

Assessment of Herbal Interactions with Anti-Cancer Drugs Using Two Drug Interaction Checker Databases and Attitudes of Cancer Patients Toward the Use of Herbal Products/Medicines: Single Center Experience

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Abstract

BACKGROUND/AIMS: Cancer patients can use herbal medicines/products to reduce symptoms and side effects, prevent metastasis and strengthen their immune system during the chemotherapy cycle. The first purpose of the study was to evaluate the attitudes of cancer patients toward the use of herbal medicines/products and to determine the herbal medicines/products used by cancer patients. The second purpose of the study was to determine the interactions between herbal medicines/products and anti-cancer drugs, using the Drugs.com and Medscape.com databases in the Oncology Clinic of Near East University Hospital.

MATERIALS AND METHODS: This was a retrospective and cross-sectional study conducted with cancer patients receiving chemotherapy in the Oncology Clinic at Near East University Hospital, between 1 June 2022 and 30 July 2022.

RESULTS: Only fifty-five cancer patients agreed to participate in this study. The highest score of 2.22 ± 0.98 was for herbal medicines/products that strengthen the immune system and the lowest score of 1.15 ± 0.45 was for herbal medicines/products that are better than chemotherapy. According to the Medscape.com database one interaction between *Eucalyptus* + and fluorouracil was in the “monitor closely” category. On the other hand, according to the Drugs.com database, two interactions between docetaxel + *Echinacea* and cyclophosphamide + *Echinacea* were categorized as moderate interactions.

CONCLUSION: This study showed that cancer patients' attitudes toward herbal product use were poor. Cancer patients with poor attitudes toward treatment were found to use more herbal products than cancer patients with good attitudes.

Keywords: Cancer patients, complementary and alternative medicine, drug-herbal interactions, herbal products

INTRODUCTION

Regarding the Global Cancer Observatory, an estimated 18.1 million new cases and 10 million deaths from all cancers combined occurred worldwide in 2020. It is also estimated that by 2040, 28 million new cases

of cancer will occur worldwide each year.¹ According to the National Cancer Institute, complementary and alternative medicine (CAM) is a medical term that refers to practices used to help manage the side effects of cancer treatments, as well as to try to treat or cure cancer diseases, that are not part of standard medical care.² The reasons for the current

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popularity of CAM, which is used by 25-50% of the general population in industrialised countries, are known to be complicated. There may be complex social and cultural reasons underlying this popularity.³⁻⁵ CAM treatments include botanical and nutritional products such as herbal, dietary, and vitamin supplements. These products are not required to be approved by the Food and Drug Administration before being dispensed to the public. Moreover, patients can obtain these products without a prescription. The administration of herbal medicines in combination with other medications or in high doses may be harmful.² Previous studies have shown that cancer patients utilise herbal products before, during, and after cancer treatment.⁶⁻⁹ Grapefruit juice, St John's Wort, Ginkgo, and Kava Kava, interact with cancer drugs and may alter the effectiveness or toxicity of the drugs due to herb-drug interactions. Many cancer patients, especially geriatric patients, are at risk of polypharmacy due to the number and variety of chemotherapy drugs and other medications. Furthermore, combining herbal products with chemotherapy may increase the risk of food-drug interactions.¹⁰⁻¹³ This may lead to a decrease in the quality of life, a change in the treatment protocol, or an increase in health costs in the treatment of cancer patients.¹⁴ Therefore, the study aimed to assess the attitudes of cancer patients receiving chemotherapy towards the use of herbal products. It also evaluated the possible drug interactions between herbal products and chemotherapy drugs using two drug interaction checker databases at the Oncology Clinic of Near East University Hospital.

MATERIALS AND METHODS

This was a retrospective and cross-sectional study conducted with cancer patients receiving chemotherapy at the Oncology Clinic of Near East University Hospital, North Cyprus between 1 June 2022 and 30 July 2022. The first purpose of the study was to assess the attitudes of cancer patients toward the use of herbal products and the herbal products used by cancer patients. The second purpose of the study was to assess the interactions between herbal medicines/products and anti-cancer drugs by consulting Drugs.com and Medscape.com databases in the Oncology Clinic of Near East University Hospital University Hospital.

The study population consisted of all adult cancer patients who received outpatient treatment at the Near East University Hospital during the data collection period and met the inclusion criteria. Cancer patients who received chemotherapy and were older than 18 years were included in the study. Patients who had not received chemotherapy or who did not want to participate were excluded from the study. All participants were informed about the aim of the study and provided verbal consent to the researchers before participating. The Institutional Review Board of Near East University approved this study (approval number: 2022/102, date: 28.04.2022).

Questionnaire

The questionnaire used in the study consisted of three parts. The first part consisted of five questions evaluating the demographic information of the participants. The second part consisted of eight questions evaluating the attitudes of cancer patients towards the use of herbal products with a 3-point Likert scale (agree, disagree, neutral). The questionnaire was formed by making modifications to a questionnaire used in a previous study.¹⁴ The questionnaire was prepared by an expert panel consisting of one pharmacologist, two clinical pharmacists, and one pharmacognosist. This questionnaire was sent to two oncology

pharmacists for face validity of the questionnaire. According to the attitude scale, cancer patients who scored 15 or more had a good attitude (out of 24) and those who scored lower than 15 had a poor attitude. The third part consisted of two questions about the names of the herbal products and the chemotherapy drugs used by the cancer patients. The questionnaire was used in both Turkish and English. Also, the questionnaire was translated into Turkish using a forward and backward method.

Drug and Herbal Interaction Evaluation

Drugs.com and Medscape.com drug interaction checker databases were used to determine the interactions between herbal products and chemotherapy drugs. Mechanisms of drug-drug interaction were categorized as pharmacodynamic, pharmacokinetic, and unknown mechanism of action. According to Medscape.com, interactions are divided into four categories: minor, monitor, serious-use alternative, and contraindicated. Additionally, according to Drugs.com, interactions are divided into 4 categories: minor, moderate, major, and unknown.

Statistical Analysis

This study's data were evaluated using the Statistical Package for Social Sciences version 21. A p-value of less than 0.05 was considered statistically significant. Demographic information and data on cancer patients' attitudes are shown in percentages and frequencies. This study determined the relationship between social-demographic factors and cancer patients' attitudes towards herbal product use, and between cancer patients' attitudes and herbal product users, by applying the chi-square test. Internal consistency was determined by Cronbach's alpha.

RESULTS

Between 1 June 2022 and 30 July 2022, a total of fifty-nine cancer patients applied to the oncology clinic. Fifty-five cancer patients consented to the study, while only four cancer patients declined. 65.5% of cancer patients were female and 34.5% were male. 50.9% of cancer patients were less than sixty-five years old and 49.1% were older than sixty-five. 58.2% of cancer patients lived in a city and 41.8% lived in a village. The most common cancer type was breast cancer (30.9%) (Table 1).

The highest score of 2.22 ± 0.98 was for the item that herbal medicines/products strengthen the immune system, and the lowest score of 1.15 ± 0.45 was for herbal medicines/products that are better than chemotherapy. A Cronbach's alpha coefficient of (0.65) was calculated for the cancer patients' attitudes (Table 2).

There was no statistically significant association between demographic factors and cancer patients' attitude towards using herbal products (Table 3).

There was no statistically significant association between the attitudes of herbal product users and those of cancer patients towards the use of herbal products (Table 4).

Cancer patients used twenty-four types of herbal products/medicines. The use of herbal products per patient was 0.43 on average. In cancer patients, the most frequently used herbal medicine/product was Cinnamon tea (8 patients, 14.54%; *Cinnamomum cassia* Blume and *Cinnamomum verum* J. Presl) (Table 5).

Table 1. Demographic characteristics of cancer patients

	n (%)
Gender	
Female	36 (65.5%)
Male	19 (34.5%)
Age (mean $\pm$ SD)	
<65 years	28 (50.9%)
$\geq$ 65 years	27 (49.1%)
Highest education status	
Primary school	11 (20%)
High school	23 (41.8%)
University	21 (38.2%)
Living place	
City	32 (58.2%)
Village	23 (41.8%)
Cancer types	
Breast cancer	17 (30.9%)
Lung cancer	6 (10.9%)
Gastrointestinal cancer	15 (27.3%)
Gynaecology cancer	6 (10.9%)
Others	11 (20%)
Attitude level	
Poor	36 (65.5%)
Good	19 (34.5%)
Herbal use	
Use	31 (56.4%)
Don't use	24 (43.6%)

SD: Standard deviation.

In this study, herbal medicines/products and drug interactions were checked using the Drugs.com and Medscape.com databases (Table 6). The term not available (N/A) was added for herbal medicines/products not found in Drugs.com, and Medscape.com databases.

DISCUSSION

The use of herbal products and anti-cancer drugs together may cause unexpected side effects. Therefore, it is of great importance that the use of herbal products is determined by healthcare professionals. If an interaction is detected between an herbal product and anti-cancer drugs, patients should be educated by oncology pharmacists and physicians about possible side effects and the potential need to stop using the herbal product during chemotherapy. This study determined that cancer patients have negative attitudes about the use of herbal products. However, the use of herbal products was higher in cancer patients with poor attitudes than with good attitudes.

According to the Medscape.com database, one interaction between *Eucalyptus* and fluorouracil was determined to be in the monitor closely category. The Medscape.com database reported that *Eucalyptus* increases the levels of fluorouracil. On the other hand, *Eucalyptus* is N/A in the Drugs.com database, meaning that the oncology pharmacist did not evaluate the interaction between *Eucalyptus* and fluorouracil using this database. According to the Drugs.com database, two interactions between docetaxel + *Echinacea* and cyclophosphamide + *Echinacea* were in the moderate interaction category. The Drugs.com database reports that *Echinacea* may alter blood levels and effects of docetaxel and cyclophosphamide. On the other hand, according to the Medscape.com database, no interaction was found between *Echinacea* and chemotherapy agents. It is of great importance that herbal medicines/products, N/A in databases, used by cancer patients are considered and investigated. Furthermore, oncologists and oncology pharmacists should determine the frequency and dosage of herbal products. If they detect an interaction between herbal and anti-cancer drugs, they should make an intervention immediately.

Table 2. Attitude of the cancer patients towards using herbal products/medicines

	Agree n (%)	Disagree n (%)	Neutral n (%)	Score (mean $\pm$ SD)
1. Herbal medicines/products strengthen the immune system.	33 (60%)	21 (38.20%)	1 (1.80%)	2.22 $\pm$ 0.98
2. Herbal medicines and products are more affordable than other treatments.	27 (49.10%)	22 (40%)	6 (10.90%)	2.09 $\pm$ 0.95
3. Herbal medicines/products are safer than using other treatments.	17 (30.90%)	36 (65.50%)	2 (3.65%)	1.65 $\pm$ 0.93
4. Herbal medicines/products are at least as effective as chemotherapy.	8 (14.50%)	40 (72.70%)	7 (12.70%)	1.42 $\pm$ 0.74
5. Herbal medicines/products are better than chemotherapy.	2 (3.60%)	49 (89.10%)	4 (7.30%)	1.15 $\pm$ 0.45
6. Herbal medicines/products reduce the side effects of chemotherapy.	22 (40%)	29 (52.70%)	4 (7.30%)	1.87 $\pm$ 0.96
7. Herbal medicines/products are helpful in reducing the pain and fatigue caused by chemotherapy.	17 (30.90%)	33 (60%)	5 (9.10%)	1.71 $\pm$ 0.92
8. Herbal medicines/products are helpful in reducing nausea and vomiting caused by chemotherapy	19 (34.50%)	32 (58.20%)	4 (7.30%)	1.76 $\pm$ 0.94

SD: Standard deviation.

In a study conducted in Palestine in 2016, patients with breast cancer stated that they used herbal remedies to fight cancer at a high rate, as they believed they strengthened the immune system.¹⁴ In this study, 60% of cancer patients stated that herbal medicines/products strengthen the immune system, which supports the results of the previous study. On the other hand, 65.5% of cancer patients stated that the use of herbal products is not safe during chemotherapy. They may be concerned about possible interactions between anti-cancer agents and herbal products.

Samuels et al.¹⁵ showed that 41.3% of patients with breast cancer were using herbal medicine for cancer-related goals, unmonitored by their oncology healthcare professional. In this study, cancer patients were using herbal products/medicines without supervision from healthcare professionals. Cancer patients may not want to reveal that information because healthcare professionals prefer that patients not use herbal products.

Engdal et al.¹⁶, showed that 37% of palliative and 38% of curative patients used herbal remedies concurrent with chemotherapy. They also reported that one palliative patient detected adverse effects when doubling the dose of injected mistletoe used. Therefore, healthcare

professionals can detect herbal product use during pre- and post-chemotherapy by asking detailed questions about the amount, time, and frequency of use of herbal products/medicines by cancer patients. Thus, they may prevent the interaction of anticancer agents and herbal products/medicines.

The findings of this study showed that although cancer patients had low attitudes towards the use of herbal products, they still used them. This situation may indicate that cancer patients have used herbal products in addition to supportive drugs to reduce the side effects caused by chemotherapy or have done so due to drug shortages in purchasing supportive care drugs used to prevent side effects.

Study Limitations

This study had some limitations. First, the number of cancer patients included in this study was low, as it was conducted in a single centre. Therefore, we recommend that future studies should be multi-center. Cancer patients may have overestimated or underestimated their responses when responding to the attitude assessment questionnaire due to their health situation and potential bias.

Table 3. Association between demographic factors and cancer patients' attitude towards using medicines/products

	Good n	Poor n	Total n	%	p-value
Gender					
Male	5	14	19	34.50%	0.351
Female	14	22	36	65.50%	
Age					
<65 years	7	21	28	51%	0.130
≥65 years	12	15	27	49%	
Education status					
Primary school	5	7	12	21.80%	0.068
High school	4	19	23	41.80%	
University	10	10	20	36.40%	
Living place					
City	13	19	32	58.20%	0.263
Village	6	17	23	41.80%	
*p<0.05 was considered the statistically significant association between demographic factors and the cancer patients' attitude towards using herbal products as determined by the Pearson chi-square test.					

Table 4. Association between cancer patients' attitudes and herbal medicines/products users

Attitude level	Herbal medicines/ products users		p-value
	Yes n (%)	No n (%)	
Good attitude	11 (35.5%)	8 (33.3%)	0.868
Poor attitude	20 (64.5%)	16 (66.7%)	
Total	31 (100%)	24 (100%)	

*p<0.05 indicated a statistically significant association between users of herbal medicines and products and the cancer patients' attitudes towards using herbal products, as determined by the Pearson chi-square test.

Table 5. Herbal medicines/products used by cancer patients

Herbal medicines/products	Number of cancer patients using n	Percentage (%)
1. Cinnamon tea, <i>Cinnamomum cassia</i> Blume and <i>Cinnamomum verum</i> J. Presl	8	14.54%
2. Carob molasses, <i>Ceratonia siliqua</i>	6	10.9%
3. Ginger tea, <i>Zingiber officinale</i> Roscoe	5	9.1%
4. Turmeric powder, <i>Curcuma longa</i> L.	5	9.1%
5. Sage tea, <i>Salvia officinalis</i> L.	5	9.1%
6. Green tea, <i>Camellia sinensis</i>	4	7.3%
7. Fennel tea, <i>Foeniculum vulgare</i>	4	7.3%
8. Peppermint tea, <i>Mentha piperita</i> L.	3	5.45%
9. Linden tea, <i>Tilia Cordata</i>	2	3.63%
10. Chamomile tea, <i>Matricaria recutita</i> L.	2	3.63%
11. Passionflower tea, <i>Passiflora incarnata</i> L.	2	3.63%
12. Eucalyptus tree oil, <i>Eucalyptus globulus</i>	2	3.63%
13. Lemon balm/Melissa tea, <i>Melissa officinalis</i>	2	3.63%
14. Artichoke capsule, <i>Cynara scolymus</i> L.	2	3.63%
15. Echinacea tea, <i>Echinacea purpurea</i>	2	3.63%
16. Ginkgo capsule, <i>Ginkgo biloba</i> L.	2	3.63%
17. Blueberry/bilberry tea, <i>Vaccinium myrtillus</i> L.	1	1.8%
18. Aniseed tea, <i>Pimpinella anisum</i> L.	1	1.8%
19. Pomegranate seed oil, <i>Punica granatum</i>	1	1.8%
20. Nettle tea, <i>Urtica dioica</i> L.	1	1.8%
21. Black cumin seeds, <i>Nigella sativa</i>	1	1.8%
22. Flaxseed tea, <i>Linum usitatissimum</i> L.	1	1.8%
23. Cumin powder, <i>Cuminum cyminum</i>	1	1.8%
24. Black Elder tea, <i>Sambucus nigra</i> L.	1	1.8%
Cancer patients may use more than one herbal product/medicine.		

Table 6. Interaction between anti-cancer drugs and herbal medicines/products

Anti-cancer drugs	Herbal medicines/products	Medscape.com drug interaction checker	Drugs.com drug interaction checker
Bendamustine/rituximab	Green tea, <i>Camellia sinensis</i>	No interaction	No interaction
Docetaxel/cyclophosphamide	Ginger tea, <i>Zingiber officinale</i> Roscoe	No interaction	No interaction
Docetaxel/cyclophosphamide	Blueberry/bilberry tea, <i>Vaccinium myrtillus</i> L.	No interaction	No interaction
Irinotecan	Lemon balm/Melissa tea, <i>Melissa officinalis</i>	No interaction	Not available
Trastuzumab	Aniseed tea, <i>Pimpinella anisum</i> L.	Not available	Not available
Trastuzumab	Linden tea, <i>Tilia Cordata</i>	Not available	Not available
Trastuzumab	Chamomile tea, <i>Matricaria recutita</i> L.	Not available	No interaction
Docetaxel/cisplatin/fluorouracil	Green tea, <i>Camellia sinensis</i>	No interaction	No interaction
Docetaxel/cisplatin/fluorouracil	Fennel tea, <i>Foeniculum vulgare</i>	No interaction	No interaction
Docetaxel/cisplatin/fluorouracil	Peppermint tea, <i>Mentha piperita</i> L.	Not available	No interaction
Paclitaxel/carboplatin	Sage tea, <i>Salvia officinalis</i> L.	No interaction	Not available
Gemcitabine/cisplatin	Peppermint tea, <i>Mentha piperita</i> L.	Not available	No interaction
Paclitaxel	Cinnamon tea, <i>Cinnamomum cassia</i> Blume and <i>Cinnamomum verum</i> J. Presl.	No interaction	No interaction
Paclitaxel	Fennel tea, <i>Foeniculum vulgare</i>	No interaction	No interaction
Paclitaxel	Flaxseed tea, <i>Linum usitatissimum</i> L.	No interaction	Not available
Irinotecan/fluorouracil/leucovorin/bevacizumab	Peppermint tea, <i>Mentha piperita</i> L.	Not available	No interaction
Irinotecan/fluorouracil/leucovorin/bevacizumab	Artichoke capsule, <i>Cynara scolymus</i> L.	Not available	Not available
Pemetrexed/nivolumab	Green tea, <i>Camellia sinensis</i>	No interaction	No interaction
Paclitaxel/carboplatin	Turmeric powder, <i>Curcuma longa</i> L.	No interaction	No interaction
Gemcitabine/carboplatin	Turmeric powder, <i>Curcuma longa</i> L.	No interaction	No interaction
Gemcitabine/carboplatin	Passion flower tea, <i>Passiflora incarnata</i> L.	No interaction	Not available
Bortezomib	Sage tea, <i>Salvia officinalis</i> L.	No interaction	Not available
Bortezomib	Ginger tea, <i>Zingiber officinale</i> Roscoe	No interaction	No interaction
Bortezomib	Cinnamon tea, <i>Cinnamomum cassia</i> Blume and <i>Cinnamomum verum</i> J. Presl.	No interaction	No interaction
Bortezomib	Black elder tea, <i>Sambucus nigra</i> L.	No interaction	Not available
Bortezomib	<i>Eucalyptus</i> tree oil, <i>Eucalyptus globulus</i>	No interaction	Not available
Gemcitabine/bevacizumab	Turmeric powder, <i>Curcuma longa</i> L.	No interaction	No interaction
Gemcitabine/bevacizumab	Carob molasses, <i>Ceratonia siliqua</i>	Not available	Not available
Fluorouracil/leucovorin/oxaliplatin	<i>Eucalyptus</i> tree oil, <i>Eucalyptus globulus</i>	Monitor closely: <i>Eucalyptus</i> increases levels of fluorouracil	Not available
Fluorouracil/leucovorin/oxaliplatin	Sage tea, <i>Salvia officinalis</i> L.	No interaction	Not available
Fluorouracil/leucovorin/oxaliplatin	Turmeric powder, <i>Curcuma longa</i> L.	No interaction	No interaction
Fluorouracil/leucovorin	Carob molasses, <i>Ceratonia siliqua</i>	Not available	Not available
Paclitaxel/trastuzumab/pertuzumab	Ginger tea, <i>Zingiber officinale</i> Roscoe	No interaction	No interaction
Paclitaxel/trastuzumab/pertuzumab	Turmeric powder, <i>Curcuma longa</i> L.	No interaction	No interaction
Paclitaxel/trastuzumab/pertuzumab	Pomegranate seed oil, <i>Punica granatum</i>	Not available	Not available
Docetaxel	Chamomile tea, <i>Matricaria recutita</i> L.	Not available	No interaction
Docetaxel	Nettle tea, <i>Urtica dioica</i> L.	No interaction	No interaction
Trastuzumab/pertuzumab	Sage tea, <i>Salvia officinalis</i> L.	No interaction	Not available
Trastuzumab/pertuzumab	Ginger tea, <i>Zingiber officinale</i> Roscoe	No interaction	No interaction
Trastuzumab/pertuzumab	Turmeric powder, <i>Curcuma longa</i> L.	No interaction	No interaction
Trastuzumab/pertuzumab	Fennel tea, <i>Foeniculum vulgare</i>	No interaction	No interaction
Gemcitabine/cisplatin/bevacizumab	Passion flower tea, <i>Passiflora incarnata</i> L.	No interaction	Not available
Liposomal doxorubicin/bevacizumab	Turmeric powder, <i>Curcuma longa</i> L.	No interaction	No interaction
Liposomal doxorubicin/bevacizumab	Cinnamon tea, <i>Cinnamomum cassia</i> Blume and <i>Cinnamomum verum</i> J. Presl.	No interaction	No interaction

Table 6. Continued

Anti-cancer drugs	Herbal medicines/products	Medscape.com drug interaction checker	Drugs.com drug interaction checker
Liposomal doxorubicin/bevacizumab	Green tea, <i>Camellia sinensis</i>	No interaction	No interaction
Docetaxel/cyclophosphamide	Ginger tea, <i>Zingiber officinale</i> Roscoe	No interaction	No interaction
Docetaxel/cyclophosphamide	Cinnamon tea, <i>Cinnamomum cassia</i> Blume and <i>Cinnamomum verum</i> J. Presl.	No interaction	No interaction
Docetaxel/cyclophosphamide	Turmeric powder, <i>Curcuma longa</i> L.	No interaction	No interaction
Docetaxel/cyclophosphamide	<i>Echinacea</i> tea, <i>Echinacea purpurea</i>	No interaction	Moderate interaction with docetaxel and cyclophosphamide medications: <i>Echinacea</i> may alter the blood levels and effects of docetaxel and cyclophosphamide
Ado-trastuzumab emtansine	<i>Echinacea</i> tea, <i>Echinacea purpurea</i>	No interaction	No interaction
Ado-trastuzumab emtansine	Cinnamon tea, <i>Cinnamomum cassia</i> Blume and <i>Cinnamomum verum</i> J. Presl.	No interaction	No interaction
Ado-trastuzumab emtansine	Fennel tea, <i>Foeniculum vulgare</i>	No interaction	No interaction
Ado-trastuzumab emtansine	Lemon balm/melissa tea, <i>Melissa officinalis</i>	No interaction	Not available
Ado-trastuzumab emtansine	Turmeric powder, <i>Curcuma longa</i> L.	No interaction	No interaction
Ado-trastuzumab emtansine	Ginger tea, <i>Zingiber officinale</i> Roscoe	No interaction	No interaction
Ado-trastuzumab emtansine	Black cumin seeds, <i>Nigella sativa</i>	Not available	Not available
Gemcitabine/cisplatin	Sage tea, <i>Salvia officinalis</i> L.	No interaction	Not available
Gemcitabine/cisplatin	Linden tea, <i>Tilia Cordata</i>	Not available	Not available
Fluorouracil/leucovorin/oxaliplatin	Cinnamon tea, <i>Cinnamomum cassia</i> Blume and <i>Cinnamomum verum</i> J. Presl.	No interaction	No interaction
Fluorouracil/leucovorin/oxaliplatin	Carob molasses, <i>Ceratonia siliqua</i>	Not available	Not available
Fluorouracil/leucovorin/oxaliplatin/docetaxel	Carob molasses, <i>Ceratonia siliqua</i>	Not available	Not available
Fluorouracil/leucovorin/oxaliplatin/docetaxel	Cumin powder, <i>Cuminum cyminum</i>	Not available	Not available
Doxorubicin/cyclophosphamide	Ginkgo capsule, <i>Ginkgo biloba</i> L.	No interaction	No interaction
Paclitaxel/trastuzumab	Ginkgo capsule, <i>Ginkgo biloba</i> L.	No interaction	No interaction

CONCLUSION

This study showed that cancer patients' attitudes toward herbal product use were poor. Cancer patients with poor attitudes were found to use more herbal products than cancer patients with good attitudes. Therefore, the interaction between herbal medicines/products and anti-cancer agents should be checked and thoroughly investigated by oncologists and oncology pharmacists using more than one drug interaction checker database.

MAIN POINTS

- Herbal medicines and products are used by cancer patients throughout their cancer treatment to mitigate the side effects of anti-cancer drugs.
- Healthcare professionals should explain to cancer patients the potential drug-herbal interactions that herbal products may cause in detail.
- Healthcare professionals should use more than one drug interaction checking program when checking for interactions between herbs and drugs.

ETHICS

Ethics Committee Approval: The Institutional Review Board of Near East University approved this study (approval number: 2022/102, date: 28.04.2022).

Informed Consent: All participants were informed about the aim of the study and provided verbal consent to the researchers before participating.

Footnotes

Authorship Contributions

Concept: N.B., A.S.B., Design: N.B., A.S.B., Data Collection and/or Processing: N.B., A.M., Analysis and/or Interpretation: N.B., A.S.B., Literature Search: N.B., A.S.B., A.M., Writing: N.B., A.S.B., A.M.

DISCLOSURES

Conflict of Interest: No conflict of interest was declared by the authors.

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