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Dietary supplementation and physical activity in cancer patients: A cross-sectional study in integrative oncology

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ABSTRACT

Background: Dietary supplements (DS) and adapted physical activity (PA) are recognized as complementary strategies in oncology; however, guidelines for DS use during cancer treatment are lacking. Many patients self-prescribe DS and their adherence to PA guidelines remains low. Combined integrative approaches, such as supplementation and exercise, can induce synergistic effects rather than each intervention alone. This study investigated patterns of DS behavior across cancer phases. Understanding the potential link between motivations for DS and interest in PA may provide insights into the design of multidisciplinary approaches for oncology patients, with the goal of enhancing their quality of life.

Methods: A cross-sectional study was conducted among 114 cancer patients using DS (106 women, 8 men), 27–79 years. Clinical data, DS behavior, and PA interest and levels (according to international guidelines) were collected by self-administered questionnaire. Descriptive statistics and chi-square tests were used. An exploratory binary logistic regression examined the association between DS behaviors and interest in PA.

Results: Vitamin D and magnesium were the most used DS across all treatment phases, while olive oil and vitamin C were frequently reported during active treatment. Although oncologists were the preferred counselling source (59.6%), the main recommendations came from naturopaths, general practitioners, and personal networks. 38.6% of participants self-prescribed DS. Self-prescription was significantly associated with reasons for not informing general practitioners about DS use (χ^2=10.371, p = 0.016). Interest in structured PA programs was higher among patients using DS for general strengthening, dietary support, and sleep ($p < 0.05$), but not among those using DS for fatigue, stress, or anxiety.

Conclusion: Among DS users, self-prescription was common despite a clear preference for oncologist guidance. Many patients rely on non-medical sources. The observed association between motivations for DS use and interest in PA highlights the need to further investigate the impact of integrated supportive care strategies in oncology.

1. Introduction

Cancer incidence and prevalence are rising globally, with 20 million new cases and nearly 10 million deaths in 2022. Experts predict that new cases will increase by 77%, reaching 35 million annually by 2050 [1]. Recent studies have concluded that being overweight, engaging in sedentary behaviors, and consuming a poor diet can increase the risk of all causes of cancer by 30% [2]. Consequently, there is a strong

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recommendation to focus on lifestyle interventions for cancer prevention and treatment. A healthy diet, regular physical activity (PA), avoidance of smoking and excessive alcohol consumption, significantly impact not only the risk of developing cancer but also the efficacy and tolerance of anti-cancer treatments [3]. A well-balanced diet can improve a patient's immune status and the body's ability to tolerate treatments, and adequate caloric intake reduces the risk of malnutrition or cancer cachexia [4].

Similarly, PA performed before, during, and after treatment has been shown to mitigate treatment-related side effects, preserve muscle mass, and improve cardiorespiratory fitness, functional capacity, and quality of life [5]. Exercise is recognized as one of the most effective non-pharmacological strategies for reducing cancer-related fatigue and psychological distress and may also influence biological pathways involved in inflammation and tumor progression [6,7]

However, despite these well-established benefits, adherence to lifestyle recommendations remains insufficient. Sedentary behavior is highly prevalent among cancer patients, and it is often perceived as an adaptive response to treatment-related symptoms rather than a modifiable risk factor. This discrepancy highlights a persistent gap between evidence-based recommendations and patients' actual behavior, which is influenced by the severity of symptoms, the stage of treatment and personal beliefs regarding health and recovery and underscores the need to better understand how patients make lifestyle decisions throughout their cancer treatment course [8]. In this context, alongside lifestyle interventions, the use of dietary supplements (DS) has increased substantially, particularly among oncology patients [9,10]. The National Center for Complementary and Integrative Health (NCCIH) defines DS as a broad category of products including vitamins, minerals, herbal preparations (botanicals), and probiotics [11]. These products are widely marketed, easily accessible, and frequently perceived as "natural" and therefore safe, contributing to their growing global popularity [11,12]. Population-based data further highlights this trend. The National Health Interview Survey (NHIS) has indicated that 17.7% of U.S. adults use non-vitamin, non-mineral supplements, with fish oil among the most consumed products [13]. Furthermore, DS use was also identified as the most popular complementary health approach, compared with other practices such as mind body exercises (deep breathing, yoga, Qi Gong or meditation, and osteopathy) [13]. Among cancer patients, DS are frequently used with the intention of complementing conventional treatments, alleviating treatment-related side effects, or directly influencing disease progression [14]. However, current guidelines from major organizations, including the American Cancer Society (ACS), the World Cancer Research Fund (WCRF), and the American Institute for Cancer Research (AICR), consistently recommend prioritizing nutrient intake through a balanced and varied diet and discourage the use of DS unless specifically indicated [15]. Despite their widespread use, evidence supporting the efficacy and safety of DS in oncology remains limited and heterogeneous, often derived from small studies with restricted generalizability. DS may negatively impact cancer management through drug interactions affecting pharmacokinetics, including processes such as absorption, metabolism, and elimination [16,17]. For example, while antioxidant supplementation may reduce the toxicity of chemotherapy and radiotherapy [15], it may also reduce treatment efficacy given chemotherapy and radiation therapy achieve anti-tumour effects through the production of reactive oxygen species and the induction of apoptosis [18]. In the setting of prostate cancer, high doses of selenium have been associated with increased cancer-related mortality, highlighting the risks of inappropriate supplementation [19]. Another example is the concomitant use of St. John's Wort with chemotherapeutic agents [20]. St. John's Wort is a common herbal supplement that can contribute to emotional balance due to its antidepressant properties, but it has been shown to reduce the efficacy of certain anticancer drugs such as docetaxel due to induction of cytochrome CYP3A4 [20]. On the other hand, some studies have shown benefits when using DS in the setting of cancer [21,22]. Supplementation with long-chain N−3 fatty acids or fish oil has shown a positive impact on cancer cachexia [23,24]. Emerging research also highlights the potential synergistic effects of combining DS with other supportive strategies, including PA [25]. An active lifestyle, in line with the recommended PA guidelines for cancer patients (150–300 min of moderate activity or 75–150 min of vigorous activity per week), combined with supplements has been shown to be a potential tool for managing tolerance to antineoplastic therapies, bone health and cancer-related fatigue [26–28].

While both PA and DS are increasingly recognized as components of supportive cancer care, they have largely been investigated separately. As a result, limited attention has been given to how patients combine these strategies in real-world settings and what drives their health-related choices. Important gaps remain regarding patients' motivations for DS use, patterns of use across treatment phases, and sources of recommendation. Concerns also persist regarding self-prescription, insufficient communication with healthcare professionals, and the limited involvement of oncologists in DS counselling. At the same time, little is known about whether patients who use DS also engage in other health-promoting behaviors, such as PA, or whether these strategies are perceived as complementary or independent. Understanding whether DS use reflects a broader proactive health approach or a compensatory behavior in the absence of other lifestyle changes, is essential to better characterize patient decision-making and to design more effective supportive care interventions.

Therefore, the present study aimed to investigate patterns of DS behavior among cancer patients reporting DS use in relation to cancer treatment, including types of supplements, timing of intake, underlying motivations, and sources of recommendation, with particular attention to self-prescribing behaviors and patient–physician communication. In addition, we examined patients' engagement in PA and explored the relationship between motivations for DS use and interest in structured PA programs. By jointly addressing these dimensions, this study aims to provide a more comprehensive understanding of patient behaviors and to provide new insights into the design of targeted, multidisciplinary approaches for oncology patients, with the goal of enhancing their quality of life.

2. Material and methods

A cross-sectional observational study was conducted at an integrative oncology center in France. A self-administered digital questionnaire was available through either a dedicated link or a QR code created on the Google Documents Platform (Google LLC, Mountain View, CA, USA) and a printed version was left in the lobby of the Institute for those who wished to participate in the survey. The questionnaire was in French and anonymous. The aim, methods of treatment, and the storage and protection of personal data were explained on the questionnaire form. Completion of the survey constituted voluntary consent to allow the anonymous data collected to be used in this study and in future research. Data were collected between January 2024 and February 2025. The study was conducted according to the Helsinki Declaration and its later amendments and was approved by the institutional review board.

2.1. Subjects

Participants were recruited at an integrative oncology Institute in France, a center dedicated to integrative supportive care for cancer patients. The questionnaire, as well as the brochure containing the QR code for participation, was specifically addressed to patients attending the Institute for oncology-related supportive care. Clinical and oncological characteristics, including cancer type, date of diagnosis, and treatment phase, were self-reported through the questionnaire. At the beginning of the survey, participants were asked to report on the localization of their cancer and the date of diagnosis (month and year), as the investigation was specifically intended for patients with an oncological condition. All eligible patients attending the Institute during

the study period were invited to voluntarily complete the questionnaire either on-site (paper format) or via a digital link/QR code; the data were collected anonymously. Given the exploratory nature of the study, no formal sample size calculation was performed, and the final sample size was based on feasibility and voluntary participation during the study period.

2.2. Questionnaire

The questionnaire was adapted from the work of Levy et al. [26] to align with the specific aims of the present study. Prior to administration, it was reviewed by the research team to ensure clarity, relevance, and comprehensibility of the items. The final questionnaire included 21 questions to collect comprehensive demographic, medical and behavioral data from cancer patients, with a focus on DS use and interest in exercise programs. It was divided into four sections:

1) Demographic, anthropometric and socio-professional characteristics: this section aimed to collect data on participants' personal and professional background, including age, gender, occupation, body measurements (weight, height, Body Mass Index – BMI) and PA level. PA was assessed through self-reported questions. Participants were first asked whether they engaged in regular PA and, if they answered yes, they were asked to indicate the weekly duration of activity using predefined categories based on international guidelines for cancer patients: less than 150 min/week of moderate activity (or less than 75 min/week of vigorous activity), 150–300 min/week of moderate activity (or 75–150 min/week of vigorous activity), or more than 300 min/week of moderate activity (or more than 150 min/week of vigorous activity) [29].
2) Oncological information: this section focused on the participants' cancer diagnosis, including the type of cancer, stage, treatments and the related phases (i.e. before, ongoing, completed treatment).
3) DS behavior: participants were first asked whether they had used DS during the previous year. Those who answered "no" were instructed to stop the questionnaire and did not complete any subsequent sections. This section assessed the types of DS taken by patients in the last year, the timing of their intake in relation to cancer treatment, the reasons for their use and the sources of recommendation. To evaluate communication with healthcare providers, the questionnaire included items on who had recommended the supplement, whether the general practitioner and the oncologist were aware of its use, and, if not, the reasons for the lack of awareness. The section also explored patients' preferences for receiving DS recommendations.
4) Interest in Exercise Programs: this section evaluates interest in exercise programs tailored for cancer patients.

The full questionnaire is presented in Appendix 1.

2.3. Data management and statistical analysis

Data analysis was performed using IBM SPSS Statistics version 29 (IBM Corp., Armonk, NY, USA). Frequency distributions were calculated for categorical variables, while median and interquartile range (IQR) were reported for continuous variables.

Given the complexity and heterogeneity of the questionnaire responses, several variables were categorized into simplified groups to facilitate analysis. Specifically, age was grouped into three categories: 1) < 45 years, 2) 46–65 years, and 3) > 66 years. Body Mass Index (BMI) was classified into five groups: 1) underweight (BMI <18.5), 2) healthy weight ($18.5 \leq$ BMI ≤ 24.9), 3) overweight ($25 \leq$ BMI ≤ 29.9), 4) obesity class I ($30 \leq$ BMI ≤ 34.9), and 5) obesity class II/III (BMI ≥ 35). Educational level was specified as: 1) Higher Education (i.e. Long higher education - more than 2 years post-high school, and Short higher education - 2 years post-high school) 2) Secondary or Vocational Education (i.e. High school diploma or equivalent - Baccalauréat; Professional certificate or equivalent - Brevet Professionnel; Vocational certificate - CAP, BEP, or equivalent); 3) No Formal Education (i.e. No diploma or primary school certificate). Occupational status was grouped as: 1) worker, 2) unemployed, and 3) retired.

Regarding cancer treatment status, patients were categorized into four groups based on their responses at the time of the questionnaire: 1) before treatment, 2) ongoing treatment, 3) completed treatment, and 4) unknown/not applicable.

For PA levels, patients were classified according to international guidelines into the following categories: 1) below PA guidelines (patients who performed less than 150 min per week); 2) in line with PA guidelines (patients who performed 150–300 min of moderate activity per week); 3) above PA guidelines (patients who performed more than 300 min per week); 4) no PA (patients who performed no PA). Additionally, to analyze self-prescribing behaviors, participants were divided into two groups: 1) non-self-prescribers, those who received recommendations from healthcare professionals (i.e. naturopaths, general practitioners, oncologist, pharmacist, nutritionist) and 2) self-prescribers. Reasons for not discussing DS use were categorized into the following groups: 1) "I don't think it's important; it's not medication, it's a natural product"; 2) "I was concerned about the doctor's reaction; the doctor wouldn't understand"; 3) "The doctor didn't ask"; 4) "I didn't have time"; or others. This categorization was applied separately to the general practitioner and the oncologist. Categorical variables were presented as absolute counts and percentages. Associations between categorical variables were assessed using Pearson's χ^2 test, with p-values referring to the comparisons reported in the corresponding tables. Statistical significance was set at $p < 0.05$. To examine the relationship between motivations for the use of DS and interest in structured PA among cancer patients, an exploratory binary logistic regression analysis was conducted. Interest in participating in a structured PA program was dichotomized as yes versus maybe/no and used as the dependent variable, while all reported motivations for DS use were entered as independent variables. Regression coefficients (B), standard errors (SE), Wald statistics, odds ratios (OR), and corresponding p-values were reported.

3. Results

3.1. Patients' characteristics

Among the 114 patients who completed the questionnaire, 93% were women (106/114), with a median age of 56.5 years (IQR: 48.75–64.0; range: 27–79 years) and BMI of 23.13 (IQR: 20.83–25.62). Most participants (64.9%) were aged between 46 and 65 years and had a healthy weight, while 29.0% were overweight or obese. Regarding education and occupation levels, 83.3% of patients had a university degree and 80.7% were employed. Most were diagnosed with breast (70.2%), urogenital (11.4%) and lung cancer (9.6%). The remaining 8.8% were diagnosed with other types of cancer. 50% of respondents were in remission, 20.2% of patients had advanced/metastatic cancer, while 14.9% were in early-stage disease and 14.9% had an unknown stage. For cancer treatments, 62.3% of patients were undergoing treatment at the time of the questionnaire. Regarding PA levels, 47.4% of patients reported performing 150–300 min of moderate activity per week, 23.7% did not meet the minimum recommended levels, 18.4% were sedentary, and 10.5% exceeded the recommended levels. Detailed patients' characteristics are provided in Table 1.

3.2. Type and timing of DS use related to cancer treatment

Before treatment, the most frequently used supplements were magnesium (7.9% [9/114]), omega3/fish oil, probiotics and vitamin D (7.0% [8/114]). During treatment, a higher percentage of patients reported using vitamin D (20.2% [23/114]), magnesium (11.4% [13/114]), olive oil (9.6% [11/114]) and vitamin C (7.0% [8/114]). After

Table 1
Patient's characteristics stratified according to categories.

Sex	N, %
(F/M)	Female: 106 (93.0%) Male: 8 (7.0%)
Age (years)	**(n = 114),%**
≤ 45	17 (14.9%)
46–65	74 (64.9%)
≥ 66	23 (20.2%)
BMI (kg/m2)	
BMI < 18.5	8 (7.0%)
18.5 ≤ BMI ≤ 24.9	73 (64.0%)
25 ≤ BMI ≤ 29.9	19 (16.7%)
30 ≤ BMI ≤ 34.9	11 (9.6%)
BMI ≥ 35	3 (2.6%)
Occupational status	
Workers	92 (80.7%)
Unemployed	4 (3.5%)
Retired	18 (15.8%)
Education level	
Higer education	95 (83.3%)
Secondary/Vocational education	16 (14.0%)
No formal education	3 (2.6%)
Localization of initial cancer	
Breast	80 (70.2%)
Lung	11 (9.6%)
Head/Neck	3 (2.6%)
Gastrointestinal	4 (3.5%)
Gynecological	3 (2.6%)
Urogenital	13 (11.4%)
Cancer treatment status	
Before	14 (12.3%)
Ongoing	71 (62.3%)
Completed	29 (25.4%)
Current phase of cancer	
Unknown	17 (14.9%)
Onset/Early stage	17 (14.9%)
Advanced/metastatic	23 (20.2%)
In remission	57 (50.0%)
Physical Activity Levels	
Below PA guidelines	27(23.7%)
In line with PA guidelines	54 (47.4%)
Above PA guidelines	12 (10.5%)
No PA	21 (18.4%)

Abbreviation: F/M, Female/Male; BMI, Body Mass Index; PA, Physical Activity.

treatment, the most consumed supplements were vitamin D (13.2% [15/114]) and magnesium (10.5% [12/114]). Some patients reported taking some supplements, particularly olive oil (10.5% [12/114]), vitamin D (8.8% [10/114]) and green tea (7.0% [8/114]), consistently throughout all treatment phases. While others, such as magnesium, turmeric, calcium, orange juice, ginger, flaxseed and rosemary, were reported in smaller proportions. The timing of the use of DS in relation to cancer treatment is detailed in Fig. 1.

3.3. Sources of DS recommendations and patient preferences regarding DS counselling

As shown in Fig. 2 and Fig. 3, the most DS recommendations came from naturopaths (20.2% [23/114]), general practitioners (19.3% [22/114]), friends or family members (16.7% [19/114]) and oncologists (10.5% [12/114]). More than 14% of patients also reported receiving advice from other patients. Advice from nutritionists, pharmacists or commercial sources/websites accounted for less than 10%. Furthermore, 30.7% (35/114) of patients reported receiving guidance from the Institute; of these, two patients stated that they did not follow the Institute's recommendations. Regarding patients' preferences on source of DS recommendations, the data revealed that they preferred guidance from their oncologist (59.7% [68/114]), general practitioner (49.1% [56/114]), naturopath (40.4% [46/114]) and nutritionist (36.0% [41/114]).

3.4. Self-Prescription behaviors and physician-patient communication

Among the 114 patients surveyed, 61.4% (70/114) were "non-self-prescribers" receiving recommendations from healthcare professionals (i.e. naturopath, general practitioner, oncologist) while the remaining 38.6% (44/114) were "self-prescribers" receiving recommendations from friends/family, websites, and other. As shown in Table 2, among self-prescribers, the main reasons for not informing their general practitioner were the belief that DS are harmless, natural products and not drugs, as well as the concern that the doctor would not understand or would react negatively. The chi-square test confirmed a statistically significant association between self-prescription behavior and reasons why general practitioner was not informed ($\chi^2 = 10.371$, $p = 0.016$). A similar trend was observed for oncologists. In addition to the belief that DS are harmless, many patients reported that their oncologist did not inquire about DS use; however, no significant association was found between self-prescription behavior and the reasons for not informing the oncologist ($\chi^2 = 3.341$, $p = 0.342$).

3.5. Motivations for supplement use and interest in structured exercise programs

Based on questionnaire answers, the main reasons given for taking DS were general strengthening (64.04% [73/114]), alleviating fatigue (56.14% [64/114]), improving anxiety or stress (36.84% [42/114]), enhancing sleep disorders (30.7% [35/114]), and prevention of cancer recurrence or treatment of cancer (24.56% [28/114]), Fig. 4.

Regarding interest in participating in a structured PA program for cancer patients, 67.5% (77/114) of the respondents expressed a willingness to participate in a tailored exercise program, while 32.5% (37/114) answered "maybe" or indicated no interest. To examine the relationship between motivations for the use of DS and interest in structured PA among cancer patients, a binary logistic regression analysis was conducted. The results shown in Table 3 indicated that patients using DS for general strengthening were significantly more likely to express interest in a tailored exercise program ($\beta = 1.625$, $p = 0.010$, $OR = 5.079$). A similar association was observed for those taking DS to support their diet ($\beta = 2.701$, $p = 0.009$, $OR = 14.900$) and improve sleep quality ($\beta = 1.192$, $p = 0.032$, $OR = 3.295$). Conversely, motivations related to mental health, fatigue, anxiety/stress, menopause, pain, gastrointestinal issues, immune system support, and cardiovascular or respiratory health did not show significant associations with interest in PA.

4. Discussion

This study investigated DS-related behaviors among cancer patients reporting DS use and attending an integrative oncology center. Our findings indicate that DS were used across all phases of cancer treatment, with vitamin D and magnesium representing the most frequently reported supplements; however, these results should be interpreted with caution due to the gender imbalance in the sample (93% women) and the recruitment of patients from an integrative care center. These observations are in line with previous studies identifying both products among the most commonly used supplements in oncology populations [30,31].

The consistent use of vitamin D across treatment phases may reflect both the high prevalence of deficiency among cancer patients and the growing awareness of its role in immune function, bone health, and overall well-being [32,33]. However, although observational studies have suggested potential associations between adequate vitamin D levels and improved outcomes, current evidence does not support its use as an anticancer therapy or for preventing disease recurrence [34,35]. Despite this uncertainty, many participants reported using DS with the intention of treating cancer or preventing recurrence, highlighting a discrepancy between patient expectations and available evidence, emphasizing the importance of patient education and evidence-based

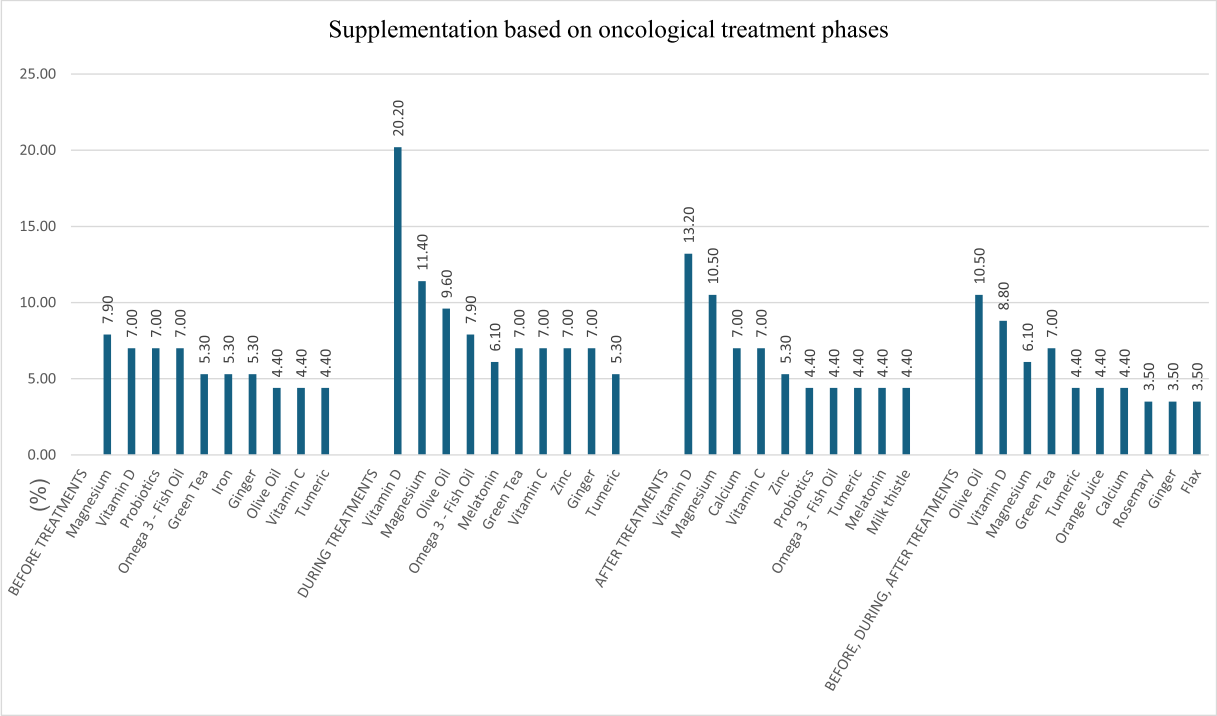


Fig. 1. Timing of Supplement Use in Relation to Cancer Treatment.

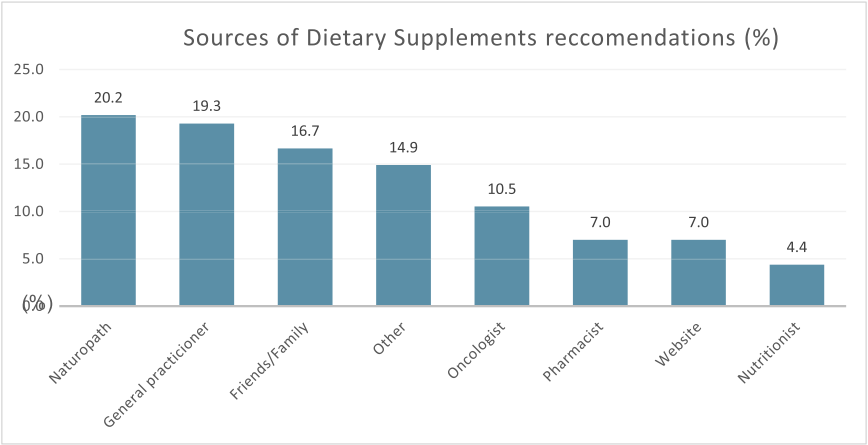


Fig. 2. Sources of Dietary Supplements recommendations.

counselling [36,37]. In addition, an increased use of antioxidant compounds such as vitamin C and zinc was observed during the active treatment phase. Although these supplements are frequently used to alleviate treatment-related symptoms, evidence supporting their safety and efficacy during active cancer treatment remains limited [38–42]. This issue is particularly relevant in the context of modern oncology, where immunotherapies and targeted therapies are increasingly used. Some supplements may modulate immune responses through effects on cytokine signaling and other immune pathways, potentially influencing the efficacy of immunotherapeutic agents, while others may interfere with drug metabolism or molecular targets involved in targeted therapies [43,44]. Due to direct clinical evidence remains limited, these considerations underscore the importance of careful evaluation and monitoring of DS use during active treatment [45]. Consistent with these concerns, also turmeric represents another supplement of interest in oncology. Despite its use was relatively uncommon in our cohort, curcumin has received considerable attention because of its antioxidant and anti-inflammatory properties and has been investigated for potential benefits on treatment-related symptoms [46–48]. However, its clinical role remains uncertain due to possible interactions with cytochrome P450 enzymes and drug transporters, which may affect the efficacy and toxicity of anticancer therapies [49,50].

Beyond conventional DS, some patients also reported regular consumption of products such as olive oil throughout all treatment phases. Although not classified as a DS, olive oil is a key component of healthy dietary patterns, particularly the Mediterranean diet, and has been associated with anti-inflammatory effects and modulation of pathways involved in carcinogenesis [51,52]. It is interesting to note that the line between food components and supplements is becoming increasingly blurred. Emerging evidence suggests that byproducts of the olive oil production chain can be incorporated into functional foods with potential health benefits, extending the concept of supplementation beyond traditional dietary supplements, although this has been explored primarily in non-oncological contexts [53,54].

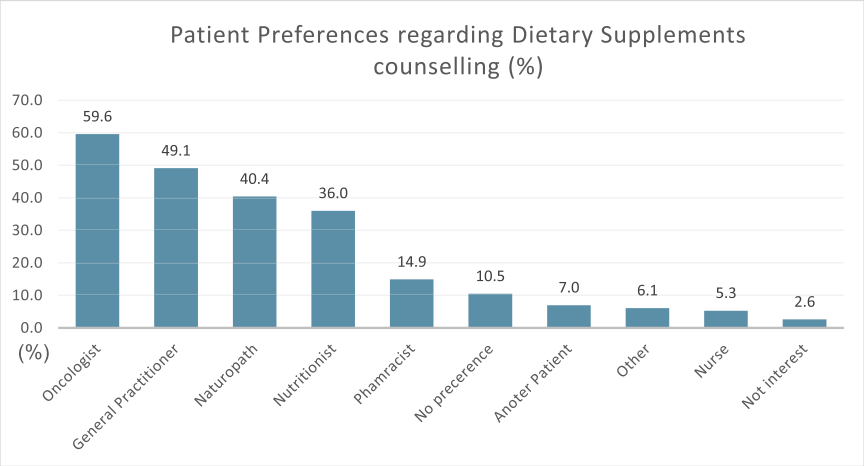


Fig. 3. Patient preferences for receiving recommendations on Dietary Supplements.

Table 2
Reasons for not informing the general practitioner and oncologist about DS use according to self-prescription behavior.

Reason for not informing the general practitioner	Self-prescribers n (%)	Non-self-prescribers n (%)	Total n (%)	p-value
Not important / not a medication / natural product	17 (54.8%)	9 (36.0%)	26 (46.4%)	
Doctor would not understand / concern about reaction	7 (22.6%)	1 (4.0%)	8 (14.3%)	
Doctor did not ask	5 (16.1%)	7 (28.0%)	12 (21.4%)	
No time / other reasons	2 (6.5%)	8 (32.0%)	10 (17.9%)	
Total	31 (100%)	25 (100%)	56 (100%)	0.016*
Reason for not informing the oncologist	**Self-prescribers n (%)**	**Non-self-prescribers n (%)**	**Total n (%)**	**p-value**
Not important / not a medication / natural product	17 (47.2%)	12 (35.3%)	29 (41.4%)	
Oncologist would not understand / concern about reaction	6 (16.7%)	3 (8.8%)	9 (12.9%)	
Oncologist did not ask	9 (25.0%)	11 (32.4%)	20 (28.6%)	
No time / other reasons	4 (11.1%)	8 (23.5%)	12 (17.1%)	
Total	36 (100%)	34 (100%)	70 (100%)	0.342

Note: Data are presented as number (n) and percentage (%) within each self-prescription group. P-values refer to the association between self-prescription behavior (self-prescribers vs non-self-prescribers) and the distribution of reasons for not informing the general practitioner or the oncologist, assessed using Pearson's χ^2 test. *$p < 0.05$ indicates statistical significance.

As highlighted by Warner et al. [55], the growing availability of online health information has facilitated the spread of nutrition-related misinformation, with many sources promoting dietary approaches or supplements using unsupported health claims. This may make it difficult for patients to distinguish reliable information from misleading content and may contribute to inappropriate supplement use [55]. Our findings support this issue. Although oncologists were the preferred source of guidance, discussions about DS were not routinely integrated into oncology consultations, and many participants reported self-prescribing supplements. Notably, these observations emerged in a population recruited from an integrative oncology service, where attention to supportive care and lifestyle-related issues might be expected to be greater than in standard oncology settings. This communication gap may therefore represent a broader challenge in cancer care and underscores the need for proactive, evidence-based counselling on supplement use within routine clinical practice [31,56].

Moreover, patients commonly start taking supplements to support the immune system, improve quality of life, and alleviate symptoms such as fatigue, stress, and sleep disturbances [31,57]. Similar motivations were observed in our cohort, where DS were mainly used to strengthen general health and manage fatigue, stress, and anxiety. Given that PA is also recommended for the management of several of these symptoms, we further explored the relationship between motivations for DS use and interest in PA. Interestingly, a substantial proportion of patients in our cohort met international PA guidelines, a finding that contrasts with previous reports describing high levels of sedentary behavior among cancer patients [58]. This may partly reflect the characteristics of participants recruited from an integrative oncology setting, where patients may be more engaged in supportive care interventions. Nevertheless, a considerable proportion of participants remained insufficiently active, confirming that physical inactivity continues to be a relevant issue in oncology populations. When examining the relationship between motivations for DS use and interest in PA, our findings seem to suggest that these strategies are not always perceived as complementary. Motivations such as fatigue, stress, and anxiety were not associated with greater interest in structured PA programs, despite strong evidence supporting exercise as one of the most effective non-pharmacological interventions for symptom management, particularly cancer-related fatigue [59–62]. This discrepancy may suggest a gap in awareness regarding the role of PA in symptom management, with supplementation often perceived as a more accessible or less demanding strategy than structured exercise. Conversely, patients using DS for general strengthening, dietary support, and sleep improvement were more likely to express interest in PA programs, suggesting that individuals already motivated to adopt complementary health strategies may be more receptive to exercise interventions when appropriately proposed [63,64].

Overall, these findings provide new insight into how patients perceive and adopt supportive care options and suggest that DS use and PA may be not always perceived as complementary strategies. The association between certain motivations for DS use and interest in PA highlights the importance of exploring integrated, multidisciplinary supportive care approaches in oncology.

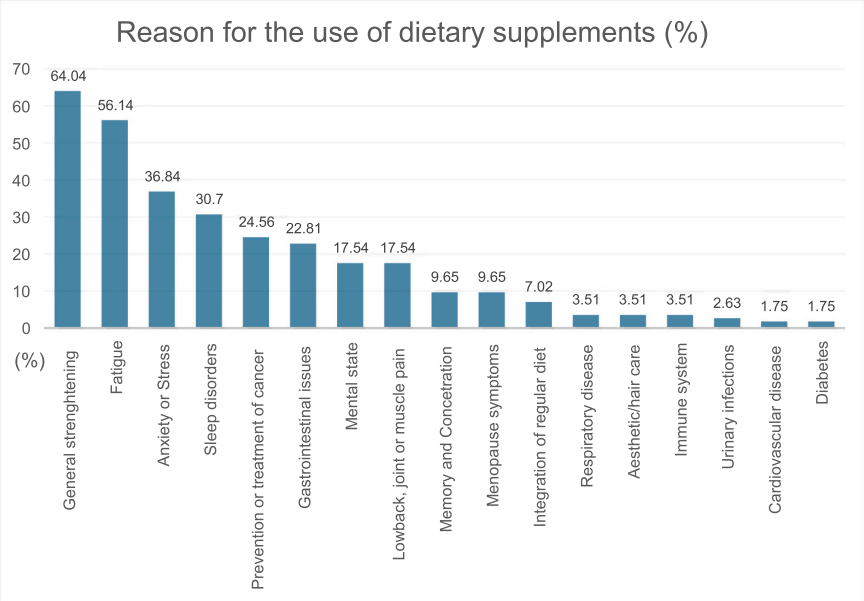


Fig. 4. Reasons of supplementation expressed in percentage.

Table 3
Exploratory binary logistic regression analysis of motivations for DS use associated with interest in participating in a structured PA program among cancer patients.

Variable	B	SE	Wald	df	p-value	OR
Mental state	0.216	0.759	0.081	1	0.776	1.241
Fatigue	−0.033	0.592	0.003	1	0.955	0.967
Anxiety or stress	−0.170	0.575	0.087	1	0.768	0.844
Memory and concentration	0.145	0.792	0.033	1	0.855	1.156
Prevention or treatment of cancer	−0.224	0.603	0.139	1	0.710	0.799
General strengthening	1.625	0.628	6.693	1	**0.010***	5.079
Cardiovascular disease	−0.771	1.455	0.281	1	0.596	0.463
Respiratory disease	0.159	1.264	0.016	1	0.900	1.173
Menopause symptoms	−0.728	1.033	0.497	1	0.481	0.483
Diabetes	1.389	1.801	0.595	1	0.441	4.012
Urinary infections	0.592	1.734	0.116	1	0.733	1.807
Low back, joint or muscle pain	0.288	0.740	0.151	1	0.697	1.333
Gastrointestinal issues	0.482	0.605	0.636	1	0.425	1.620
Sleep disorders	1.192	0.556	4.597	1	**0.032***	3.295
Aesthetic / hair care	0.098	1.547	0.004	1	0.949	1.103
Integration of regular diet	2.701	1.030	6.873	1	**0.009***	14.900
Immune system	1.522	1.492	1.041	1	0.308	4.581

Note: Dependent variable: interest in participating in a structured PA programme (yes vs maybe/no). Odds ratios (OR). Statistical significance was set at *$p < 0.05$.

5. Conclusion

This study highlights the diversity of DS use behaviors among patients attending an integrative oncology center and underscores the importance of understanding the motivations, sources of information, and decision-making processes underlying supplement use. Despite a clear preference for receiving guidance from oncologists, communication regarding DS use appeared insufficient, potentially increasing the risk of inappropriate self-prescription and unrecognized interactions with anticancer therapies. A novel finding of this study is that DS use and interest in PA seems to be not consistently aligned. While many patients used supplements to address symptoms for which exercise is also recommended, these strategies were not always perceived as complementary. This observation highlights the potential value of a more integrated supportive care model in which nutritional counselling, discussions about DS use, and PA promotion are addressed together. From a clinical perspective, these findings suggest that oncologists may benefit from proactively discussing the potential benefits, risks, and interactions of DS while promoting evidence-based lifestyle interventions, including exercise, as part of routine supportive cancer care. Strengthening education and training in integrative oncology may help clinicians provide safer, more informed, and personalized guidance.

6. Study limitations

This study has several limitations that should be acknowledged. First, the absence of randomization and a control group, together with the use of a convenience sample based on voluntary participation, may have introduced selection bias and limited the generalizability of the findings.

A major limitation is the composition of the study population, which was predominantly female (93%), largely composed of breast cancer survivors with high education level. These characteristics reflect the profile of patients attending the integrative oncology service at the Institute but limit the representativeness of the sample and the applicability of the findings to the broader oncology population. The heterogeneity of supplement patterns also limited the feasibility of meaningful subgroup analyses across demographic and clinical subgroups.

Furthermore, no formal sample size calculation was performed, as this was an exploratory study based on voluntary participation, which may have limited the statistical power of the analysis. Future studies should include larger and more diverse populations to further investigate the relationship between DS use and PA in oncology settings. Despite these limitations, this study offers new insights into the relationship between DS use and PA behaviors among patients receiving integrative cancer care.

CRediT authorship contribution statement

Alain Toledano: Writing – review & editing, Supervision, Project administration. **Nathaniel Scher:** Methodology. **Attilio Parisi:** Supervision. **Elisa Grazioli:** Writing – review & editing, Validation, Formal

analysis. **Paul Ihout:** Validation. **Stéphanie Nuan-Aliman:** Investigation. **Julia Gleize:** Data curation. **Nesrine Barhoumi:** Data curation. **Cécile Pétureau:** Investigation. **Ilan Darmon:** Resources. **Caroline Chiche-Journo:** Investigation. **Ivan Dimauro:** Validation. **Carine Chaix-Couturier:** Writing – review & editing, Visualization, Conceptualization. **Arianna Murri:** Writing – original draft, Software, Formal analysis, Conceptualization. **Margherita Saliola:** Methodology.

Ethics statement

The study was conducted according to the Helsinki Declaration and its later amendments and was approved by Adène Fonds de dotation institutional review board; approval number assigned: IRB_ADENE_20250604.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.aimed.2026.100694.

References

[1] F. Bray, M. Laversanne, H. Sung, et al., Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries, CA Cancer J. Clin. 74 (2024) 229–263, https://doi.org/10.3322/caac.21834.

[2] C.M. Friedenreich, C. Ryder-Burbidge, J. McNeil, Physical activity, obesity and sedentary behavior in cancer etiology: epidemiologic evidence and biologic mechanisms, Mol. Oncol. 15 (2021) 790–800, https://doi.org/10.1002/1878-0261.12772.

[3] T. Sanft, M. Harrigan, B. Cartmel, et al., Effect of healthy diet and exercise on chemotherapy completion rate in women with breast cancer: The Lifestyle, Exercise and Nutrition Early after Diagnosis (LEANer) study: Study protocol for a randomized clinical trial, Contemp. Clin. Trials 109 (2021) 106508, https://doi.org/10.1016/j.cct.2021.106508.

[4] R. Valdés-Ramos, A.D. Benítez-Arciniega, Nutrition and immunity in cancer, Br. J. Nutr. 98 (2007) S127–S132, https://doi.org/10.1017/S0007114507833009.

[5] C. Torregrosa, F. Chorin, E.E.M. Beltran, C. Neuzillet, V. Cardot-Ruffino, Physical Activity as the Best Supportive Care in Cancer: The Clinician's and the Researcher's Perspectives, Cancers (Basel) 14 (2022) 5402, https://doi.org/10.3390/cancers14215402.

[6] E.L. Gomes, R.J. Marker, C. Bell, S. Aichele, H.J. Leach, Acute effects of exercise to mitigate cancer-related fatigue: A state-of-the-art review, Eur. J. Cancer Care (2025) 5511950, https://doi.org/10.1155/ecc/5511950.

[7] D. Caporossi, A. Parisi, C. Fantini, E. Grazioli, C. Cerulli, I. Dimauro, AlphaB-crystallin and breast cancer: role and possible therapeutic strategies, Cell. Stress. Chaperon-.-. 26 (2021) 19–28, https://doi.org/10.1007/s12192-020-01175-0.

[8] A. Henriksson, M.L. Elfström, A. Söderlund, P. von Heideken Wågert, Exploring sedentary behavior during neo- or adjuvant treatment in patients with cancer: A phenomenological study, Eur. J. Oncol. Nurs. 70 (2024) 102556, https://doi.org/10.1016/j.ejon.2024.102556.

[9] S. Song, J. Youn, Y.J. Lee, et al., Dietary supplement use among cancer survivors and the general population: a nation-wide cross-sectional study, BMC Cancer 17 (2017) 891, https://doi.org/10.1186/s12885-017-3885-1.

[10] D. Du, H. Luo, J.B. Blumberg, et al., Dietary Supplement Use among Adult Cancer Survivors in the United States, J. Nutr. 150 (2020) 1499–1508, https://doi.org/10.1093/jn/nxaa040.

[11] National Center for Complementary and Integrative Health, Complementary, alternative, or integrative health: What's in a name? U.S. Department of Health and Human Services. https://www.nccih.nih.gov/health/complementary-alternative-or-integrative-health-whats-in-a-name (accessed 24 January 2025).

[12] R. Iye, T. Okuhara, H. Okada, R. Yokota, T. Kiuchi, A content analysis of video advertisements for dietary supplements in Japan, Healthcare 9 (2021) 742, https://doi.org/10.3390/healthcare9060742.

[13] T.C. Clarke, L.I. Black, B.J. Stussman, P.M. Barnes, R.L. Nahin, Trends in the use of complementary health approaches among adults: United States, 2002-2012, Natl. Health Stat. Rep. no 79. Hyattsville MD Natl. Cent. Health Stat. (2015).

[14] A.E. Kristoffersen, T. Stub, J.V. Nilsen, et al., Exploring dietary changes and supplement use among cancer patients in Norway: prevalence, motivations, disclosure, information, and perceived risks and benefits: a cross sectional study, BMC Nutr. 10 (2024) 65, https://doi.org/10.1186/s40795024-00872-8.

[15] M. Harvie, Nutritional supplements and cancer: potential benefits and proven harms, Am. Soc. Clin. Oncol. Educ. Book. (2014) e478–e486, https://doi.org/10.14694/EdBook_AM.2014.34.e478.

[16] C.B. Ambrosone, G.R. Zirpoli, A.D. Hutson, 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. 38 (2020) 804–814, https://doi.org/10.1200/JCO.19.01203.

[17] American Cancer Society, Safety of dietary supplements during cancer treatment. https://www.cancer.org/cancer/managing-cancer/treatment-types/complementary-and-integrativemedicine/dietary-supplements/safety.html (accessed 24 January 2025).

[18] G. Bjelakovic, D. Nikolova, C. Gluud, Antioxidant supplements and mortality, Curr. Opin. Clin. Nutr. Metab. Care 17 (2014) 40–44, https://doi.org/10.1097/MCO.0000000000000009.

[19] S.M. Lippman, E.A. Klein, P.J. Goodman, et al., Effect of selenium and vitamin E on risk of prostate cancer and other cancers: the Selenium and Vitamin E Cancer Prevention Trial (SELECT), JAMA 301 (2009) 39–51, https://doi.org/10.1001/jama.2008.864.

[20] J.S. Markowitz, J.L. Donovan, C.L. DeVane, et al., Effect of St John's wort on drug metabolism by induction of cytochrome P450 3A4 enzyme, JAMA 290 (2003) 1500–1504, https://doi.org/10.1001/jama.290.11.1500.

[21] S. Yalcin, M. Gumus, B. Oksuzoglu, et al., Nutritional Aspect of Cancer Care in Medical Oncology Patients, Clin. Ther. 41 (2019) 2382–2396, https://doi.org/10.1016/j.clinthera.2019.09.006.

[22] C.L. Rock, C. Doyle, W. Demark-Wahnefried, et al., Nutrition and physical activity guidelines for cancer survivors, CA Cancer J. Clin. 62 (2012) 243–274, https://doi.org/10.3322/caac.21142.

[23] R. Colomer, J.M. Moreno-Nogueira, P.P. García-Luna, et al., N-3 fatty acids, cancer and cachexia: a systematic review of the literature, Br. J. Nutr. 97 (2007) 823–831, https://doi.org/10.1017/S000711450765795X.

[24] J. de Aguiar Pastore Silva, M. Emilia de Souza Fabre, D.L. Waitzberg, Omega-3 supplements for patients in chemotherapy and/or radiotherapy: A systematic review, Clin. Nutr. 34 (2015) 359–366, https://doi.org/10.1016/j.clnu.2014.11.005.

[25] K.H. Schmitz, J.C. Brown, M.L. Irwin, K. Robien, J.M. Scott, N.A. Berger, B. Caan, A. Cercek, T.E. Crane, S.R. Evans, J.A. Ligibel, J.A. Meyerhardt, T. Agurs-Collins, K. Basen-Engquist, J.W. Bea, S.F. Cai, B. Cartmel, V.M. Chinchilli, W. Demark-Wahnefried, C.M. Dieli-Conwright, L. DiPietro, S.E. Doerksen, S.L. Edelstein, J. Elena, W. Evans, L.M. Ferrucci, J. Foldi, S. Freylersythe, H. Furberg, L.W. Jones, R. Levine, C.S. Moskowitz, C. Owusu, F. Penedo, B.A. Rabin, E. Ratner, M. Rosenzweig, T. Salz, T. Sanft, M. Schlumbrecht, G. Spielmann, C.A. Thomson, A. H. Tjaden, M.R. Weiser, S. Yang, A.F. Yu, F.M. Perna, Exercise and nutrition to improve cancer treatment-related outcomes (ENICTO), JNCI Cancer 117 (2025) 9–19, https://doi.org/10.1093/jnci/djae177.

[26] S.H. Kim, Y.U. Cho, S.J. Kim, S. Hong, M.S. Han, E. Choi, The effect on bone outcomes of adding exercise to supplements for osteopenic breast cancer survivors: A pilot randomized controlled trial, Cancer Nurs. 39 (2016) 144–152, https://doi.org/10.1097/NCC.0000000000000245.

[27] F.D. de Lima, C.L. Battaglini, S.N. Chaves, et al., Effect of strength training and antioxidant supplementation on perceived and performance fatigability in breast cancer survivors: a randomized, double-blinded, placebo-controlled study, Appl. Physiol. Nutr. Metab. 45 (2020) 1165–1173, https://doi.org/10.1139/apnm-2020-0166.

[28] T. Pérez-Bilbao, M. Alonso-Dueñas, A.B. Peinado, A.F. San Juan, Effects of combined interventions of exercise and diet or exercise and supplementation on breast cancer patients: A systematic review, Nutrients 15 (2023) 1013, https://doi.org/10.3390/nu15041013.

[29] K.L. Campbell, K.M. Winters-Stone, J. Wiskemann, A.M. May, A.L. Schwartz, K. S. Courneya, D.S. Zucker, C.E. Matthews, J.A. Ligibel, L.H. Gerber, G.S. Morris, A. V. Patel, T.F. Hue, F.M. Perna, K.H. Schmitz, Exercise guidelines for cancer survivors: Consensus statement from international multidisciplinary roundtable, Med. Sci. Sports Exerc. 51 (2019) 2375–2390, https://doi.org/10.1249/MSS.0000000000002116.

[30] A.E. Kristoffersen, T. Stub, J.V. Nilsen, et al., Exploring dietary changes and supplement use among cancer patients in Norway: prevalence, motivations, disclosure, information, and perceived risks and benefits: a cross sectional study, BMC Nutr. 10 (2024) 65, https://doi.org/10.1186/s40795024-00872-8.

[31] M. Tank, K. Franz, E. Cereda, K. Norman, Dietary supplement use in ambulatory cancer patients: a survey on prevalence, motivation and attitudes, J. Cancer Res. Clin. Oncol. 147 (2021) 1917–1925, https://doi.org/10.1007/s00432-021-03594-7.

[32] M. Henn, V. Martin-Gorgojo, J.M. Martin-Moreno, Vitamin D in cancer prevention: Gaps in current knowledge and room for hope, Nutrients 14 (2022) 4512, https://doi.org/10.3390/nu14214512.

[33] G. Seraphin, S. Rieger, M. Hewison, E. Capobianco, T.S. Lisse, The impact of vitamin D on cancer: A mini review, J. Steroid Biochem. Mol. Biol. 231 (2023) 106308, https://doi.org/10.1016/j.jsbmb.2023.106308.

[34] S. Dallavalasa, S.V. Tulimilli, V.G. Bettada, M. Karnik, C.A. Uthaiah, P. G. Anantharaju, S.M. Nataraj, R. Ramashetty, O.A. Sukocheva, E. Tse, et al., Vitamin D in cancer prevention and treatment: A review of epidemiological, preclinical, and cellular studies, Cancers 16 (2024) 3211, https://doi.org/10.3390/cancers16183211.

[35] M. Calvani, A. Pasha, C. Favre, Nutraceutical Boom in Cancer: Inside the Labyrinth of Reactive Oxygen Species, Int. J. Mol. Sci. 21 (6) (2020) 1936, https://doi.org/10.3390/ijms21061936.

[36] M. Rogge, P. Kumar, O. Grundmann, ACCP Public Policy Committee, Front-line health care professionals lack critical knowledge in dietary supplement and nutraceutical products: A call to action for comprehensive educational opportunities, J. Clin. Pharmacol. 62 (2022) 17–19, https://doi.org/10.1002/jcph.1985.
[37] E. Ben-Arye, A. Polliack, E. Schiff, T. Tadmor, N. Samuels, Advising patients on the use of nonherbal nutritional supplements during cancer therapy: A need for doctor-patient communication, J. Pain. Symptom Manag. 46 (2013) 887–896, https://doi.org/10.1016/j.jpainsymman.2013.02.010.
[38] National Cancer Institute, Vitamin D and cancer. https://www.cancer.gov/about-cancer/causesprevention/risk/diet/vitamin-d-fact-sheet, (accessed 26 March 2025).
[39] M. Woldeselassie, A. Tamene, Therapeutic controversies over use of antioxidant supplements during cancer treatment: a scoping review, Front. Nutr. 11 (2024) 1480780, https://doi.org/10.3389/fnut.2024.1480780.
[40] C. Muñoz-Montesino, E. Peña, F.J. Roa, K. Sotomayor, E. Escobar, C.I. Rivas, Transport of. Vitamin C in Cancer, Antioxid. Redox Signal. 35 (2021) 61–74, https://doi.org/10.1089/ars.2020.8166.
[41] A.Y. Jung, X. Cai, K. Thoene, N. Obi, S. Jaskulski, S. Behrens, D. Flesch-Janys, J. ChangClaude, Antioxidant supplementation and breast cancer prognosis in postmenopausal women undergoing chemotherapy and radiation therapy, Am. J. Clin. Nutr. 109 (2019) 69–78, https://doi.org/10.1093/ajcn/nqy223.
[42] D. Sur, A. Gorzo, S. Sabarimurugan, S.M. Krishnan, C.V. Lungulescu, S.R. Volovat, C. Burz, A comprehensive review of the use of antioxidants and natural products in cancer patients receiving anticancer therapy, Anticancer. Agents Med. Chem. 22 (2022) 1511–1522, https://doi.org/10.2174/1871520621666210901100827.
[43] A. Golonko, T. Pienkowski, R. Swislocka, S. Orzechowska, K. Marszalek, L. Szczerbinski, A.H. Swiergiel, W. Lewandowski, Dietary factors and their influence on immunotherapy strategies in oncology: A comprehensive review, Cell. Death Dis. 15 (2024) 254, https://doi.org/10.1038/s41419-024-06641-6.
[44] H. Yakubi, C. Angerman, I. Zhao, S. Papneja, C. Marengo, M. Zhu, R. Beechinor, You shall not pass: Pharmacist review of drug–herb interactions in cancer treatment, Pharm. Pract. Focus. Oncol. 7 (2025). https://www.pharmacytimes.com/view/you-shall-not-pass-pharmacist-review-of-drug-herb-interactions-in-cancer-treatment-ppfo (August).
[45] I. Levy, S. Attias, E. Ben-Arye, L. Goldstein, E. Schiff, Potential drug interactions with dietary and herbal supplements during hospitalization, Intern. Emerg. Med. 12 (2017) 301–310, https://doi.org/10.1007/s11739-016-1548-x.
[46] S. Allegra, S. De Francia, F. Turco, I. Bertaggia, F. Chiara, A. Armando, S. Storto, M. V. Mussa, Phytotherapy and drugs: Can their interactions increase side effects in cancer patients? J. Xenobiotics 13 (2023) 75–89, https://doi.org/10.3390/jox13010007.
[47] K. Mansouri, S. Rasoulpoor, A. Daneshkhah, et al., Clinical effects of curcumin in enhancing cancer therapy: A systematic review, BMC Cancer 20 (2020) 791, https://doi.org/10.1186/s12885020-07256-8.
[48] A. Giordano, G. Tommonaro, Curcumin and Cancer, Nutrients 11 (2019) 2376, https://doi.org/10.3390/nu11102376.
[49] I.Y. Dimeji, H.L. Jabba, N. Murtala, A.S. Ayodeji, Curcumin as a modulator of drug metabolism and gene expression: Implications for pharmacogenomics, Pharmacol. Res. Rep. 4 (2025) 100067, https://doi.org/10.1016/j.prerep.2025.100067.
[50] L.P. Volak, S. Ghirmai, J.R. Cashman, M.H. Court, Curcuminoids inhibit multiple human cytochromes P450, UDP-glucuronosyltransferase, and sulfotransferase enzymes, whereas piperine is a relatively selective CYP3A4 inhibitor, Drug. Metab. Dispos. 36 (2008) 1594–1605, https://doi.org/10.1124/dmd.108.020552.
[51] H.R. Pessoa, L. Zago, C.C. Curioni, D.C. Ferraz da Costa, Modulation of biomarkers associated with risk of cancer in humans by olive oil intake: A systematic review, J. Food Sci. 87 (2022) 4470–4483, https://doi.org/10.1016/j.jff.2022.105275.
[52] C. Bonfiglio, R. Reddavide, A.M. Cisternino, A. Campanella, L. Fontana, G. Giannelli, Protective effect of extra virgin olive oil on cancers, gastrointestinal cancers, and all-cause mortality: A competing risk analysis in a Southern Italian cohort, Cancers (Basel) 16 (2024) 3575, https://doi.org/10.3390/cancers16213575.
[53] G. Marrone, S. Urciuoli, M. Di Lauro, J. Ruzzolini, F. Ieri, P. Vignolini, F. Di Daniele, C. Guerriero, C. Nediani, N. Di Daniele, et al., Extra virgin olive oil and cardiovascular protection in chronic kidney disease, Nutrients 14 (2022) 4265, https://doi.org/10.3390/nu14204265.
[54] G. Marrone, A. Murri, S. Urciuoli, M. Di Lauro, E. Grazioli, P. Vignolini, K. Cornali, E. Tranchita, C. Masci, C. Cerulli, et al., Functional foods and adapted physical activity as new adjuvant therapy for chronic kidney disease patients, Nutrients 16 (2024) 2325, https://doi.org/10.3390/nu16142325.
[55] E.L. Warner, K.M. Basen-Engquist, T.A. Badger, T.E. Crane, M. Raber-Ramsey, The online cancer nutrition misinformation: A framework of behavior change based on exposure to cancer nutrition misinformation, Cancer 128 (2022) 2540–2548, https://doi.org/10.1002/cncr.34218.
[56] C. Jiang, O. Larbi, D. Feyes, G.M. Wang, H. Momotaz, M. Li, K. Daunov, B. Daly, S. Mazanec, S. Rodgers-Melnick, et al., A survey of cancer patients, caregivers, and providers regarding familiarity, importance, and utilization of supportive and integrative oncology services, Support. Care Cancer 29 (2021) 5777–5785, https://doi.org/10.1007/s00520-021-06081-4.
[57] K.D. Chandwani, J.L. Ryan, L.J. Peppone, M.M. Janelsins, L.K. Sprod, K. Devine, L. Trevino, J. Gewandter, G.R. Morrow, K.M. Mustian, Cancer-related stress and complementary and alternative medicine: a review, Evid. Based Complement. Altern. Med. 2012 (2012) 979213, https://doi.org/10.1155/2012/979213.
[58] A. Henriksson, M.L. Elfström, A. Söderlund, P. von Heideken Wågert, Exploring sedentary behavior during neo- or adjuvant treatment in patients with cancer: A phenomenological study, Eur. J. Oncol. Nurs. 70 (2024) 102556, https://doi.org/10.1016/j.ejon.2024.102556.
[59] A. Avancini, A. Borsati, L. Toniolo, C. Ciurnelli, L. Belluomini, T. Budolfsen, C. Lillelund, M. Milella, M. Quist, S. Pilotto, et al., Physical activity guidelines in oncology: A systematic review of the current recommendations, Crit. Rev. Oncol. Hematol. 210 (2025) 104718, https://doi.org/10.1016/j.critrevonc.2025.104718.
[60] A. Cano-Uceda, P. García-Fernández, B. Peuyadé-Rueda, A.M. Cañuelo-Marquez, C. Solís-Mencía, C. Lucio-Allende, L. De Sousa-De Sousa, J.L. Maté-Muñoz, From evidence to practice: A systematic review and meta-analysis on the effects of supervised exercise on fatigue in breast and prostate cancer survivors, Appl. Sci. 15 (2025) 8399, https://doi.org/10.3390/app15158399.
[61] E. Tranchita, A. Murri, E. Grazioli, et al., The Beneficial Role of Physical Exercise on Anthracyclines Induced Cardiotoxicity in Breast Cancer Patients, Cancers 14 (2022) 2288, https://doi.org/10.3390/cancers14092288.
[62] C. Moulton, A. Murri, G. Benotti, et al., The impact of physical activity on promoter-specific methylation of genes involved in the redox-status and disease progression: A longitudinal study on post-surgery female breast cancer patients undergoing medical treatment, Redox Biol. 70 (2024) 103033, https://doi.org/10.1016/j.redox.2024.103033.
[63] Y. Azemmour, S. Boutayeb, H. Beddaa, et al., Physical activity in cancer care: barriers and interventions, Pan Afr. Med. J. 43 (2022) 131, https://doi.org/10.11604/pamj.2022.43.131.31743.
[64] J. Frikkel, M. Götte, M. Beckmann, S. Kasper, J. Hense, M. Teufel, M. Schuler, M. Tewes, Fatigue, barriers to physical activity and predictors for motivation to exercise in advanced cancer patients, BMC Palliat. Care 19 (2020) 43, https://doi.org/10.1186/s12904-020-00542-z.