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ORIGINAL PAPER

Use of complementary and alternative medicine by patients with cancer: a cross-sectional study at different points of cancer care

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Abstract Complementary and alternative medicine (CAM) is widely used by cancer patients. In order to learn more on the usage of CAM, its reasons and motifs as well as sources of information along the trajectory of treatment, we decided to evaluate the prevalence and predictors for the use of CAM by cancer patients while being under active treatment with chemo- or radiotherapy or in aftercare. We distributed a standardized questionnaire among patients attending a department of radiooncology, an ambulance for oncology and offices of general practitioners (GPs). Five hundred and six patients took part. Most attributed cancer to stress and trauma (23.7 and 16.4 %) or genes (20.8 %). Forty-four percentage reported knowing a physician with competence in CAM, and in all settings, most patients named the GP. Fifty-one percentage admitted using CAM, 35 % informed the oncologist about using CAM, 56 % informed the GP, and 26 % did not inform any physician. Most often used CAM was vitamin D (17 %) and selenium (16 %). Most important goals were to strengthen the immune system (59 %) and become active (52 %). Most patients were satisfied with the CAM methods they used. Yet, with some methods, dissatisfaction was up to 30 %. The GP has an important function concerning CAM in oncology as most patients believe the GP to have best

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knowledge in CAM. In order to integrate complementary medicine into evidence-based medicine, physicians should be trained on how to communicate on CAM with the patient and with each other. Explaining cancer and cancer therapies in a way lay persons are able to understand may be helpful. Physicians should actively address patients' needs of involvement not only in decision making, but also actively in the therapy.

Keywords Complementary and alternative medicine · Cancer · Information needs

Introduction

Complementary and alternative medicine (CAM) is a widespread phenomenon among cancer patients. The prevalence of CAM use in Europe varies from 0.3 to 86 % [1]. In western countries, 40 to more than 90 % of cancer patients use CAM at some time of their disease [2–5].

Many patients not only want to take part in decision making, but also to actively contribute to the treatment, to better cope with side effects and to strengthen their own body [6, 7]. This active engagement is one of the main reasons for professionals to accept CAM [8–10].

While data on CAM usage have been published for different types of cancer and analyzed with respect to gender, age or education [4, 5, 7, 11–13], so far no data exist on usage at different times and points of cancer care. Few data point to the fact that patients with more advanced cancers are more likely to use CAM [4], yet, in a recent survey on patients in palliative care, we did not find a higher user rate than reported for Germany or in other cancer patient groups asked during the same period [5, 7, 14, 15].

As usage of CAM, its reasons and motifs as well as sources of information may vary along the trajectory of treatment, we decided to ask patients concerning CAM usage at different points of care. Aim of the study was to evaluate the prevalence and predictors for the use of complementary and alternative methods by cancer patients while being under active treatment with chemo- or radiotherapy or in aftercare.

Patients and methods

Study population

As we wanted to compare usage in different settings and treatment and aftercare situations, we focused on patients at centers for radiotherapy and chemotherapy on the one hand and patients at offices of general practitioners (GPs) on the other hand. From November 2013 to August 2014, all cancer patients attending the Department of Radiotherapy–Radiooncology of the University of Münster/Westfalia (University Hospital and Dependance St. Franziskus Hospital, Münster). The ambulance for oncology of the St. Franziskus Hospital at Münster and offices of 13 GPs from a network at Münster being members of the medical association Westfalen Lippe were asked to fill in the questionnaire anonymously before the counseling with the physician.

All patients were informed that participating in the study was voluntary and would not have any influence on the further counseling procedure or their treatment.

Inclusion criteria were all patients with the diagnosis of a neoplasm either currently or in the past. We excluded all patients who were not able to understand the questionnaire by themselves, for example, because of low literacy in German. Furthermore, the patients were not allowed to take part in the study, if they have done so in another institution before.

The questionnaire has been developed by members of the working group Prevention and Integrative Oncology and has been used with some modifications in several surveys [5, 7, 14, 15]. It contains 23 questions and is divided into two parts (see supplementary material). The first part of the questionnaire contains demographic data (age, gender, education, religion, marital status), data concerning cancer diagnosis, current therapies, information on lifestyle (nutrition and physical activity, smoking and alcohol, getting psychological support, attending a self-help group) as well as the patients' individual ideas regarding the cause of cancer.

The second part of the questionnaire comprises questions regarding the use of CAM and reasons to use CAM, communication with the physician and source of information on CAM. The questionnaire ends with a list of often used CAM methods in Germany (also derived from the literature and the former surveys), in which the patient is asked to mark his or her former or current use and satisfaction with the respective method.

Most questions were closed questions, providing lists of possible answers which were derived from the literature in the initial version of the questionnaire and has been adapted in the former surveys to the current answers of patients with cancer in Germany.

Ethical approval

The Ethical Review Committee of the Medical Association Westfalen Lippe had been informed. Due to anonymity of the survey, an ethic vote was not necessary.

Statistical analysis

IBM SPSS 22 was used for the analyses of the data using Chi-square tests and a bivariate analysis for correlations.

Results

Demographic data

Over the period of 10 months, 506 patients participated in the survey (Table 1), 200 (39.9 %) in the department of radio-oncology, 110 (21.6 %) in the ambulance for oncology and 196 (38.5 %) in the 13 offices of GPs. The median age of participants was 61 years, with a range from 9 to 89 year, 188 (37.2 %) of them were male and 311 (61.5 %) female.

Lifestyle

The results concerning lifestyle are provided in Fig. 1. Most patients reported only low physical activity. Women more often stick to a healthy diet ($p < 0.001$), whereas men more often reported drinking alcohol ($p < 0.001$) and smoking ($p = 0.017$).

Lay etiology

The patients' concepts regarding the cause of cancer are presented in Fig. 2. Most patients stated that they did not know the cause of their disease. From the remaining, most attributed cancer to stress and trauma (23.7 and 16.4 %) or genes (20.8 %).

Women significantly more often named the immune system, mental trauma and genes (all $p < 0.001$) as reason for their cancer, whereas men significantly more often ($p < 0{,}001$) suspected smoking and alcohol being the reason for their cancer. Those patients who admitted drinking alcohol more often suggested toxins ($p = 0.036$) and "smoking and alcohol" ($p = 0.03$) as reason for their cancer. Accordingly, those admitting smoking ticked "smoking and alcohol" as reason for cancer more often ($p < 0.001$). Patients who supposed stress as factor for their cancer also visited the psychologist significantly more often ($p = 0.001$). Those who suspected a mental trauma (9.7 %) as possible reason for their cancer often were divorced ($p < 0.001$). They significantly more often sought help by a psychologist ($p = 0.009$).

Physician with competence in CAM

Asked whether they knew a physician with competence in CAM, 259 (43.9 %) answered yes. In all settings, most patients named the GP (60.2 %) (Fig. 3).

CAM usage and satisfaction

Of all the participants, 258 (50.7 %) admitted using CAM and 243 (47.7 %) denied doing this (Fig. 4). Women more often used CAM than men ($p < 0.0001$), while education had no influence. Moreover, patients during active cancer therapy also reported using CAM more often ($p = 0.02$). The longer the patients knew about their disease, the more likely they used CAM ($p < 0.001$). In contrast, being metastasized was not associated with CAM usage. Those physically active did not engage in CAM more often than those being inactive. There is a significant association between using the help of a psychologist or self-help group and using CAM ($p < 0.0001$; $p = 0.017$ resp.).

There were significant differences between participants from the different institutions. More than half of the patients attending the oncologist (53.6 %) or the GP (56.6 %) reported using CAM, while only 43.3 % of those at the radio-oncologist did so ($p = 0.0456$).

From those patients who admitted to use CAM, 34 (34.9 %) informed their oncologist about the use of CAM, 120 (55.8 %) told their GP, 37 (17.2 %) conveyed it to a specialist, 55 (25.6 %) did not express it to anyone, and 14 (6.5 %) could not remember whether they told it to their doctors.

Patients who informed their oncologist about their use of CAM were more often female ($p = 0.028$) and had a higher education ($p = 0.021$). Those under active therapy were more likely to tell their GP and oncologist about their use of CAM ($p = 0.048$; $p = 0.001$, resp.). Also those informed about being metastasized more often disclosed their CAM usage to a physician ($p = 0.001$).

More detailed data on type of CAM used and satisfaction with this CAM are presented in Table 2. Most often used CAM were vitamin D (17.4 %) and selenium and other trace elements (16.2 %). There were no associations between type of CAM usage and state of disease and type of therapy. Yet, concerning lifestyle, patients reporting adhering to a healthy diet more often reported using meditation, relaxation or yoga ($p = 0.025$; $p = 0.002$; $p = 0.011$ resp.). In contrast, there were no associations between CAM and reported physical activity.

Women more often used selenium ($p = 0.038$), acupuncture (0.016), Chinese herbs (0.047), prayer (0.047), relaxation techniques (0.032) and yoga (0.001). Using selenium was associated with higher education ($p = 0.037$) as was using homeopathy ($p = 0.002$). There were no significant associations between type of CAM used and current status of disease. Patients attending the GP more often reported using vitamin D ($p = 0.001$), receiving vitamin C infusions ($p = 0.037$) and adhering to a low-carb diet ($p = 0.001$).

CAM usage was partly associated with lay etiology concepts. Those patients being convinced of a deficit in the

Table 1 Demographic data ($N = 506$)

	All patients *N* (%)	Patients at the radio-oncologist *N* (%)	Patients at the medical oncologist *N* (%)	Patients at the general practitioner *N* (%)
Gender				
Female	311 (61.5)	110 (55)	81 (73.6)	120 (61.2)
Male	188 (37.2)	86 (43)	27 (24.5)	75 (38.3)
No answer	7 (1.4)	4 (2)	2 (1.8)	1 (0.5)
Age				
<36	17 (3.4)	10 (5)	2 (1.8)	5 (2.6)
36–50	97 (19.2)	37 (18.5)	35 (31.89)	25 (12.8)
51–65	181 (35.8)	81 (40.5)	40 (36.4)	60 (30.6)
66–80	180 (35.6)	65 (32.5)	30 (27.39)	85 (43.4)
>80	23 (4.5)	3 (1.5)	107 (97.3)	20 (10.2)
No answer	8 (1.6)	4 (2)	3 (2.7)	1 (0.5)
Education				
Not graduated	10 (2)	6 (3)	1 (0.9)	3 (1.5)
Main-/Middle School	301 (59.5)	122 (61)	68 (61.8)	111 (56.6)
Higher School Certificate/A—Level	54 (10.7)	23 (11.3)	10 (9.1)	21 (10.7)
University degree	133 (26.3)	45 (22.2)	31 (28.2)	57 (29.1)
No answer	8 (1.6)	4 (2)	0 (0.00)	4 (2)
Partnership				
Married	329 (65)	137 (68.5)	69 (62.7)	123 (62.8)
Living with a partner	44 (8.7)	16 (8)	14 (12.7)	14 (7.1)
Single	52 (10.3)	24 (12)	13 (11.8)	15 (7.7)
Divorced	34 (6.7)	11 (5.5)	8 (7.3)	15 (7.7)
Widowed	42 (8.3)	9 (4.5)	6 (5.5)	27 (13.8)
No answer	5 (1)	3 (1.5)	0 (0.00)	2 (1)
Religion				
Christian	412 (82)	159 (79.5)	86 (78.2)	170 (86.7)
Muslim	2 (0.4)	1 (0.5)	1 (0.9)	0 (0.00)
Other	11 (2.2)	4 (2)	3 (2.7)	4 (2)
None	70 (13.8)	32 (16)	20 (18.2)	18 (9.2)
No answer	8 (1.6)	4 (2)	0 (0.00)	4 (2)
Type of cancer				
Prostate cancer	33 (6.50)	14 (7.00)	0 (0.00)	19 (9.70)
Other urogenital cancers	20 (4.00)	5 (2.50)	0 (0.00)	15 (7.70)
Colorectal cancer	39 (7.70)	7 (3.50)	10 (9.10)	22 (11.20)
Other GIT cancer	32 (6.30)	11 (5.50)	14 (12.70)	7 (3.60)
Breast cancer	18 (36.00)	66 (33.00)	57 (51.80)	59 (30.10)
Gynecologic cancer	24 (4.70)	6 (3.00)	13 (11.80)	5 (2.60)
Leukemia and lymphoma	26 (5.10)	12 (6.00)	7 (6.40)	7 (3.60)
Lung cancer	32 (6.30)	19 (9.50)	6 (5.50)	7 (3.680)
Melanoma	14 (2.80)	1 (0.50)	0 (0.00)	13 (6.60)
Others	73 (14.40)	43 (21.50)	0 (0.00)	30 (15.30)
No answer	31 (6.10)	16 (8.00)	3 (2.70)	12 (6.10)
Current treatment				
Yes	337 (66.60)	171 (85.50)	108 (98.20)	58 (29.60)
No	161 (31.80)	23 (11.50)	1 (0.90)	137 (69.90)
No answer	8 (1.60)	6 (3.00)	1 (0.90)	1 (0.50)
Radiation	170 (53.80)	151 (93.80)	6 (6.00)	13 (23.60)
Chemotherapy	115 (36.40)	8 (5.00)	81 (81.00)	26 (47.30)

Table 1 continued

	All patients *N* (%)	Patients at the radio-oncologist *N* (%)	Patients at the medical oncologist *N* (%)	Patients at the general practitioner *N* (%)
Small molecules	2 (0.60)	0 (0.00)	1 (1.00)	1 (1.80)
Antibody	8 (2.50)	0 (0.00)	7 (7.00)	1 (1.80)
Endocrine therapy	17 (5.40)	2 (1.20)	3 (3.00)	12 (21.80)
Others	3 (0.90)	0 (0.00)	1 (1.00)	2 (3.60)
Nonspecific	1 (0.30)	0 (0.00)	1 (1.00)	0 (0.00)
Metastases				
Yes	133 (26.30)	61 (30.50)	50 (45.50)	22 (11.20)
No	347 (68.60)	124 (62.00)	55 (50.00)	168 (85.70)
No answer	26 (5.10)	15 (7.50)	5 (4.50)	6 (3.10)
Time elapsed since first diagnosis				
<1 month	55 (10.90)	40 (20.00)	10 (9.10)	5 (2.60)
<1 year	178 (35.20)	88 (44.00)	65 (59.10)	25 (12.80)
>1 year	185 (36.60)	48 (24.00)	26 (23.60)	111 (56.60)
>10 years	73 (14.40)	16 (8.00)	9 (8.20)	48 (24.50)
No answer	15 (3.0)	8 (4.00)	0 (0)	7 (3.60)

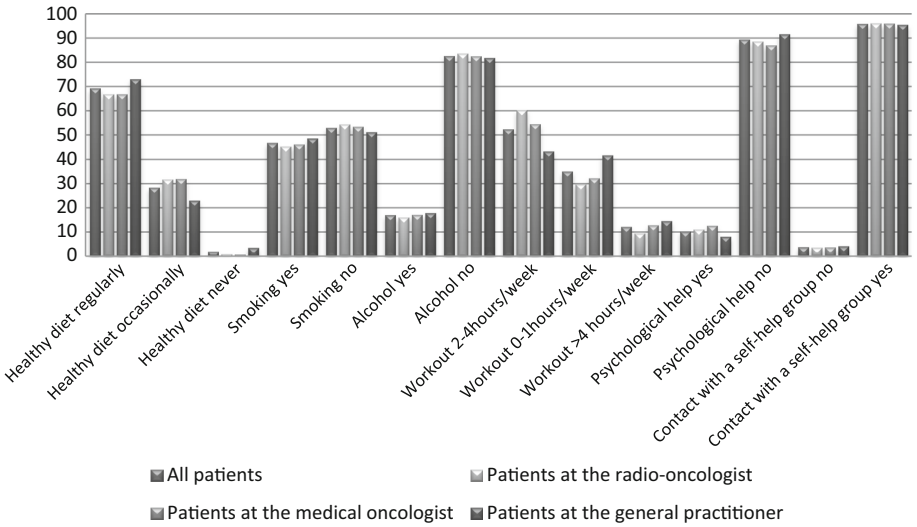

Fig. 1 Answers regarding lifestyle and nutrition ($N = 506$)

immune system being a cause of cancer significantly more often used antioxidants ($p = 0.005$) and selenium ($p = 0.004$), while those believing in lifestyle as factor used vitamin D ($p = 0.009$). Those thinking of a mental trauma or their personality preferred mistletoe ($p = 0.004$; $p = 0.006$ resp.), while those thinking of toxins as causative agents more often used medical herbs, meditation or relaxation techniques ($p = 0.001$; $p < 0.001$; $p < 0.001$ resp.).

In general, patients were satisfied of even very satisfied with the CAM methods they used. Yet, with some methods, dissatisfaction was up to 30 %, especially in those patients interrogated at the medical oncologist (mistletoe, acupuncture, phytotherapy; low-carb diet even 50 %). From patients using mistletoe, those under current therapy were less satisfied ($p = 0.033$) and those without metastases were more satisfied ($p = 0.004$). With respect to lifestyle, there was a significant association between healthy diet and satisfaction with meditation, relaxation techniques and yoga ($p = 0.025$; $p = 0.002$; $p = 0.011$ resp.).

Reasons to use CAM

Reasons to use CAM were reported by 506 patients (Fig. 5). Most patients reported using CAM in order to strengthen the immune system (58.7) become active by themselves (51.5 %). There were no differences between patients at the different institutions apart from patients at

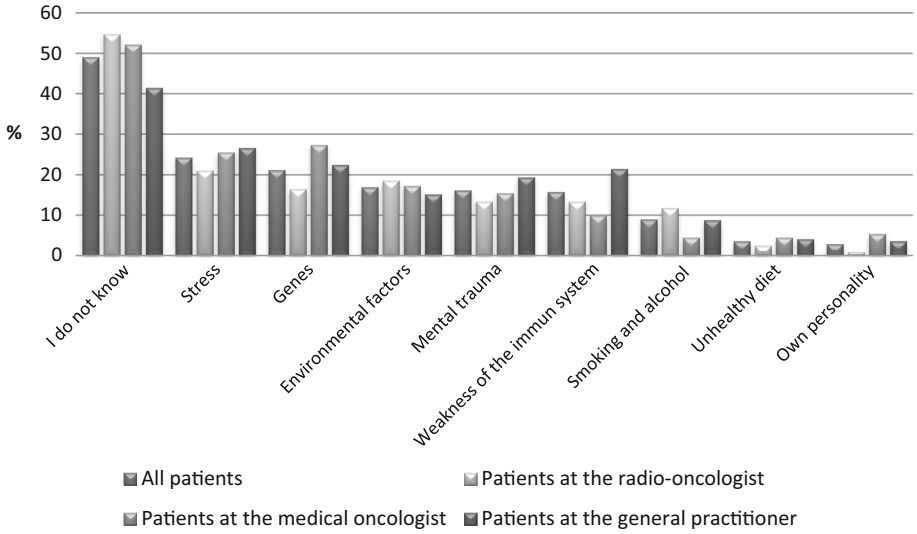

Fig. 2 Patients' individual concepts regarding the cause of cancer (several answers possible) ($N = 506$)

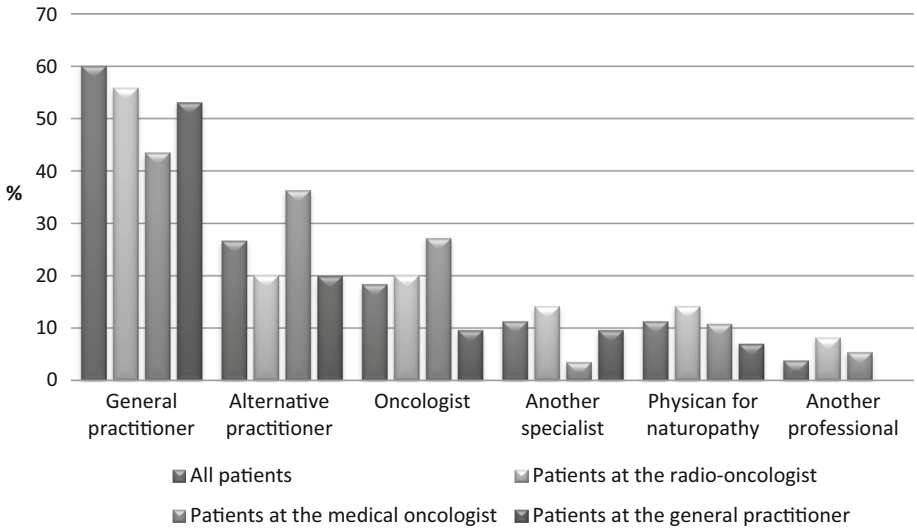

Fig. 3 Answers to the question whether they have a professional with competence in CAM ($N = 506$)

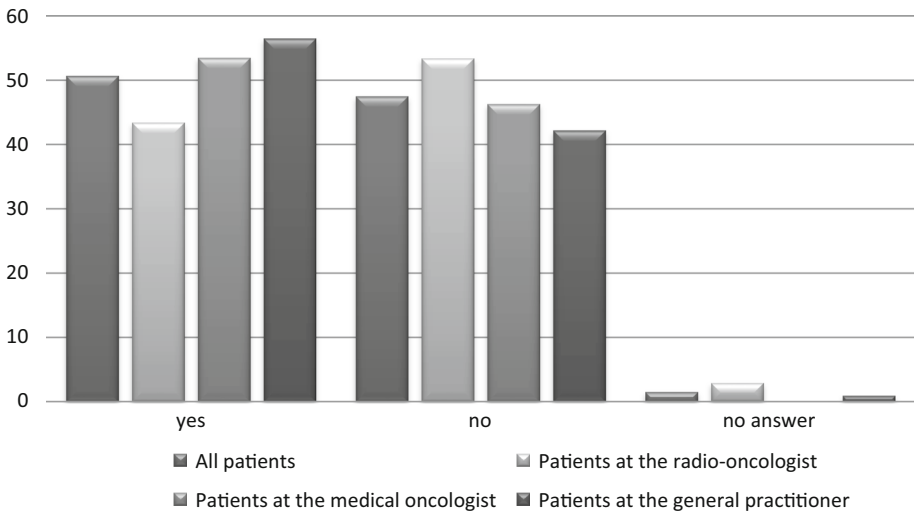

Fig. 4 CAM usage of the participants ($N = 506$)

Table 2 CAM usage and satisfaction ($N = 246$)

	Patients using this method *N* (%)	Satisfaction with the method	All patients *N* (%)	Patients at the radio-oncologist *N* (% of users in this group)	Patients at the medical oncologist *N* (% of users in this group)	Patients at the general practitioner *N* (% of users in this group)
Vitamin D	88 (35.8)	Not at all	4 (5.9)	1 (7.7)	2 (14.3)	1 (2.4)
		a little bit	24 (35.3)	5 (38.5)	5 (35.7)	14 (34.1)
		Very satisfied	40 (58.8)	7 (53.8)	7 (50.0)	26 (63.4)
Selenium and other trace elements	82 (33.3)	Not at all	7 (10.9)	2 (13.3)	2 (11.8)	3 (9.4)
		A little bit	17 (26.6)	7 (46.7)	4 (23.5)	6 (18.8)
		Very satisfied	40 (62.5)	6 (40.0)	11 (64.7)	23 (71.9)
Vitamin ACE	70 (28.5)	Not at all	3 (6.1)	1 (11.1)	1 (9.1)	1 (3.4)
		A little bit	24 (49.0)	4 (44.4)	7 (63.6)	13 (44.8)
		Very satisfied	22 (44.9)	4 (44.4)	3 (27.3)	15 (51.7)
Homeopathy	61 (24.8)	Not at all	2 (3.7)	2 (11.1)	0 (0.0)	0 (0.0)
		A little bit	13 (24.1)	6 (33.3)	1 (11.1)	6 (22.2)
		Very satisfied	39 (72.2)	10 (55.60)	8 (88.9)	21 (77.8)
Relaxation technique	60 (24.4)	Not at all	3 (5.9)	1 (11.10)	1 (9.1)	1 (3.2)
		A little bit	12 (23.5)	3 (33.30)	2 (18.2)	7 (22.6)
		Very satisfied	36 (70.6)	5 (55.60)	8 (72.7)	23 (74.2)
Mistletoe	59 (24.0)	Not at all	8 (16.7)	3 (20.0)	2 (33.3)	3 (11.1)
		a little bit	7 (14.6)	3 (20.0)	0 (0.0)	4 (14.8)
		Very satisfied	33 (68.8)	9 (60.0)	4 (66.7)	20 (74.1)
Prayer	57 (23.2)	Not at all	3 (7.7)	1 (11.1)	2 (16.7)	0 (0.0)
		A little bit	4 (10.3)	1 (11.1)	1 (8.3)	2 (11.1)
		Very satisfied	32 (82.1)	7 (77.80)	9 (75.0)	16 (88.9)
Acupuncture	45 (18.3)	Not at all	6 (16.7)	0 (0.0)	2 (28.6)	4 (17.4)
		A little bit	9 (25.0)	3 (50.0)	1 (14.3)	5 (21.7)
		Very satisfied	21 (58.3)	3 (50.0)	4 (57.1)	14 (60.9)
Phytotherapy	45 (18.3)	Not at all	6 (17.1)	0 (0.0)	2 (33.3)	4 (19.0)
		A little bit	10 (28.6)	5 (62.5)	1 (16.7)	4 (19.0)
		Very satisfied	19 (54.3)	3 (37.5)	3 (50.0)	13 (61.9)
Yoga/Tai Chi/Qi Gong	43 (17.5)	Not at all	1 (2.6)	0 (0.0)	1 (9.1)	0 (0.0)
		A little bit	8 (21.1)	3 (33.3)	2 (18.2)	3 (16.7)
		Very satisfied	29 (76.3)	6 (66.7)	8 (72.7)	15 (83.3)
Low-carb diet	41 (8.1)	Not at all	4 (12.9)	0 (0.0)	3 (50.0)	1 (6.7)
		A little bit	9 (29)	5 (50.0)	1 (16.7)	3 (20.0)
		Very satisfied	18 (58.1)	5 (50.0)	2 (33.3)	11 (73.3)

Table 2 continued

	Patients using this method *N* (%)	Satisfaction with the method	All patients *N* (%)	Patients at the radio-oncologist *N* (% of users in this group)	Patients at the medical oncologist *N* (% of users in this group)	Patients at the general practitioner *N* (% of users in this group)
Meditation	38 (16.7)	Not at all	3 (8.8)	1 (12.5)	0 (0.0)	2 (11.8)
		A little bit	9 (26.5)	4 (50.0)	0 (0.0)	5 (29.4)
		Very satisfied	22 (64.7)	3 (37.5)	9 (100.0)	10 (58.8)
Enzymes	24 (9.8)	Not at all	2 (10.0)	1 (11.1)	1 (25.0)	0 (0.0)
		A little bit	8 (40.0)	6 (66.7)	0 (0.0)	2 (28.6)
		Very satisfied	10 (50.0)	2 (22.2)	3 (75.0)	5 (71.4)
Vitamin C infusions	21 (8.5)	Not at all	3 (16.7)	0 (0.0)	2 (40.0)	1 (8.3)
		A little bit	1 (5.6)	0 (0.0)	0 (0.0)	1 (8.3)
		Very satisfied	14 (77.8)	1 (100.0)	3 (60.0)	10 (83.3)
Chinese herbs	11 (4.5)	Not at all	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
		A little bit	4 (44.4)	2 (66.7)	1 (50.0)	1 (25.0)
		Very satisfied	5 (55.6)	1 (33.3)	1 (50.0)	3 (75.0)
Medical mushrooms	3 (1.2)	Not at all	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
		A little bit	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
		Very satisfied	2 (100.0)	2 (100.0)	0 (0.0)	0 (0.0)

The table shows the amount of patients using the different methods and the respective level of satisfaction. The first column shows the overall number of patients using the specific method—multiple answers were possible. The second column shows the cumulated level of satisfaction for each method, while the following columns show the results depending on the setting. Differences between the number of patients using a method (column 1) and the sum of results regarding the level of satisfaction (column 2 ff.) are due to the fact that some patients did not answer all questions

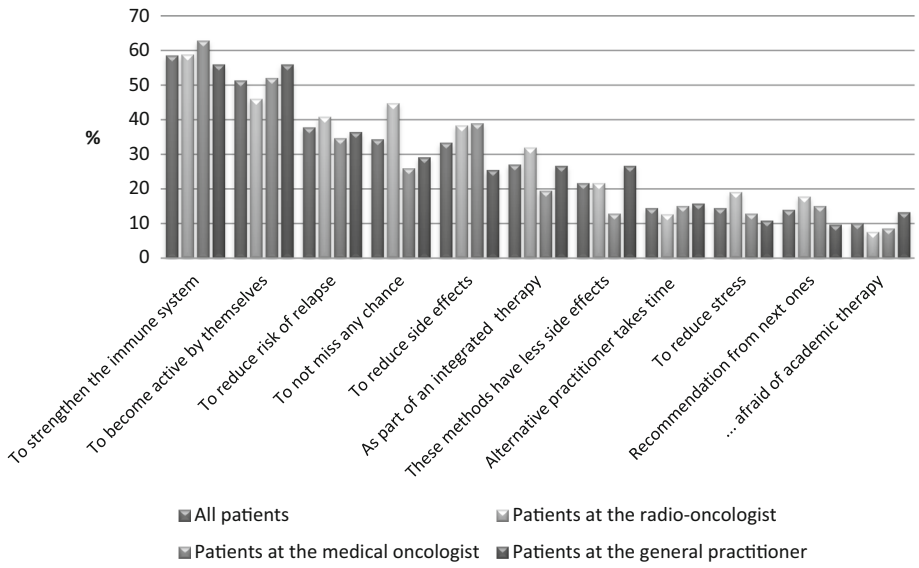

Fig. 5 Reasons to use CAM ($N = 506$)

the radio-oncologist more often citing "not to miss any chance" as reason ($p = 0.032$).

Considering gender, females more often used CAM for becoming active themselves ($p = 0.004$), to get an integrated therapy ($p = 0.007$), to reduce risk of relapse ($p = 0.034$) and because naturopath listen more intensely to the patient ($p = 0.030$). Men significantly more often used CAM because family members and friends recommended to do so ($p = 0.006$). Also higher education was associated with CAM usage in order to boost the immune system ($p = 0.008$) and to reduce side effects ($p < 0.001$).

Discussion

About a half of the cancer patients participating in our study reported using CAM. Women more often used CAM than men, while education had no influence. These data are in part in line with national and international data which show a prevalence of CAM usage of about 40–50 % with predominant usage by female patients [2, 4, 5, 11, 16]. Yet, in most studies, higher education was associated with using CAM [2, 11, 16], which in our study is only true for homeopathy. Patients during active cancer therapy also reported using CAM more often, and the longer the patients knew about their disease, the more likely they used CAM. An explanation may be that with time elapsing, patients have time to consider CAM and gather information, while at the time of diagnosis, other topics are more important. This idea is also supported by the higher number of patients attending the GP using CAM. For physicians and other professionals engaged in patient information, this would help for better timing of offering information on CAM.

Most important reasons to use CAM were to strengthen the immune system and to become active. These two main reasons have been described in other studies [17]. Reduction of side effects and improving quality of life are other main reasons described in the literature [2, 18]. Molassiotis and colleagues in a European survey described physical and emotional well-being as an important aim [2]. In our data, higher education was associated with CAM usage in order to boost the immune system and to reduce side effects which may point to rising belief in self-efficacy with higher literacy and health literacy. This fits well with patients reporting adhering to a healthy diet more often using meditation, relaxation or yoga in our study. In contrast, we did not find any associations concerning physical activity.

Some aspects of CAM seem to be gender specific. Females more often use CAM because physicians providing CAM listen more intensely to them. This may be due to more needs of communication from the part of the women or it may be that male patients get more information from their physicians than females [19]. In another study, we were able to show that men were more satisfied with information regarding endocrine therapy provided by the physician than women. Additionally, they more often looked for a second opinion which may point to the importance of active information seeking by patients and different strategies with respect to gender. Need for more and better communication in fact is a decisive motif for CAM usage of cancer patients in the palliative setting [14].

Most often used CAM was supplements as vitamin D and selenium. Vitamin D was more often reported by patients from the GPs which may be due to a campaign in the region with many GPs taking part. Risky CAM usage

which may be described as usage which entails CAM with side effects or interactions [15, 20–22] was only reported by a minority of patients in our study. Antioxidants, mistletoe, phytotherapy and low-carb diet each were only used by <15 %. Yet, the rate of patients using any of these CAM methods was 43.5 % (107 from 246 answering the question).

Communication on CAM must be improved in order to reduce these risks [23]. Yet, a quarter of the patients did no report using CAM to any physician and only about a third reported it to the oncologist. This is far lower than in another setting [17] where we asked participants in an online community on CAM. In this forum, 63 % reported having informed the oncologist. The contrast to the data presented here may be explained by the fact that most probably patients taking part in fora may be more engaged and more willing to communicate than others.

From our data, the importance of the GP in this context becomes clear. Most patients in our survey talked to the GP on this topic. Informing the oncologist might be associated with a higher barrier as patients with higher education more often reported having informed this expert. Less than half of the patients knew a physician with competence in CAM. This is in line with data from an online survey [17]. The most often reported physician with knowledge in CAM from point of view of the patients is the GP. In our former survey, only 17 % pointed to the GPs [17].

There are several limitations to our study. First of all, it may not be representative. Yet, by integrating different institutions and settings, this study represents more patients than similar surveys which were conducted at cancer institutions. Second, we did not gather information on all types of CAM, but only on those included in our list. This list is based on the literature of the last 20 years and our own previous studies in which we asked patients to add methods to the lists we provided in these studies. Yet, as CAM is a broad range of different methods, we may have missed new or seldom used methods. Regarding the demographic data, we consequently relied on patients reporting regarding tumor, stage of disease and treatment which may not be correct. Yet, reporting by physicians or their assistants would have made it necessary to pseudonomize the survey. As this may reduce comprehensive reporting of CAM usage by the patients who might be afraid of their doctors learning about their CAM activities, we refrained from this. Last, the study does not perfectly simulate the trajectory of cancer patients as nearly a third of the patients at the GP reported actually receiving a cancer therapy. On the other hand, the differences between CAM usage at the different institutions mostly were not significant.

In order to integrate complementary medicine into evidence-based medicine, not only more studies with high methodological quality are necessary. Moreover, physicians should be trained on how to communicate on this topic with the patient and with each other [23]. Explaining cancer and cancer therapies in a way lay persons are able to understand may be helpful. Physicians should actively address patients' needs of involvement not only in decision making, but also actively in the therapy.

Compliance with ethical standards

Conflict of interest The authors declare no conflict of interest.

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