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Differences in perceptions of the benefits and risks of complementary and alternative medicine use among oncology patients and healthcare professionals

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Abstract

Complementary and Alternative Medicine (CAM) is increasingly present in oncology care; however, the healthcare perspectives of professionals and patients regarding its efficacy and safety often diverge. This study examined CAM's perceived benefits and potential adverse effects among oncology patients and healthcare professionals. A cross-sectional study was conducted between November 2022 and May 2023 at the University Hospital Sisters of Mercy Center in Zagreb, Croatia. The study included 832 participants, comprising 411 oncology patients and 421 healthcare professionals (100 physicians and 321 nurses). Data was collected using survey questionnaire based on modified versions of the CAM Health Belief Questionnaire (CHBQ) and the Integrative Medicine Attitude Questionnaire (IMAQ). Statistics analyses included descriptive and inferential methods, such as one-way analysis of variance (ANOVA) and post hoc Tukey tests. Oncology patients were significantly more likely to perceive CAM as beneficial than healthcare professionals. Over 80% of patients believed that CAM contributes to symptom relief, whereas only 60% of healthcare professionals shared this view. The most pronounced differences in perceptions were observed regarding the potential for disease regression, with 43% of patients endorsing this claim compared to only 21% of healthcare professionals. A significant difference was also noted in the perception of adverse effects — physicians expressed more substantial concern about CAM- related side effects, particularly gastrointestinal disturbances (M = 3.69, SD = 1.134) and blood pressure irregularities (M = 3.60, SD = 1.137), while patients were less likely to associate CAM with adverse effects (M = 2.13, SD = 1.029 for gastrointestinal disturbances). The study results underscore the substantial differences in CAM perceptions between oncology patients and healthcare professionals. While patients view CAM as a valuable adjunct to oncology treatment, healthcare professionals—especially physicians—remain more cautious regarding its efficacy and safety. This highlights the need for further research and education initiatives to ensure informed and safe CAM integration into clinical practice.

Keywords: Adverse effects, Alternative therapy, Complementary Therapy, Healthcare workers, Patients, Positive outcomes.

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Institutional Review Board Statement: This study was approved by the Ethics Committee of the University Hospital Centre Sisters of Mercy (Class: 003-06/21-021001, Registration Number: 251-29-1111-2l-01-9) and was conducted in compliance with all relevant guidelines ensuring the proper conduct of the research and protection of participants while adhering to the principles of good clinical practice. During the study, the most important ethical and bioethical principles — autonomy, justice, beneficence and non-maleficence — were upheld by the Nuremberg Code, the Declaration of Helsinki (latest revision), the Health Act of the Republic of Croatia (NN 158/08, 71/10, 139/10, 22/11, 84/11, 12/12, 35/12, 70/12, 82/13, 100/18, 125/19, 147/20, 119/22, 156/22 and 33/23), the Law on Patients' Rights of the Republic of Croatia (NN 169/04, 37/08) and Regulation (EU) 2016/679 of the European Parliament and of the Council of 27. April 2016 on the protection of natural persons in the processing of personal data. Regulation (EU) 2016/679 of the European Parliament and of the Council of April 27, 2016, on protecting natural persons about the processing of personal data and the free movement of such data (GDPR).
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1. Introduction

Complementary and alternative medicine (CAM) is a broad spectrum of medical and health practices, products, and therapies not considered part of conventional medicine [1]. CAM includes diverse approaches such as herbal medicine, acupuncture, meditation, energy-based therapies, and mind-body interventions, and is particularly prevalent among patients with chronic diseases, including cancer patients [2]. CAM use among cancer patients has been the subject of numerous studies, with data showing that between 30% and 70% of patients use at least one CAM method during their treatment [3]. Patients often choose CAM to relieve symptoms associated with their disease and its treatment, including pain, fatigue, nausea, and emotional distress [4]. In addition, some patients believe CAM can improve immune function or contribute to disease regression [5]. However, despite its widespread use, scientific evidence on the effectiveness of many CAM methods is still limited, and specific methods may pose risks due to potential interactions with conventional therapies [6].

The potential benefits of CAM in cancer care are promising, including improved symptom management, enhanced psychological well-being, and increased patient satisfaction with treatment. Mind-body interventions, such as meditation, yoga, and acupuncture, have shown to be beneficial in reducing anxiety, depression, and chemotherapy-induced nausea. However, the use of herbal preparations and dietary supplements is controversial due to potential interactions with standard cancer therapies, which could reduce their efficacy or increase the risk of side effects.

Very little is known about the attitudes of healthcare professionals towards CAM as well as oncology patients in the Republic of Croatia. These variations in CAM usage reflect not only differences in personal health beliefs but also in professional attitudes. Studies suggest that physicians, nurses, and patients often differ significantly in their perception, acceptance, and use of CAM modalities, with patients generally demonstrating more favorable attitudes than healthcare professionals [7, 8].

The results collected are not unambiguous even in the works in world literature, and they vary, with physicians usually being more skeptical than nurses and other healthcare professionals. It is therefore essential to distinguish between CAM and integrative medicine. While CAM refers to therapies that are used alongside or instead of conventional treatments and are not fully integrated into the dominant healthcare system, integrative medicine refers to a coordinated approach that combines evidence-informed CAM practices with conventional care, aiming to treat the whole person in a patient-centered manner [9].

While some clinicians recognize the potential benefits of integrative medicine, many remain cautious due to the lack of solid clinical evidence and possible side effects or interactions with chemotherapy, radiotherapy, and targeted therapy. This careful approach reflects their commitment to patient safety and their professional judgment.

Given that both healthcare professionals and oncology patients have a particular perception of the benefits and possible side effects of using methods and techniques from the CAM spectrum and that no data on this is available in research published so far in the Republic of Croatia, it was considered essential to investigate this area through field research.

1.1. Aim and Purpose

The research aimed to gain insight into healthcare professionals' and oncology patients' beliefs and attitudes about the possible benefits and side effects of using individual methods and techniques from the spectrum of CAM and integrative medicine.

1.2. Hypothesis

A null hypothesis was also set: "There are no statistically significant differences between and within the stratum of healthcare professionals and oncology patients in attitudes towards the possible benefits and side effects of using individual methods and techniques from the spectrum of CAM and integrative medicine."

2. Methods

2.1. Instruments

For this research, two questionnaires were used, one for health workers and the other for oncology patients and were created with minor modifications of the previously used CAM Health Belief. Questionnaire (CHBQ) [10] and Integrative Medicine Attitude Questionnaire (IMAQ) [11] questionnaire. The modifications were limited to the collection of sociodemographic data (e.g., age, gender, professional background for healthcare professionals; diagnosis, duration of illness for oncology patients) and to the rephrasing of items to clarify their relevance for oncology patients. These adjustments were made to ensure content clarity and contextual appropriateness for the respective target groups, without altering the original constructs or measurement scales of the validated instruments.

The questionnaire items related to beliefs and attitudes about CAM, including possible adverse effects, were designed to capture respondents' perceptions and expectations rather than their direct personal experiences with CAM use. It is important to note that respondents' beliefs and opinions about CAM and its possible side effects may be formed not only based on their personal experience but also through a wide range of other sources, such as information from healthcare providers, media, cultural background, and social influences. It would be unrealistic to expect that all participants have personally tried various CAM techniques or directly experienced their side effects. This clarification was added to better explain the nature of the data and the context of the responses.

2.2. Ethics

This research was approved by the Ethics Committee of KBC Sestre milosrdnice (Class: 003-06/21-02/001, Reg. No.: 251-29-111/1-2l-01-9, date: January 9, 2021) and was conducted by all relevant guidelines that ensure proper conduct of the research and protection of participants, while respecting the principles of good clinical practice. During the research, compliance with the key ethical and bioethical principles of autonomy, justice, beneficence and non-maleficence was ensured, by the Nuremberg Code, the Declaration of Helsinki (latest revision), the Health Care Act of the Republic of Croatia and the Patients' Rights Act of the Republic of Croatia. It was conducted by Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on protecting individuals about the processing of personal data. And the free flow of such data (GDPR).

2.3. Study Design and Participants

The cross-sectional study was conducted from November 2022 to May 2023 at the UHC Sestre milosrdnice Clinical Hospital in Zagreb, Croatia. The study sample consisted of three distinct groups: oncology patients, physicians, and nurses. Participants were purposively recruited from these groups to ensure adequate representation of the perspectives relevant to the research objectives. Specifically, the first group included oncology patients with a confirmed diagnosis, regardless of disease stage. The second and third groups comprised healthcare professionals working either directly or indirectly with oncology patients: physicians and nurses, respectively. Within the healthcare professional category, physicians and nurses were treated as separate subgroups for analysis. This approach ensured proportional inclusion of each group but does not represent a stratified random sample drawn from a single homogeneous population. Rather, it was a targeted recruitment from predefined groups relevant to the study aims.

The study included healthcare workers who work directly in the oncology sector, which includes doctors and nurses working in oncology departments, as well as those healthcare workers who are indirectly related to healthcare and team care of oncology patients, which provides for doctors and nurses working in hematology, surgery, gynecology and otolaryngology, and within the Clinical Hospital Center where the study was conducted. Of the respondents, 411 were oncology patients and 421 were healthcare professionals (100 doctors and 321 nurses). A total of 150 physicians were approached, of whom 100 participated in the study (response rate: 66.6%), and 450 nurses were invited, of whom 321 participated (response rate: 71.33%).

When conducting the research in the 1st stratum, the Face-to-face survey method was used, and the survey was conducted by the principal researcher (stratum 1) and trained interviewers (stratum 2). The face-to-face method is a survey conducted in personal contact with the respondent, i.e., the interviewer reads the questions to the respondent in front of them and carefully records their answers. This allows the interviewer to have better control over the survey process, because they could pay attention and record the non-verbal reactions of the respondent or some other relevant information that they would not have noticed otherwise.

The questionnaires were distributed to healthcare workers, doctors, and nurses personally in unmarked envelopes, and a third party collected them.

2.4. Statistics

The research results were grouped according to the set research objectives and interpreted in the form of a textual presentation and tables, providing insight into respondents' attitudes, preferences, and behavioral patterns regarding CAM.

The statistical analysis used inferential statistical methods to analyze data on attitudes and beliefs towards complementary and alternative medicine. As part of the descriptive analysis, the data were presented in tabular form, with

absolute frequencies, percentages, and measures of central tendency (arithmetic mean, standard deviation, minimum and maximum value). One-way analysis of variance (ANOVA) was used to compare mean values between three or more groups when the data distribution was normal. A post hoc test was performed after the ANOVA test for more precise analyses, such as the Tukey test, which identified specific differences between groups.

3. Results

3.1. Description of the Sample

The study included 832 participants, of whom 29.4% were male and 70.6% female. Of the oncology patients, 42.6% were male and 57.4% female, while the medical staff was divided into physicians (32% male, 68% female) and nurses/technicians (11.8% male, 88.2% female). Regarding age distribution, the highest percentage of participants fell into the 51–60 age group (25.2%), closely followed by the 41–50 age group (24.8%), while 22.8% were over 60. Specifically, 44.3% of oncology patients were over 60, while most healthcare professionals were between 31 and 50. Regarding education attainment, 40.6% of participants had a secondary school degree, while 58.3% had a university degree. All doctors had a university degree, while 73.2% of nurses had one. In terms of work experience, most healthcare professionals had been working for 16 to 25 years (27%), while 8.5% had more than 35 years of experience. Most doctors had between 5 and 25 years of experience, while a significant proportion of nurses had a more extended service period. In terms of involvement in oncology, 30.7% of healthcare professionals worked directly in oncology, while 69.3% contributed indirectly to oncology patient care. Of the physicians, 56% worked in oncology departments, compared to 22.9% of nurses.

3.2. Beliefs about the Benefits of CAM

An analysis of the perceived benefits of complementary and alternative medicine provides insight into the experiences of patients and healthcare professionals using these methods. By examining the subjective experiences of the effects of CAM, it is possible to understand which benefits are most recognized among different groups, as well as differences in perception between patients and healthcare professionals. Tables 1, 2, and 3 show the attitudes of patients and healthcare professionals towards the perceived benefits of CAM, including relief of symptoms, remission of illness, quality sleep, and pain relief.

Table 1.
Degree of agreement of respondents with claims about the benefits of CAM.

Positive outcomes	Degree of agreement on a Likert scale 1 – 5	Group					
		Patients		Healthcare workers		Total	
		N	%	N	%	N	%
Relief of discomfort	I completely disagree	3	0.7%	36	8.5%	39	4.7%
	I mostly disagree	6	1.5%	32	7.6%	38	4.6%
	Neither agree nor disagree	60	14.6%	99	23.5%	159	19.1%
	I mostly agree	231	56.3%	146	34.6%	377	45.3%
	I completely agree	110	26.8%	109	25.8%	219	26.3%
	Total	410	100.0%	422	100.0%	832	100.0%
Remission of the disease	I completely disagree	21	5.1%	89	21.1%	110	13.2%
	I mostly disagree	43	10.5%	64	15.2%	107	12.9%
	Neither agree nor disagree	168	41.0%	130	30.8%	298	35.8%
	I mostly agree	128	31.2%	92	21.8%	220	26.4%
	I completely agree	50	12.2%	47	11.1%	97	11.7%
	Total	410	100.0%	422	100.0%	832	100.0%
Quality and peaceful sleep	I completely disagree	8	2.0%	40	9.5%	48	5.8%
	I mostly disagree	16	3.9%	42	10.0%	58	7.0%
	Neither agree nor disagree	106	25.9%	100	23.7%	206	24.8%
	I mostly agree	192	46.8%	145	34.4%	337	40.5%
	I completely agree	88	21.5%	95	22.5%	183	22.0%
	Total	410	100.0%	422	100.0%	832	100.0%
Pain relief	I completely disagree	4	1.0%	38	9.0%	42	5.0%
	I mostly disagree	13	3.2%	34	8.1%	47	5.6%
	Neither agree nor disagree	132	32.2%	109	25.8%	241	29.0%
	I mostly agree	182	44.4%	145	34.4%	327	39.3%
	I completely agree	79	19.3%	96	22.7%	175	21.0%
	Total	410	100.0%	422	100.0%	832	100.0%

Table 1 shows respondents' degree of agreement with the claims about the benefits of CAM, indicating significant differences between patients and healthcare professionals in the perception of its effectiveness. Patients are more likely to recognize the positive effects of CAM, with the majority agreeing with the claims about alleviating symptoms, relieving pain and improving sleep. On the other hand, healthcare professionals take a more cautious stance, with more pronounced

neutral responses and a higher proportion of those who disagree with the claims, especially regarding the regression of illness as a potential benefit of CAM. Patients' highest level of agreement was recorded with the claim that CAM contributes to relieving symptoms, while healthcare professionals are more reserved about this claim. A similar pattern is present in the perception of the impact of CAM on sleep quality and pain relief, where patients show greater confidence in these methods. The difference is particularly pronounced with the claim about the regression of illness, where healthcare professionals disagree with a significantly higher percentage of patients.

Table 2.
Comparison of Perceptions Regarding CAM Benefits Across Three Respondent Groups: Tukey test results.

Benefits	(i) What is your occupation/status?	(j) What is your occupation/status?	Mean value (ij)	Standard error	*p**	95% Interval reliability	
						Lower border	Upper border
Relief hardship	Doctor	Nurse	- 1.112 *	0.107	0.000	-1.36	- 0.86
		Patient	- 1.298 *	0.104	0.000	-1.54	-1.05
		Doctor	1.112 *	0.107	0.000	0.86	1.36
	Nurse	Patient	- 0.187 *	0.070	0.020	- 0.35	- 0.02
	Patient	Doctor	1.298 *	0.104	0.000	1.05	1.54
		Nurse	0.187 *	0.070	0.020	0.02	0.35
Withdrawal diseases	Doctor	Nurse	- 1.203 *	0.125	0.000	-1.50	- 0.91
		Patient	- 1.398 *	0.122	0.000	-1.68	-1.11
	Nurse	Doctor	1.203 *	0.125	0.000	0.91	1.50
		Patient	- 0.195 *	0.081	0.044	-0.39	0.00
	Patient	Doctor	1.398 *	0.122	0.000	1.11	1.68
		Nurse	0.195 *	0.081	0.044	,00	0.39
High quality and peaceful sleep	Doctor	Nurse	- 1.228 *	0.114	0.000	-1.50	- 0.96
		Patient	- 1.248 *	0.111	0.000	-1.51	- 0.99
	Nurse	Doctor	1.228 *	0.114	0.000	0.96	1.50
		Patient	-0.020	0.074	0.961	- 0.19	0.15
	Patient	Doctor	1.248 *	0.111	0.000	0.99	1.51
		Nurse	0.020	0.074	0.961	-0.15	0.19
Mitigation hurts	Doctor	Nurse	- 1.114 *	0.111	0.000	-1.37	- 0.85
		Patient	- 1.086 *	0.108	0.000	-1.34	- 0.83
	Nurse	Doctor	1.114 *	0.111	0.000	0.85	1.37
		Patient	0.028	0.072	0.923	-0.14	0.20
	Patient	Doctor	1.086 *	0.108	0.000	0.83	1.34
		Nurse	-0.028	0.072	0.923	-0.20	0.14

Note: p* - value levels significance; p < 0.05 indicates statistically significant difference between compared groups.

Table 2 presents post-hoc comparisons using the Tukey HSD test following a one-way ANOVA that revealed statistically significant differences in the perceived benefits of CAM among the three respondent groups—physicians, nurses, and patients. These differences reflect variations in professional roles and attitudes toward complementary medicine.

In the domain of pain relief, significant differences were observed between all three groups. Patients reported the highest level of agreement, followed by nurses, who scored significantly higher than physicians ($p < 0.001$) but significantly lower than patients ($p = 0.020$). Physicians expressed the lowest level of agreement ($p < 0.001$).

A comparable pattern emerged for disease remission, where patients again demonstrated the strongest belief in CAM efficacy, significantly higher than both healthcare professional groups ($p < 0.001$). Nurses showed greater agreement than physicians ($p < 0.001$), though still significantly less than patients ($p = 0.044$).

Regarding improvements in sleep quality, physicians differed significantly from both nurses and patients ($p < 0.001$), while no significant difference was found between patients and nurses ($p = 0.961$), indicating a shared perspective between the two.

In terms of overall symptom relief, physicians again showed significantly lower levels of agreement than both patients and nurses ($p < 0.001$), with no significant difference between the latter two ($p = 0.923$).

Overall, the findings indicate that patients consistently report the strongest belief in CAM benefits, nurses exhibit a moderate but significantly more favorable view than physicians, and physicians remain the most skeptical group. These results underscore the importance of enhancing communication and mutual understanding between healthcare professionals and patients concerning expectations and perceived value of CAM therapies.

Table 3.
Statistical significance of differences in beliefs and attitudes between group and subgroup about the benefits of CAM: Tukey test results.

Positive outcomes	(i) By profession / status	(j) By profession / status	Mean value (ij)	Standard error	*p**	95% confidence interval	
						Lower bound	Lower bound
Relief of discomfort	Physician	Nurse	-1.112 *	0.107	0.000	-1.36	-0.86
		Patient	-1.298 *	0.104	0.000	-1.54	-1.05
	Nurse	Physician	1.112 *	0.107	0.000	0.86	1.36
		Patient	-0.187 *	0.070	0.020	-0.35	-0.02
	Patient	Physician	1.298 *	0.104	0.000	1.05	1.54
		Nurse	0.187 *	0.070	0.020	0.02	0.35
Remission of the disease	Physician	Nurse	-1.203 *	0.125	0.000	-1.50	-0.91
		Patient	-1.398 *	0.122	0.000	-1.68	-1.11
	Nurse	Physician	1.203 *	0.125	0.000	0.91	1.50
		Patient	-0.195 *	0.081	0.044	-0.39	0.00
	Patient	Physician	1.398 *	0.122	0.000	1.11	1.68
		Nurse	0.195 *	0.081	0.044	0.00	0.39
Quality and peaceful sleep	Physician	Nurse	-1.228 *	0.114	0.000	-1.50	-0.96
		Patient	-1.248 *	0.111	0.000	-1.51	-0.99
	Nurse	Physician	1.228 *	0.114	0.000	0.96	1.50
		Patient	-0.020	0.074	0.961	-0.19	0.15
	Patient	Physician	1.248 *	0.111	0.000	0.99	1.51
		Nurse	0.020	0.074	0.961	-0.15	0.19
Pain relief	Physician	Nurse	-1.114 *	0.111	0.000	-1.37	-0.85
		Patient	-1.086 *	0.108	0.000	-1.34	-0.83
	Nurse	Physician	1.114 *	0.111	0.000	0.85	1.37
		Patient	0.028	0.072	0.923	-0.14	0.20
	Patient	Physician	1.086 *	0.108	0.000	0.83	1.34
		Nurse	-0.028	0.072	0.923	-0.20	0.14

Note: p* - the significance level value $p < 0.05$ indicates a statistically significant difference between the compared groups.

Table 3 compares the attitudes of doctors, nurses and patients towards the benefits of CAM, with the differences expressed as means and confidence intervals. The results clearly show that doctors are significantly more skeptical of all claims than nurses and patients, with the significant difference in perception being between doctors and patients. The significant difference between the groups was recorded in the perception of relief of symptoms and remission of the disease, where patients expressed significantly more positive attitudes towards doctors. On the other hand, nurses occupy an intermediate position, showing a greater tendency to recognize the benefits of CAM compared to doctors, but with less enthusiasm compared to patients. Regarding pain relief and quality sleep, doctors still show a lower level of agreement. Still, the difference between nurses and patients in this segment is not statistically significant, suggesting that these groups have more similar perceptions of the benefits of CAM in these domains.

3.3. Beliefs About the Side Effects of CAM

The adverse effects of CAM are an essential aspect of assessing the safety and acceptability of these methods among patients and healthcare professionals. Tables 4, 5 show the attitudes of patients and healthcare professionals towards the perceived adverse effects of CAM, including digestive disorders, blood pressure and/or pulse disorders, sleep disorders, irritability, difficulty moving, and allergies.

Table 4.
Degree of agreement of respondents with statements about the undesirable effects of CAM.

Adverse effects	Degree of agreement on a Likert scale 1 – 5	Group					
		Patients		Healthcare workers		Total	
		N	%	N	%	N	%
Digestive disorders (diarrhea, vomiting, etc.)	I completely disagree	145	35.4%	113	26.8%	258	31.0%
	I mostly disagree	108	26.3%	76	18.0%	184	22.1%
	Neither agree nor disagree	126	30.7%	121	28.7%	247	29.7%
	I mostly agree	22	5.4%	76	18.0%	98	11.8%
	I completely agree	9	2.2%	36	8.5%	45	5.4%
	Total	410	100.0%	422	100.0%	832	100.0%
Blood pressure/pulse disorder	I completely disagree	145	35.4%	117	27.7%	262	31.5%
	I mostly disagree	105	25.6%	83	19.7%	188	22.6%
	Neither agree nor disagree	141	34.4%	122	28.9%	263	31.6%
	I mostly agree	17	4.1%	69	16.4%	86	10.3%
	I completely agree	2	0.5%	31	7.3%	33	4.0%
	Total	410	100.0%	422	100.0%	832	100.0%
Sleep disorder	I completely disagree	150	36.6%	124	29.4%	274	32.9%
	I mostly disagree	119	29.0%	74	17.5%	193	23.2%
	Neither agree nor disagree	129	31.5%	126	29.9%	255	30.6%
	I mostly agree	9	2.2%	68	16.1%	77	9.3%
	I completely agree	3	0.7%	30	7.1%	33	4.0%
	Total	410	100.0%	422	100.0%	832	100.0%
Irritability	I completely disagree	154	37.6%	117	27.7%	271	32.6%
	I mostly disagree	118	28.8%	80	19.0%	198	23.8%
	Neither agree nor disagree	123	30.0%	117	27.7%	240	28.8%
	I mostly agree	12	2.9%	79	18.7%	91	10.9%
	I completely agree	3	0.7%	29	6.9%	32	3.8%
	Total	410	100.0%	422	100.0%	832	100.0%
Difficulty moving	I completely disagree	163	39.8%	128	30.3%	291	35.0%
	I mostly disagree	124	30.2%	86	20.4%	210	25.2%
	Neither agree nor disagree	116	28.3%	133	31.5%	249	29.9%
	I mostly agree	5	1.2%	52	12.3%	57	6.9%
	I completely agree	2	0.5%	23	5.5%	25	3.0%
	Total	410	100.0%	422	100.0%	832	100.0%
Allergies	I completely disagree	162	39.5%	120	28.4%	282	33.9%
	I mostly disagree	99	24.1%	91	21.6%	190	22.8%
	Neither agree nor disagree	125	30.5%	114	27.0%	239	28.7%
	I mostly agree	23	5.6%	66	15.6%	89	10.7%
	I completely agree	1	0.2%	31	7.3%	32	3.8%
	Total	410	100.0%	422	100.0%	832	100.0%

The table shows the respondents' perceptions of possible adverse effects of CAM, analyzing the differences between patients and healthcare professionals. In general, patients are more likely to reject the association of CAM with adverse effects. At the same time, healthcare professionals show higher uncertainty and a greater tendency to recognize possible risks. The significant differences in attitudes between the groups were observed in digestive disorders, blood pressure disorders, and irritability, where healthcare professionals significantly more often express agreement that CAM could cause these problems. In contrast, patients mainly express disagreement or a neutral attitude. Also, the perception of the association of CAM with impaired movement and allergies is significantly more pronounced among healthcare professionals. At the same time, patients do not consider these phenomena relevant in CAM. The only item for which the responses of the two groups are relatively similar refers to sleep disorders, with both groups mostly taking a neutral or disagreeing attitude. However, healthcare professionals still recognize this possibility somewhat more often.

Table 5.
Tukey HSD post-hoc analysis of differences in perceived adverse effects of CAM among physicians, nurses, and patients.

Unwanted effects	(i) What is your occupation/status ?	(j) What is your occupation/ status?	Mean value (ij)	Standard error	*p**	95% Interval reliability	
						Lower border	Upper border
Digestive disturbances (diarrhea, vomiting, ...)	Doctor	Nurse	1.385 *	0.124	**0.000**	1.09	1.68
		Patient	1.561 *	0.121	**0.000**	1.28	1.85
	Nurse	Doctor	- 1.385 *	0.124	**0.000**	-1.68	-1.09
		Patient	0.176	0.081	0.076	- 0.01	0.37
	Patient	Doctor	- 1.561 *	0.121	**0.000**	-1.85	-1.28
		Nurse	-0.176	0.081	0.076	- 0.37	0.01
Disorder blood pressure/pulse	Doctor	Nurse	1.366 *	0.119	**0.000**	1.09	1.64
		Patient	1.510 *	0.115	**0.000**	1.24	1.78
	Nurse	Doctor	- 1.366 *	0.119	**0.000**	-1.64	-1.09
		Patient	0.144	0.077	0.151	- 0.04	0.32
	Patient	Doctor	- 1.510 *	0.115	**0.000**	-1.78	-1.24
		Nurse	-0.144	0.077	0.151	- 0.32	0.04
Allergies	Doctor	Nurse	1.223 *	0.122	**0.000**	0.94	1.51
		Patient	1.418 *	0.119	**0.000**	1.14	1.70
	Nurse	Doctor	- 1.223 *	0.122	**0.000**	-1.51	- 0.94
		Patient	0.196 *	0.079	**0.036**	0.01	0.38
	Patient	Doctor	- 1.418 *	0.119	**0.000**	-1.70	-1.14
		Nurse	- 0.196 *	0.079	**0.036**	- 0.38	- 0.01
Difficult movement	Doctor	Nurse	1.101 *	0.114	**0.000**	0.83	1.37
		Patient	1.333 *	0.111	**0.000**	1.07	1.59
	Nurse	Doctor	- 1.101 *	0.114	**0.000**	-1.37	- 0.83
		Patient	0.232 *	0.074	**0.005**	0.06	0.41
	Patient	Doctor	- 1.333 *	0.111	**0.000**	-1.59	-1.07
		Nurse	- 0.232 *	0.074	**0.005**	- 0.41	- 0.06
Irritability	Doctor	Nurse	1.207 *	0.120	**0.000**	0.93	1.49
		Patient	1.493 *	0.117	**0.000**	1.22	1.77
	Nurse	Doctor	- 1.207 *	0.120	**0.000**	-1.49	- 0.93
		Patient	0.286 *	0.078	**0.001**	0.10	0.47
	Patient	Doctor	- 1.493 *	0.117	**0.000**	-1.77	-1.22
		Nurse	- 0.286 *	0.078	**0.001**	- 0.47	- 0.10
Disorder sleep	Doctor	Nurse	1.299 *	0.118	**0.000**	1.02	1.58
		Patient	1.513 *	0.115	**0.000**	1.24	1.78
	Nurse	Doctor	- 1.299 *	0.118	**0.000**	-1.58	-1.02
		Patient	0.213 *	0.077	**0.015**	0.03	0.39
	Patient	Doctor	- 1.513 *	0.115	**0.000**	-1.78	-1.24
		Nurse	- 0.213 *	0.077	**0.015**	- 0.39	- 0.03

Note: p* - value levels significance; $p < 0.05$ indicates statistically significant difference between compared group.

The results of the Tukey post-hoc analysis in Table 5 indicate statistically significant differences in beliefs and attitudes among respondents of different professions in the perception of adverse effects of CAM. The most pronounced differences are present in the assessment of digestive disorders, where doctors, compared to patients ($p < 0.001$) and nurses ($p < 0.001$), perceive a significantly higher probability of this adverse effect, while the difference between patients and nurses is not statistically significant ($p = 0.076$). The same pattern is maintained for blood pressure and pulse disorders - doctors show significantly higher agreement compared to patients ($p < 0.001$) and nurses ($p < 0.001$), while the difference between nurses and patients is not significant here either ($p = 0.151$). In the case of allergic reactions, all three groups show statistically significant differences - doctors are the most cautious, then nurses, and patients show the lowest level of agreement ($p < 0.05$). A similar pattern is observed for difficulty moving, irritability, and sleep disturbances: physicians show statistically the highest level of concern for each of the listed adverse effects compared to both groups ($p < 0.001$), while nurses also express a higher level of agreement compared to patients ($p < 0.05$). Overall, doctors show the largest level agreement with possibility unwanted effects KAM for all observed categories. Nurses occupy the middle position, while patients express the lowest level of agreement, except in the case of allergies and difficulty moving, where the differences between them and nurses are significant.

4. Discussion

The issue of complementary, alternative and integrative medicine opens up a more expansive space for considering its role in healthcare, mainly through the prism of perceived benefits and potential risks. The different views between patients

and healthcare professionals highlight the complexity of this topic and reflect different perceptions of the effects of CAM on health. Looking at CAM through the prism of these aspects provides insight into how various groups value its use and how such perspectives can shape communication, implementation and trust in this type of therapy. The difference between the groups may reflect doctors' more critical attitude based on their clinical experience and scientific knowledge. At the same time, patients probably perceive CAM as a more natural and safer alternative, with fewer adverse effects. Nurses occupy an intermediate position, with their views being closer to patients than doctors, but still showing a higher level of caution than patients. The lowest perception of risk among patients may indicate a lack of information about potential side effects or a subjectively positive experience with CAM. These findings align with international research exploring attitudes toward CAM among healthcare professionals and patients. For instance, a study in the Netherlands among 355 nurses found that 37% had prior knowledge of integrative medicine, and after survey participation, 83% viewed it as an important innovation. Nurses working in nursing homes showed significantly more positive attitudes compared to those in hospital settings [12]. Similarly, Furlow, et al. [13] surveyed obstetrician-gynecologists and patients in the United States, finding that physicians generally expressed more positive attitudes towards CAM than their patients. Most physicians regularly referred or provided CAM therapies, whereas patients often used CAM without professional consultation. The study highlighted a marked contrast in perceptions of CAM's role between these groups, which may be influenced by differences in medical education and healthcare systems [13]. These international findings underscore the complexity of CAM integration and the need to consider cultural and educational contexts when interpreting attitudes among healthcare providers and patients. Further insight into attitudes toward CAM within the Croatian healthcare context is provided by studies conducted among healthcare professionals. Radovčić and Nola examined primary care physicians' opinions and found that a significant majority (88%) support the integration of CAM methods with evidence-based medicine (EBM). Almost all respondents (98%) agreed on the importance of documenting CAM use in patients' medical records, highlighting the need for transparency and monitoring within the healthcare system. However, 76% also reported strong resistance to CAM among Croatian physicians, indicating a need for further education and cultural change within the medical community [14].

While the study by Jurković and Racz [15] focused solely on family medicine physicians (n=84), our research, including a broader sample of physicians and nurses, offers a more comprehensive perspective on healthcare professionals' attitudes toward CAM. This broader view aligns with findings from Jurković and Racz [15] where a majority of future healthcare professionals also supported CAM integration with EBM (80.7%) and emphasized the need for physician consultation prior to CAM use (77.5%) [15]. Similar positive attitudes were found in a study among nursing and allied health students, with over 70% supporting documentation of CAM therapies in medical records and patient disclosure to medical teams [16].

Our results confirm these trends, showing that nurses generally exhibit more support for CAM integration than physicians, who tend to be more skeptical. For instance, nurses more strongly agreed with statements regarding the effectiveness of CAM and its potential to stimulate natural healing processes compared to physicians. This professional divide may be related to differences in clinical training and exposure to evidence-based standards. Moreover, our study reveals a general confidence in the safety of CAM, with relatively few respondents viewing CAM as a public health threat—a finding consistent with a systematic review by Zhao, et al. [17].

These Croatian findings emphasize the complexity of integrating CAM into conventional healthcare, highlighting the importance of education, formal guidelines, and open communication between patients and healthcare providers to ensure safe and effective integrative care.

The differences in CAM perceptions between patients and healthcare professionals highlight the need for better education and open communication within healthcare settings. Improving healthcare providers' knowledge can foster safer, more informed use of CAM therapies by facilitating open dialogue, especially regarding potential interactions with conventional treatments.

The tendency to believe that natural remedies are safe has significantly contributed to their popularity despite the potential risks that some herbal preparations may pose. Although many users perceive natural remedies as harmless, research suggests otherwise. For example, black cohosh (*Actaea racemosa* L.), which is often used by women taking hormonal drugs after breast cancer, has been associated with severe liver problems in rare cases. The plant has traditionally been used to relieve menstrual pain and menopausal symptoms in women [18, 19] has been used in Europe for over 40 years, and clinical trials have confirmed its efficacy and safety [18, 20]. This product, together with Dong Quai and ginseng, can stimulate the growth of cancer cells in breast cancer lines positive for estrogen receptors, which makes them contraindicated for such patients [21].

Although natural remedies are often perceived as safe, clinical studies and reported cases of adverse reactions show that their use is not always without risks, especially in cancer patients. In a survey by Molassiotis, et al. [4] 4.4% of cancer patients reported adverse effects associated with CAM therapies. The effects were transient and most often associated with the intake of herbal or mineral preparations. Reported symptoms included gastrointestinal complaints such as abdominal pain (caused by thyme and nettle tea, vitamin C, and aloe), indigestion and nausea after consuming nettle tea, itching associated with nettle leaves, selenium tablets, and mistletoe, headaches and migraines, diarrhea, and impaired renal function and acid accumulation in the body after taking vitamin C [4]. In addition, herbal remedies can significantly affect the effectiveness of conventional therapies. For example, St. John's wort can accelerate the elimination of drugs such as antineoplastics Imatinib, reducing its concentration in the body by as much as 44% [22]. Such interactions pose a serious challenge in the context of integrative medical care.

Although this study was not aimed at examining in detail the benefits and side effects associated with the use of CAM, it is important to highlight their potential presence and severity. The results of this study indicate that health professionals rarely warned respondents about the possible side effects of CAM, which may contribute to the perception of CAM as a completely safe treatment option. Although often unfounded, this perception is deeply rooted in public opinion, especially about natural remedies whose safety is usually taken for granted, despite evidence indicating their potential toxicity and risks [23]. The results of this study confirm that professional status is a key factor in shaping the perception of the safety of CAM. While doctors express the highest level of skepticism about the safety of these methods, patients perceive them mainly as safe. At the same time, nurses occupy an intermediate position with a tendency to share the patient's perspective in certain aspects. The differences between groups emphasize the need for objective information about the potential side effects of CAM, so that patients and health professionals can make informed decisions based on available scientific evidence.

Patient awareness of possible interactions between herbal preparations and conventional medications is often worryingly low. Research conducted on patients using anticoagulant medication warfarin showed that only 28% of respondents who were taking herbal medicines at the same time were aware of possible interactions [24]. These results indicate a serious problem of lack of information, which can increase the risk of side effects or reduced treatment effectiveness. In our study, as many as 86.1% of respondents stated that healthcare professionals had never warned them about the possible harmful effects of CAM. This further supports concerns about inadequate education and communication in the healthcare system.

Adverse effects associated with CAM use are essential in assessing their safety, especially in the oncology population. A study by Kust, et al. [25] showed that only 8.7% of subjects reported adverse effects of CAM such as vomiting and diarrhea. These adverse effects often occur as a result of standard therapies, especially chemotherapy, suggesting that some reported symptoms may be exaggerated or nonspecific to CAM. The most commonly reported adverse effects included constipation (2.5%), drowsiness (1.9%), vomiting (1.9%), diarrhea (1.2%), and burning sensation in the eyes (1.2%). Notably, most patients were unaware of the possibility of interactions between CAM and standard oncology therapies; only 23% of subjects were informed about this risk, while the remaining 77% of patients were not informed about this potential hazard by their healthcare professionals [25]. Although Kust, et al. [25] study does not provide reasons why patients do not report CAM use to their doctor, the results show that 66.5% of patients did not report CAM use to their oncologist. These data suggest that these patients may not have been warned about the potential risks, which raises the question of the role of physicians in informing patients about the safety of CAM and the importance of open communication in clinical practice.

Also, patients often use multiple CAM therapies simultaneously, with an average of 2.3 per patient, and some have used up to seven different methods, making it difficult to assess safety and efficacy. Potential adverse effects associated with CAM use include a wide range of health risks, such as allergic contact dermatitis, organic toxicity that can affect key organs such as the liver, kidneys, and heart, mechanical injury and infections (e.g., hepatitis and bacterial endocarditis) associated with acupuncture, and various nutritional deficiencies, especially in infants and young children who are subjected to restrictive alternative diets [26].

The results of this study highlight the importance of systematic and careful assessment of the safety of CAM, given that potential risks, although profound, often remain unnoticed or underestimated in practice. Although CAM has significant potential to improve quality of life and alleviate symptoms, the study's results indicate the need for caution and a responsible approach. Ensuring a better understanding of potential interactions and side effects is essential for safely using CAM combined with conventional therapies. Furthermore, continuing to raise patient awareness that "natural" does not automatically mean "safe" should be a priority in communication between patients and healthcare professionals. The results also highlight the need for better education and communication about the safety of CAM so that patients have realistic expectations about possible risks. At the same time, healthcare professionals can approach informing patients with less prejudice, considering their perspective [27].

5. Limitations of This Research

This study has several limitations. First, as a cross-sectional study, it captures perceptions at a single time point and cannot establish causal relationships. Data were collected through self-report questionnaires, which may be subject to social desirability and recall biases. The sample was drawn from a single clinical center in Zagreb, limiting the generalizability of the findings to other populations or healthcare settings. The smaller number of physicians compared to nurses may affect the precision of subgroup analyses. Additionally, the study focused on subjective attitudes without incorporating objective clinical data on CAM's actual effects. Finally, CAM was considered broadly without distinguishing between specific methods, and factors such as prior education or professional specialization were not explored in depth.

Furthermore, due to the health condition of oncology patients, data collection methods differed between groups: patients participated in interviews, while healthcare professionals completed questionnaires. This approach was necessary to ensure patient comfort and comprehension given their clinical status, although it may limit direct comparability between groups. This limitation is acknowledged and considered in interpreting the results. Due to the specific research focus on comparing perceptions of complementary and alternative medicine among oncology patients and healthcare professionals, the sample was purposefully recruited from these distinct groups rather than drawn as a stratified random sample from a single population. This approach allowed for adequate representation of each subgroup relevant to the study aims. However, this targeted recruitment limits the generalizability of the findings and should be considered when interpreting the results.

5.1. Further Research Directions and Recommendations for Future Studies

This study offers valuable insights into perceptions of complementary and alternative medicine (CAM) among oncology patients and healthcare professionals. However, further research is needed to deepen understanding in several key areas.

Future studies should analyze in more detail the differences in attitudes between healthcare professionals, especially between physicians and nurses, and investigate factors influencing these differences, such as formal medical education, personal use of CAM, and the role of nurses in advising patients.

While this research explored patient perceptions of CAM benefits and risks, it did not assess actual clinical outcomes. Future research should focus on the long-term effects of CAM on quality of life, psychological well-being, and symptom management in cancer patients, as well as potential interactions with conventional treatments and the impact of specific CAM modalities (e.g., acupuncture, herbal remedies).

Additionally, research should examine patients' information sources about CAM, reasons for not consulting healthcare professionals, and the socio-cultural factors influencing CAM acceptance. Developing evidence-based guidelines for CAM use in oncology based on such research is essential.

6. Conclusion

This study analyzed the perceptions of the benefits and risks of CAM among oncology patients and healthcare professionals, aiming to understand better their attitudes and the potential impact of CAM on oncology care.

This study rejected the null hypothesis, according to which there are no statistically significant differences in the views of healthcare professionals and oncology patients on the benefits and possible side effects of CAM. The data obtained clearly show substantial differences in the perception of CAM between these two groups, with patients being more inclined to recognize the potential benefits. At the same time, healthcare professionals, especially physicians, are more cautious and skeptical about its use.

Differences in the perception of the benefits of CAM showed that more than 80% of patients believe that CAM provides significant benefits, where this preference is most strongly reflected in the perception of its effectiveness in alleviating symptoms and improving the general condition. Health professionals are less inclined to this point of view – doctors are the most skeptical, while nurses are more open to the potential benefits of CAM. The significant differences were recorded in the statement that CAM can lead to disease remission - 43% of patients believe this, while only 21% of healthcare workers share this opinion.

In risk assessment and adverse effects of CAM, physicians express the significant concern about possible side effects of CAM, especially digestive disorders ($M = 3.69$, $SD = 1.134$) and blood pressure disorders ($M = 3.60$, $SD = 1.137$). At the same time, patients associate CAM with adverse effects to a lesser extent ($M = 2.13$, $SD = 1.029$ for digestive disorders). Nurses occupy an intermediate position between patients and physicians, which indicates a differentiated approach within the health sector.

In conclusion, the results of this study confirm that CAM is a present part of oncology care but that patients' and healthcare professionals' perceptions of its effectiveness and safety differ significantly. These findings highlight the need for a more systematic and scientifically based approach to integrating CAM into medical practice.

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