https://doi.org/10.48047/AFJBS.6.14.2024.12067-12081

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

Ethnobotanical study of medicinal plants used in the treatment of respiratory diseases in Setif region, Algeria

Nawel Merouani [1,*], Rachid Belhattab [2]

[1] Department of Vegetal Biology and Ecology, Faculty of Nature and Life Sciences, Ferhat Abbas University, Sétif-1, Algeria, Laboratory of Applied Microbiology

[2] Department of Biochemistry, Faculty of Nature and Life Sciences, Ferhat Abbas University, Sétif-1, Algeria, Laboratory of Applied Microbiology

***Corresponding Author:** nawelmerouani@yahoo.fr

Volume 6, Issue 14, Sep 2024

Received: 15 July 2024

Accepted: 25 Aug 2024

Published: 05 Sep 2024

doi: 10.48047/AFJBS.6.14.2024.12067-12081

Abstract

Medicinal plants are considered to be a very important natural source in the treatment of many diseases due to their richness in secondary metabolites in varying proportions depending on the plants and the environmental conditions.

In order to give an idea about the medicinal plants used in Setif to treat diseases that affect the respiratory system, we carried out an ethnobotanical survey that targeted 100 people from the local population, including herbalists.

The survey identified 43 plants species belonging to 23 families including Lamiaceae, which are the majority, followed by Asteraceae, Rutaceae, Myrtaceae, Apiaceae, Lauraceae....

The remedies are prepared mainly by infusion (% 34.88). The leaves of the plant are used in the treatment of respiratory diseases at a percentage of 41.86%, and are administered exclusively orally. The results obtained constitute a very valuable source of information for the region studied and for the national medicinal flora. They could be a database for further research in the fields of phytochemistry and pharmacology and with the aim of finding new natural substances.

Keywords: Setif (Algeria), Medicinal plants, Ethnobotany, Respiratory system diseases

Introduction

Medicinal plants are an important part of our natural wealth. They serve as important therapeutic agents as well as valuable raw materials for manufacturing numerous traditional and modern medicines. The history of medicinal plant use for treating diseases and ailments probably dates back to the beginning of human civilization. Our forefathers were compelled to use any natural substance that they could find to ease their sufferings caused by acute and chronic illnesses, physical discomforts, wounds and injuries, and even terminal illnesses. Since ancient times, plants with therapeutic properties have secured an important place in the healing practices and treatment of diseases (Abdul motaleb, 2011).

A medicinal plant is any plant which, in one or more of its organs, contains substances that can be used for therapeutic purposes, or which are precursors for chemo-pharmaceutical semi-synthesis. When a plant is designated as «medicinal»it is implied that the said plant is useful as a drug or therapeutic agent or an active ingredient of a medicinal preparation.

Medicinal plants may therefore be defined as a group of plants that possess some special properties or virtues that qualify them as articles of drugs and therapeutic agents, and are used for medicine (Chevallier, 2016).

About 500 herbs are still employed within conventional medicine, although whole plants are rarely used. In general, the herbs provide the starting material for the isolation or synthesis of conventional drugs. Digoxin, for example, which is used for heart failure, was isolated from common foxglove (*Digitalis purpurea*), and the contraceptive pill was synthesized from constituents found in wild yam (*Dioscorea villosa*).

From the earliest times, herbs have been prized for their pain-relieving and healing abilities, and today we still rely on the curative properties of plants in about 75 percent of our medicines. Over the centuries, societies around the world have developed their own traditions to make sense of medicinal plants and their uses. Some of these traditions and medicinal practices may seem strange and magical, others appear rational and sensible, but all are attempts to overcome illness and suffering, and to enhance quality of life.

Many of the thousands of plant species growing throughout the world have medicinal uses, containing active constituents that have a direct action on the body. They are used both in herbal and conventional medicine and offer benefits that pharmaceutical drugs often lack,

helping to combat illness and support the body's efforts to regain good health (Chevallier,2016).

Today, herbal remedies are coming back into prominence because the efficacy of conventional medicines such as antibiotics, which once had near-universal effectiveness against serious infections, is on the wane. Over the years, infectious organisms have developed resistance to synthesized drugs, and the herb sweet wormwood (*Artemisia annua*) and its active constituent artemisinin, for example, are now the standard treatment for malaria in tropical areas where the protozoa causing the infection no longer respond to conventional treatment.

Herbal medicine often complements conventional treatments, providing safe, well-tolerated remedies for chronic illnesses. It is experiencing a dramatic renaissance in Western countries, partly because no effective conventional treatment as yet exists for many chronic illnesses, such as asthma, arthritis, and irritable bowel syndrome. In addition, concern over the side effects of biomedicine is encouraging people to look for more gentle forms of treatment. It is estimated that 10–20% of hospital patients in the West are there due to the side effects of conventional medical treatment (Chevallier, 2016).

Moreover, providing modern medical healthcare across the world is still a far-off goal due to economic constraints. Thus, it is necessary that we continue to look for new and, if possible, more efficacious drugs, and the vast reserves of phytotherapy may be an ideal target.

Plants have played a significant role in maintaining human health and improving quality of life for thousands of years. In particular, herbs have been used as food and for medicinal purposes for centuries. In herbal medicine, the term herb refers not only to seed-producing plants but also bark, roots, leaves, seeds, flowers, and the fruit of trees (Mahadeva Rao and Subramanian, 2009).

According to the World Health Organization, about three-quarters of the world's population relies on traditional medicine for primary healthcare needs and most of this treatment involves use of plant extracts or their active components (Egan, 2002). However, the mechanism of action of most herbal medicines has not been fully understood, and experience obtained from their traditional use over the years should not be ignored (Elvin-Lewis, 2001).

The use of medicinal plants is increasing because of their widespread use and for their curative effects on various diseases (Selles et al., 2012).

The term ethnobotany was coined by John W. Harsberger in 1896 and was considered as the art of collection of useful plants by a group of people and the description of the uses of plants. Over the last century, ethnobotany has evolved into a scientific discipline that focuses on the

people- plant relationship in a multidisciplinary manner, incorporating not only collection and documentation of indigenous uses but also ecology, economy, pharmacology, public health, and other disciplines. Presently, ethnobotany has become increasingly valuable in the development of health care and conservation programs in different parts of the world. Ethnobotanical studies that explore and help to preserve knowledge are therefore urgently needed before traditional folklores are lost ever (Kunwar and Bussmann, 2008).
Respiratory system is the essential body part of living beings. Disturbance of it or its organ in respect of anatomy, physiology can cause severe disease or may be death. Care in normal condition as well as disease state is necessary (Patel et al., 2013).

The respiratory system can be affected by diseases ranging from a simple allergy to chronic asthma, bronchitis or even cancer. In order to give an idea of the situation of medicinal plants used in Setif to treat diseases of the respiratory system, we carried out an ethnobotanical survey which targeted 100 people from the local population to know the plants used and their method of preparation.

Materials and Methods

The ethnobotanical investigation was carried out in Setif, a city located in east Algeria, at 300 km of Algiers. The survey targeted 100 people from the local population (elderly people and traditional healers). Parts of plants used, ailments treated, prepations and mode of uses were recorded. The main focus was to collect the oral information about the ethnomedicinal uses of medicinal plants by local population in the treatment of respiratory diseases.

Data analysis

Quantitative analysis of ethnobotanical data was done by calculating the familiarity index Fi. The Fi, a relative indicator of the familiarity of a plant species, is defined as the frequency a given plant species is mentioned as a medicine divided by the total number of traditional healers interviewed in the study (Tabuti et al., 2004). The Fi was calculated as follows:

$$Fi = Na / Nb \times 100$$

Where Na is the number of informants that mention a species as a medicine and Nb is the total number of respondents (Chinsembu,2016).

Statistical analysis:

Questionnaires data were then transferred to Microsoft Excel 2007 and processed.

Results and Discussion

Ethnobotanical Study

Women and men use plants with a predominance of women. Indeed, 85% of women surveyed use this medicinal plant against 15% of men (**Figure 1**). This can be explain that women use traditional medicine in other domains than therapy and also because mothers give first aid especially to their children using herbs.

These results showed that women are more dependent on traditional phytotherapeutic knowledge that men.

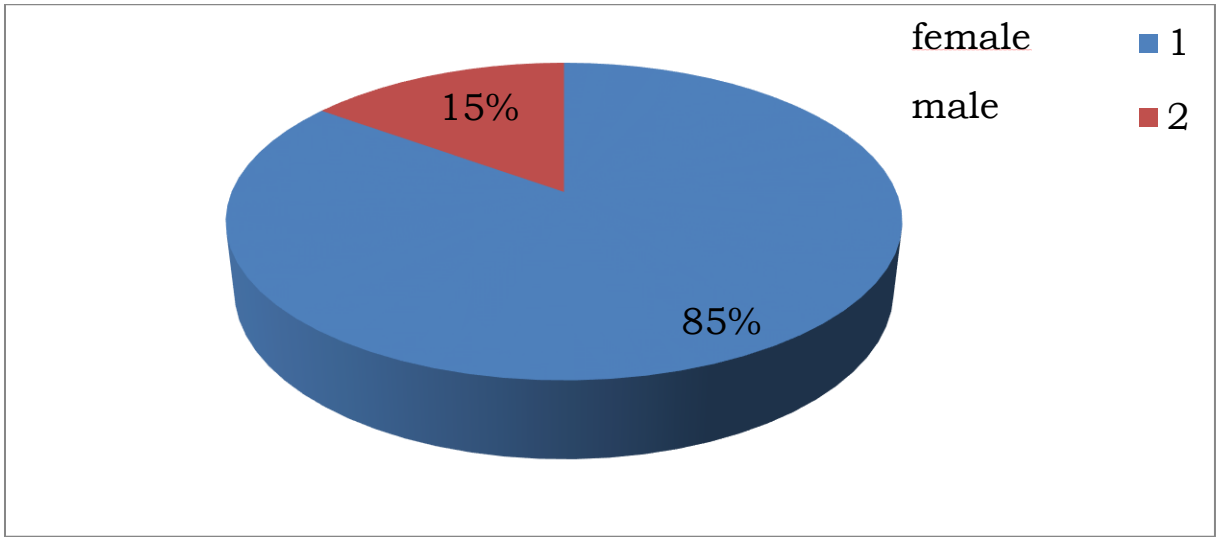

Figure 1. *Percentage of use of plants according to the sex*

A total of 43 medicinal plant species, distributed across 23families, have been reported to be used by local people in Setif region as remedies against respiratory system diseases (Table 1). Ethnomedicinal flora data related to the plants: families, scientific names, local names, plant parts used, preparation methods, frequency indices are in Table 1.

Table1. Medicinal plants used to treat respiratory system diseases in Serif Region, Algeria.

Family name	Scientific name	Local name	Plant Parts used	Preparation methods	Frequency index (Fi)
Anacardiaceae	*Pistacia lentiscus* L.	Darow	Leave and Flower	Decoction , oil	14
Apiaceae	*Pimpinella anisum* L.	Habate hlawa	Seed	Infusion	7
	Petroselinum crispum (Mill.) A.W.Hill.	Maadnous	Leave	Poultices	9
Asteraceae	*Tusilago farfara L.*	Hachichate el soual	Leave and Flower	Decoction, Infusion , Mixture powder - honey	15
	Anthemis nobilis (L.) All.	Baboundje	Flower	Decoction, Infusion ,	10
	Artemisia herba-alba Asso.	chih	Leave and flowers summits	Decoction, Poultices	5
	Artemisia absinthium	Chadjarate Meriem	Leave and flowers summits	Decoction	2
Brassicaceae	*Eruca sativa Miller.*	El djardjir	Leave	Juice	2
	Lepiduim sativum L.	hab rechad	Seed	Decoction, Infusion ,	38
Cactaceae	*Opuntia ficus-indica* L.	Nouarate el hindi	Flower	Mixture powder - honey	4
Fabaceae	*Glycyrrhiza globra* L.	Aargue el sousse	root	Decoction, Infusion ,	17
	Ceratonia siliqua	El kharoube	Fruit	Inhalation	3
Lamiaceae	*Origanum glandulosum Desf*	zaatar	Leave and flowers summits	Decoction, Infusion , Inhalation, local use with olive oil, mixture leaves –honey (oral)	71
	Mentha Spicata L.	naenaae	Leave and flowers summits	Decoction, Infusion ,	58
	Lavandula officinalis	khezama	Leave and Flower	Infusion , Inhalation	10
	Rosmarinus officinalis L.	Iklile el djabal	Leave	Infusion	15
	Mentha puleguim L.	fliou	Leave	Infusion	17

	Origanum majorana L.	El mardaouche	Leave and flowers summits	Decoction, Infusion , Mixture oil –honey	12
	Salvia officinalis L.	Siwak el nabiye	Leave and flowers summits	Decoction	4
	Ocimum basilicum L.	hebak	Leave	Decoction,	12
Lauraceae	*Cinnamomum* L.	El Karefa	Bark	Decoction,	18
	Laurus nobilis L.	El rande	Leave	Decoction,	6
Liliaceae	*Allium cepa* L.	El bassale	Bulb	Mixture of Bulb juice- honey, poultices	41
	Allium Sativum L.	El thoume	Bulb	Mixture of Bulb with oil or milk	29
Linaceae	*Linum usitatissimum* L.	zeriaat el katan	Seed	Mixture of Seed powder –sugar,burn seeds and in hale the smoke	10
Moraceae	*Ficus carica* L.	El tine	Fruit	Macerate Fruits with olive oil	10
Myrtacceae	*Eucalyptus globulus labill.*	El kalitousse	Leave	Burn leaves and in hale the smoke, Infusion the leaf powder	46
	Myrthus communis L.	El Rihan	Leave	Decoction	9
	Syzygium aromaticum L.	El krenefel	Fruit	Inhalation ,oil, poultices	20
Oleaceae	*Olea europea* L.	zitoun	Fruit	Mixture of oil -sugar	35
Papaveraceae	*Papaver rhoeas* L.	El khachkhache	Flower	Decoction	3
Pinaceae	*Pinus halepensis*	Aalk snouber	*Oleo-resin* (Gum)	Mixture of Gum-olive oil	34
Pteridaceae.	*Adiantum capillus venveris* L.	Sek el khadame	Whole plant	Decoction	3
Ranunculaceae	*Nigella sativa* L.	El haba el sawda	seed	Burn seeds and in hale the smoke, mixture seeds powder –honey or oil	14
Rutaceae	*Citrus limon* (L.)Burm. F.	El laymoune	Fruit	Mixture of Limon juice -honey	39
	Citrus sinensi L.	El bourtoukal	Fruit	Fruit juice	6
	Ruta chalepensis L.	El fidjle	Leave and	Decoction	2

			flowers summits		
Theaceae	*Camellia sinensis* L.	El chaye el akhdare	Leave	Decoction	3
Tiliaceae	*Tilia platyphyllos* L.	El zayzafoune	Flower	Infusion	9
Verbenaceae	*Lippia citriodora* (L)*Kunth.*	Tizana Louiza	Leave	Decoction , Infusion ,	28
Violaceae	*Viola odorata* L.	El banafssadje	Flower	Decoction mixture of powder – honey	3
Zingiberaceae	*Zimgiber officinale Roscoe.*	zanjabil	rhizome	Infusion	42
	Alpinia galanga (L.) sw.	khouldjlene	rhizome	Decoction , Infusion	23

Lamiaceae appeared as the most prominent family that contains 8 species, followed by Asteraceae (4 species,), Rutaceae(3species,) and Myrtaceaec 3 species (**Figure 2**).

The other families were represented by 1 and 2 plant species. The families Lamiaceae and Asteraceae had the highest diversity of species used to treat respiratory system infections probably because these families contain several species of plants.

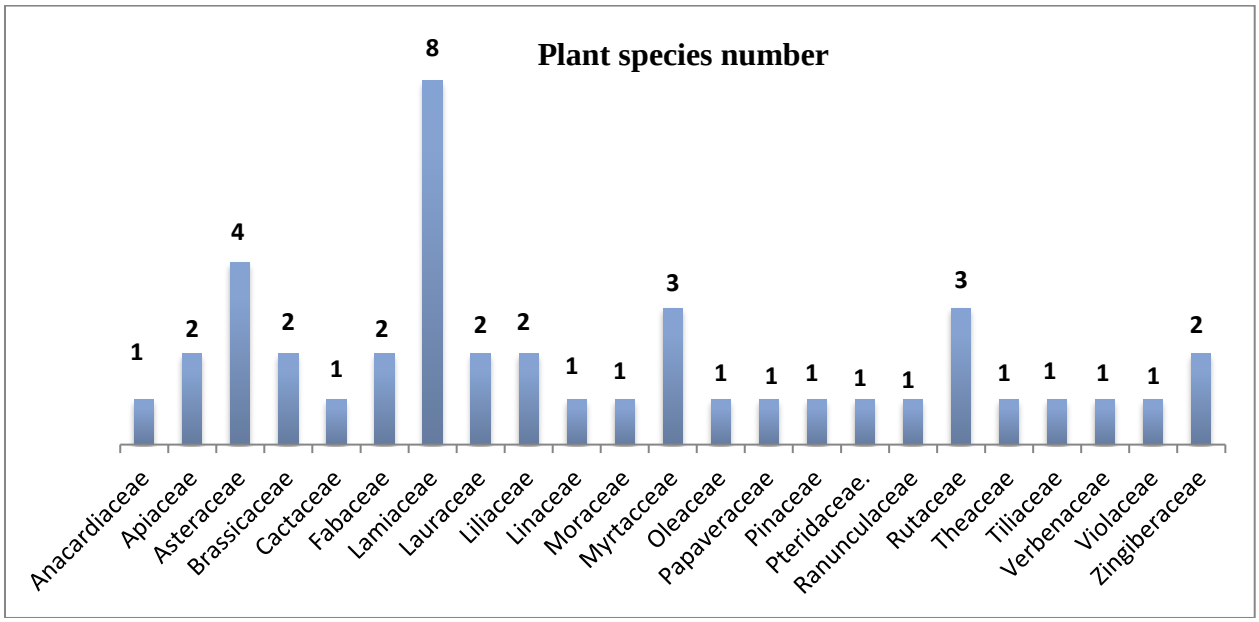

Figure2. *Plant families recommended by local healer for the treatment of respiratory system diseases. (Frequency of botanical families)*

This study revealed 10 commonly used plants: *Origanum glandulosum Desf, Mentha spicata* L., *Eucalyptus globulus labill. Zimgiber officinale Roscoe., Allium cepa* L.,*Citrus limon* L., *Lepiduim sativum* L., *Olea europea* L. and *pinus halepensis* (Table 1).

Each part of the plant has therapeutic properties. For this, medicinal plants can be used whole or in part (leaf, stem, root, bark, fruit).

Plant parts widely used by local people in the study area to treat respiratory system diseases include leaves, roots, seeds, fruits ….,The most plant parts used were leaves (41.86 %), followed by flowers ,seeds, fruits and roots (41.86 %, 23.25%, 13.95% , 11.62 %and 4,65%) respectively, other parts consist of only 4,67% (**Figure 3**).

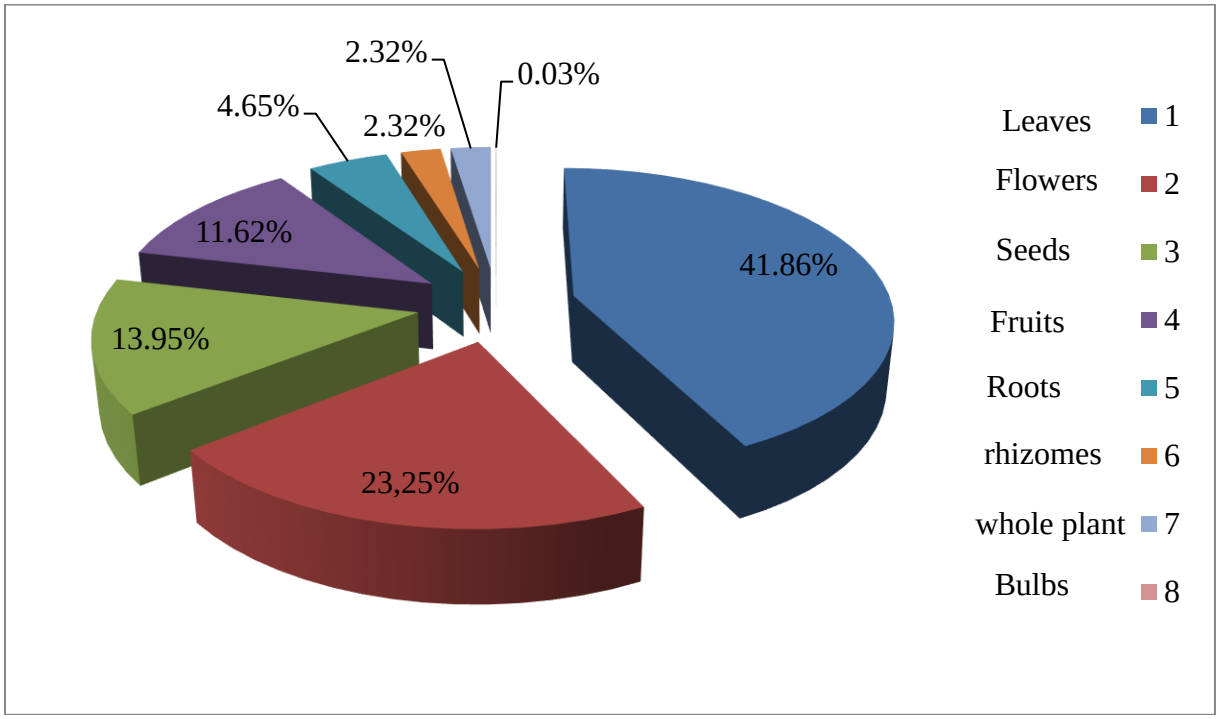

Figure3. *Percentage of different plant parts used to treat respiratory system diseases in the study area.*

Very common methods of remedy preparation in the study area were reported, as shown in Figure 4, Infusion of leaf and fruit (34.88%) was the most frequently used preparation method of medicinal plants, followed by decoction of roots and seeds (21.06%). For the powder preparation, cataplasm (external application) Bandaging/Dressing Topical poultices and as juice the percentages are respectively 16.27%, 10.62% and 9.91% .The lowest percentage was used for inhalation(Fumigation or smoke) 6,97 % and as ointment (0,29%). Smoke of the plant is inhaled to cure asthma.

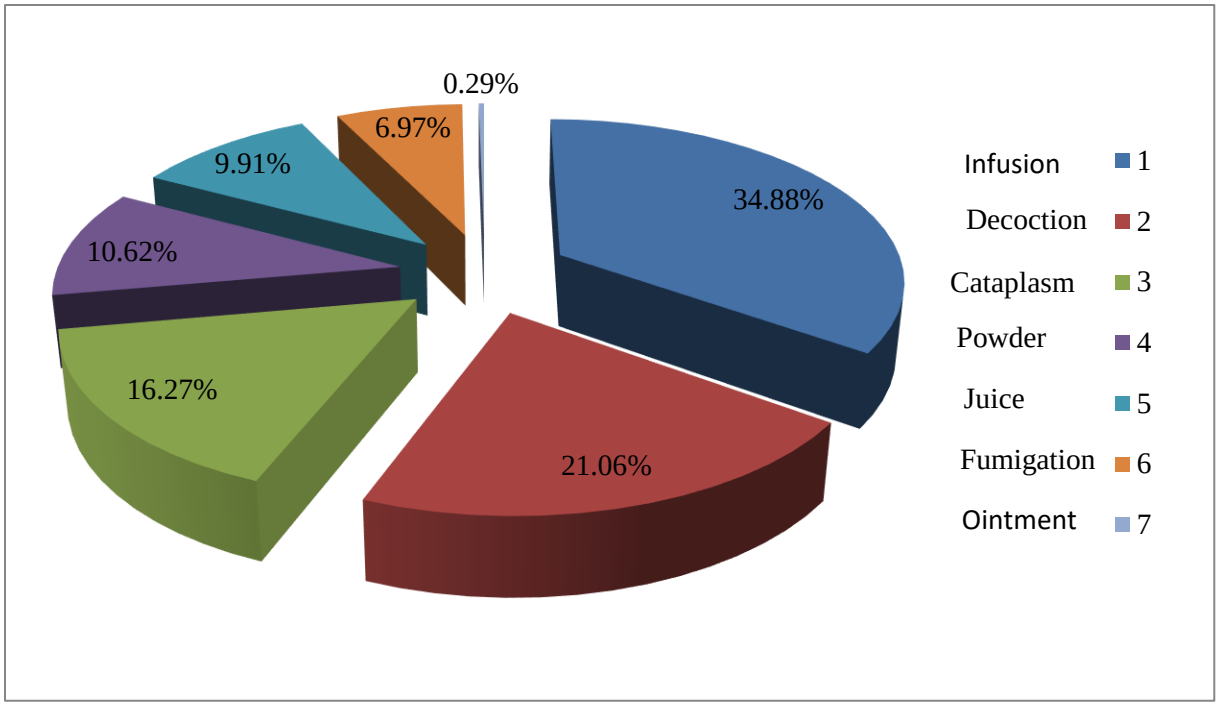

Figure 4. *Percentage of different preparation methods of medicinal plants used in the study area.*

Figures 2, 3 and 4, respectively show the plant families, Percentage of different plant parts used, and percentage of different preparation methods of medicinal plants for respiratory system diseases in the study area.

By comparing our study with the study conducted by El Hilah et *al*.(2015) in Moroccan central plateau , we find a similarity with regard to the most used plant family, the Lamiaceae family, with 16 species and the method of preparation, Infusion is the most popular method with a percentage of 72.50%., but there is a difference in the plant part used, where it was found the use of whole plant is the most common in the treatment of the respiratory diseases, with a percentage of 58.36%.

And also, the ethnobotanical and ethnopharmacological studies were conducted in the Rif region (northern Morocco) by Chaachouay et *al*. (2019), This study identified a total of 41 medicinal plant species belonging to 22 botanical families. The most important family is that of the Lamiaceae represented by 8 species. The leaf was considered the most used part of the plant and the majority of the remedies were prepared in the form of decoction.

Similarely Orch et *al*.,(2020) also contributed to a better knowledge of the medicinal plants used in the treatment of respiratory diseases, an ethnobotanical study was carried out among

the population bordering the Izarène forest(Morocco). The analysis of the results revealed 40 plant species, which fall into 19 botanical families. The *Lamiaceae* family was the most represented (14 species). The highest Relative Citation Frequency was recorded for *Mentha pulegium*. The leaf was considered the most used part of the plant, and most of the remedies were prepared by decoction.

Our results were consistent also with those obtained by Ben Akka et *al*.,(2017), The ethnobotanical study carried out in the region of Oum Rbia (Morocco) made it possible to identify the medicinal plants used by the local population and to collect the maximum information on this use against respiratory diseases. A survey of 1360 people from the region's population noted that 170 people use medicinal plants against respiratory diseases. Women accounted for 55.3% of the workforce versus 44.7% for men; the leaves are the most widely used part of the plant. Infusion and decoction are the most commonly used methods for preparing traditional remedies. The most widely used species in the treatment of respiratory diseases are: *Origanun glandulosum, Eucalyptus globulus, Nigella sativa, Mentha pulegium, Lavandula stoechas, Zingiber officinale, Ammodaucus leucotrichus, Ficus carica*.Thus, the survey made it possible to inventory 66 medicinal species which are divided into 36 plant families; Lamiaceae (21.2%), Myrtaceae (10.6%), Apiaceae (8.8%), Amaryllydaceae (7.7%) and Zingiberaceae (7.1%).

There are other studies that gave results that differ slightly from our results in terms of the family that uses it most, the plant part used, or the method of preparation.

According to the Kandel's study Medicinal plants are important in primary health care systems in Nepal, A total of 119 species belonging to 61 families is reported in the literature as being traditionally utilized in Nepal to treat various respiratory disorders. Most of the reported medicinal plant species belong to the family Araceae, Piperaceae, and Euphorbiaceae with 5 species in each family. Similarly, the most frequently used plant part is Root (25%) followed by Bark (13%), Seed (12%), Whole plant (11%), Rhizome (11%), Flower (9%), Fruits (8%), Leaves (7%) and 0thers (4%).

And also, Haile's et *al*., (2022) study is aimed at assessing and compiling the different ethnomedicinal studies in different parts of Ethiopia used to treat respiratory diseases. For this, a total of 65 articles of recent publications (from 2000 to May 2021years) that provided full information about the use of medicinal plant species to treat respiratory disorder diseases in Ethiopia were consulted. Based on this, a total of 96 medicinal plants belonging to 57

families were reviewed. The commonly recorded families used to manage respiratory problems were Asteraceae, Lamiaceae, Solanaceae and Fabaceae. Due to the easiest form of their preparation for treating respiratory disorders, leaves are the most cited plant parts followed by roots. Crushing and pounding are useful methods of remedy preparation to treat respiratory diseases.

Another Field survey was carried out over the period of 2years in study area, the local communities of Gallies Abbottabad, Northern Pakistan realized by Kayani and al.,(2014).The results are a total of 120 species of plants belonging to 90 genera of 51families were reported to be used ethnomedicinally for the treatment of 25 different respiratory disorders.

The medicinal plant families most commonly encountered in the study area were Asteraceae (14.2 % of use-reports) followed by Solanaceae (6%), Apiaceae (5%), Mimosaceae and Lamiaceae (4.2%).Leaves were the most commonly used plant parts and most of the herbal medicines were prepared in the form of decoctions and administered orally. The most significant species according to their use value were *Solanum virginianum*, *Althea officinalis*, *Inula obtusifolia*, *Saxifraga hirculus* and *Sisymbrium erysimoides*.

As for The ethnobotanical study carried out by Shawarb et *al*.,(2023) focused on the medicinal plants that are used to treat respiratory diseases in the northern part of Palestine; Nablus, Tulkarm, Qalqilia, and Jenin.

The study showed that 31 plant species of 19 families were used for respiratory disorders treatment. Six species were from the Lamiaceae family, three species from the Apiaceae family, two species from Amaryllidaceae, Fabaceae, Myrtaceae, Rutaceae and Zingiberaceae, and one plant species for each of the rest of families. Leaves and fruits were the most commonly used parts of plants. Decoction was the method of preparation and was taken as a hot drink. Chamomile, mint, sage, lemon, and ginger were in the recipes for the five respiratory diseases (flu, allergy, cough,sore throat and Bronchitis).

Conclusion

The study revealed that the area harbors a diversity of medicinal plants, and associated knowledge. Local people depend on medicinal plants to meet their basic health care needs. The dependency on these plant resources is associated with easy access, perceived efficacy, and cultural values attached to the plants.

This study documented the indigenous knowledge of medicinal plants that alleviate symptoms of diseases of the respiratory system in Setif, Algeria. Overall, 43 plant species found in 23 families and 38 genera were used in the management of respiratory diseases. Furthermore studies are needed to determine the biological activities, cellular safety, and to isolate as well as characterize the plants active compounds.

This ethno-medicinal survey of medicinal plants provides new areas of research on the effect medicinal plants. In the case of safety and effectiveness, they can be refined and processed to produce natural drugs.

References

Abdul motaleb, M.(2011). Selected medicinal plants of Chittagong hill tracts. *IUCN* (*International Union for Conservation of Nature*), Dhaka, Bangladesh . 116p.

Ben Akka, F., Benkhnigue,O. , Salhi, S., El Hilah, F., Dahmani, J., Douira, A. and Zidane, L.(2017).Ethnobotany Study of Medicinal Plants Used in the Treatment of Respiratory Diseases in the Middle Region of Oum Rbai. *International Journal of Environment, Agriculture and Biotechnology (IJEAB).*2(4),1460 – 1468.

Chaachouay, N., Benkhnigue,O., Fadli, M., El Ayadi, R. and Zidane, L.(2019). Ethnopharmacological studies of Medicinal and Aromatic Plants Used in the Treatment of Respiratory System Disorders in the Rif, Morocco.*Ethnobotany Research and Applications, journal of plants,people,and applied research* . 18(22): 1- 17. https://doi.org/10.32859/era.18.22.1-17

Chevallier, A.(2016). The Encyclopedia Of Medicinal Plants, Houghton Mifflin Edition, Third American Edition, 336 p.

Chinsembu, K.C.(2016). Ethnobotanical study of medicinal flora utilised by traditional healers in the management of sexually transmitted infections in Sesheke District, Western Province, Zambia.*Revista Brasileira de Farmacognosia*.26, 268–274.

Egan, C.D.(2002). Addressing use of herbal medicine in the primary care setting. *J. Am. Acad. Nurse Pract*. 14,166–171. https://doi:10.1111/j.1745-7599.2002.tb00108.x

El Hilah, F., Ben Akka, F., Dahmani, J., Belahbib, N. and Zidane, L.(2015)Étude ethnobotanique des plantes médicinales utilisées dans le traitement des infections du système respiratoire dans le plateau central marocain. *Journal of Animal &Plant Sciences*. 25(2), 3886-3897.

Elvin-Lewis, M. (2001). Should we be concerned about herbal remedies. *J. Ethnopharmacol.* 75,141–164. https://doi:10.1016/S0378-8741(00)00394-9

Haile, A. A., Tsegay, B. A.,Seid A, Adnew, W. and Moges, A.(2022). A Review on Medicinal Plants used in the Management of Respiratory Problems in Ethiopia over a Twenty-Year Period (2000–2021). *Evidence-Based Complementary and Alternative Medicine*. 1-14. https://doi.org/10.1155/2022/2935015

Kandel, B., Thakuri, B. S., Paudel, S., Sigdel, S., Khanal, P., Sapkota, K., Bhusal, B., Paudel, D., Mahara, S., Gurung, S., Ghimire, S., Subedi, P., Sapkota, P., Ghimire, C. P. and Gautam, D. (2020).Ethnobotanical uses of locally available plants for respiratory diseases by fifteen ethnic groups of Nepal: A review. *Asian Journal of Pharmacognosy* . 4(4), 11-21

Kayani, S., Ahmad, M., Zafar, M., Sultana, S., Khan, M. P. Z., Ashraf, M. A., Hussain, J. and Yaseen, G.(2014). Ethnobotanical uses of medicinal plants for respiratory disorders among the inhabitants of Gallies – Abbottabad, Northern Pakistan. *Journal of Ethnopharmacology*. 156, *47–60.* https://doi:10.1016/j.jep.2014.08.005

Kunwar, R. and Bussmann, R.(2008). Ethnobotany in the Nepal Himalaya. *Journal of ethnobiology and ethnomedicine*. 4(24),1-8. https:// doi:10.1186/1746-4269-4-24.

Mahadeva Rao, U. S. and Subramanian, S. (2009). Biochemical evaluation of antihyperglycemic and antioxidative effects of *Morinda citrifolia* fruit extract studied in streptozotocin-induced diabetic rats. Med Chem Res. 18,433–446.
https://doi. 10.1007/s00044-008-9140-1.

Orch, H., Zidane, L. and Douira, A.(2020). Ethnobotanical study of plants used in the treatment of respiratory diseases in a population bordering the forest of Izarène. *Journal of Pharmacy & Pharmacognosy Research*. 8 (5), 392-409.

Patel, D., Sharma, K., Chauhan, C. S. and Jadon, G. An Overview on Respiratory System. (2013). *International Journal of advanced research in pharmaceutical and biosciences* (*IJARPB*). 3(4),1-10.

Selles, C., Medjdoub, H., Dib, M. A., Zerriouh, M. and Tabti, B. (2012). Anti-diabetic activity of aqueous root extract of *Anacyclus pyrethrum* L. in streptozotocin-induced diabetic rats. *Journal of Medicinal Plants Research*. 6(16), 3193-3198. https:// doi: 10.5897/JMPR11.1693

Shawarb, N., Badrasawi, M., Abu Qaoud, H. and Hussein, F. (2023). An ethno-botanical study of medicinal plants used for the management of respiratory tract disorders in northern parts of Palestine. *BMC Complementary Medicine and Therapies*. 23(387), 1 – 11.

Tabuti, J.R.S., Dhillion, S.S. and Lye, K.A. (2004). The status of wild food plants in Bulamogicounty, Uganda. *Int. J. Food Sci. Nutr*. 55,485–498.

,