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Review article: Master's research based.

Ethnobotanical survey on medicinal plants used for cancer patients at the Saida hospital.

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Abstract

The main aim of our work was to identify the medicinal plants used to treat cancer and determine their traditional uses in the wilaya of Saida, Algeria. To this end, an ethnobotanical survey was carried out among 120 cancer patients.

A 120 of the patients were found to have used phytotherapy for symptomatic treatment. The parameters of our survey included gender, age, region, type of cancer, type of plants used and side effects were registered and organised in a table form that displays each cancer type and it's corresponding parameters.

This study also enabled the identification of 15 species, the most used being *Thapsia garganica* (Thapsia), *Ephedra vulagaris* (Ephedra) and *Aquilaria malaccensis* (Aquilaria).

Finally, it is noted that the use of traditional medicine is widely accepted, and the conventional use of these plants can be rationalised due to their richness in active components.

Key words

Cancer, Phytotherapy, Ethnobotanical study, Saida.

Introduction

According to the World Health Organization (WHO), cancer is one of the leading causes of death worldwide, responsible for approximately 10 million deaths in 2020. The most frequently diagnosed cancers in 2020 were breast cancer (2.26 million cases), lung cancer (2.21 million cases), colorectal cancer (1.93 million cases), prostate cancer (1.41 million cases), No-melanoma skin cancer (1.20 million cases), and stomach cancer (1.09 million cases). The leading causes of cancer deaths were lung cancer (1.80 million deaths), colorectal cancer (916,000 deaths), liver cancer (830,000 deaths), stomach cancer (769,000 deaths) and breast cancer (685,000 deaths) (Global Cancer Observatory) (World Health Organization (WHO)).

In Algeria, cancer is a major public health concern. According to the International Agency for Research on Cancer (IARC), the number of new cancer cases in Algeria in 2020 was around 49,000, with the most common cancers being breast cancer, prostate cancer and lung cancer. Breast cancer is the most common, particularly affecting women, while prostate cancer is most common in men. The high prevalence of cancer in Algeria is attributed to factors such as smoking, infections (e.g., hepatitis B and C), and changes in lifestyle and dietary habits (Global Cancer Observatory) (EMRO - WHO).

Ethnobotany

Ethnobotany is a multifaceted field that explores the complex connections between plants and human societies. It includes the study of how various crops interact with plants, including their traditional knowledge, uses, and management practices (Balick & Cox, 1996).

This discipline examines the cultural, ecological, and economic dimensions of plant use, illuminating the diverse ways in which different communities integrate plants into their lives. Ethnobotanical research explores topics such as traditional medicine, food systems, ritual practices, and ecological management strategies, offering valuable insights into the complex relationship between humans and their botanical environment (Cotton, 1996).

Cancer

Cancer is defined as "a group of diseases characterized by uncontrolled growth and the spread of abnormal cells. If the spread is not controlled, it can lead to death" (American Cancer Society, 2023). Cancers can form in almost any tissue or organ in the body, and tumors can be benign (No cancerous)

or malignant (cancerous), the latter having the ability to invade nearby tissues and spread to other parts of the body via the blood and lymphatic system (National Cancer Institute, 2023).

The causes of cancer are multiple and include genetic factors, environmental exposures, such as chemicals or radiation, as well as lifestyle habits, such as smoking and poor diet (World Health Organization, 2023). In terms of prevention, strategies include reducing exposures to carcinogens, promoting healthy lifestyles, and vaccinating against certain viruses that can cause cancer (Centers for Disease Control and Prevention, 2023).

Cancer is a complex, multifactorial disease characterized by the uncontrolled growth and spread of abnormal cells in the body. These cells have lost the ability to regulate their growth and division, leading to the formation of tumors or tissue masses that can invade surrounding tissues and organs. Cancer can occur in virtually any part of the body and can manifest in different forms, each with its own unique characteristics and behaviors (American Cancer Society, 2022).

Cancer is a group of heterogeneous diseases characterized by the abnormal proliferation of cells, which can infiltrate and destroy surrounding tissues and organs. This uncontrolled growth usually results from genetic mutations or epigenetic alterations that disrupt the normal regulatory mechanisms governing cell cycle progression, apoptosis, and DNA repair (American Cancer Society, 2022).

The development of cancer involves a complex interplay of genetic, environmental, and lifestyle factors. These factors may include exposure to carcinogens (such as tobacco smoke or ultraviolet radiation), viral infections (such as human papillomavirus or hepatitis B virus), genetic predisposition (inherited mutations in tumor suppressor genes or oncogenes), hormonal influences, immune dysfunction, and chronic inflammation.

Cancer cells exhibit several fundamental characteristics that distinguish them from normal cells, including sustained proliferative signaling, growth suppressor evasion, resistance to cell death, activation of invasion and metastasis, induction of angiogenesis, and evasion of immune destruction. These features allow cancer cells to proliferate uncontrollably, avoid immune surveillance, and spread to distant sites in the body, leading to the formation of secondary tumors or metastases (Hanahan & Weinberg, 2000).

Cancer diagnosis and treatment typically involve a multidisciplinary approach, including imaging studies (such as computed tomography or magnetic resonance imaging), histopathological

examination of tissue biopsies, molecular profiling of tumors, and various therapeutic modalities (such as surgery, chemotherapy, radiotherapy, targeted therapy, immunotherapy, or combination regimens). The selection of treatment modalities depends on factors such as the type and stage of cancer, the patient's overall health, and preferences (National Cancer Institute, 2022).

Medicinal plants

Medicinal plants, in their diversity, refer to plant organisms used for therapeutic purposes because of their bioactive components that have healing properties. They are used in traditional and complementary medicine to prevent, treat or relieve various ailments and diseases. According to the World Health Organization (WHO, 2020), herbal remedies are "plants that contain active ingredients that can be used for therapeutic purposes or are precursors to pharmaceutical substances." The use of herbal medicines has gained popularity in recent decades due to their therapeutic potential and the growing interest in natural health approaches (Ekor, 2014). They have become increasingly important subjects of study in the field of pharmacology and medicine, due to their potential for the discovery of new drugs (Fabricant & Farnsworth, 2001).

Herbal medicine

Herbal medicine, also known as herbal medicine or botanical medicine, involves the use of plants or plant extracts for medicinal purposes (Gertsch, 2009). This practice has been an integral part of traditional medicine systems around the world for centuries and continues to be widely used today (Sarris & Wardle, 2010). Herbal medicine encompasses a diverse range of practices, from the use of specific parts of the plant such as leaves, roots, or seeds, to the extraction and formulation of active compounds for therapeutic purposes (Gertsch, 2009).

Herbal medicine is a form of traditional medicine that relies on the use of medicinal plants for therapeutic purposes. It is based on the idea that plants contain a variety of active chemical compounds that can have beneficial effects on human health. These active compounds can include essential oils, flavonoids, tannins, alkaloids, polysaccharides, and many others (Heinrich et al., 2012).

The use of plants for medicinal purposes dates back to ancient times and is present in many cultures around the world. Modern herbal medicine combines traditional knowledge about medicinal plants with scientific research methods to assess their efficacy and safety (Heinrich et al., 2012).

Herbal medicines can be used in a variety of ways in herbal medicine, including herbal teas, liquid extracts, capsules, tablets, ointments, or essential oils. Each herb has its own medicinal properties and can be used to treat a wide range of conditions, from digestive and respiratory disorders to dermatological, musculoskeletal, and even psychological problems (Heinrich et al., 2012).

Herbal medicine is often used as a complementary approach to conventional medicine, although it can sometimes be used as a primary treatment, especially in cultures where traditional practices are widely accepted (Heinrich et al., 2012).

Scientific research is conducted to evaluate the efficacy and safety of herbal medicines, as well as to understand their mechanisms of action. These studies help to establish appropriate dosing protocols and identify potential interactions with other drugs (World Health Organization, 2013).

Herbal medicine is often seen as a holistic approach to health, taking into account not only physical symptoms, but also the emotional, mental, and environmental aspects of well-being. This can include practices such as meditation, relaxation, and lifestyle changes to promote healing and overall health (Heinrich et al., 2012).

Forms of use:

Infusions or Herbal teas:

Infusions or herbal teas involve infusing plant materials, such as leaves, flowers or roots, in hot water to extract their medicinal properties (Posadzki et al., 2013).

Tablets or Capsules:

Plant extracts are often encapsulated or compressed into tablets or capsules for convenient consumption and standardized dosing (Williamson, 2001).

Dyes:

Tinctures are concentrated liquid extracts of plants, usually prepared by soaking plant matter in alcohol or vinegar (Gafner & Boon, 2008).

Essential Oils:

Essential oils are volatile compounds extracted from plants through processes such as steam distillation or cold pressing, valued for their aromatic and therapeutic properties (Baser & Buchbauer, 2015).

Poultices or Compresses:

Poultices or compresses involve applying crushed or soaked plant material directly to the skin to relieve inflammation, pain, or other ailments (Sparavigna & Setaro, 2018).

Decoctions:

Decoctions are concentrated plant preparations made by boiling plant parts, such as roots or bark, in water to extract the medicinal constituents (Sofowora, 2013).

Ointments or Creams:

Ointments or creams containing plant extracts are applied topically to the skin for a variety of purposes, including wound healing and skin problems (Liu et al., 2016).

Inhalations:

Inhalation therapy involves inhaling the vapors of plant aromatic compounds, either by inhaling vapor or using diffusers, for respiratory or aromatherapy purposes (Li et al., 2019).

Powders:

Plant powders are finely ground plant materials used internally or externally for therapeutic purposes, often added to beverages, foods, or skin care products (Oliveira et al., 2018).

Capsules:

Herbal extracts are encapsulated in gelatin or vegetarian capsules for oral administration, providing a convenient and tasteless delivery method (Gul et al., 2017).

Materials and methods

The study took place in the oncology department of the Ahmed Medaghri Public Hospital (EPH) in the willaya of Saida, the operation of the EPH is led by staff: Medical and paramedical, administrative and security, An on-call report takes place every working day from 8 a.m. to 4 p.m. and another from 4 p.m. to 8 a.m., so the service is open 24 hours a day, The staff of the department headed by the head of department. During this staff, the on-call team reports on the activities and events that have taken place over the past 24 hours, The service provides the therapeutic day provided by the doctors. A visit is made every day to the different inpatient units directed by the security guard every day from 1:00 p.m.

Protocol of questioning

This is a descriptive cross-sectional study based on a questionnaire on the use of medicinal plants by cancer patients. The questionnaire was distributed to 120 patients (31 men and 89 women), hospitalized for one month (2024), in the oncology department of the Ahmed Medaghri Hospital in Saida. Participants were not given any incentives and were able to withdraw from the study at any time. All data obtained is kept confidential.

The following questions were centered on a form that contains the following questions:

Basic questions on Sex, The region, Age and Weight.

Question about the disease, Type of cancer, Duration of illness and Family history.

Questions about risk factors, social scourges (Nicotine, Alcohol), Feeding and Workplaces exposed to harmful substances.

Questions about chronic diseases, If the disease was present before, during or after the cancer diagnosis.

Questions about the types of treatments, Pharmaceutical, Chemotherapy, Radiotherapy and Surgery.

Questions about plants, Type of plants, Duration of use, Adjunctive or Alternative Use of Medical Treatment, Forms of use, Results and experience and Effects.

Results

Sex

The results reveal a significantly unbalanced distribution of cancer cases between the sexes, with a marked predominance in females, accounting for 74% of cases compared to only 26% in men. This disparity raises important questions about gender differences in health and highlights the need for a deeper understanding of the factors underlying this trend. The remark highlights the importance of continuing to explore gender dynamics in health and developing gender-responsive approaches to address these disparities, Fig 1.

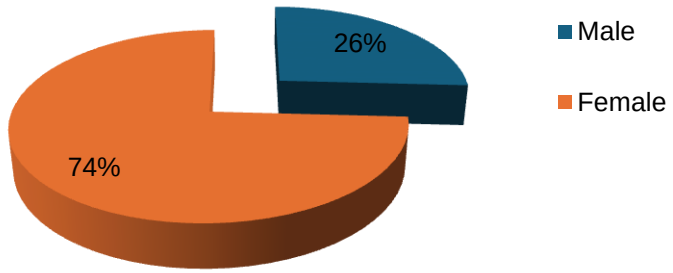

Fig 1. Distribution of the "Illness" by sex.

A significantly unbalanced distribution of cancer cases between the sexes, with a marked predominance in the females reaching 74% of cases contrasted by only 26% in men.

Age

Breakdown of the survey results by age of cancer patients is reflected in Fig2. The following depicts an analysis of this data:

1. Age < 20 years: 1%

This category represents a very small proportion of patients. This is consistent with the generally low incidence of cancer in children and adolescents.

2. Age 20-30 years: 0%

The absence of patients in this age group may seem surprising, but it is possible. Cancers are generally less common in this age group.

3. Age 30-45 years: 19%

This age group represents a significant proportion of patients. Although cancers are less common in young adults, certain types of cancers (such as breast, colon, and testicular cancers) can appear at this age.

4. Age 46-55 years: 38%

This is the age group most represented in the results, which is consistent with general statistics showing an increase in cancer incidence as people age. Early screening and diagnosis are more common in this age group.

5. Age 56-60 years: 12%

- This proportion is relatively low compared to that of 46-55 year olds. It is possible that this is due to local variations in the population or specific screening and diagnostic factors.

6. Age > 60 years: 30%

People over the age of 60 make up a significant proportion of patients, which is expected given that the risk of cancer increases with age. Cancers are more common in older adults due to a variety of factors, including the buildup of genetic mutations over time.

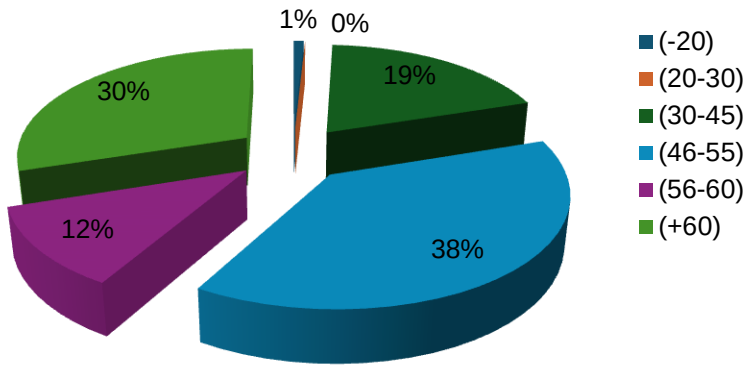

Fig 2. Distribution of participants by age.
Cancer patients survey results according to their age. Highest percentage amounts to 38% in ages of the range of 46 to 55 years old. A relatively high percentage of 30% cases in the persons older than 60 years and milder proportions of cancer cases; 19% in ages of 30 to 45 and 12% in ages of 56 to 60. Refer to text above for analysis.

The majority of patients are in the 46 to 55 age groups (38%) and over 60 years (30%), which is in line with the epidemiological trends observed for many types of cancers. The low proportion of younger patients (< 20 years and 20-30 years) is also consistent with the generally lower incidence of cancers in these age groups. Variations in the middle age groups (30-45 years and 56-60 years) may be influenced by demographic and screening factors specific to the study population.

Type of cancer

The data reveals a varied distribution of cancer types among the patients included in the study, Fig 3. Breast cancer stands out as the most common type, accounting for 51% of all

observed cases, with 61 women affected. Then, colon and lung cancers as well as cervical cancer come in second place, each accounting for 7% of cases with 9 patients affected for each type.

Other types of cancer, such as cancer of the vacuum, pancreas and liver, as well as brain cancer, are also represented, each accounting for about 4% to 5% of cases. Bladder cancer, bone cancer, and kidney cancer follow, each accounting for about 2% to 3% of cases.

Finally, several types of cancer are less common, each accounting for less than 1% of cases, such as colon-rectal cancer, stomach cancer, prostate cancer, and ovarian cancer.

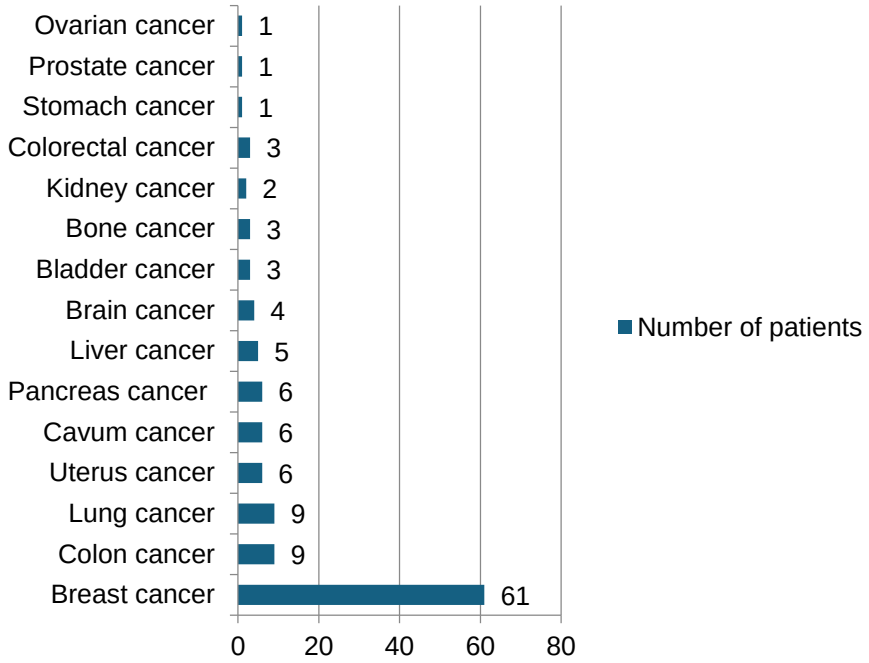

Fig 3. Distribution of patients according to type of cancer.
Among the sample set of 120 patient of whom 81 women, breast cancer stands out as the most common type, accounting for 51% of all observed cases.

These findings highlight the diversity of cancer types and highlight the importance of surveillance, early detection and type-specific treatment to improve patient outcomes and quality of life.

Use of plants in the Saida hospital

The ethnobotanical survey conducted identified three predominant plant species among the medicinal plants used by cancer patients: *Thapsia garganica*, *Ephedra vulgaris* and *Aquilaria malaccensis*, Table 1.

Thapsia garganica: Mainly used to relieve pain, nausea and digestive disorders, *Thapsia garganica* seems to be a preferred resource for patients for its analgesic and anti-inflammatory properties.

Ephedra vulgaris: Frequent use of *Ephedra vulgaris* aims to counteract fatigue associated with cancer, providing patients with a boost of energy. This plant, renowned for its stimulating and tonic effects, appears to be a natural option to combat fatigue induced by illness and treatments.

Aquilaria malaccensis: Recognizable for its antiemetic action, *Aquilaria malaccensis* is used to alleviate the side effects of cancer therapies, particularly nausea and vomiting, providing patients with symptom relief.

	Species	Frequency	Type of cancer	Preparation method	Usage method	Use period	Satisfaction	Side effects
1	*Thapsia garganica*	44 (36, 66%)	24S, 4 CA, 2CO, 3CR, 2U, 3R, 4P, 2PN	D: 3 P: 38 I : 3	OL: 2 O: 42	PJ: 7 PS:5 PM:22 PA:10	I :2 E:25 ES:16	Yes: 16 No: 27
2	*Ephedra vulagaris*	37 (30, 83 %)	20S, 3 CA, 3CR, 3U, 1CO, 1F, 1R, 4P, 1V, 2 PN	I : 35 P :2	O: 37	PJ: 5 PS:7 PM:3 PA:6	I : 1 E:27 ES:9	Yes : 9 No : 28
3	*Aquilaria malaccensis*	36 (30%)	20S, 1 CO, 4CR, 2U, 4P, 1OV, 1F, 1PN, 2 CA	I : 6 P : 30	O: 36	PJ: 8 PS:5 PM:16 PA:7	I: 1 E:19 ES:16	Yes : 9 No : 27
4	*Prunus persica*	29 (24, 16 %)	13S, 2 CO, 3CR, 1CA, 2U, 2V, 5PO, 1F	P : 29	O : 29	PJ: 9 PS: 3 PM: 13 PA: 4	I :2 E:19 ES:8	Yes: 9 No:20
5	*Berberis vulgaris*	28 (23, 33 %)	15S, 1 V, 2 CO, 4 PO, 2 U, 2OS, 1F, 1 CA	P :28	O : 28	PJ: 9 PS: 5 PM:10? PA: 4	E: 16 ES: 11 IS : 1	Yes : 12 No : 16
6	*Nigella sativa*	25 (20, 83%)	12 S, 1 V, 2 CR, 2 CO, 2U, 1 P, 2 F, 1CR, 2 PO	I : 1 P : 24	O : 25	PJ: 6 PS : 3 PM: 12 PA: 4	I : 1 E: 17 ES: 5 IS : 2	Yes : 8 No : 17

7	*Atriplex halimus*	22 (18, 33 %)	14 S, 2 U, 4 PO, 1CA, 1 CR	P: 22	O: 22	PJ: 5 PS: 4 PM: 7 PA: 6	E: 20 ES: 2	Yes : 2 No : 20
8	*arthrophytum scopariu m*	20 (16, 66%)	10 S, 2 U, 2 R, 1F, 3CR, 1CO, 1 CA	I : 1 P : 19	O : 20	PJ: 2 PS : 3 PM : 9 PA : 6	E: 13 ES: 7	Yes : 7 No : 13
9	*Artemisia herba alba*	17 (14, 16%)	10 S, 2 CO, 2 CR, 1 CA, 1 F, 1 PO	I : 7 P : 10	O : 17	PJ: 6 PS: 5 PM: 4 PA: 2	I : 2 E: 10 ES: 5	Yes : 5 No : 12
10	*Marrubiu m vulgare*	12(10%)	6 S, 1 CR, 3 CA, 2 P	I : 1 P : 9 A : 2	OL : 3 O : 9	PJ: 5 PS : 4 PM: 2 PA : 1	I : 2 E : 10	Yes : 0 No : 12
11	*Curcuma longa*	9(7, 5%)	6 S, 1 F, 1 CO, 1P	P : 9	O: 9	PJ : 2 PS : 1 PM : 2 PA: 4	I : 1 E : 6 ES : 2	Yes: 3 No: 6
12	*Trigonella foenum-graecum*	9(7, 5%)	5 S, 1 P, 1 F, 1CA, 1CR	P : 9	O: 9	PM: 3 PA : 1 PJ : 1 PS : 4	E : 6 ES: 3	Yes: 3 No: 6
13	*graviola sp*	6(5%)	1CO, 2 PO, 2P, 1 S	I : 4 F : 2	O : 6	PJ : 2 PS : 1 PM: 3	I : 1 E : 3 ES: 2	Yes : 3 No : 3
14	*Prunus armeniac a*	5(4, 16 %)	3S, 1PO, 1P	A : 5	O: 5	PM : 4 PA : 1	E : 4 ES : 1	Yes : 1 No : 4
15	*Cardamin e sp*	4 (3, 33 %)	1 U, 1 P, 1 CA, 1 S	P: 4	O : 4	PM : 2 PA: 2	E: 3 ES : 1	Yes: 1 No : 3

Table 1. The use of plants by patients in Saida hospital**.**

Methods of plants identification used by patients (n=120): Method of preparation (D: Decoction; I: Infusion; M: Maceration; P :P oudre; A: Other); Method of use (O: oral administration; I: inhalation; L: local use; A: Other); Cancer type (F: liver; PM: Lung; U: Cervix; S: Breast; CR: colorectal; V: bladder; PR: prostate; O: ovaries; A: Kidney; PA: Pancreas; CA: Catum; Bone: Bone; CO: Colon; A: other); Period of use (PJ: per Day; PS: per week; PM: per month; PA :P ar Ans); Satisfaction (I: ineffective; E: efficient; ES: effective but causes side effects; SI: ineffective but causes side effects.

These observations highlight the importance of botanical resources in managing symptoms and side effects in cancer patients.

Discussion

The results of this ethnobotanical survey study reveal a strong preference for three specific medicinal plants among cancer patients at Saida Hospital. *Thapsia garganica*, *Ephedra vulgaris*, and *Aquilaria malaccensis* are widely used to relieve various symptoms associated with the disease and treatments. This preference indicates a confidence of patients in the effectiveness of these natural remedies in alleviating their physical suffering and improving their overall well-being. These results confirm our hypothesis that cancer patients would turn to herbal remedies to supplement their conventional medical treatment.

The results show similarities with some studies conducted in the Maghreb region. For example, a study conducted by Rodriguez et al. (2019) in Algeria also identified *Thapsia garganica* as a commonly used herb for its analgesic properties in cancer patients. However, some differences can be noted, such as the prevalence of *Ephedra vulgaris* use, which has been less frequently reported in other similar studies conducted in Tunisia by Ben Salah et al. (2021). On the other hand, our results are consistent with a study conducted in Morocco by El Amri et al. (2020) which also reported the use of *Aquilaria malaccensis* to relieve the side effects of cancer treatments. These variations could be due to geographical or cultural differences or to the specificities of the populations studied.

Several factors could explain the popularity of *Thapsia garganica*, *Ephedra vulgaris*, and *Aquilaria malaccensis* among cancer patients. First, these herbs could offer a natural alternative to conventional medications, which are often associated with unwanted side effects. In addition, confidence in traditional remedies and the perception of their safety and efficacy could influence their preferential use. In addition, the availability and ease of access to these plants in the region could also play a role in their uptake by patients.

Furthermore, the results highlight the importance of taking into account traditional medicinal practices in the overall management of cancer patients. They highlight the need to integrate ancestral knowledge into cancer care programs to provide holistic treatment options tailored to patients' needs. In addition, our results provide a basis for future research to further explore the mechanisms of action and clinical efficacy of these medicinal plants.

It is worth noting some limitations of our study. First, our investigation relies on self-reported patient data, which could lead to memory or social desirability biases. Second, our sample comes from only one hospital, which limits the generalizability of our results to other geographic or cultural contexts. Finally, the lack of an in-depth evaluation of the efficacy and safety of the medicinal plants studied is another limitation, thus requiring further research to validate their traditional uses.

Conclusion

In conclusion, our ethnobotanical survey conducted at the Saida hospital highlighted the significant importance of herbal medicine in the treatment of cancer. With 120 cancer patients using herbal medicine, and % of them to mitigate the side effects of conventional treatments, these results underline the population's acceptance and confidence in the effectiveness of medicinal plants.

One notable observation is that parameters such as gender, age, region, type of cancer, date of diagnosis did not show significant effects on the use of herbal remedies by cancer patients. This suggests that interest in herbal medicine in the fight against cancer transcends demographic and medical differences.

The analysis of the plants recorded revealed a significant diversity with 15 species identified belonging to different families. These results provide a solid basis for in-depth phytochemical and pharmacological studies, aimed at validating the traditional use of these plants and identifying potential new sources of anticancer agents.

In short, this study seeks to contribute to our understanding of cancer treatment practices by integrating traditional knowledge with modern research. It also paves the way for future investigations to harness the therapeutic potential of medicinal plants in the fight against this devastating disease.

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