ONLINE FIRST

Palliative Medicine in Practice

ISSN: 2545-0425

e-ISSN: 2545-1359

Facebook counselling in the field of complementary and alternative medicine (CAM) among Polish breast cancer patients: a narrative review

Authors: Aneta Brygida Jędrzejewska, Barbara Janina Ślusarska, Grzegorz Józef Nowicki

DOI: 10.5603/pmp.100311

Article type: Review paper

Submitted: 2024-04-18

Accepted: 2024-05-15

Published online: 2024-05-17

[REVIEW]

DOI: 10.5603/pmp.100311

Facebook counselling in the field of complementary and alternative medicine (CAM) among Polish breast cancer patients: a narrative review

[Short title: Facebook CAM counselling for Polish breast cancer patients]

Aneta Brygida Jędrzejewska[https://orcid.org/0000-0002-5263-1061], Barbara Janina Ślusarska[https://orcid.org/0000-0003-0101-9216], Grzegorz Józef Nowicki[https://orcid.org/0000-0002-0503-8847]

Medical University of Lublin

Address for correspondence:

Aneta Brygida Jędrzejewska, Medical University of Lublin, Aleje Racławickie 1, 20–059 Lublin, e-mail: jedrzejewska.ab@gmail.com

Abstract

Introduction: Breast cancer (BC) patients often use complementary and integrative therapies as supportive care as suggested by on-line sources during cancer treatment and when coping with the side effects of treatment. However, the evidence for the effectiveness of such therapies is limited. The aim of this review was to critically analyse Facebook's advice to women with BC regarding the use of complementary and alternative medicine (CAM) and assess their safety and effectiveness.

Methods: Narrative review.

Results: The search yielded 1,300 pieces of advice provided by the community of Facebook groups. These were analysed, and their safety and effectiveness were assessed. Many different CAM therapies were identified, which were grouped into five categories.

Conclusions: Currently, searching for information on CAM on Polish-language Facebook groups by breast cancer patients poses a risk of obtaining advice of unproven effectiveness. Patients are exposed to suggestions that they should take products that may interact with

conventional treatment or that they may be persuaded to give up conventional treatment. Cancer care providers should consider the complexity and implications of the unmet need for information and support for breast cancer patients that result in seeking CAM advice on Facebook groups. Measures should be taken to ensure that breast cancer patients can find reliable evidence on CAM online in social media.

Keywords: complementary and alternative medicine, breast cancer, online health information-seeking, social media; misinformation

Introduction

Complementary medicine includes therapies used in addition to conventional medicine. Alternative medicine includes therapies used in place of conventional medicine, while integrative medicine is the coordinated use of evidence-based complementary practices and conventional care [1]. Integrative oncology refers to complementary and integrative therapies with conventional oncology care [2]. In oncological diseases, patients use complementary and integrative therapies intending to improve well-being, improve quality of life (QOL) and alleviate the symptoms of the disease and the side effects of conventional treatments. The most common types of complementary and alternative medicine (CAM) include herbal products and dietary supplements such as vitamins and minerals [3–6]. Breast cancer (BC) patients often use complementary and integrative therapies as supportive care during cancer treatment and when coping with the side effects of treatment [7, 8]. However, the evidence for the effectiveness of such therapies is limited [9]. CAM among patients is perceived as safe and is usually self-administered without prior consultation with a physician. Despite the widespread belief among patients that vitamins or plant-derived therapies are inherently safe, there is growing evidence that caution should be exercised [10]. Some CAM methods, especially herbal products, vitamins and minerals, can have a negative impact on the treatment process of patients, leading to disease complications, the omission of conventional treatment toxicity and drug interactions [5, 11, 12]. Herbal products contain many natural chemicals that share metabolic pathways with some anti-cancer drugs, potentially leading to under- or over-exposure to these drugs and consequently to treatment failure or increased

toxicity. Therefore, CAM-drug interactions are a significant concern when treating cancer patients [11, 13, 14]. The potential interactions between CAM and anticancer drugs are estimated to be around 55–85% in patients taking both types of treatment [15]. These results may be underestimated because patients rarely inform healthcare professionals about the use of CAM.

During the COVID-19 pandemic, cancer patients experienced particular difficulties and barriers in using the services of formal healthcare facilities, which undoubtedly could have influenced the increased interest in CAM methods among this group of patients and the transfer of their activity towards the use of social media in order to meet therapeutic needs and expectations [16]. Social networks allow greater access to health-related information and provide a point of free communication between people living with similar chronic diseases [17]. The results of a systematic review examining the use of social media by healthcare professionals suggest that healthcare providers see social media platforms as valuable tools to help patients self-manage chronic conditions [18]. When patients access health-related information on Facebook, their primary motives are to receive social support, exchange advice and increase knowledge [19]. In addition, exchange of information regarding specific diseases and related problems occurs in Facebook groups. Nowadays, social media has become an important and common mechanism for providing support in self-management, coping and treatment of chronic diseases [20].

Previous research has shown that Facebook groups are a communication tool used by patients seeking information or support for BC [21]; however, there is a gap in research examining what self-healing and self-management content is communicated on Facebook groups related to CAM therapies for BC. The aim of this review was to critically analyse Facebook's advice to women with BC regarding the use of CAMs and assess their safety and effectiveness.

Methods

Facebook data search design and procedure

The procedure of searching for groups on Facebook for the selection of groups involved creating a new account on the Facebook platform after deleting all browsing history and cookies from the internet browser (Google Chrome). Two researchers individually then entered terms related to complementary and alternative medicine (alternative medicine,

complementary medicine, natural medicine, natural therapies, herbs, herbal medicine, Chinese medicine, homoeopathy, and Ayurvedic medicine) in the Facebook group category. After searching for each term, the first five groups found in the browser, the members of which exceeded 50 thousand people, were joined. The next step was to send a request to the administrator of each group regarding the possibility of searching posts in the group for CAM advice.

Inclusion/exclusion criteria for Facebook groups

The analysis was limited to all public and closed Facebook groups related to CAM, where the content was posted in Polish. Secret Facebook groups or those that did not appear in the Facebook group search were excluded from the analysis because only individual Facebook users who were invited by the Secret Group admin or a current Facebook member have the ability to see the group title, description, members and content. In addition, any closed group that did not accept the researchers' request to join the Facebook group before data collection began was excluded, as group posts can only be viewed by members alone.

Collection of data related to complementary and alternative medicine advice

After obtaining the administrator's consent to join the group, two researchers independently searched for a specific group of content or entries related to BC employing the search engine, using terms such as “breast cancer”, “breast neoplasm”, “breast”, “breasts". Only posts regarding patients seeking help in the treatment and/or management of BC symptoms in 2020–2022 were analysed. The analysis excluded posts concerning benign breast tumours, cysts and posts in which the author indicated that she had not yet received a final diagnosis of a lesion in the breast. Advice posted in the comments by other members of the groups was then collected. The advice was selected in six categories: (a) herbs and plant products (*per os*), (b) vitamins and minerals, (c) mushrooms, (d) discouraging/encouraging conventional medicine, and (e) other.

Assessment of the safety and effectiveness of CAM therapies recommended by users in the form of advice on Facebook groups, taking into account the evidence-based medicine (EBM) guidelines.

Complementary and alternative medicine therapy advice provided on Facebook groups that appeared 20 or more times was found in the NatMed Pro database. Detailed information regarding the inclusion criteria of studies is provided in Table S1 and Table S2. A scoping review method is an approach that allows for the inclusion of diverse methodologies (*i.e.*

experimental and non-experimental research) and has a significant impact on EBM. The approach can be used to map fields of a topic where it is difficult to visualize the range of material categories, contributing to the presentation of varied perspectives on a phenomenon of concern. We followed the steps proposed by Arksey and O'Malley [22] to conduct this review, which includes 5 stages: identifying the research question; identifying relevant studies; study selection; charting the data; and collating, summarizing and reporting the results. We did not intend to complete further meta-analysis or sub-group analysis due to the heterogenicity of the study designs included in this review. This scoping review followed the Preferred Reporting Items for Systematic Reviews and Meta-analysis extension for Scoping Reviews (PRISMA-ScR) checklist (Table S3).

Search strategies and study selection

A NatMed Pro database search was conducted by two investigators. NatMed Pro is a subscription database presenting up to date clinical data on natural medicines, herbal medicines and dietary supplements used in the Western world [22]. Compiled by pharmacists and physicians, it is an online tool that collects evidence-based research from impartial, peer-reviewed sources. It enables the assessment of potential interactions between the drug and CAM, as well as assessment of safety and effectiveness. The study inclusion criteria and search strategy are presented in the Supplementary Materials, Table S2.

In the first stage, the “Effectiveness Checker” tool was applied to check how effective the proposed CAM methods are in the treatment of breast cancer. In the second stage, the “Interaction Checker” tool was employed to analyse potential interactions between conventional treatment and CAM products. The data selection process is presented in Figure 1. Data including the authors' name, year of publication and details of the interventions, and outcome measures or conclusions were compiled in Table S4.

Results

Advice on CAM for breast cancer

Of the 12 groups that met the inclusion criteria for the study, the administrators of 7 groups accepted the researchers' request to join the group, of which no posts regarding BC were found in the two groups. Detailed information on the groups is included in Table S1.

Table 1 presents the characteristics of advice recommending the use of CAM in BC therapy found on Facebook groups. Ultimately, 29 posts were analyzed, from which 1437 CAM advice offerings on BC was collected. The most common advice was to take herbs and plant products (N = 560; 39.01%) and vitamins and minerals (n = 351; 24.4%) (Table 1). The most frequently recommended herbs and plant products were beetroot (n = 70; 12.5%), dandelion (n = 51; 9.1%), cannabidiol (n = 44; 7.9%), flax seed (n = 36; 6.4%) and the fungus chaga (n = 19; 43.2%) (listed separately), with vitamins and minerals being: iodine (n = 132; 37.6%), vitamin D (n = 84; 23.9%) and vitamin C (n = 65; 18.5%). Other recommended therapies included: castor oil compress (n = 85; 24.6%), amygdalin (n = 43; 12.5%) and baking soda compress (n = 36; 10.4%). Regarding recommendation of conventional medicine: encouragement (n = 102; 74.5%); discouragement (n = 35; 25.5%).

Effectiveness of complementary and alternative medicine therapy of advice posted on Facebook groups

Based on the NatMed Pro database search, information was found on the effectiveness of products such as flax seed and vitamin C in BC treatment. Studies on breast cancer prevention were excluded.

Flaxseed

A small clinical study shows that dietary flaxseed has the potential to reduce tumor growth in postmenopausal patients with breast cancer. Consuming a muffin containing ground flaxseed reduces markers of tumor cell proliferation [23].

Vitamin C

A meta-analysis results suggest that post-diagnosis vitamin C supplementation may be associated with a reduced risk of total mortality and breast cancer-specific mortality. Vitamin C supplementation is associated with a 15% lower risk of breast cancer related mortality when compared to no supplementation [24]. On the other hand, a large observational study in patients with breast cancer undergoing radiotherapy shows that Vitamin C supplementation does not reduce risk of breast cancer recurrence. Although the vitamin C group had notably less aggressive tumour types, recurrence-free survival was similar in both vitamin C and control groups [25].

Interactions between complementary and alternative medicine and conventional treatment

Based on the NatMed Pro database search, information was found on potential interactions with conventional treatment in such CAM products as black seed (*Nigella sativa*), cannabidiol (CBD), chaga (*Inonotus obliquus*), dandelion (*Taraxacum officinale*), evening primrose (*Oenothera biennis*), greater celandine (*Chelidonium majus*), delta-9-tetrahydrocannabinol (THC), selenium, turmeric (*Curcuma longa*), vitamin C and vitamin D. The analysis included drugs used in the treatment of breast cancer, such as: tamoxifen, letrozole, exemestane, doxorubicin, cyclophosphamide, epirubicin, paclitaxel, docetaxel, carboplatin, methotrexate, mitomycin and vincristine. We identified 132 combinations of potentially interaction of CAM products and anticancer agents. Among this n = 82 (62.9%) revealed no interaction risk, n = 45 (34.1%) hypothetical interaction risk and 4 potential clinical interaction risk (3%). Table 2. presents potential interactions between herbal medicines and anticancer agents.

Black seed

Black seed may interact with tamoxifen and cyclophosphamide. In vitro researches suggest that black seed, especially thymoquinone, the main bioactive compound, may increase levels of drugs metabolised by CYP2C9 [26]. Black seed might also interfere with immunosuppressive therapy. The effect of black seed is unclear. Some animal studies suggest that it might stimulate immune function [27, 28] when others suggest that it may suppress [29, 30].

Cannabidiol

Cannabidiol might have interactions with tamoxifen, letrozole, exemestane, doxorubicin, cyclophosphamide, paclitaxel, docetaxel and vincristine. In vitro studies show that cannabidiol (CBD) inhibits CYP2C9, CYP3A4, CYP2C19 and suggest that it plays an essential role as herb-drug interaction [31]. CBD intake might also increase levels of drugs metabolized by CYP2C8 and increase levels of certain glucuronidated drugs. *In vitro* researches also show that cannabidiol inhibits uridine diphosphoglucuronosyl transferase (UGT) 1A9 and UGT2B7, enzymes responsible for glucuronidation [32]. That suggests that CBD could decrease the clearance and increase levels of glucuronidated drugs. Additionally, in one case report, women who was taking tamoxifen and cannabidiol were found to be presented with a 9.2% increase in N-desmethyltamoxifen and an 18.8% increase in endoxifen levels after discontinuing cannabidiol for 67 days [33].

Chaga

Chaga may interact with cyclophosphamide. *In vitro* researches demonstrate that certain constituents of chaga (polysaccharides) stimulate immune function and might interfere with immunosuppressive therapy [34].

Dandelion

Dandelion could potentially interfere with Tamoxifen and Doxorubicin. Dandelion intake may increase the clearance of drugs that are UGP substrates. Studies conducted in female rats reveal that consumption of dandelion-tea increases (244% of control) the activity of phase II detoxifying enzyme UGP [35].

Evening primrose

Evening primrose may interact with Tamoxifen. In vitro studies show that intake of evening primrose may increase the level and clinical effects of *CYP2C29* substrates [36].

Greater celandine

Greater celandine might have interaction with tamoxifen, cyclophosphamide and methotrexate. *In vitro* researches indicate that consumption of greater celandine inhibits CYP2D6 enzyme activity and may increase levels of drugs metabolized by CYP2D6 [37]. Greater celandine intake can also affect the liver, it has been linked to many cases of hepatotoxicity [38–40]. Co-treatment with greater celandine and hepatotoxic drugs might, therefore, increase the risk of liver damage. Moreover, clinical research suggest that greater celandine might stimulate immune responses, so might decrease the effects of immunosuppressive therapy [41].

Delta-9-tetrahydrocannabinol (THC)

Delta-9-tetrahydrocannabinol (THC) could potentially interact with tamoxifen, letrozole, doxorubicin, cyclophosphamide, paclitaxel and vincristine. *In vitro* researches show that THC moderately increase levels and adverse effects of CYP2C9 and CYP3A4 substrates [42, 43]. THC intake may also alter levels of drugs that are substrates of P-glycoprotein (P-gp). Most *in vitro* researches suggest that THC can inhibit P-gp and increase the accumulation of probe compounds by reducing P-gp mediated drug efflux [44, 45].

Selenium

Selenium may interact with cyclophosphamide. Preliminary clinical studies suggest that selenium intake may stimulate the immune system and may reduce the effectiveness of immunosuppressant therapy [46].

Turmeric

Turmeric can theoretically interact with every drug selected in this review. *In vitro* and animal research show that consuming turmeric might increase levels metabolized by CYP3A4 [47, 48]. *In vitro* and animal studies show turmeric intake might also increase the absorption of P-glycoprotein substrates and hold potencies to cause herb-food interactions [49, 50]. Turmeric has antioxidant effects. Theoretically, this may reduce the activity of chemotherapy drugs that generate free radicals. However, research is conflicting [51].

A small clinical trial in patients with breast cancer taking tamoxifen shows that co-treatment with curcumin could lower endoxifen concentrations below the threshold for efficacy (potentially 20–40% of the patients) [52]. Additionally, a few case reports shows that turmeric consumption may increase the risk of liver damage when hepatotoxic drugs are prescribed, especially when taken in high doses [53, 54].

Vitamin C

Vitamin C could potentially interfere with doxorubicin, cyclophosphamide, epirubicin, carboplatin and mitomycin. The antioxidant effects of vitamin C might reduce the effectiveness of antitumor antibiotics. More evidence is needed to determine the effects that vitamin C could potentially have on chemotherapy, because there are many opinions about risks or benefits of antioxidant supplementation [55].

Vitamin D

Vitamin D intake might have interaction with tamoxifen, letrozole, exemestane, doxorubicin, cyclophosphamide, paclitaxel, docetaxel, and vincristine. Vitamin D might affect CYP3A4 enzyme activity and reduce the bioavailability of CYP3A4 substrates. In vitro research suggests that vitamin D induces CYP3A4 transcription [56].

Discussion

Social networks such as Facebook provide access to health-related information and enable communication between people with similar health problems. However, the unmet needs of patients to manage their symptoms, coupled with a desire to use natural methods to improve their health, mean that patients seeking guidance on complementary health approaches may result in making decisions based on recommendations gathered from resources of varying credibility without any professional education. The Internet is a

significant source of health misinformation that threatens public health because it hinders the delivery of evidence-based medicine, as well as negatively impacts the patient–doctor relationship, while the use of unproven therapies is associated with reduced survival [10, 57, 58].

Our research has shown that BC patients commonly seek information on CAM to treat their disease. Herbs, plant products (43.1%), and vitamins and minerals (27.0%) were the most frequently proposed CAM products. These results align with previous study reports on the most commonly used CAMs by patients [59, 60]. Natural compounds derived from plants have provided a range of useful chemotherapeutic drugs for malignant tumours due to their wide range of anti-cancer effects, and vitamin or mineral deficiencies are observed among BC patients. However, the vast majority of the evidence cited confirms that the CAMs recommended by Facebook users are not effective and most may lead to interactions with conventional drugs. The quality of herbal products and the lack of strong scientific evidence currently make integrating them into conventional cancer care practices difficult. A factor that complicates the assessment of the quality and safety of herbs and other plant products is their complexity and high variability.

Clinical studies reviewed in our study citing in favour of CAM for BC show that products such as flaxseed [23] and vitamin C [24, 25] can be used for supporting the effects of a conventional medicinal products. However, these products are not able to produce a therapeutic effect on their own as suggested by the group members. In addition, some of these products were effective or ineffective depending on the type of BC and whether the study patients were pre-menopausal or postmenopausal.

The results of our study showed that the CAM products proposed by the community of Facebook groups can lead to interactions with conventional treatment. Our results demonstrate that four of the CAM-drug interactions reveal potential clinical interaction and forty-five present hypothetical interaction risk. Additionally, proposed CAM treatments included methods such as castor oil poultice, yellow tulip bulb-ointment, recall healing and baking soda poultice, for which the review found no credible scientific evidence of their effectiveness. It has also been observed that part of the Facebook group community discourages BC patients from using conventional medicine, which can result in a much lower chance of survival [58, 61].

The results of our research indicate that the CAM methods proposed by the Facebook community groups did not include mind-body practices such as yoga, meditation, acupressure

or relaxation techniques, which have proven effectiveness and safety in reducing the effects of common problems experienced by BC patients, including chemotherapy-induced nausea and vomiting (CINV) [62, 63], anxiety and depression [64, 65], pain [66–69] or which improve the quality of life [64, 65, 70–72]. In addition, it was observed that the advice posted by the community groups did not include information on potential CAM-drug interactions or questions about whether and/or what conventional treatment is currently used among respondents seeking additional treatment methods.

The search for additional information and the use of CAM methods to treat and manage the symptoms of the disease and/or meet the psychological needs of many patients (which is associated with improved optimism and prospects), can affect recovery and potential cancer treatment outcomes [73]. Therefore, it is important that healthcare professionals discuss the use of CAMs with patients, not only by discouraging ineffective and unsafe methods, but also by recommending CAMs, the effectiveness and safety of which are scientifically proven. It is also important to increase the social media activity of medical CAM specialists to promote integrative oncology — a patient-centred, evidence-based field of cancer care that uses mind-body practices, natural products and/or lifestyle modifications in addition to conventional cancer treatment derived from different traditions [2].

Strengths and limitations

The strengths of these studies require further consideration. First, to the best of our knowledge, this is the first study to assess the phenomenon of Polish BC patients seeking information on CAM on the Facebook platform. It is also worth noting that the analysed posts came from the period of the COVID-19 pandemic, when anti-epidemic procedures were in force, blocking women's access to formal healthcare facilities, which probably allowed them only partially to assess the scope of seeking direct advice from BC patients. On the other hand, for patients, perhaps it was a period of increased activity on FB groups as a form of meeting their health needs due to social isolation procedures during the pandemic. Second, our work is also the first to assess whether the proposed CAM advice in Facebook groups is safe and effective, and we did so by utilizing the credibility of the EBM evidence.

Nevertheless, this study has several limitations. Firstly, the study's design does not allow us to determine exactly which of the recommended CAM methods will be employed by BC patients. Secondly, it was not possible to obtain information on what conventional treatment they were currently receiving from posts by BC patients, so it was impossible to assess the exact risk of an interaction between CAM and conventional treatment. Thirdly, the

safety and efficacy analysis of the recommended CAM methods was not a systematic review; therefore, not all information about the individual methods was disclosed. In addition, only posts from groups that were visible in the Facebook search engine and in which the administrator allowed the analysis of posted content were taken into account in the data collection process. Finally, the analysed content did not include information on fan pages and other portals or forums outside the Facebook platform.

Conclusions

Currently, searching for information on CAM on Polish-language Facebook groups by BC patients poses a risk of obtaining advice of unproven effectiveness. In addition, patients are exposed to suggestions to take products that may interact with conventional treatment or may be persuaded to give up traditional treatment. There is a need to improve communication between BC patients and healthcare professionals about safe and effective CAM methods and the risk of CAM-drug interactions.

Cancer care providers should consider the complexity and implications of the unmet need for information and support for BC patients that result in seeking CAM advice on Facebook groups. On the other hand, measures should be taken to ensure that BC patients can also find reliable evidence on CAMs online in online forums and groups. Incorporating evidence-based CAM practices can be an important component of interventions aimed at improving BC patients' quality of life and survival. Further research is needed to determine which CAM methods are safe and effective as an integrative adjunct to conventional cancer therapies. This research can be used as a framework to develop educational materials for providers and patients on integrative oncology.

Article information and declarations

Acknowledgments

None.

Ethics statement

The study was conducted in accordance with the Declaration of Helsinki. The Bioethics Committee has issued its Ethical Approval at the Medical University of Lublin (decision number: KE–0254/29/02/2022).

Author contributions

Conceptualization: ABJ, BJŚ; methodology: ABJ; formal analysis: ABJ; data curation: ABJ, BJŚ; writing — original draft preparation: ABJ; writing — review and editing: BJŚ, GJN; supervision: BJŚ, GJN; project administration: BJŚ, GJN. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflicts of interest.

Funding

This research received no external funding.

Supplementary material

The Supplementary Material for this article can be found online at https://journals.viamedica.pl/palliative_medicine_in_practice/article/view/100311.

References

1. Complementary, alternative, or integrative health: What's in a name?; NCCIH. https://www.nccih.nih.gov/health/complementary-alternative-or-integrative-health-whats-in-a-name (6.12.2021).
2. Witt CM, Balneaves LG, Cardoso MJ, et al. A comprehensive definition for integrative oncology. J Natl Cancer Inst Monogr. 2017; 2017(52): 3–8, doi: 10.1093/jncimonographs/lgx012, indexed in Pubmed: 29140493.
3. Jędrzejewska A, Ślusarska BJ, Szadowska-Szlachetka Z, et al. Use of complementary and alternative medicine in patients with cancer and their relationship with health behaviours — cross–sectional study. Ann Agric Environ Med. 2021; 28(3): 475–482, doi: 10.26444/aaem/140165, indexed in Pubmed: 34558273.
4. Theuser AK, Hack CC, Fasching PA, et al. Patterns and trends of herbal medicine use among patients with gynecologic cancer. Geburtshilfe Frauenheilkd. 2021; 81(6): 699–707, doi: 10.1055/a-1487-6284, indexed in Pubmed: 34168382.
5. Wolf CP, Rachow T, Ernst T, et al. Interactions in cancer treatment considering cancer therapy, concomitant medications, food, herbal medicine and other supplements. J Cancer Res Clin Oncol. 2022; 148(2): 461–473, doi: 10.1007/s00432-021-03625-3, indexed in Pubmed: 33864520.

6. Kufel-Grabowska J, Bartoszkiewicz M. Complementary and alternative therapies in oncology. Nowotwory J Oncol. 2022; 72(2): 135–136, doi: 10.5603/NJO.a2022.0016.

7. Behzadmehr R, Dastyar N, Moghadam MP, et al. Effect of complementary and alternative medicine interventions on cancer related pain among breast cancer patients: A systematic review. Complement Ther Med. 2020; 49: 102318, doi: 10.1016/j.ctim.2020.102318, indexed in Pubmed: 32147038.

8. Wanchai A, Armer JM, Stewart BR. Complementary and alternative medicine use among women with breast cancer: a systematic review. Clin J Oncol Nurs. 2010; 14(4): E45–E55, doi: 10.1188/10.CJON.E45-E55, indexed in Pubmed: 20682492.

9. Greenlee H, Balneaves LG, Carlson LE, et al. Clinical practice guidelines on the use of integrative therapies as supportive care in patients treated for breast cancer. J Natl Cancer Inst Monogr. 2014; 2014(50): 346–358, doi: 10.1093/jncimonographs/lgu041, indexed in Pubmed: 25749602.

10. Ambrosone CB, Zirpoli GR, Hutson AD, et al. Dietary supplement use during chemotherapy and survival outcomes of patients with breast cancer enrolled in a cooperative group clinical trial (SWOG S0221). J Clin Oncol. 2020; 38(8): 804–814, doi: 10.1200/JCO.19.01203, indexed in Pubmed: 31855498.

11. Ben-Arye E, Samuels N, Goldstein LH, et al. Potential risks associated with traditional herbal medicine use in cancer care: a study of middle eastern oncology health care professionals. Cancer. 2016; 122(4): 598–610, doi: 10.1002/cncr.29796, indexed in Pubmed: 26599199.

12. Keene MR, Heslop IM, Sabesan SS, et al. Complementary and alternative medicine use in cancer: a systematic review. Complement Ther Clin Pract. 2019; 35: 33–47, doi: 10.1016/j.ctcp.2019.01.004, indexed in Pubmed: 31003679.

13. Kanimozhi T, Hindu K, Maheshvari Y, et al. Herbal supplement usage among cancer patients: a questionnaire-based survey. J Cancer Res Ther. 2021; 17(1): 136–141, doi: 10.4103/jcrt.JCRT_612_18, indexed in Pubmed: 33723144.

14. Mohamed MEF, Frye RF. Effects of herbal supplements on drug glucuronidation. Review of clinical, animal, and in vitro studies. Planta Med. 2011; 77(4): 311–321, doi: 10.1055/s-0030-1250457, indexed in Pubmed: 21049395.

15. Firkins R, Eisfeld H, Keinki C, et al. The use of complementary and alternative medicine by patients in routine care and the risk of interactions. J Cancer Res Clin Oncol. 2018; 144(3): 551–557, doi: 10.1007/s00432-018-2587-7, indexed in Pubmed: 29356888.

16. Moraliyage H, De Silva D, Ranasinghe W, et al. Cancer in lockdown: impact of the COVID-19 pandemic on patients with cancer. Oncologist. 2021; 26(2): e342–e344, doi: 10.1002/onco.13604, indexed in Pubmed: 33210442.

17. Moorhead SA, Hazlett DE, Harrison L, et al. A new dimension of health care: systematic review of the uses, benefits, and limitations of social media for health communication. J Med Internet Res. 2013; 15(4): e85, doi: 10.2196/jmir.1933, indexed in Pubmed: 23615206.

18. De Angelis G, Wells GA, Davies B, et al. The use of social media among health professionals to facilitate chronic disease self-management with their patients: a systematic review. Digit Health. 2018; 4: 2055207618771416, doi: 10.1177/2055207618771416, indexed in Pubmed: 29942633.

19. Antheunis ML, Tates K, Nieboer TE. Patients' and health professionals' use of social media in health care: motives, barriers and expectations. Patient Educ Couns. 2013; 92(3): 426–431, doi: 10.1016/j.pec.2013.06.020, indexed in Pubmed: 23899831.

20. Patel R, Chang T, Greysen SR, et al. Social media use in chronic disease: a systematic review and novel taxonomy. Am J Med. 2015; 128(12): 1335–1350, doi: 10.1016/j.amjmed.2015.06.015, indexed in Pubmed: 26159633.

21. Bender JL, Jimenez-Marroquin MC, Jadad AR. Seeking support on facebook: a content analysis of breast cancer groups. J Med Internet Res. 2011; 13(1): e16, doi: 10.2196/jmir.1560, indexed in Pubmed: 21371990.

22. NatMed Pro. https://naturalmedicines.therapeuticresearch.com/ (2.01.2024).

23. Thompson LU, Chen JM, Li T, et al. Dietary flaxseed alters tumor biological markers in postmenopausal breast cancer. Clin Cancer Res. 2005; 11(10): 3828–3835, doi: 10.1158/1078-0432.CCR-04-2326, indexed in Pubmed: 15897583.

24. Harris HR, Orsini N, Wolk A. Vitamin C and survival among women with breast cancer: a meta-analysis. Eur J Cancer. 2014; 50(7): 1223–1231, doi: 10.1016/j.ejca.2014.02.013, indexed in Pubmed: 24613622.

25. Khazaei S, Nilsson L, Adrian G, et al. Impact of combining vitamin C with radiation therapy in human breast cancer: does it matter? Oncotarget. 2022; 13(1): 439–453, doi: 10.18632/oncotarget.28204, indexed in Pubmed: 35222809.

26. Wang Z, Wang X, Wang Z, et al. Potential herb-drug interaction risk of thymoquinone and phenytoin. Chem Biol Interact. 2022; 353: 109801, doi: 10.1016/j.cbi.2022.109801, indexed in Pubmed: 34998822.

27. Fararh KM, Atoji Y, Shimizu Y, et al. Mechanisms of the hypoglycaemic and immunopotentiating effects of Nigella sativa L. oil in streptozotocin-induced diabetic hamsters. Res Vet Sci. 2004; 77(2): 123–129, doi: 10.1016/j.rvsc.2004.03.002, indexed in Pubmed: 15196902.

28. Massadeh AM, Al-Safi SA, Momani IF, et al. Analysis of cadmium and lead in mice organs: effect of Nigella sativa L. (Black Cumin) on the distribution and immunosuppressive effect of cadmium-lead mixture in mice. Biol Trace Elem Res. 2007; 115(2): 157–167, doi: 10.1007/BF02686027, indexed in Pubmed: 17435259.

29. Islam SkN, Begum P, Ahsan T, et al. Immunosuppressive and cytotoxic properties of Nigella sativa. Phytother Res. 2004; 18(5): 395–398, doi: 10.1002/ptr.1449, indexed in Pubmed: 15174000.

30. Boskabady MH, Vahedi N, Amery S, et al. The effect of Nigella sativa alone, and in combination with dexamethasone, on tracheal muscle responsiveness and lung inflammation in sulfur mustard exposed guinea pigs. J Ethnopharmacol. 2011; 137(2): 1028–1034, doi: 10.1016/j.jep.2011.07.030, indexed in Pubmed: 21801826.

31. Nasrin S, Watson CJW, Perez-Paramo YX, et al. Cannabinoid metabolites as inhibitors of major hepatic CYP450 enzymes, with implications for cannabis-drug interactions. Drug Metab Dispos. 2021; 49(12): 1070–1080, doi: 10.1124/dmd.121.000442, indexed in Pubmed: 34493602.

32. Highlights of prescribing information. www.fda.gov/medwatch (21.12.2023).

33. Parihar V, Rogers A, Blain AM, et al. Reduction in tamoxifen metabolites endoxifen and n-desmethyltamoxifen with chronic administration of low dose cannabidiol: a CYP3A4 and CYP2D6 drug interaction. J Pharm Pract. 2022; 35(2): 322–326, doi: 10.1177/0897190020972208, indexed in Pubmed: 33191836.

34. Kim YO, Han SB, Lee HW, et al. Immuno-stimulating effect of the endo-polysaccharide produced by submerged culture of Inonotus obliquus. Life Sci. 2005; 77(19): 2438–2456, doi: 10.1016/j.lfs.2005.02.023, indexed in Pubmed: 15970296.

35. Maliakal PP, Wanwimolruk S. Effect of herbal teas on hepatic drug metabolizing enzymes in rats. J Pharm Pharmacol. 2001; 53(10): 1323–1329, doi: 10.1211/0022357011777819, indexed in Pubmed: 11697539.

36. Zou L, Harkey MR, Henderson GL. Effects of herbal components on cDNA-expressed cytochrome P450 enzyme catalytic activity. Life Sci. 2002; 71(13): 1579–1589, doi: 10.1016/s0024-3205(02)01913-6, indexed in Pubmed: 12127912.

37. Liu Y, Cui T, Peng Y, et al. Mechanism-based inactivation of cytochrome P450 2D6 by chelidonine. J Biochem Mol Toxicol. 2019; 33(2): e22251, doi: 10.1002/jbt.22251, indexed in Pubmed: 30368994.

38. Teschke R, Glass X, Schulze J. Herbal hepatotoxicity by Greater Celandine (Chelidonium majus): causality assessment of 22 spontaneous reports. Regul Toxicol Pharmacol. 2011; 61(3): 282–291, doi: 10.1016/j.yrtph.2011.08.008, indexed in Pubmed: 21893153.

39. Stickel F, Pöschl G, Seitz HK, et al. Acute hepatitis induced by Greater Celandine (Chelidonium majus). Scand J Gastroenterol. 2003; 38(5): 565–568, doi: 10.1080/00365520310000942, indexed in Pubmed: 12795472.

40. Moro PA, Cassetti F, Giugliano G, et al. Hepatitis from Greater celandine (Chelidonium majus L.): review of literature and report of a new case. J Ethnopharmacol. 2009; 124(2): 328–332, doi: 10.1016/j.jep.2009.04.036, indexed in Pubmed: 19397968.

41. Nowicky JW, Staniszewski A, Zbroja–Sontag W. et al. Evaluation of thiophosphoric acid alkaloid derivatives from Chelidonium majus L. (“Ukrain”) as an immunostimulant in patients with various carcinomas. Drugs Exp Clin Res. 1991 Jan 1;17(2):139–143. https://europepmc.org/article/med/1713821 (21.12.2023).

42. Damkier P, Lassen D, Christensen MM, et al. Interaction between warfarin and cannabis. Basic Clin Pharmacol Toxicol. 2019; 124(1): 28–31, doi: 10.1111/bcpt.13152, indexed in Pubmed: 30326170.

43. Chayasirisobhon S. Mechanisms of action and pharmacokinetics of cannabis. Perm J. 2020; 25: 1–3, doi: 10.7812/TPP/19.200, indexed in Pubmed: 33635755.

44. Zhu HJ, Wang JS, Markowitz JS, et al. Characterization of P-glycoprotein inhibition by major cannabinoids from marijuana. J Pharmacol Exp Ther. 2006; 317(2): 850–857, doi: 10.1124/jpet.105.098541, indexed in Pubmed: 16439618.

45. Tournier N, Chevillard L, Megarbane B, et al. Interaction of drugs of abuse and maintenance treatments with human P-glycoprotein (ABCB1) and breast cancer resistance protein (ABCG2). Int J Neuropsychopharmacol. 2010; 13(7): 905–915, doi: 10.1017/S1461145709990848, indexed in Pubmed: 19887017.

46. Peretz A, Nève J, Desmedt J, et al. Lymphocyte response is enhanced by supplementation of elderly subjects with selenium-enriched yeast. Am J Clin Nutr. 1991; 53(5): 1323–1328, doi: 10.1093/ajcn/53.5.1323, indexed in Pubmed: 2021141.

47. Hou XL, Takahashi K, Kinoshita N, et al. Possible inhibitory mechanism of Curcuma drugs on CYP3A4 in 1alpha,25 dihydroxyvitamin D3 treated Caco-2 cells. Int J Pharm. 2007; 337(1-2): 169–177, doi: 10.1016/j.ijpharm.2006.12.035, indexed in Pubmed: 17270371.

48. Valentine SP, Le Nedelec MJ, Menzies AR, et al. Curcumin modulates drug metabolizing enzymes in the female Swiss Webster mouse. Life Sci. 2006; 78(20): 2391–2398, doi: 10.1016/j.lfs.2005.09.017, indexed in Pubmed: 16297412.

49. Yue GGL, Cheng SW, Yu H, et al. The role of turmerones on curcumin transportation and P-glycoprotein activities in intestinal Caco-2 cells. J Med Food. 2012; 15(3): 242–252, doi: 10.1089/jmf.2011.1845, indexed in Pubmed: 22181075.

50. Zhang W, Tan TM, Lim LY. Impact of curcumin-induced changes in P-glycoprotein and CYP3A expression on the pharmacokinetics of peroral celiprolol and midazolam in rats. Drug Metab Dispos. 2007; 35(1): 110–115, doi: 10.1124/dmd.106.011072, indexed in Pubmed: 17050652.

51. Mitchell TM. Correspondence re: Somasundaram et al., Dietary curcumin inhibits chemotherapy-induced apoptosis in models of human breast cancer. Cancer Res., 62: 3868-3875, 2002. Cancer Res. 2003; 63(16): 5165–5166; author reply 5166–5167, indexed in Pubmed: 12941849.

52. Hussaarts KG, Hurkmans DP, Oomen-de Hoop E, et al. Impact of curcumin (with or without piperine) on the pharmacokinetics of tamoxifen. Cancers (Basel). 2019; 11(3), doi: 10.3390/cancers11030403, indexed in Pubmed: 30909366.

53. Arzallus T, Izagirre A, Castiella A, et al. Drug induced autoimmune hepatitis after turmeric intake. Gastroenterol Hepatol. 2023; 46(10): 805–806, doi: 10.1016/j.gastrohep.2023.01.002, indexed in Pubmed: 36634868.

54. Halegoua-DeMarzio D, Navarro V, Ahmad J, et al. Liver injury associated with turmeric-a growing problem: ten cases from the drug-induced liver injury network [DILIN]. Am J Med. 2023; 136(2): 200–206, doi: 10.1016/j.amjmed.2022.09.026, indexed in Pubmed: 36252717.

55. Yasueda A, Urushima H, Ito T. Efficacy and interaction of antioxidant supplements as adjuvant therapy in cancer treatment: a systematic review. Integr Cancer Ther. 2016; 15(1): 17–39, doi: 10.1177/1534735415610427, indexed in Pubmed: 26503419.

56. Robien K, Oppeneer SJ, Kelly JA, et al. Drug-vitamin D interactions: a systematic review of the literature. Nutr Clin Pract. 2013; 28(2): 194–208, doi: 10.1177/0884533612467824, indexed in Pubmed: 23307906.

57. Johnson SB, Park HS, Gross CP, et al. Use of alternative medicine for cancer and its impact on survival. J Natl Cancer Inst. 2018; 110(1): 121–124, doi: 10.1093/jnci/djx145, indexed in Pubmed: 28922780.

58. Johnson SB, Park HS, Gross CP, et al. Complementary medicine, refusal of conventional cancer therapy, and survival among patients with curable cancers. JAMA Oncol. 2018; 4(10): 1375–1381, doi: 10.1001/jamaoncol.2018.2487, indexed in Pubmed: 30027204.

59. Jędrzejewska AB, Ślusarska BJ, Jurek K, et al. Translation and cross-cultural adaptation of the international questionnaire to measure the use of complementary and alternative medicine (I-CAM-Q) for the Polish and cross-sectional study. Int J Environ Res Public Health. 2022; 20(1): 124, doi: 10.3390/ijerph20010124, indexed in Pubmed: 36612446.

60. Kristoffersen AE, Quandt SA, Stub T. Use of complementary and alternative medicine in Norway: a cross-sectional survey with a modified Norwegian version of the international questionnaire to measure use of complementary and alternative medicine (I-CAM-QN). BMC Complement Med Ther. 2021; 21(1): 93, doi: 10.1186/s12906-021-03258-6, indexed in Pubmed: 33726724.

61. Joseph K, Vrouwe S, Kamruzzaman A, et al. Outcome analysis of breast cancer patients who declined evidence-based treatment. World J Surg Oncol. 2012; 10: 118, doi: 10.1186/1477-7819-10-118, indexed in Pubmed: 22734852.

62. Dibble SL, Chapman J, Mack KA, et al. Acupressure for nausea: results of a pilot study. Oncol Nurs Forum. 2000; 27(1): 41–47, indexed in Pubmed: 10660922.

63. Molassiotis A, Helin AM, Dabbour R, et al. The effects of P6 acupressure in the prophylaxis of chemotherapy-related nausea and vomiting in breast cancer patients. Complement Ther Med. 2007; 15(1): 3–12, doi: 10.1016/j.ctim.2006.07.005, indexed in Pubmed: 17352966.

64. Crane-Okada R, Kiger H, Sugerman F, et al. Mindful movement program for older breast cancer survivors: a pilot study. Cancer Nurs. 2012; 35(4): E1–13, doi: 10.1097/NCC.0b013e3182280f73, indexed in Pubmed: 22705939.

65. Kim YH, Kim HJ, Ahn SDo, et al. Effects of meditation on anxiety, depression, fatigue, and quality of life of women undergoing radiation therapy for breast cancer. Complement Ther Med. 2013; 21(4): 379–387, doi: 10.1016/j.ctim.2013.06.005, indexed in Pubmed: 23876569.

66. Gan TJ, Jiao KR, Zenn M, et al. A randomized controlled comparison of electro-acupoint stimulation or ondansetron versus placebo for the prevention of postoperative nausea and vomiting. Anesth Analg. 2004; 99(4): 1070–1075, doi: 10.1213/01.ANE.0000130355.91214.9E, indexed in Pubmed: 15385352.

67. Bao T, Cai L, Giles JT, et al. A dual-center randomized controlled double blind trial assessing the effect of acupuncture in reducing musculoskeletal symptoms in breast cancer patients taking aromatase inhibitors. Breast Cancer Res Treat. 2013; 138(1): 167–174, doi: 10.1007/s10549-013-2427-z, indexed in Pubmed: 23393007.

68. Crew KD, Capodice JL, Greenlee H, et al. Pilot study of acupuncture for the treatment of joint symptoms related to adjuvant aromatase inhibitor therapy in postmenopausal breast cancer patients. J Cancer Surviv. 2007; 1(4): 283–291, doi: 10.1007/s11764-007-0034-x, indexed in Pubmed: 18648963.

69. Crew KD, Capodice JL, Greenlee H, et al. Randomized, blinded, sham-controlled trial of acupuncture for the management of aromatase inhibitor-associated joint symptoms in women with early-stage breast cancer. J Clin Oncol. 2010; 28(7): 1154–1160, doi: 10.1200/JCO.2009.23.4708, indexed in Pubmed: 20100963.

70. Siedentopf F, Utz-Billing I, Gairing S, et al. Yoga for patients with early breast cancer and its impact on quality of life — a randomized controlled trial. Geburtshilfe Frauenheilkd. 2013; 73(4): 311–317, doi: 10.1055/s-0032-1328438, indexed in Pubmed: 24771916.

71. Raghavendra RM, Nagarathna R, Nagendra HR, et al. Effects of an integrated yoga programme on chemotherapy-induced nausea and emesis in breast cancer patients. Eur J

Cancer Care (Engl). 2007; 16(6): 462–474, doi: 10.1111/j.1365-2354.2006.00739.x, indexed in Pubmed: 17944760.

72. Pruthi S, Stan DL, Jenkins SM, et al. A randomized controlled pilot study assessing feasibility and impact of yoga practice on quality of life, mood, and perceived stress in women with newly diagnosed breast cancer. Glob Adv Health Med. 2012; 1(5): 30–35, doi: 10.7453/gahmj.2012.1.5.010, indexed in Pubmed: 27257529.

73. Edwards GV, Aherne NJ, Horsley PJ, et al. Prevalence of complementary and alternative therapy use by cancer patients undergoing radiation therapy. Asia Pac J Clin Oncol. 2014; 10(4): 346–353, doi: 10.1111/ajco.12203, indexed in Pubmed: 24837068.

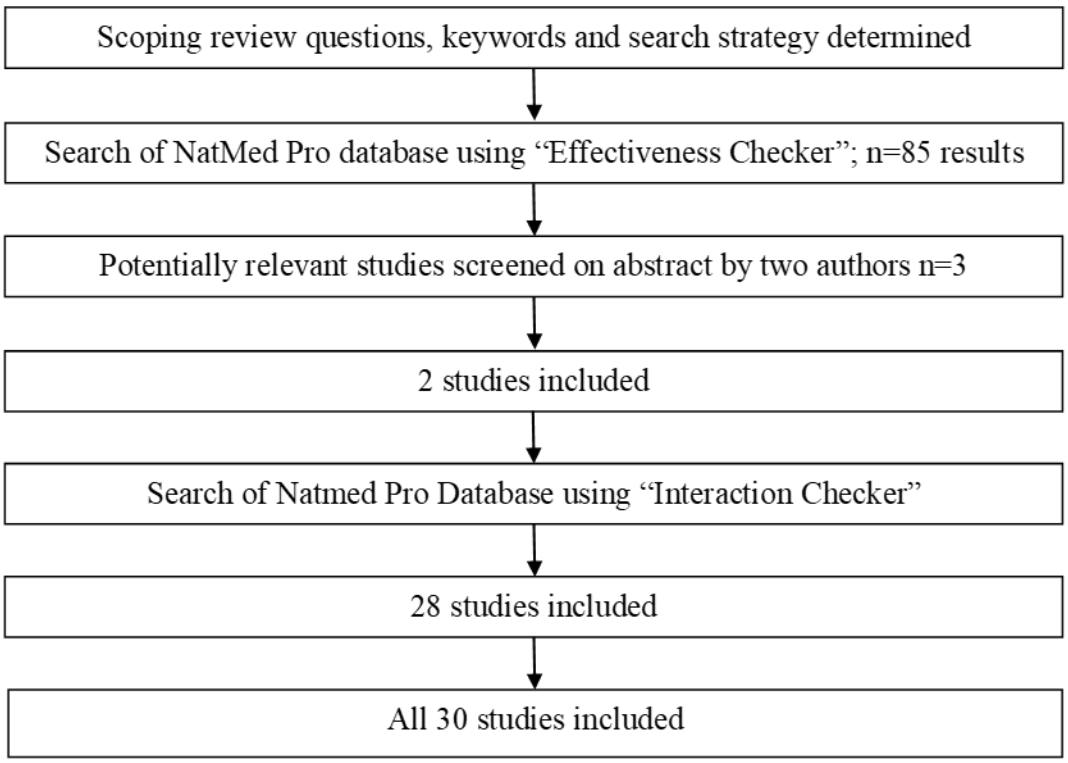

Figure 1. The data selection process

Table 1. Characteristics of recommended CAMs for women with breast cancer by the community on Facebook groups

Type of CAM	**n (%)**
Herbs and plant products	**560 (100)**
Beetroot (*Beta vulgaris*)	70 (12.5)
Dandelion (*Taraxacum officinale)*	51 (9.1)
Cannabidiol (CBD)	44 (7.9)
Flax seed (*Linum usitatissimum)*	36 (6.4)
Urtica (*Urtica dioica)*	28 (5.0)
Turmeric (*Curcuma)*	27 (4.8)
Black seed (*Nigella sativa)*	19 (3.4)
Burdock (*Arctium)*	18 (3.2)
Common wormwood (*Artemisia absinthium)*	18 (3.2)
Evening-primroses (*Oenothera)*	17 (3.0)
Graviola (*Annona muricata)*	16 (2.9)
Delta-9-tetrahydrocannabinol (THC)	16 (2.9)
Cleavers (*Galium aparine)*	14 (2.5)
Greater celandine (C*helidonium majus)*	14 (2.5)
Capsaicin	11 (2.0)
Swedish Bitters	10 (1.8)
Other	151 (26.9)
Vitamins and minerals	**351 (100)**
Iodine	132 (37.6)
Vitamin D	84 (23.9)
Vitamin C	65 (18.5)
Vitamin K	19 (5.4)
Selenium	18 (5.1)
Zinc	12 (3.4)
Other	21 (6.0)
Mushrooms	**44 (100)**
Chaga (*Inonotus obliquus)*	19 (43.2)
Other	25 (56.8)
Other therapies	**349 (100)**
Castor oil compress	85 (24.6)
Amygdalin	43 (12.5)
Baking soda compress	36 (10.4)
Recall healing	26 (7.5)
Yellow tulip bulb ointment	17 (4.9)
Other	138 (40.0)
Other	**137 (100)**
Encouraging the use of conventional medicine	102 (74.5)
Discouraging the use of conventional medicine	35 (25.5)

n — the number of comments with a recommended product in a given category

Table 2. Potential interactions between herbal medicines and anticancer agents

	Tamoxifen	Letrozole	Exemestane	Doxorubicin	Cyclophosphamide	Epirubicin	Paclitaxel	Docetaxel	Carboplatin	Methotrexate	Mitomycin	Vincristine
Black seed	CYP2C9				IMM							
CBD	CYP2C9 CYP3A4 UGT	CYP2C19 CYP3A4	CYP3A4	CYP3A4	CYP2C19 CYP3A4		CYP2C8 CYP3A4	CYP3A4				CYP3A4
Chaga					IMM							
Dandelion	UGT			UGT								
Evening primrose	CYP2C9											
Greater celandine	CYP2D6 HEP				HEP IMM					HEP		
THC	CYP2C9 CYP3A4 P-gp	CYP3A4		CYP3A4 P-gp	CYP3A4		CYP3A4 P-gp					CYP3A4 P-gp

Selenium					IMM							
Turmeric	CYP3A4 HEP P-gp	CYP3A4	CYP3A4	AE CYP3A4 P-gp	AE CYP4A4 HEP	AE	CYP3A4 P-gp	CYP3A4	AE	HEP	AE	CYP3A4 P-gp
Vitamin C				AE	AE	AE			AE		AE	
Vitamin D	CYP3A4	CYP3A4	CYP3A4	CYP3A4	CYP3A4		CYP3A4	CYP3A4				CYP3A4

	No expected interaction		Theoretical interaction		Potential clinical interaction

Red — inhibition; green — increase; violet— controversial in references (inhibition and/or induction); IMM — interfere with immunosuppressive therapy; HEP — might increase the risk of hepatoxity; AE — antioxidant effects; UGT-UDP — glucuronosyltransferase; THC — delta-9-tetrahydrocannabinol; CBD — cannabidiol; CYP2C9 — cytochrome P2C9 (*etc.*)