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Research Article

Traditional Herbal Remedies from Algeria for Treating Digestive Disorders

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Abstract

Due to their efficiency in many treatments, the employment of herbal remedies has retained its importance for leading a human life. Traditional knowledge is passed from one generation to the next, which is protected. This research aimed to analyze traditional herbal remedies used in treating digestive disorders by El-Oued people (Southeastern Algeria). The research was conducted from September 2021 to June 2022. One hundred individuals, including thirty plant vendors, were selected from different regions. Personal interviews and questionnaires were employed to collect the data. SPSS version 20 and Microsoft Office Excel 2007 were used to organize the data and conduct the descriptive statistics analysis. This investigation enabled the discovery of 40 species in 16 families and different genres. Lamiaceae, with 22.5 % plants, were the most used sources for the treatment, and 54 % of herbs were spontaneous species. The use of seeds at 21 %, dry parts at 92 % and infusion method at 48 % was most commonly used in herbal remedies preparations. The participants cited *Trigonella tibetana*, *Juniperus communis*, and *Punica granatum* as sources of digestive disorders treatment. El-Oued region has an extremely high number of herbal remedy species, which suggests that the region's traditional medicine serves as a source of knowledge about medicinal plants for treating digestive disorders and illnesses associated with them.

Keywords: Herbal remedies, Digestive disorders, Medicinal plants, Interviews.

INTRODUCTION

In general, the uses of medicinal plants to cure humans, and Africans in particular, have existed for thousands of years. The development of modern medicine has been strongly influenced by medicinal plants, which have played a significant role in the history of medicine ¹. Today, many drugs come from herbs, some of which are produced from plants and secondary metabolites that can treat disorders and diseases ^{2,37,38}.

Numerous studies have shown the therapeutic potential and ability of many secondary metabolites from herbal remedies, such as Hepatoprotective ³ Haemato-protective ⁴, Antibacterial ⁵, Antifungal ⁶, Antidiabetic ⁷, Cosmetics, and Food for their health benefits ⁸. Consequently, finding powerful natural sources has become a top priority for creating novel drugs in the pharmaceutical sector ⁹. Algeria has a diverse flora in its coastal regions, mountain ranges, high plateaus, steppe, and Saharan oases, including more than 3000 plant species from various botanical families. This is due to the country's geographic location, relief, and wide range of climates and soils. Moreover, this diversity is represented by aromatic and medicinal plants, most of which exist spontaneously ¹⁰.

The populations of the study region (El-Oued State) depend on agriculture for their food production and on natural plants for firewood, medicine, construction materials, and other cultural necessities. In order to advance ideas for the

sustainable use and protection of biodiversity, gathering and recording traditional knowledge about medicinal plants may be useful. This study focused primarily on herbal remedies for digestive problems and was carried out in the Algerian desert.

MATERIALS AND METHODS

Study area:

In Algeria, El-Oued is a large state, delimited between the longitudes 33° to 34° N and 6° to 8° E, located in the southeastern of Algeria, 620 km from the capital (Algeria), to the northern coasts of the Erg Oriental, where it is surrounded by: Ouargla, Djelfa, Biskra, Khencila, Tebessa and Libya (Figure: 01.). From the West El-Oued state is limited by the chott of Oued Righ, from the North by the chotts Merouane, Melghir and Rharsa, and by Tunisian chott El-Djerid which borders it to the East ^{11,12}. The soil of the El-Oued state region resembles other Saharan soils in many ways. This soil has a sandy texture and structure, is deficient in organic content, and has very high water permeability. Furthermore, El-Oued has high temperatures and significant thermal changes due to its continental location and proximity to the equator. Its summers are sweltering ¹¹. For the plant cover of the study area to be open, a different density and diversity are presented by spontaneous plants characterized by a speed of growth, small size, and adaptation facing the region's edaphic and climatic conditions ¹².*Methods:*

To conduct this study, only people with knowledge of medicinal plants were invited to complete a questionnaire during face-to-face interviews. More than 100 male and female respondents aged 25 to 60, with different levels of education and work were interviewed for Ethnobotanical data on medicinal plants used for the treatment of liver diseases. Encompassing numerous types of data such as the local name of plant species, Growth forms (spontaneous or

cultivated species), parts of plants utilized in the traditional treatment, preparation condition (dry or fresh), preparation procedure of medicinal plants ^{13,14,15}. We presented the specimens to several persons after collecting them to ensure that the results were accurate. The reported medicinal plant specimens were then identified by experts using the available Flora. The plant list has verified the scientific and authorship names of medicinal plants in (www.theplantlist.org).

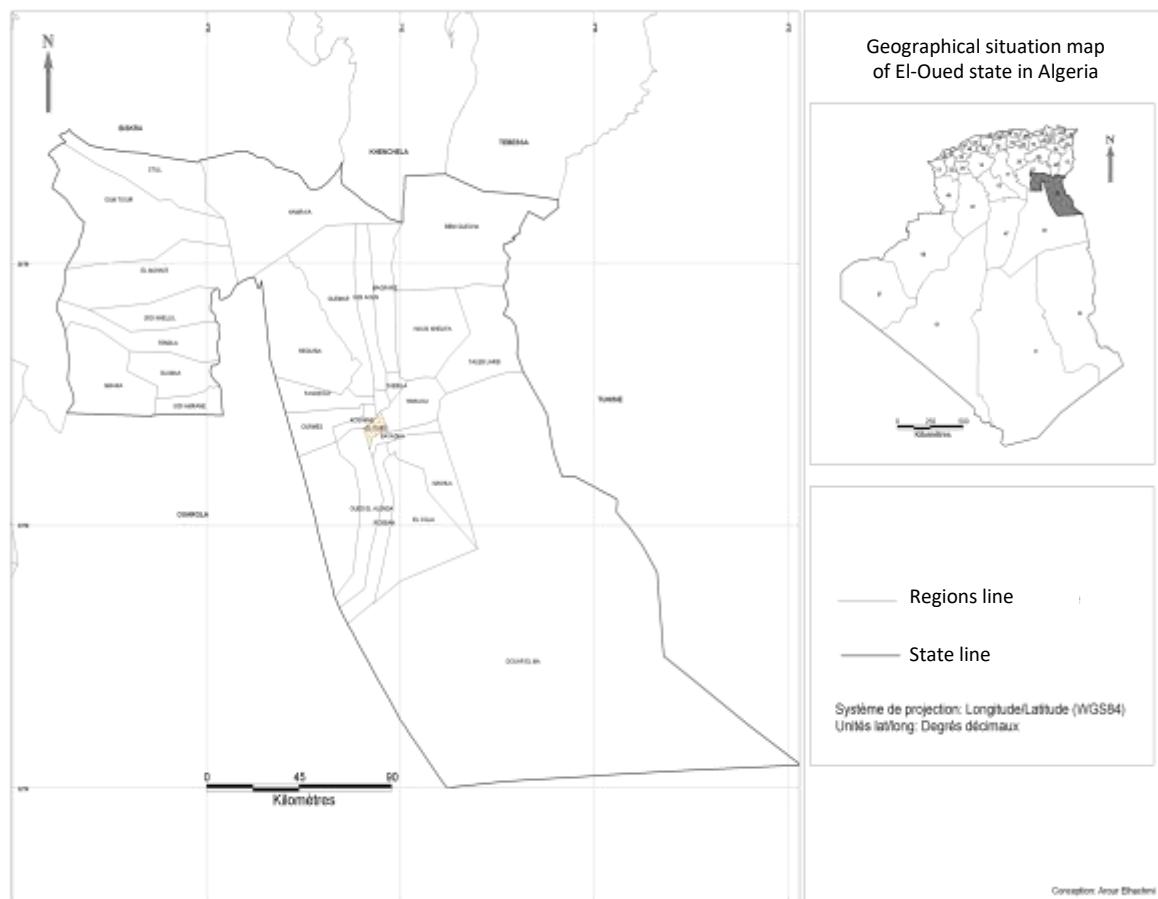


Figure 01: Map of the study area showing El-Oued region

RESULTS

Informant's details:

Results for gender, age group (In years), and educational statuses are summarized in table: 01. The most significant

number of informants (83 %) was male, and (17 %) was female. The age of informants was 20 to 40 years. On average, male informants reported more medicinal plants than informants female, with the educational status of informants ranging between (10 %) illiterate and (90 %) literate.

Table 1: Demographic details of the informants.

Parameters	Gender		Age group (In years)		Educational status	
	Male	Female	20-40 (Youngers)	41-60 (Elders)	Illiterate	literate
Percentage (%)	83	17	52	47	10	90

Medicinal plants used for digestive disorders

The data collected identified forty (40) medicinal plants from sixteen (16) botanical families presented in Table: 02, with the

Lamiaceae, Apiaceae, and Compositae families having the greatest representation.

Table 02: Identification and vernacular name of plants listed according to their frequency of use.

Family	Scientific name	Vernacular names	Frequency
Lamiaceae	<i>Lavandula stoechas</i>	Khzama	3
	<i>Teucrium polium</i>	Khaiata	1
	<i>Rosmarinus officinalis</i>	Iklil aljabal	2
	<i>Ocimum basilicum</i>	Raihan	4
	<i>Thymus vulgaris</i>	Zaatar	2
	<i>Origan marjolaine</i>	Mardkouch	1
	<i>Marrubium vulgare</i>	Mreyout	1
	<i>Salvia officinalis</i>	Miramya	3
	<i>Mentha crispa</i>	Naanaa	2
Apiaceae	<i>Coriandrum sativum</i>	Kousbour	1
	<i>Cuminum cyminum</i>	Kamoun akhdar	3
	<i>Foeniculum vulgare</i>	Besbas	5
	<i>Ferula assa -foetida</i>	Hentit	3
	<i>Ammodaucus leucotrichus</i>	Draiga	1
	<i>Apium graveolens</i>	Krafa	1
	<i>Pimpinella anisum</i>	Yansoun	2
Compositae	<i>Saussurea costus</i>	Keset Hendi	1
	<i>Anacyclus valentinus</i>	Gartoufa	1
	<i>Matricaria chamomilla</i>	Babounj	4
	<i>Artemisia absinthium</i>	Chih	2
	<i>Cichorium intybus</i>	Hendiba	1
Lythraceae	<i>Lowsonia inermis</i>	Hena	2
	<i>Punica granatum</i>	Romane	6
Lauraceae	<i>Laurus nobilis</i>	Raned	2
	<i>Cinnamomum verum</i>	Karfa	2
Zingiberaceae	<i>Zingiber officinale</i>	Zanjabil	5
	<i>Curcuma longa</i>	Kourcoum	1
Leguminosae	<i>Glycyrrhiza glabra</i>	Aregsous	3
	<i>Senna alexandrina</i>	Sanamaki	3
Fabaceae	<i>Trigonella tibetana</i>	Helba	9
	<i>Quercus afares Pомel</i>	Balout	1
Cupressaceae	<i>Thuja occidentalis</i>	Elafer	3
	<i>Juniperus communis</i>	Arar	6
Phyllanthaceae	<i>Phyllanthus emblica</i>	Amlaj	1
	<i>Umbilicus-veneris</i>	Esoura	1
Amaryllidaceae	<i>Allium sativum</i>	Thoum	2
	<i>Camellia sinensis</i>	Tay	1
Pinaceae	<i>Pinus halepensis</i>	Sanoubar	1
	<i>Aloysia citrodora</i>	Tisana	1
Verbenaceae	<i>Pistacia lentiscus</i>	Mestka elhoura	2
Anacardiaceae			

Medicinal plants parts and form used for digestive disorders

Table: 03 illustrate the various therapeutic plant, their growth form (Spontaneous or Cultivated), plant use, part of

the plant used (Leaves, Seed, Roots, Flower, Stems, Fruits, and entire plant), and use condition (Fresh or Dry) employed by traditional practitioners in the research area.

Table 03: Growth form, plant use, part used and condition for use of plants.

Species	Growth form	Plant use	Part used	Use condition
<i>Lavandula stoechas</i>	Cu	T	L+F+St	D
<i>Teucrium polium</i>	S	T	Ep	D
<i>Rosmarinus officinalis</i>	S	T+N	L	F
<i>Ocimum basilicum</i>	S	T	L	D
<i>Thymus vulgaris</i>	S	T	Ep	D
<i>Origan marjolaine</i>	S	T	L	D
<i>Marrubium vulgare</i>	S	T	L	D
<i>Salvia officinalis</i>	S	T	S	D
<i>Mentha crispata</i>	Cu	T+N	L	D
<i>Coriandrum sativum</i>	Cu	T+N	S+L	D+F
<i>Cuminum cyminum</i>	Cu	T+N	S	D
<i>Foeniculum vulgare</i>	S	T+N	S	D
<i>Ferula assa -foetida</i>	S	T	Ep	D
<i>Ammodaucus leucotrichus</i>	S	T	S	D
<i>Apium graveolens</i>	Cu	T	S	D
<i>Pimpinella anisum</i>	S	T+N	S	D
<i>Saussurea costus</i>	S	T	R	D
<i>Anacyclus valentinus</i>	S	T	S	D
<i>Matricaria chamomilla</i>	Cu	T	Fl	D
<i>Artemisia absinthium</i>	S	T+N	L	F
<i>Cichorium intybus</i>	S	T	S+L+Fl	F
<i>Lowsonia inermis</i>	Cu	T+C	L+Fl	D
<i>Punica granatum</i>	Cu	T	F	D
<i>Laurus nobilis</i>	S	T+N	L	D
<i>Cinnamomum verum</i>	Cu	T+N	S	D
<i>Zingiber officinale</i>	Cu	T+N	R	F
<i>Curcuma longa</i>	Cu	T+N	S	D
<i>Glycyrrhiza glabra</i>	S	T	R	D
<i>Senna alexandrina</i>	S	T	L	D
<i>Trigonella tibetana</i>	Cu	T	S	D
<i>Quercus afares Pomet</i>	S	T	S	D
<i>Thuja occidentalis</i>	S	T	Ep	D
<i>Juniperus communis</i>	S	T	L	F
<i>Phyllanthus emblica</i>	S	T	S	D
<i>Umbilicus-veneris</i>	S	T	L	D
<i>Allium sativum</i>	Cu	T+N	R	F
<i>Camellia sinensis</i>	Cu	T+N	L	D
<i>Pinus halepensis</i>	S	T	S	F
<i>Aloysia citrodora</i>	Cu	T	L	D
<i>Pistacia lentiscus</i>	Cu	T	Ep	D

S: Spontaneous, **Cu:** Cultivated, **C:** Cosmetic, **T:** Therapeutic, **N:** Nutrition, **L:** Leaves, **S:**Seed, **R:** Roots, **Fl:** Flower, **St:** Stems, **F:** Fruits **Ep:**Entire plant, **F:**Fresh, **D:** Dry.

Preparation mode, duration and doses of Medicinal plants used for digestive disorders

Results obtained for preparation modes, dose, and duration of treatment of medicinal plants used in the El-Oued state are

presented in Figure: 01. Local people in the study area used a different mode of preparation, such as powder or extract, and applied for the traditional medicines in infusion with dose equal 1/Day until the cure.

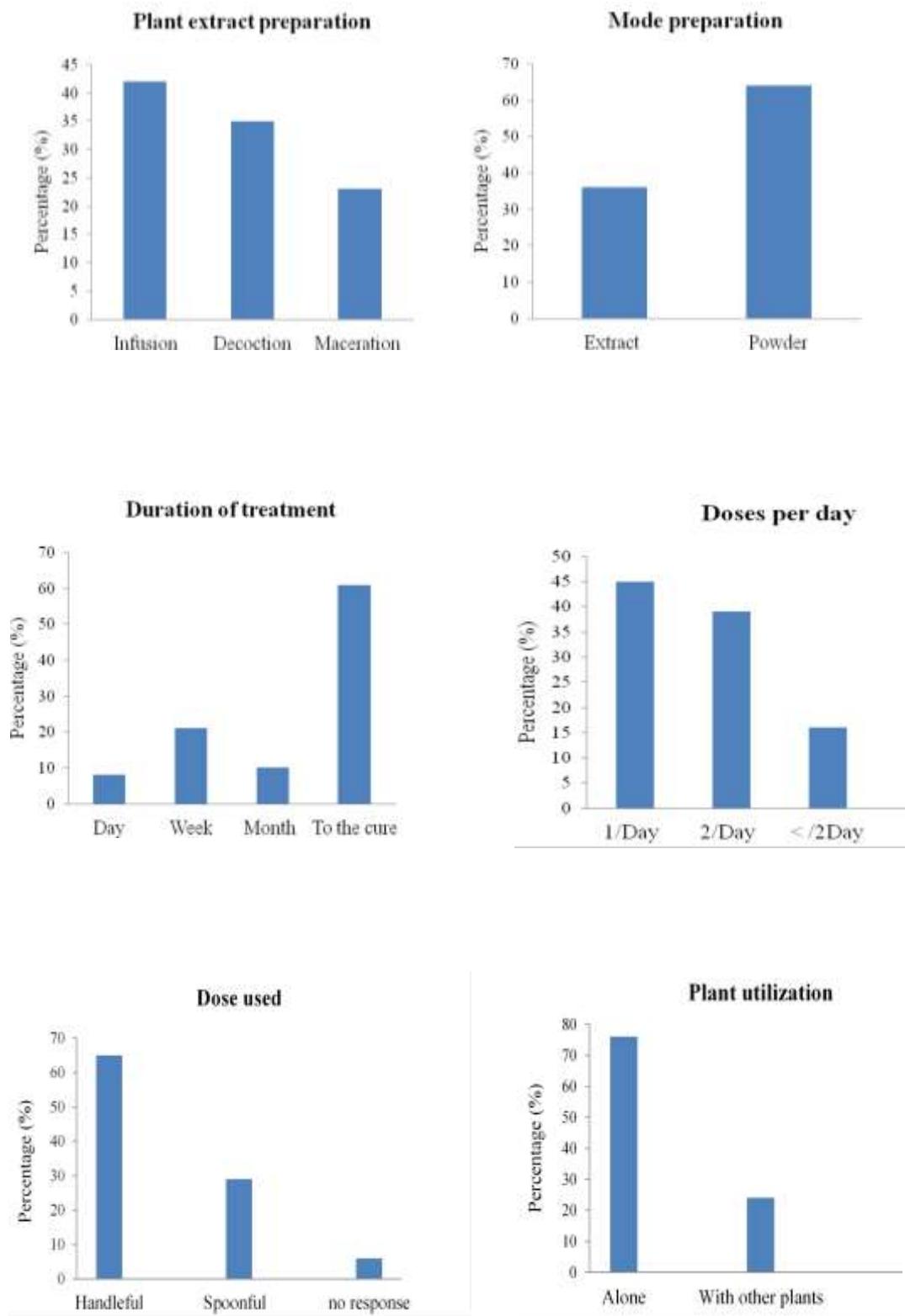


Figure 2: Preparation mode, duration of treatment and doses of plants used for treatment of digestive disorders.

Plants list used for treatment of different digestive disorders

The study area results demonstrated in table: 04 confirm that medicinal plants have an essential role in treating the

digestive system directly or indirectly and are accompanied by side effects of some medicinal plants.

Table 04: Plants list used for treatment of different digestive disorders.

Species	Pathologies							Secondary effects
	Gastric ulcer	Gastritis	Colic	Stomach gas	Stomach germ	Stomach acidity	Intestinal gases	
<i>Lavandula stoechas</i>	+							/
<i>Teucrium polium</i>	+							/
<i>Rosmarinus officinalis</i>	+				+			/
<i>Ocimum basilicum</i>						+		/
<i>Thymus vulgaris</i>				+				Raise blood pressure
<i>Origan marjolaine</i>	+							/
<i>Marrubium vulgare</i>	+					+		/
<i>Salvia officinalis</i>							+	/
<i>Mentha crispata</i>						+		/
<i>Coriandrum sativum</i>				+				/
<i>Cuminum cyminum</i>							+	/
<i>Foeniculum vulgare</i>						+		/
<i>Ferula assa -foetida</i>	+			+				Skin lesions
<i>Ammodaucus leucotrichus</i>					+			/
<i>Apium graveolens</i>	+				+			/
<i>Pimpinella anisum</i>	+						+	/
<i>Saussurea costus</i>					+			/
<i>Anacyclus valentinus</i>		+					+	/
<i>Matricaria chamomilla</i>	+	+	+					Itching and relaxation
<i>Artemisia absinthium</i>					+			Cause nausea
<i>Cichorium intybus</i>						+	+	/
<i>Lowsonia inermis</i>	+							/
<i>Punica granatum</i>	+					+		stomatitis
<i>Laurus nobilis</i>				+				/
<i>Cinnamomum verum</i>		+						Diarrhea
<i>Zingiber officinale</i>					+			Causes heartburn
<i>Curcuma longa</i>		+						/
<i>Glycyrrhiza glabra</i>		+			+			Sweating a lot
<i>Senna alexandrina</i>							+	Abortion
<i>Trigonella tibetana</i>					+	+	+	Low blood sugar
<i>Quercus afares Pomel</i>	+							/
<i>Thuja occidentalis</i>			+			+		/
<i>Juniperus communis</i>	+	+						/
<i>Phyllanthus emblica</i>	+						+	/
<i>Umbilicus-veneris</i>		+						/
<i>Allium sativum</i>	+			+				/
<i>Camellia sinensis</i>		+						Insomnia
<i>Pinus halepensis</i>	+	+						/
<i>Aloysia citrodora</i>				+				Peaceful sleep
<i>Pistacia lentiscus</i>				+				/

DISCUSSION

One of the most prevalent medical conditions that affect people is digestive system problems. Numerous ethnomedical investigations have shown that traditional people worldwide regularly employ medicinal herbs to treat digestive system

problems ¹⁸. Consequently, fewer female than male respondents were interviewed during the present study. Several aspects influence ethnobotanical fieldwork; the sociocultural framework of the society, the actual circumstances, the willingness of the informants, and the related sociocultural limits ¹⁶. The younger participants in the

study mentioned that more categories use medicinal plants than older participants. Additionally, the results do not support the findings of the Kidane et al., (2018) study ¹⁷, which found that illiterate informants knew more about herbal remedies than literate people.

According to this study, El-Oued state people in Algeria use 40 different types of medicinal plants to cure digestive diseases, and they are classified into 16 families. The most significant number of herbal species (9 species) is from the Lamiaceae family. They are followed by Apiaceae (7 species) and Compositae (5 species). The other families are represented by many species ranging from 1 to 2. The findings differ from what Tangjiman et al., (2015) ¹⁸ receives: Zingiberaceae (6 species), Euphorbiaceae (4 species), and Fabaceae (4 species). One of the most significant herbal families, the Lamiaceae, contains many plants with biological and therapeutic uses that face gastrointestinal disorders. The most well-known members of this family include several different fragrant spices, including thyme, mint, oregano, basil, sage, savory, and rosemary ¹⁹. In the same context, the result indicates the significant taxonomic variety of medicinal plants in the research region and the extensive information related to their use in conventional digestive disease treatment ²⁰.

The used plant species' for digestive diseases treatment characteristics showed that 60 % grew spontaneously in the wild and 40% were cultivated. In similar, results of recent research are shown that the uses of spontaneous medicinal plants are so superior (90 %) to cultivating species (10 %) ²¹. this finding about growth forms with (59 % of spontaneous plants) and (41 % of cultivated species) has been reported by another author ²². The concentrations of bioactive substances in medicinal plants (spontaneous or cultivated species) change depending on several factors. These levels can be impacted by factors like extraction techniques, genotype, maturity, storage conditions, and even the type of soil used for growing. Its usefulness may also depend on when and how the plant is harvested ²³. Compared to other plant organs, leaves were the ones the El-Oued people utilized most frequently to make remedies. Numerous investigations also demonstrated the importance of the leaf in creating treatments ^{24, 25, 26}. The primary photosynthetic organ of plants, leaves are considered an essential part of the natural pharmacy for synthesizing numerous active ingredients, especially those that are more pharmacologically effective against illnesses ²⁷. Given that, in most instances, at least a few leaves are left on the parent plant, which subsequently permits the plants to continue their life functions, leaf collection might be marketed as a sustainable practice [28]. On the other hand, analysis results for the preparation state of medicinal plants (fresh or dry) showed that most medicinal plants were created from dry plant materials (77 %). In the comparison, medicinal plants were prepared from fresh plant material (23%). The findings contrast with those of several studies ^{29, 30, 31}.

Traditional medicine employs several preparation techniques for plants, such as extraction, powder, oils, essential oils, capsules, and cataplasm. Users are actively searching for the simplest method to prepare herbal treatments. Information regarding the usage of medicinal plants and their therapeutic characteristics can vary from person to person ³². This investigation showed that most herbal medicines were delivered orally until the cure using extract preparation and were discovered to be prepared mainly by infusion (42 %) and decoction (34 %) are the most popular preparation techniques ¹⁸.

In many different nations and regions, including Ethiopia, Brazil, the Peruvian Andes, and Bolivia, digestive diseases

were the most prevalent usage categories. Interestingly, past ethnomedical examinations in various parts of the world revealed that 33 investigated plants had been utilized for treating digestive system diseases ^{33, 34, 35, 36}. Furthermore, 23 investigated plants had similar uses to those in other research. It is possible that the frequent use of these plant species by El-Oued people is a sign of their efficacy and demonstrates the importance of medicinal plant knowledge for treating digestive system diseases.

During the interview with non-specialist informants, 100 actual use records were recorded. These are related to ten different diseases. The most often recorded condition was a gastric ulcer, which made up slightly more than 23 % of all user records. Diarrhea, Gastritis, Stomach gas, and constipation were other prominent conditions ¹⁸. Overall, several plants showed effective biological defenses against various digestive disorders. A literature search revealed, however, that several of the therapeutic herbs utilized by people had not been examined in any pharmacological investigations on the gastrointestinal tract. Therefore, investigating the biological research of some of the medicinal plants utilized by El-Oued people to treat digestive system ailments is highly interesting.

CONCLUSION

This study demonstrated that several medicinal plants in the study region (El-Oued state, Algeria) might be used to cure various digestive illnesses. Forty plant species belonging to 16 families were recorded during this study, with the predominance of Lamiaceae. Digestive system diseases are treated mainly by foliage, the most used plant organ; on the other hand, infusion represents the region's most dominant preparation method of traditional medicine. Traditional herbal use persists in the El-Oued region, despite easy access to modern healthcare and medicines. Thus, this work constitutes a source of information that will contribute to the widespread local knowledge of the medicinal flora. It can also provide a database for the exploitation of this valuable resource in order to discover new active ingredients usable in pharmacology.

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Author's contribution

Djahra Ali Boutelis: Conceptualization, Methodology, Investigation, Data curation, Writing – original draft, preparation, Writing –review & editing, Funding acquisition. Lmhanat Iman: Visualization, Investigation, Validation. Benkaddour Mounia and Benkerara Salah: Investigation, Writing – review & editing. Laib Ibtissam and Benine Chaima: Writing – review & editing. All authors have read and approved the final manuscript.

Conflicts of interest

There are no any conflicts of interest declared by authors.

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