RESEARCH ARTICLE

Predictors of high phytotherapy usage among women with cancer: the impact of cancer duration, symptoms, and psychosocial factors

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Abstract

Objective: Gynecological and Breast Cancers (GCBC) are extremely common worldwide, including in Morocco. Patients suffering from these forms of cancer often turn to complementary and alternative medicine (CAM), particularly phytotherapy. However, there has been no research on Moroccan patients using this medicine. We aim to assess the frequency and factors involved in the use of phytotherapy. Methods: This was a cross-sectional analytical study. We interviewed 317 patients in an oncology unit. We calculated the 12-month prevalence of herbal medicine use and identified predictors of herbal medicine use by multivariate analysis using SPSS software. Results: The prevalence of patients using phytotherapy was 40.7%. Patients used 48 plant species. The most commonly used plants were *Marrubium vulgare* L., *Allium cepa* L. and *Retama monosperma* (L.) Boiss. This use was associated with a cancer duration greater than one year ($p < 0.05$; OR $= 0.414$), pain ($p < 0.01$; OR $= 2.711$), anorexia ($p < 0.05$; OR $= 2.079$), the social impact of the disease ($p < 0.01$; OR $= 4.140$), the expected benefits of C&CM ($p < 0.000$; OR $= 3.453$), and the social norms of relatives ($p < 0.000$; OR $= 3.502$). Conclusion: The use of herbal medicine as CAM among women with is highly prevalent. The user profile identified in this study deviates from the patterns observed in the international literature. Further research is warranted in different regions of Morocco, exploring various CAM modalities, and employing alternative methodological approaches. The use of herbal medicine as CAM in women with GCBC is widespread. The profile of users identified in this study deviates from patterns observed in the international literature. Further research is warranted in different regions of Morocco, exploring different CAM modalities and using other methodological approaches.

Keywords Breast cancer · Complementary medicine, gynecological cancer · Herbal medicine, Morocco

- **What is alredy known on this topic**: Eight studies have been conducted in Morocco regarding the use of CAM. However, none of these studies specifically focused on women with gynecological cancer.

- **What this study adds**: It is the first study which is interested in the predictors of the use of phytotherapy as it is the first study that focuses on the predictors of the use of phytotherapy as CAM.

- **How this study might affect research, practice or policy**: Gynecological cancers represent the majority of cancers treated in Morocco. The results will enable health professionals to tailor educational messages to women affected by these cancers.

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Introduction

Breast cancer, cervical cancer, ovarian cancer and uterine cancer are among the ten most common malignancies worldwide. Between 1990 and 2019, incidence and case-fatality rates for these gynecological and breast cancers

rose significantly. Projections for 2040 indicate an expected increase of 33.8% in breast cancer cases, 40.3% in cervical cancer cases, 36.6% in ovarian cancer cases and 30.3% in uterine cancer cases (Sung et al. 2021).

In 2018, statistical morbidity data from Morocco indicated that breast cancer had the highest incidence, with 10,136 new cases (19.2%). It was followed by lung cancer with 6,488 cases (12.3%) and prostate cancer with 3,990 cases (7.6%). Lung cancer emerged as the leading cause of cancer-related deaths, accounting for 3,518 fatalities (19.4%). Breast cancer followed with 3,518 deaths (10.7%), and cervical cancer accounted for 2,465 deaths (7.5%) (Alami Merrouni and Elachouri 2021).

Chemotherapy is the primary treatment for most of these cancers, despite its potential to cause adverse effects. These side effects can lead to prolonged hospitalization, increased medical costs, reduced quality of life, and may even affect disease outcomes (Wu et al. 2018). As a result, patients often explore alternative options, including complementary and alternative medicines (CAM) (Singh et al. 2024).

Herbal medicine is a widely used form of CAM. For instance, Black cohosh (*Cimicifuga racemosa*) has been shown to help women with breast cancer manage menopausal symptoms with minimal side effects (Klose 2024). In the USA, a 66% prevalence of herbal medicine use has been reported among gynecological oncology patients (von Gruenigen et al., 2001). Herbal remedies like turmeric, quercetin, and resveratrol have demonstrated efficacy against ovarian cancer (Rezaei-Tazangi et al. 2021). These herbs influence key biological processes such as apoptosis, invasion, migration, oxidative stress, and immune response. By modulating pathways like VEGF, PI3K-AKT, MAPK, and NF-κB, herbal medicines play a significant role in the prevention and treatment of gynecological disorders (He et al. 2024).

However, patients may experience a variety of adverse effects following the use of this therapy. These may result from pharmacodynamic or pharmacokinetic interactions with chemotherapy. Potential toxicities include anaphylaxis, liver toxicity, renal failure, cardiovascular toxicity, and carcinogenic effects, among others (Träger 2017). In Morocco, several adverse effects have been reported in these patients, including gastrointestinal disorders, nephropathy and hepatotoxicity (Aboufaras et al. 2023).

In Morocco, research on the use of phytotherapy in women with gynecological and breast cancers (GCBC) is lacking. Only one Moroccan study has investigated the use of all CAM modalities in women with breast cancer, but it failed to identify all predictive factors, such as economic and psychocognitive influences. The sole independent factor identified was a high level of education (Rahou et al. 2017). Our study aims to assess the prevalence and factors associated with herbal medicine use among GCBC patients at the Beni Mellal Oncology Center.

Materials and methods

Survey and participants

A total of 317 women diagnosed with breast or gynecological cancer voluntarily participated in this study, which employed both descriptive and analytical methods. Participants were selected through non-probability sampling, with stratification based on cancer type. The sample size was calculated using the SurveyMonkey website, targeting a population of 1,124 individuals. The minimum required sample size was determined to be 287, according to the [SurveyMonkey sample size calculator](https://fr.surveymonkey.com/mp/sample-size-calculator/).

The study was approved by the Ethics Committee of the Faculty of Medicine in Oujda, under authorization number 29/2020. Data were collected through interviews using a questionnaire administered to patients at the Beni Mellal Oncology Center, including both day hospital patients and outpatients.

Variables and statistical analyses

The study variables were structured within a theoretical framework tailored to the use of complementary medicines in healthcare, drawing on Anderson's socio-behavioral model (Fouladbakhsh and Stommel 2007). The use of herbal medicine within the past year served as the dependent variable. For psychological variables, a Moroccan version of a questionnaire assessing subjective and psychological aspects of complementary medicine was.

Sequential logistic regression, a technique for both bivariate and multivariate analysis, was used to identify factors influencing and predicting the use of medicinal plants. The analysis was conducted using the Statistical Package for the Social Sciences (SPSS v23) software.

Results

Characteristics of the sample

Breast cancer was the most prevalent malignancy among the women studied ($n=213$; 67.2%), followed by cervical ($n=72$; 22.7%), ovarian ($n=17$; 5.4%), and endometrial cancer ($n=15$; 4.7%). Among the patients, 24% presented with advanced-stage cancer, while the remaining 76% were in stages II and III. Post-surgery, 31.2% received adjuvant

chemotherapy. The average age of the women was 50.63 years. The majority were non-employed (86.1%), illiterate (72.9%), and married (64.4%).

Prevalence and usage trends

The use of medicinal plants was prevalent in 40.7% of the patients (129/317), with the highest usage among women with breast cancer (42%), followed by those with cervical (38.9%), ovarian (35.3%), and endometrial cancer (33.3%) (Fig. 1). The patients utilized 48 plant species from 28 different botanical families, with *Marrubium vulgare* L. (50 users), *Allium cepa* L. (37 users), and *Retama monosperma* (L.) Boiss (36 users) being the most common. Table 1 details the plants used, along with the corresponding number of users and cancer types treated.

Nearly half of the users (45.7%) aimed for a curative treatment, while 31% sought to improve their quality of life. Among the non-users ($n = 188$), 29 expressed intentions to try this therapy in the future. A significant portion of users (42.26%) consistently used the therapy from diagnosis, while 34% tried it for a month. Only 12.4% informed their caregivers about their use. Positive outcomes were reported by 43% of users, while 14.72% experienced side effects, including digestive disturbances, hepatotoxicity, and hemorrhage.

Factors of herbal medicine use

The bivariate analysis revealed that women with gynecological or breast cancer who had used herbal medicine in the preceding year were significantly more likely to present with stage III or IV cancer ($p < 0.05$), have experienced illness for over a year ($p < 0.000$), and report a decline in health, with symptoms negatively impacting their quality of life ($p < 0.01$).

Psychologically, these individuals were more likely to perceive the impact of their condition as predominantly social and emotional ($p < 0.000$). They exhibited a positive attitude toward the outcomes of complementary and alternative medicine (CAM) therapies ($p < 0.000$), regarded their disease as more severe ($p < 0.000$), and were strongly influenced by the social norms of their social circle, including friends, family, and fellow patients ($p < 0.000$).

No correlation was observed between herbal medication use and caregiver social norms, reported socioeconomic barriers to CAM use, or beliefs about the efficacy of conventional cancer treatment.

Table 2 presents the results of the multivariate analysis. Sequential logistic regression identified variables that independently predict herbal medication use. CAM use was less common among patients diagnosed within the past year. The likelihood of using herbal medicine was doubled in individuals experiencing anorexia or discomfort. Patients who believed their illness would have social consequences were four times more likely to use herbal therapy. Those influenced by family and with a strong belief in the treatment's benefits were more inclined to engage in CAM therapy.

Discussion

We found that 40.7% of the women in the sample reported using herbal medicine in the past 12 months. Our findings are consistent with those from Germany, where 48% of women with gynecological or breast cancer (GCBC) use CAM, with herbal medicine, particularly mistletoe, accounting for 77% of this use (Fasching et al. 2007). A higher

Fig. 1 Use rates of phyotheraphy by kind of cancer
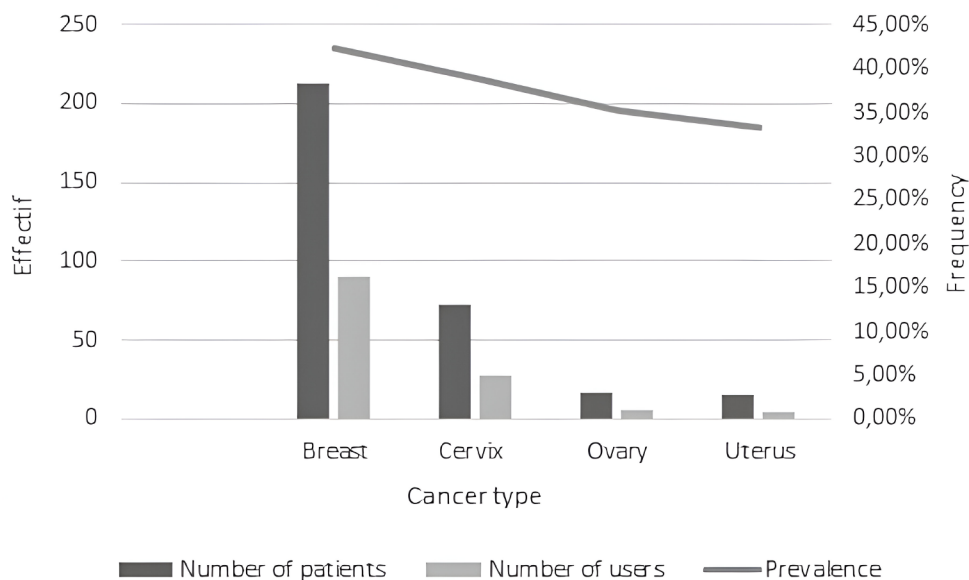
Table 1 Medicinal plants used

Families	Species	English name	Name (arab /Amazigh)	Part	Method of preparation	Type of cancer	Number of users
AMARANTHACEAE	*Beta vulgaris L.*	Beet	Lbarba	Roots	Natural juice (see recipes)	BC	10
	Haloxylon scoparium Pomel	------	Eremt	Leaves	Decoction	BC	01
AMARYLLIDACE	*Allium cepa L.*	Onion	Lbasla /azalim	Bulb	Natural juice: Juice with honey and lemon/ In the form of soups with barley Little baked in the oven Natural juice: / sometimes reinforced with olive oil (for breast cancer)	BC/UC /OC/CC	37
	Allium sativum L.	Garlic	Toma / Tiskert	Bulb	naturel or crushed Cooked in food/Oven roasted Decoction (for breast cancer)	BC/UC /OC/CC	27
ANACARDIACAE	*Pistacia atlantica Desf*	Pistachio tree	aalk lbtem	Leaves	Decoction of the gum with olive oil	BC	02
ANNONACEAE	*Annona muricata L.*	Soursop	Graviola	Fruits	Natural juice	BC/UC	03
APIACEAE .	*Apium graveolens L.*	Celery	Krafs	Aerial p.a.	Decoction / cooked with the soup	BC	01
	Carum carvi L.	Caraway	Karwiya	Seeds; Leaves	Maceration of the powder	BC	02
	Daucus carota L.	Carrot	khizzou	Root	Natural or cooked in soup (recipes)	BC	04
	Foeniculum vulgare Mill	Fennel	Nafaâ /Tamsawt	Seeds	Maceration of the powder/ Added In bread /Powder with olive oil	BC/OC/ CC	13
	Petroselinum sativum Hoffm.	Parsley	Maadanous	Aerial parts	Natural juice with oranges	BC/CC	03
	Pimpinella anisum L.	Aniseed	Hbat hlawa	Seeds	Maceration of the powder/ Added In bread/ Powder with olive oil	BC/OC/ CC	13
ARISTOLOCHIACE	*Aristolochia longa L.*	Aristoloche	Berztam /Ajrakhi	Rhizome/ root	Powder with honey/ Maceration with olive oil	BC/ CC	04
	Artemisia herba-alba Asso	white wormwood	Chih /Ifsi	Aerial part	Infusion: / Decoction: Powder / 250 g of powder in 1 kg of honey Decoction (for cervical cancer)	BC/CC	12
BORAGINACEA	*Borago officinalis L.*	Borage	Hobob liqah	Stamen	Mixed in a glass of water or with some honey	BC/OC	02
BRASSICACEAE	*Lepidium sativum L.*	Cress	Hebbrchad	Seed	Seed maceration Powder with Allium cepa juice on the breast	BC	03

Table 1 (continued)

Families	Species	English name	Name (arab /Amazigh)	Part	Method of preparation	Type of cancer	Number of users
CUPRESSACAE	*Juniperus oxycedrus L.*	prickly juniper/ Cade/ cade juniper	getran Tagga / taqqa / getran rqiq/ Gatran tiqqi	branches and wood	Used as an cade oil / the tar is prepared by distillation locally in khénifra or bejaad - Maceration of Half a spoon or a spoon in a glass of water Maceration of 5 glasses in 5 L of water: Infusion: ½ spoon a spoon in a glass Mix with honey / mix with milk infusion (for breast cancer) infusion (colorectal cancer) Infusion/ Maceration (cervix cancer)	BC/UC/ OC/CC	31
CUCURBITACAE	*Cucarbita maxima L.*	Giant pumpkin	Lgaraa /tahsayt	Seeds	Natural with a glass of water	BC/CC	05
EBENACEAE	*Diospyros kaki thunb.*	persimmon	Kaki	Fruits	Natural	BC	01
EUPHORBIACE	*Euphorbia echinus Coss. & Hook*	---	Daghmous/ tikiwt	Roots	Powder Powder with honey Natural /Natural juice with milk/ Squeeze and drink the liquid Decoction/ Maceration with milk /Cooked with lentils / Juice with oranges 2 drops of the juice in a date 3 times a day	BC BC	6
	Euphorbia resinifera Berg.	Spurge	Zaggoum /Tikiwt	Resin/aeriel parts			02
FABACEAE	*Ceratonia siliqua L.*	Carob	*Kharroub/* tikidit	Seeds	Natural / Powder	CC	01
	Cicer arietinum L.	Chickpea	HOmos	Seeds	Decoction / maceration	CC	01
	Retama monosperma (L.) Boiss	bridal broom	Rtem/tillouguitte	Aeriel parts	Decoction: a handful in 7 L of water / half a kilo in10L 250 g to 350 g in 7–8 L for 1 h to 2 h:	BC/OC/ CC	36
	Trigonella foenum-graecum L.	Fenugreek	Lhalba/ tifidas	Seed	Seeds in soup	BC/OC CC	15
IRIDACEAE	*Crocus sativus L.*	Saffron	zaafran	Flower /leaves	Infusion of in tea/ decoction Powder with a glass of water	BC	01

Table 1 (continued)

Families	Species	English name	Name (arab /Amazigh)	Part	Method of preparation	Type of cancer	Number of users
LAMIACEAE .	*Ajuga iva (L.) Schreb.*	Herb Ivy	Chendgoura/ Timzine	Whole plant	Decoction / powder with honey	BC	02
	Marrubium vulgare L.	white horehound	Maariwa /Merriwt	leaves	Infusion with honey/Infusion in tea Infusion of 1 to 3 leaves Powder infusion/Powder decoction/Decoction: powder associated with olive(for breast cancer) infusion or decoction (for cervix cancer) Infusion (for ORL cancer)	BC/OC/ CC	50
	Mentha suaveolens Ehrh.	Apple mint	Mersita /Timersit	leaves	Infusion	BC	01
	Origanum compactum Benth.	Oregano	Zaatr	Aeriel parts	Infusion / powder decoction	BC/CC	5
	Salvia hispanica L	Chia	Hobob chia	Seed	Associated with barley bread/ Brewing in coffee	BC	01
	Thymus broussonetii Boiss.	Thymus	Ziitra /Azakoni	Aeriel parts	Infusion with honey	BC	03
LAURACEAE	*Cinnamomum zeylanicum Blume*	Cinnamon	Qarfa	Bark	Powder with honey and olive oil	BC	01
LINACEAE	*Linum usitatissimum L.*	Flaxseed	Zariit lkattan	Seeds	Maceration of the seed powder In barley bread /Powder with olive oil or honey	BC/CC	06
LYTHRACEAE	*Lawsonia inermis L.*	The henna tree	Lhenna	Leaves	Infusion / Powder maceration	BC	01
MALVACEAE	*Malva sylvestris L.*	Mallow	Khbbiza / Baqula/ amejjir	Leaves	Decoction	BC	02
	Eucalyptus camaldulensis Dehnh.	river redgum	kalitûs, katibtûs	leaves	Decoction	BC	01
NITRARIACEAE	*Peganum harmala L.*	African rue	Harmal	Seeds	Powder with honey Toasted powder with honey	BC	01
OLEACEAE	*Olea europaea L.*	Olive	Zaytoun/Azemur	Leaves	Infusion	BC	04
PEDALIACEAE	*Sesamum indicum L.*	Sesame	Jeljlan	Seeds	maceration / Natural/ In barley bread The seed crushed in honey or pounded in a little milk	BC/CC	3

Table 1 (continued)

Families	Species	English name	Name (arab /Amazigh)	Part	Method of preparation	Type of cancer	Number of users
POACEAE	*Hordeum vulgare L.*	Barley	Echiir/ tumzin	Grain	In the form of bread enriched with the seeds of other plants (see recipes) Soup (milk porridge or not semolina: tchicha, hassua laassida or lbalboula) enriched with Allium cepa L or *Allium sativum* and seeds (see recipes) Decoction of powder with olive oil	BC/OC/CC	13
	Pennisetum typhoides (Burm. f.) Stapf & C.E. Hubb.	Pearl millet	Illan	Seeds	Seed powder / Powder decoction with olive oil Associated with barley bread	BC/OC	03
PORTULACACEAE	*Portulaca oleracea L.*	Common purslane	Rejla	Aerial part	Cooked with olive oil	BC	02
RANUNCULACEAE	*Nigella sativa L.*	Black seed / black cumin	Sanouj; Haba Saoudaâ/ Haydwan	Seed	Powder with honey/Powder in food or in bread Powder decoction	BC/CC	11
ROSACEAE	*Prunus armeniaca L.*	Apricot	lmchmach	Seeds	Powder / Raw Grains	BC	02
	Prunus amygdalus Stokes var	Almond	lûz lhar	Fruits	Natural	BC	03
RUTACEAE	*Citrus limon (L.) Burm. f.*	Lemon	Lhamed	Fruits	Natural juice	BC	03
ZINGIBERACEAE	*Curcuma longa L.*	Turmeric	kharqum	Rhizome	Honey infusion / Powder	BC/CC	03

Type of cancer : BC : Breast cancer/ CC : Cervix Cancer / OC: Ovarian / UC : Uterus

Table 2 Predictors of traditional herbal medicine use:

Variables	P value	OR	CI (95%)
Cancer duration of less than one year	0,014	0,414	0,093 – 1,832
Pain	0,005	2,711	1,344-5,469
Anorexia	0,035	2,079	1,052 – 4,108
Social impact	0,004	4,140	1,657 – 13,644
Expected benefits of C&CM	0,000	3,453	2,775-6,178
Social norms of relatives about C&CM	0,000	3,502	2,337- 5,248

Overall prediction percentage of the model: 84.9%

Chi-2 : (Degree of freedom = 8) = 199.18

Probability Chi-2 = 0.000

R2 Nagelkerke: 0,629

Probability Hosmer and Lemeshow Test: 0,204

prevalence of 69% was reported in Germany. However, in this country, patients with gynecological cancer used herbal medicine less frequently than healthy individuals. Their primary motivation was to alleviate symptoms associated with cancer and its treatment (Theuser et al. 2021).

In contrast, this prevalence is significantly higher than the 31% reported in Moroccan studies for herbal medicine use among cancer patients of all types. Additionally, the plant species used differ from those commonly employed in Morocco, where *Aristolochia longa* L., *Nigella sativa* L., and *Trigonella foenum-graecum* L. are frequently utilized (Aboufaras et al. 2021).

The higher rate of phytotherapy usage compared to the national average may be explained by several factors. First, the participants in this study are women, whereas other research in Morocco has included both sexes and various cancer types. Additionally, the surveyed patients in the Beni Mellal-Khenifra region receive care in public oncology centers, as no private facilities are available in the area. This

suggests that these patients may belong to lower or middle social classes. In contrast, other patients seek treatment at university hospital centers in Casablanca, Marrakech, and Rabat, or in private clinics across Morocco.

The high prevalence of herbal medicine use in female cancers may be attributed to the general widespread use of these therapies among women, as noted in various studies (Amrati et al. 2021). This trend aligns with findings from Western studies, where female gender consistently emerges as an independent factor for CAM use (Bone and Mills 2013; Dufter et al. 2021). Women, particularly those of Arab and Moroccan descent, often possess extensive knowledge of herbal medicine, making these therapies both accessible and cost-effective. Cultural beliefs further reinforce the perceived safety and efficacy of herbal medicines, with the perception that they lack chemical components and are safer than conventional drugs (Alqethami et al. 2017; Kim Sooi and Lean Keng 2013; Nega et al. 2019).

In our study, the users were women who had been living with cancer for over a year, experiencing pain or anorexia, perceiving a significant social impact of the disease, strongly believing in the benefits of CAM, and being highly influenced by the social norms of their friends, families, and other patients. In contrast, only one study in Morocco specifically focused on women with breast cancer and used logistic regression to identify predictors of T&CM use. This study identified higher education as an independent factor associated with T&CM use (Rahou et al. 2017).

This paradox may be explained by the fact that the research included all CAM methods, not just natural products like herbal therapy. For instance, among American women with gynecological cancer, the use of mind-body techniques within CAM was associated with a higher level of education (Wong et al. 2020). In Turkey, CAM use was prevalent in 68.3% of patients, with high satisfaction (5.80/7) and perceived effectiveness (5.71/7). CAM use also increased with advanced cancer stages and chronic conditions (Gul Pinar 2020).

The disparity between the profile observed in our study and the typical profile in Western countries can be attributed to differences in the nature and typology of CAM, particularly regarding quality and economics, between developing and Western countries. For instance, herbal treatment is considered modern in Western countries, whereas it is viewed as traditional in the Middle East and North Africa (MENA) region. Additionally, our study is the first of its kind to investigate the factors influencing herbal medicine use among women with GCBC.

The traditional and non-integrated use of herbal medicine in clinical practice poses significant risks for patients, as herbal medicine is a biologically active form of CAM. In a study conducted in the gynecology and obstetrics department in Munich, 18.1% of patients experienced interactions due to the combination of CAM with anticancer drugs metabolized by cytochrome P450 3A4 (Drozdoff et al. 2019). Another study in Israel explored herb-drug interactions in gynecological cancer patients, finding that certain herbs, such as ephedra, reduced the cytotoxicity of carboplatin on ovarian cancer cells. Conversely, mistletoe and ginger enhanced the sensitivity of cisplatin-resistant cells treated with carboplatin and paclitaxel (Ben-Arye et al. 2017).

On the other hand, these plants can improve the quality of life of patients and reduce symptoms of cancer or adverse drug reactions such as fatigue, pain and discomfort. Plants such as *Prunus armeniaca* L. and *Curcuma longa* L. have been found to be particularly effective and positively perceived by patients in Morocco (Aboufaras et al. 2023).

Strengths and weaknesses

In Morocco, eight studies have explored this topic, but none have specifically focused on CAM use among women with gynecological cancer. This study is the first of its kind in Morocco and also the first to investigate predictors of phytotherapy use. When interpreting the results, it is important to consider the non-random quota sampling procedure used in the study. Additionally, some patients did not understand Arabic, requiring a multilingual translator to provide a secondary translation into the Amazigh dialect.

Implications for practice and future research

Identifying predictors of phytotherapy use among gynecological cancer patients will enable health professionals to implement targeted therapeutic education. This can improve communication, care, and trust between patients and healthcare providers. Additionally, enhancing professionals' skills in this area may help mitigate risks associated with potentially dangerous CAM. Notably, the Moroccan Ministry of Health, in collaboration with the World Health Organization (WHO), is working to establish therapeutic education programs for chronically ill patients for the first time in Morocco.

Conclusions

Our research indicates that women with gynecological and breast cancers (GCBC) frequently use herbal medicine as part of CAM. The user profile identified in our study diverges from previous descriptive studies conducted in Morocco, which did not account for psychological characteristics or employ multivariate analysis. Additionally, our findings contrast with those from Western countries

due to differences in CAM modalities studied. To validate these results, further research is needed at both regional and national levels within the MENA region. Medical personnel should remain vigilant to prevent potential herb-drug interactions.

Author contributions Aboufaras Mohamed: Conceptualization, Investigation, Writing, Software, Formal analysis; Selmaoui Karima: Reviewing, Editing, and Validation; Ouzennou Nadia: Conceptualization, Methodology, Writing, Supervision, Preparation; Najib Raja; Lakhdissi asmaa: investigation, clinic judgment.

Data availability The data that support the findings of this study are available from the corresponding author, [M/A], upon reasonable request.

Declarations

Ethics approval and consent to participate The study protocol, reviewed and approved by the Ethics Committee of the Faculty of Medicine of Oujda (Number: 29/2020), adheres to ethical standards in research according to the Declaration of Helsinki. Participation is voluntary, with the right to withdraw at any time without consequences. Personal information will be kept confidential, and data will be anonymized. Participants will receive detailed information about the study, including its purpose, procedures, potential risks, benefits, and their rights, and can ask questions before consenting. They will also be informed about significant findings or changes in the research that may affect their willingness to continue participating.

Conflict of interest The corresponding author confirms on behalf of all authors that there have been no involvements that might raise the question of bias in the work reported or in the conclusions, implications, or opinions stated.

References

Aboufaras M, Selmaoui K, Ouzennou N (2021) Use of complementary traditional phytotherapy to manage cancer in Morocco: a decade-long review of ethnopharmacological studies. J Herb Med 29:1–10. https://doi.org/10.1016/j.hermed.2021.100494

Aboufaras M, Selmaoui K, Ouzennou N (2023) Efficacies and side effects of medicinal plants used by patients with cancer in Morocco: A retrospective treatment-outcome study. J Ethnopharmacol 301:115783

Alami Merrouni I, Elachouri M (2021) Anticancer medicinal plants used by Moroccan people: Ethnobotanical, preclinical, phytochemical and clinical evidence. J Ethnopharmacol 266:113435. https://doi.org/10.1016/j.jep.2020.113435

Alqethami A, Hawkins JA, Teixidor-Toneu I (2017) Medicinal plants used by women in Mecca: Urban, Muslim and gendered knowledge. J Ethnobiol Ethnomed 13:1–24. https://doi.org/10.1186/s13002-017-0193-4

Amrati FE, Z, Bourhia M, Slighoua M, Mohammad Salamatullah A, Alzahrani A, Ullah R, Bari A, Bousta D (2021) Traditional medicinal knowledge of plants used for cancer treatment by communities of mountainous areas of Fez-Meknes-Morocco. Saudi Pharm J 29:1185–1204. https://doi.org/10.1016/j.jsps.2021.09.005

Ben-Arye E, Lavie O, Samuels N, Khamaisie H, Schiff E, Raz OG, Mahajna J (2017) Safety of herbal medicine use during chemotherapy in patients with ovarian cancer: A bedside-to-bench approach. Med Oncol 34:1–6. https://doi.org/10.1007/s12032-017-0910-9

Bone K, Mills S (2013) Herbal therapeutic systems. In: Bone K, Mills S (eds) Principles and practice of phytotherapy, 2nd edn. London, pp 3–16

Drozdoff L, Klein E, Kalder M, Brambs C, Kiechle M, Paepke D (2019) Potential interactions of biologically based complementary medicine in gynecological oncology. Integr Cancer Ther 18:1534735419846392. https://doi.org/10.1177/1534735419846392

Dufter SA, Hübner J, Ahmadi E, Zomorodbakhsch B (2021) Traits of cancer patients and CAM usage. J Cancer Res Clin Oncol 147:3685–3692

Fasching PA, Thiel F, Nicolaisen-Murmann K, Rauh C, Engel J, Lux MP, Beckmann MW, Bani MR (2007) Association of complementary methods with quality of life and life satisfaction in patients with gynecologic and breast malignancies. Support Care Cancer 15:1277–1284. https://doi.org/10.1007/s00520-007-0231-1

Fouladbakhsh J. M, Stommel M (2007) Using the behavioral model for complementary and alternative medicine: The CAM healthcare model. J Complement Integr Med 4. https://doi.org/10.2202/1553-3840.1035

Gul Pinar AA (2020) The prevalence of complementary and alternative medicine among women with gynecologic cancers: Levels of effectiveness and satisfaction. Clin Res Obstet Gynecol 3:1–8

He Q, Wan S, Jiang M, Li W, Zhang Y, Zhang L, Wu M, Lin J, Zou L, Hu Y (2024) Exploring the therapeutic potential of tonic Chinese herbal medicine for gynecological disorders: An updated review. J Ethnopharmacol 329:118144. https://doi.org/10.1016/j.jep.2024.118144

Kim Sooi L, Lean Keng S (2013) Herbal medicines: Malaysian women's knowledge and practice. Evidence-Based Complement Altern Med 2013:1–10. https://doi.org/10.1155/2013/438139

Klose P (2024) Das phytotherapeutikum cimicifuga racemosa (traubensilberkerze). Z Für Phytotherapie 45:117–121. https://doi.org/10.1055/a-2315-5648

Nega SS, Bekele HM, Meles GG, Nordeng H (2019) Medicinal plants and concomitant use with pharmaceutical drugs among pregnant women. J Altern Complement Med 25:427–434. https://doi.org/10.1089/acm.2018.0062

Rahou BH, Rhazi K, Hanchi Z, Ouasmani F, Benazzouz B (2017) Self-reported use of complementary and alternative medicine among Moroccan women with breast cancer. Cancer Oncol Res 5:1–9. https://doi.org/10.13189/cor.2017.050101

Rezaei-Tazangi F, Roghani-Shahraki H, Khorsand Ghaffari M, Abolhasani Zadeh F, Boostan A, ArefNezhad R, Motedayyen H (2021) The therapeutic potential of common herbal and nano-based herbal formulations against ovarian cancer: New insight into the current evidence. Pharmaceuticals 14:1315. https://doi.org/10.3390/ph14121315

Singh K, Gupta JK, Jain D, Kumar S, Singh T, Saha S (2024) Exploring the ancient wisdom and modern relevance of Chinese

medicine: A comprehensive review. Pharmacol Res - Mod Chin Med 11:100448. https://doi.org/10.1016/j.prmcm.2024.100448

Sung H, Ferlay R, Laversanne M, Soerjomataram I, Jemal A, Bray F (2021) Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancer in 185 countries. CA CANCER J CLIN 71:209–249. https://doi.org/10.3322/caac.21660

Theuser AK, Hack CC, Fasching PA, Antoniadis S, Grasruck K, Wasner S, Knoll S, Sievers H, Beckmann MW, Thiel FC (2021) Patterns and trends of herbal medicine use among patients with gynecologic cancer. Geburtshilfe Frauenheilkd 81:699–707. https://doi.org/10.1055/a-1487-6284

Träger S (2017) Pratiques non conventionnelles à visée thérapeutique (PNCAVT) et cancer broncho-pulmonaire. Revue Des Maladies Respiratoires Actualités 9:408–412

von Gruenigen V. E, White L. J, Kirven M. S, Showalter A. L, Hopkins M. P, Jenison E. L (2001) A comparison of complementary and alternative medicine use by gynecology and gynecologic oncology patients. Int J Gynecol Cancer 11

Wong CH, L, Sundberg T, Chung VC, H, Voiss P, Cramer H (2020) Prevalence and predictors of mind-body medicine use among women diagnosed with gynecological cancer: Findings from the 2017 US national health interview survey. Gynecol Oncol 157:740–744. https://doi.org/10.1016/j.ygyno.2020.03.011

Wu Y-H, Chen H-Y, Lai C-H, Yeh C-S, Pang J-HS, Qiu J-T, Chou H-H, Yang L-Y, Pan Y-B (2018) Use of Chinese herbal medicine improves chemotherapy-induced thrombocytopenia among gynecological cancer patients: An observational study. Evidence-Based Complement Altern Med 2018:1–8. https://doi.org/10.1155/2018/4201325