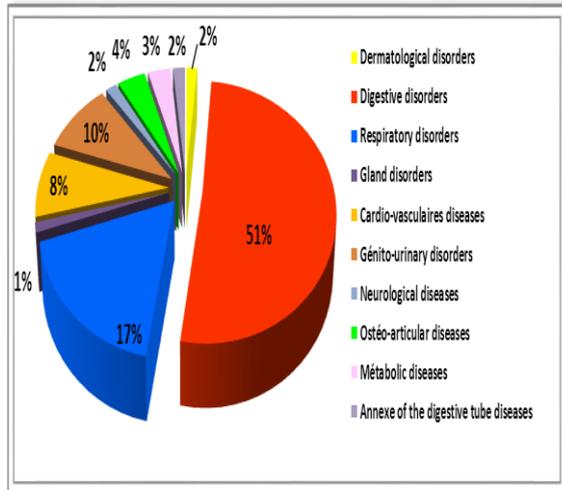


**Fig. 1.** Most medicinal plant parts used.



**Fig. 2.** Preparation methods used of medicinal plants.

Concerning the treatment duration 62% of the questioned people use healing plants for a day only and 18% use them for a week while 4% use them for a month and 16% use herbs until the cure. Among the informants 80% use spoons of medicinal plant and 18% use a handle and only 1% uses a pinch. As for how informants got the information about healing plants, 46% of the informants refer to others (family, friends, social networks, TV, internet), 44% refer to themselves, 9% learned it by an herbalist and 1% by doctors. As for the treatment efficiency 41% of the informants think that plants allow a cure, 58% said that it helps to improve the health on the other hand 1% think that the plants are ineffective.



**Fig. 3.** The most diseases treated by medicinal plants cited in the survey.

The ethnobotanical survey made in Mostaganem allowed us to identify a number of diseases treated by herbal medicine such as digestive diseases (stomach pain, diarrhea, constipation), respiratory affections (Pulmonary Disease, asthma, bronchitis), genito-urinary affections, cardio-vascular diseases and plenty of other diseases as indicated in (Fig. 3).

*Floristic analysis*

The field surveys in Mostaganem allowed us to identify different medicinal plant species used in local herbal medicine, by means of 500 questionnaires carried out in this city, an ethnofloristic catalog was drawn up. The medicinal plants which are usually used by the population were identified and listed in (Table 1).

**Table 1.** Main medicinal plants used by the population of Mostaganem (Algeria).

Family	Species		Percentage%	Therapeutic uses
	Scientific name	Common name		
	<i>Pimpinella anisum</i>	Anis vert	0.45%	Antimicrobial properties, intestinal gas, digestive disorders.
	<i>Carum carvi</i>	Carvi	0.68%	Menstrual cramping, antiseptic, treat flatulence, bronchitis and sore throat.
Apiaceae	<i>Foeniculum vulgare</i>	Fenouil	4.13%	Colic in infants, <b>flatulence</b> , digestive disorders and inflammation of the respiratory tract.
	<i>Cuminum cyminum</i>	Cumin	1.37%	Antiflatulent, treat menstrual cramping.
	<i>Ammi visnaga</i>	Faux ammi	5.28%	Bronchitis, angina, <b>diabetes</b> .
	<i>Bunium bulbocastanum</i>	Châtaigne de terre	1.60%	Goiter, diabetic, cardiovascular diseases.
	<i>Férule persique</i>	Ferula assa foetida	0.68%	Bronchitis, asthma, cough. infantile pneumonia and flatulent colic.
Aristolochiaceae	<i>Aristolochia baetica</i>	Aristolochie	0.22%	Arthritis, <i>rheumatoid</i> .
Astéraceae	<i>Artemisia vulgaris</i>	Armoise	1.83%	Stomach and intestinal conditions, colic, diarrhea, constipation.
	<i>Chamaemelum nobile</i>	Camomille	2.75%	Bactericidal, convulsion, stomach, inflammation of the throat.
Brassicaceae	<i>Lipidium satvum</i>	Cresson alénois	2.06%	Prostates pain, urinary, retention, anemia, rheumatic pain.
	<i>Cardamine pratensis</i>	Cardamine	0.68%	Indigestion, promote appetite, antispasmodic, carminative, diuretic.
Cactaceae	<i>Cactaceae</i>	Cactus	0.91%	Reduce cholesterol and blood sugar levels, treat wounds.
Caryophyllaceae	<i>Arenaria serpyllifolia</i>	Sablina	0.68%	Antitussive, depurative, diuretic and febrifuge.
Chenopodiaceae	<i>Atriplex halimus</i>	Pourpier de mer	3.67%	Fibrome, hypertension, diabetes, diuretic, involuntary urine, prostate, cyst.
Cupressaceae	<i>Jumperus communis</i>	Genévrier	2.98%	Urolithiasis, vaginal infection, urinary tract, anti diarrheal, carminative, diuretic.
	<i>Cassia senna</i>	Séné	0.68%	Constipation

Family	Species			Therapeutic uses
	Scientific name	Common name	Percentage%	
Fabaceae	<i>Glycyrrhiza glabra</i>	Réglisse	0.91%	Digestive disorders, Antiviral, anti-inflammatory, cough.
Labiaceae	<i>Ocimum basilicum</i>	Basilic	1.37%	Blood pressure, stomachic, sedative.
	<i>Lavandula officinalis</i>	Lavande	5.05%	Antispasmodic, flu, stomach pain, infection of the genital tract.
	<i>Mentha pulegium</i>	Menthe pouliot	2.29%	Antihypertensive, antispasmodic.
	<i>Salvia officinalis</i>	Sauge	0.45%	Spasm, common cold, intestinal gases, diabetes, stomach pain.
	<i>Rosmarinus officinalis</i>	Romarin	3.67%	Carminative, antispasmodic, antiseptic, gastric disorders, pain of menstruation.
	<i>Mentha spicata</i>	Menthe	2.75%	Antispasmodic, analgesic, indigestion, headache, hypotension, sedative disinfectant.
Lamiaceae	<i>Ajuga chamaepitys</i>	Ajuga iva	0.68%	Antibacterial, anti-inflammatory, diabetes, cardiovascular and digestive problems.
	<i>Teucrium polium</i>	Germandrée	0.68%	Anti-bacterial, anti-diabetic, anti-diarrhoea.
	<i>Origanum majorana</i>	Marjolaine	1.37%	Head pains, digestive disorders
	<i>Thymus vulgaris</i>	Thym	6.20%	Bronchit, colds, colic, cough, flatulence, Antibacterial, anti-inflammatory.
	<i>Marrubium vulgare</i>	Marrube blanc	1.83%	Diabetes, diarrhée, indigestion, bloating, gas.
	<i>Nepeta cataria</i>	Cataire	1.60%	Antispasmodic, tonic, antitussive, carminative, diuretic, sedative, intestinal gases.
Lauraceae	<i>Cinnamomum verum</i>	Cannelle	2.75%	Allergic rhinitis, common cold, menstrual discomfort, spasms, upset stomach, hypoglycemic.
Liliaceae	<i>Allium sativum</i>	Ail	2.06%	Hypertension, cardiac disease, antiseptic, anti-inflammatory, antispasmodic, diuretic, tonic.
	<i>Allium cepa</i>	Oignon	0.45%	Anti-inflammatory, antirheumatic, antiseptic, bactericide, diuretic, cough, laryngitis.
Linaceae	<i>Linum usitatissimum</i>	Graine de lin	4.59%	Diabetes, high cholesterol, heart disease, stomach upset, constipation.
Lythraceae	<i>Punica granatum</i>	Grenadier	1.83%	High blood pressure, high cholesterol, hyperglycemia, , indigestion, bloating, flatulence.
Malvaceae	<i>Hibiscus sabdariffa</i>	Karkadé	0.68%	Anticancer, anti-inflammatory, menstrual pain.
Mimosaceae	<i>Acacia</i>	Acacia	0.22%	High cholesterol, irritable bowel syndrome, prebiotic.
	<i>Myrtus communis</i>	Myrte	0.68%	Eczema, hypotensive, skin diseases.
	<i>Eugenia caryophyllata</i>	Clou de girofle	1.14%	Antipyretic, antiseptic, anesthetic.
Myrtaceae	<i>Eucalyptus globulus</i>	Eucalyptus	2.98%	Flu, antitussive, antiseptic, bactericide, carminative, diaphoretic, rheumatic pain, asthma, bronchitis.
Oleaceae	<i>Olea europaea</i>	Olive	0.91%	Diabetes, high blood pressure, diuretic, antipyretic, tonic, laxative, ypocholestérinisants, sedative, coughs, colds.

Family	Species			Therapeutic uses
	Scientific name	Common name	Percentage%	
Ranunculaceae	<i>Nigella sativa</i>	Nigelle	0.91%	Analgesic, antiseptic, antispasmodic, appetizer, carminative, digestive disorders. Hepatic diseases, Astringent, laxative, purgative.
Rhamnaceae	<i>Rhamnus</i>	Nerprun	0.91%	
	<i>Zizphus lotus</i>	Jujubier sauvage	0.68%	Constipation, high cholesterol, neonatal jaundice, anxiety, diabetes.
Rosaceae	<i>Prunus domestica</i>	Prunier	0.68%	Relieves constipation, reduce cholesterol levels
Rutaceae	<i>Citrus limon</i>	Citron	0.91%	Common cold, antibacterial, anti-cancer.
	<i>Ruta graveolens</i>	Rue des jardins	3.44%	Antiseptic, constipation, colic, hypertension, menstrual pain, cardiac disease, vomiting.
Thymelaeaceae	<i>Thymelaea hirsuta</i>	Passerine hérissée	0.68%	Antidiabetic and antihypertensive
Urticaceae	<i>Urtica dioica</i>	Ortie	2.52%	Arthritis, anti-inflammatory.
Verbénaceae	<i>Verbena officinalis</i>	Verveine	4.13%	Indigestion, colic, emmenagogue, sedative, tonic.
Viscaceae	<i>Viscum album</i>	Gui	0.91%	Cardiovascular disease, indigestion
Zingiberaceae	<i>Curcuma longa</i>	Curcuma	1.83%	High cholesterol, osteoarthritis, anti cancer.
	<i>Zingiber officinalis</i>	Gingembre	3.44%	Carminative, cold, bronchitis, angina, cardiovascular disease.
Zygophyllaceae	<i>Peganum harmala L</i>	Harmel	0.68%	Colds, flu, antitussive, diarrhée, cardiovascular disease.

The floristic analysis helped us to distinguish 54 medicinal plants species listed in 27 botanical families (Table 1). Among these identified families, those are the most representative: Lamiaceae with (11 species) followed by Apiaceae (7 species), Cupressaceae (4 species), Myrtaceae (3 species), Asteraceae, Rhamnaceae, Liliaceae and Rutaceae have the same number of species (2 species).

### Discussion

The use of medicinal plants is much spread in North Africa and particularly in Algeria, this is what we noticed through this investigation. In our study, we found out that people of different ages have already used herbal medicine to treat their sickness especially people aged between 20 and 40 years old. This result confirms that obtained by several authors in neighbouring countries such as the Mehdioui and Kahouadji study (Mehdioui and Kahouadji, 2007). This can be explained by the fact that the young people are much more informed about medicinal plants thanks to social media which increasingly highlight the phytotherapy benefits through advertisements that market medicinal and cosmetics products based on medicinal plants.

We noticed that women use more frequently medicinal plants than men, these results are in agreement with studies results realized in many regions of Algeria and neighboring countries whose people share a common culture and traditions, have showed that generally the use of medicinal plant is higher among women than men (Mehdioui and Kahouadji, 2007; Sarri *et al.*, 2014), and perhaps because they finally understood that there are plenty of diseases today although we have no solution in the drug world and by solution we mean curative ones for the moment they are counting on anti-inflammatory drugs which cause sometimes undesirable effect while medicinal plants can relieve pain and treat some health issues without causing any toxic effect.

As for the family situation most of the people interrogated are married, these results are close to results obtained in Morocco (Benkhniqne *et al.*, 2011) with a percentage of 80% of people married, compared to 19.20% single, also an important rate of users have university level, this can be explained by the fact that people are now aware of the medicinal plants benefits by discovering it through books and reviews which contains all the details about herbal plants.

There are different parts in the medicinal plants that can be used it depends on the disease treated in other meaning one plant can be used differently we can use the leaves for treating a kind of health problem and the roots for another health problem, in our study leaves and seeds are the most used. The use of seeds is explained by the ease of their obtaining at the herbalist and their storage also, as for the use of leaves, this raised frequency can be explained by the ease and the speed of the harvest, but also by the fact that they are the seat of the photosynthesis and sometimes the storage of the secondary metabolites responsible for biological properties of the plant (Bigendako-Polygenis and Lejoly, 1990), these results are concordant with reports in many other ethnomedicinal studies like (Macia *et al.*, 2005). It should be noted that the uses of plant organs are sometimes combined. For some plant, leaves and fruits are used together (*Rhus tripartitum*, *Rhamnus alaternus*). For others, it is the leaves and stem (*Zygophyllum simplex*, *Argyrobium uniflorum*) or leaves and seeds (*Peganum harmala*, *Osyris alba*) [20].

In order to make easier the administration of the drug various methods of preparation are used like decoction, infusion, powder, fumigation, cataplasm and maceration, users are always looking for the simplest way to use herbal medicine. It is often reported that the infusion and decoction are the most preparation mode used like in ours because they collect the most active substances and mitigates or cancels the toxic effect of certain ailments (Salhi *et al.*, 2010; Sari *et al.*, 2012). This result shows also that the local population believes in decoction and infusion mode and finds it adequate to warm the body and disinfect the plant (Lahsissène *et al.*, 2009).

The ethnobotanical survey made in the city of Mostaganem allowed us to identify a number of medicinal plants showing that the population is highly dependent on these plants that allow them to treat various diseases, The floristic analysis helped us to distinguish 54 medicinal plants species listed in 27 botanical families most cited are Lamiaceae with (11 species), Apiaceae (7 species).

These results are in accordance with that obtained in neighboring cities (Hseini and Kahouadji, 2007). It can be explained by the fact that these families are the most spread in Algeria and that they are an important part of its flora (Quezel and Santa, 1963), and that perhaps these species are very rich in active substances that have healing powers.

The ethnobotanical study conducted allowed us to define 11 most used medicinal plants by the population of Mostaganem, *Thymus vulgaris* is the most medicinal plants commonly used due to its various benefits. Thyme has been thought of to be antiseptic, antimicrobial, medication, astringent, anthelmintic, medicinal drug, carminative, disinfectant, medicinal drug and tonic. This one is incredibly useful in cases of assorted intestinal infections and infestations, like hookworms, ascarids, gram-positive and gram-negative bacterium, fungi and yeasts as well. Its active constituent, thymol, is active against enterobacteria, it may also improve liver functioning and act as an appetite stimulant. It will be used in treatment of cartilaginous tube, bronchial and urinary infections. Used as a gargle, Thyme is helpful in treatment of laryngitis and inflammation. It is used for skin issues like oily skin, sciatica, acne, dermatitis, skin condition and bug bites (Prasanth *et al.*, 2014), followed by *Ammi visnaga* (khella) which has several constituents with known pharmacological activity, the plants is used as antispasmodic for colic and abdominal cramps, kidney stones, menstrual pain, and premenstrual syndrome, also used for respiratory conditions including asthma, bronchitis, cough, and whooping cough. It is also used for cardiovascular disorders including hypertension, cardiac arrhythmias, congestive heart failure, angina, atherosclerosis, and hypercholesterolemia. khella is used on the skin for vitiligo, psoriasis, patchy hair loss (*Alopecia areata*), wound healing, inflammation conditions, and poisonous bites (Meyer, 2002), followed by *Lavandula officinalis* this plant is used in pharmacy, phytotherapy and aromatherapy to treat central nervous system disorders, such as anxiety, stress, and sleep disorders (Lopez *et al.*, 2017).

There is also *Linum usitatissimum* which is usually used to lose weight, then *Foeniculum vulgare* a medicinal and aromatic plant with a diverse pharmacological benefits, Fennel water has properties similar to those of anise and dill water, which are used to treat flatulence of infants. Fennel tea also employed as a carminative, is made by pouring boiling water on a teaspoonful of bruised fennel seeds (Agarwal *et al.*, 2008), this plant is also used to treat Gastritis (Tene *et al.*, 2007) and irritable colon (Alzweiri *et al.*, 2011). There is also *Verbena officinalis* called commonly vervain, it is occasionally grown as an ornamental plant but perhaps more often for the powerful properties some herbalists ascribe to it (Kou *et al.*, 2013). *Verbena officinalis* herb has been used in traditional medicine internally as tea or liqueur for treatment of infections and fever (Schonbichler *et al.*, 2013).

Medical use of Common Vervain is usually as a herbal tea, also used in folk medicine for the treatment of inflammatory disorders (Calvo, 2006) skin burns, abrasions, and gastric diseases (Speroni *et al.*, 2007), followed by other plants as *Atriplex halimus*, *Rosmarinus officinalis*, *Zingiber officinalis*, *Chamaemelum nobile*, *Jumperus communis*, *Mentha pulegium*, *Cinnamomum verum*.

Through the study we deduced that the opinion of the population studied on herbal therapy is generally positive, the majority of the subjects think that herbal therapy is effective without side effects. These people even admitted that its effectiveness is assured, that it improves the quality of life and overcome the limits of modern medicine.

Each crop has a history of using medicinal plants to cure diseases. In Algeria the use of medicinal plants is a tradition of a thousand years. The most recent published work on Algerian medicinal plants is reported in Bloued and Baba Aissa work (Baba-aissa, 2000; Beloud, 1998).

### Conclusion

Many of the medicinal plants have a very interesting biological property, which are used in several applications and in various fields such as Medicine, Pharmacy.

For several years, the use of medicinal plants or herbal preparations has been increasingly successful. Today, more than half the world's population practices herbal therapy.

Traditional medicine is certainly an integral part of the Algerian population culture too. It has been used in Algeria thanks to the richness and diversity of its flora, the Ethnobotanical study made in Mostaganem indicates that the region is very rich in many plants which have a various benefits in traditional medicine used by the people. The ethnobotanical investigation revealed multitude results on the medicinal plants use, this results revealed a big diversity of plants (54 species identified belonging to 27 botanical families), very widely used by the studied population, the most frequently mentioned being Lamiaceae and Apiaceae. The leaves are the most used part with a percentage of (36%). Preparation mode the most common was infusion. Similarly, on all the diseases treated, digestive system diseases represent the most cited diseases (51%) with respiratory disorders (17%).

Finally, this ethnobotanical study allowed us to put in evidence the place of phytotherapy in the city of Mostaganem by inventorying various medicinal plants and identifying the different ways of using and exploiting these plants. This work is an important source of information that contributes to knowledge of the medicinal flora.

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