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Prevalence, socio-demographic and clinical predictors of post-diagnostic utilisation of different types of complementary and alternative medicine (CAM) in a nationwide cohort of Danish women treated for primary breast cancer

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ABSTRACT

Aim: This study investigated the prevalence and predictors of use of complementary and alternative medicine (CAM) in a nationwide inception cohort of Danish women treated for early-stage breast cancer as well as differences in user patterns for individual types of CAM.

Methods: Use of CAM since the time of diagnosis was assessed 12–16 weeks post-surgery for the 3343 women (age 18–70) included in the study (response rate: 68%). Socio-demographic and clinical variables were obtained from national longitudinal registries.

Results: 40.1% of the women had used one or more types of CAM. Users were younger than non-users. Age adjusted analyses showed that CAM users were characterised by absence of comorbidity, higher educational level, higher personal income, higher social status, being divorced/separated and living in the metropolitan area of Copenhagen. Multivariate analyses revealed that chemotherapy was the only clinical and treatment-related predictor of CAM use, and that CAM users were more likely to be of normal weight and non-smokers. Of CAM users, 33.7% believed that CAM would have a positive influence upon their breast cancer. Different characteristics distinguished users of individual types of CAM.

Conclusion: The results of this first nationwide study of utilisation of CAM in breast cancer show that CAM users are healthier and more likely to have higher socio-economic status than non-users. Different user patterns for individual types of CAM may be overlooked, when different types of CAM are treated as one homogeneous category.

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1. Introduction

Cancer patients using complementary and alternative medicine (CAM) represent a considerable challenge for oncologists, both in terms of patient needs for an informed dialogue regarding CAM, and because some types of CAM may interact with standard treatments causing adverse effects.[1] CAM represents a considerable industry with $34 billion out-of-pocket expenditures being reported in the United States (US) per year, with the majority of CAM types still remaining to be evaluated.[2] Research in CAM use is, therefore, highly relevant, both from a societal and a clinical perspective.

CAM is usually defined as 'diagnosis, treatment and/or prevention which complements mainstream medicine by contributing to a common whole, by satisfying a demand not met by orthodoxy or by diversifying the conceptual frameworks of medicine'.[3,4] There are reports of increasing utilisation rates of CAM in industrialised countries, and breast cancer patients have been found to be among the most frequent users.[4–7] A recent European study of breast cancer patients from 11 countries found that CAM use varied from 15.8–73.3% between individual countries.[8] In the few studies of CAM use among Danish breast cancer patients, utilisation rates varied from 33% to 83%,[9–12] but the results are based on relatively small samples.

Previous results suggest that breast cancer patients using CAM are generally younger and have higher socio-economic status than non-users,[13–15] although not all results support these findings.[16] Other factors commonly associated with CAM use include duration and progression of disease,[6] although results are inconsistent.[17] Furthermore, breast cancer patients having received breast-conserving surgery and chemotherapy[18,19] and those experiencing disease- and treatment-related symptoms have been found to be more likely CAM users.[20,21]

It is conceivable that the considerable between-study variations found in CAM use are due to differences in patient selection criteria, e.g. time since diagnosis and disease stage, and more general cultural, demographic and socio-economic differences between countries, e.g. in healthcare coverage and use, as well as differences in public acceptance of CAM, e.g. in authorisation and registration of CAM providers.[22] The conceptualisation of CAM as well as other methodological aspects including length of observation may also play a role. According to a recent review, only half of the published studies (25 of 52) employed multivariate analyses when assessing characteristics associated with CAM use.[23] Potential confounders such as age are therefore often not accounted for. Furthermore, collapsing heterogeneous types of CAM into one single category could mask differences between users of individual types of CAM.[24,25] Questionable representativity resulting in selection bias is another issue raised in relation to existing research.[23]

A large population-based study with the ability to control for several potential confounders may help identify factors associated with the use of specific types of CAM. Using data from a nation-wide cohort of women treated for early-stage breast cancer, we therefore investigated the prevalence as well as socio-demographic, health-related, and clinical predictors of CAM use in general and of specific types of CAM.

2. Patients and methods

2.1. Study design and materials

The present study utilised data from a nationwide prospective inception cohort of 4917 Danish women treated surgically for early-stage invasive breast cancer and allocated to one of the five existing standard Danish Breast Cancer Cooperative Group (DBCG) treatment protocols between October 2001 and March 2004. Details concerning the cohort have previously been published.[26] Eligible women were informed about the study at the surgical departments, and the Charlson Comorbidity Index[27] was completed for each patient. At baseline, 12–16 weeks post-surgery, all eligible women were mailed a questionnaire package, additional information, an informed consent form and a prepaid return envelope, and were invited to participate in the study. A hotline telephone and email service was offered to answer questions regarding the study and the filling of the questionnaire. If the questionnaires and the written consent form were not returned within 3 weeks, a single reminder was sent. A total of 3343 women (68.0%) returned a valid questionnaire. The majority of the questionnaires (91%) were mailed out 12–16 weeks after primary surgery and the remaining questionnaires were mailed out during the following 3 months. Responders were younger than non-responders (median 55.7 years versus 58.0 years; range: 23–70 years). Age-adjusted analyses revealed that participation was not influenced by clinical factors, and the sample can therefore be considered as nationally representative with respect to disease- and treatment-related variables.[26] The study was approved by The Regional Science-Ethical Committees and The Danish Data Protection Agency.

2.2. Eligibility

Eligible patients were 18–70 years old resident Danish women with histologically confirmed breast cancer T 1-3, N0-3 and M0 according to the TNM classification,[28] and no history of other cancers, except non-melanoma skin cancer or carcinoma *in situ* of the cervix uteri. Additional requirements were ability to read Danish and being capable of completing a questionnaire.

2.3. Data collection

Since 1968, all Danish residents have been assigned a 10-digit personal identification number (CPR-number) by The Danish Civil Registration System, which is used across all public registration systems, making linkages between a large number of registry-based data sources possible. Addresses, CPR-numbers and data concerning eligibility, comorbidity, histopathology and treatment-related variables were obtained directly from the surgical departments responsible for treating breast cancer in Denmark during the inclusion period, as well as from the DBCG-registry. The DBCG registry can be considered as nearly complete. Validation studies suggest that at least

97% of all eligible women having had surgery for primary breast cancer in Denmark during the inclusion period were identified for the study.[29] Demographics, psychiatric history and socio-economic variables were collected from six of the nationwide Danish longitudinal registries through a linkage serviced by Statistics Denmark.[30] Further detailed information on health behaviours, health status and psychosocial variables was obtained for the women in the questionnaire group.

2.4. Assessment of CAM use

Use of CAM since time of diagnosis was assessed with an adapted version of the Danish Health and Morbidity Survey.[31,32] The question was phrased: 'Have you used any of the following alternative treatments in the time period after your breast cancer diagnosis?' The participants were asked, if they had used one or more of the following types of CAM: (1) Herbal medicine, (2) Reflexology; (3) Relaxation or yoga; (4) Kinesiology; (5) Dietary/exercise counselling; (6) Healing, laying on hands, or similar; (7) Massage/manipulation; (8) Meditation; (9) Needle acupuncture; (10) Dietary or vitamin supplement beyond ordinary vitamin pills or (11) Other types (specified). When possible, the last variable was subsequently recoded independently and negotiated by two investigators into one of the 10 listed types of CAM. 'No CAM use' was assessed with the control item: 'No, I did not use any type of complementary or alternative treatment in the time after I was diagnosed with breast cancer'. CAM users were also asked 'Do you believe that the alternative therapy you have received will have a positive effect upon the breast cancer illness itself?' with response options (1) no, not really, (2) possibly, (3) yes, relatively certain and (4) yes, absolutely certain.

2.5. Covariates

Covariates included socio-demographic variables of personal income, mean household net-wealth, social status, educational level, marital status, ethnicity, urbanicity, number of children and psychiatric history, using relevant national registries (see Ref. 26 for further details). The socio-demographic variables refer to pre-cancer conditions either in the year prior to the date of surgery minus one month or, when appropriate, at the date of surgery minus one month. Additional covariates included the weighted index score of the Charlson Comorbidity Index (CCI),[27,33,34] the 10-item Physical Functioning subscale (PF) of the MOS Short Form (SF-36),[35] Body Mass Index (BMI) categorised according to World Health Organisation (WHO) guidelines,[36] smoking and alcohol consumption presented in units per day (beers, glasses of wine or drinks).

2.6. Statistical analysis

SF-36 PF totals with more than 50% missing values were coded as missing. The missing values were substituted on the PF subscale only, with the mean of the remaining completed items according to the manual.[35,37] Unadjusted associations with CAM use were assessed by χ^2-tests. Subsequently, a logistic regression model was used to evaluate the association of each variable with CAM use adjusted for the influence of other variables. The results are presented as adjusted odds ratio (OR). Independent variables considered in the regression models referred to three phases of the woman's cancer history: pre-cancer, peri-surgery, and post-surgery, and data were analysed accordingly. Demographic and socioeconomic factors, comorbidity and psychiatric history were analysed at the first step, as these data refer to pre-cancer conditions and, therefore, are unbiased by the cancer experience. Information about the disease and treatment had been known to women for more than 2 months, when the questionnaire was completed. Clinical variables were therefore analysed at the second step. Post-treatment health behaviours and other health-related variables could be influenced by the cancer diagnosis and treatment, and were therefore analysed at the third step. At each step in the multivariate analyses all independent variables were inspected for multicollinearity. Logistic regression analysis evaluated age-adjusted as well as fully adjusted associations between individual types of CAM and the study variables. Age was treated as a continuous variable in all multivariate analyses. Associations between use of specific types of CAM and perceived efficacy on breast cancer were explored with non-parametric correlations. All analyses were conducted with SPSS 14.0.1 for Windows.

3. Results

3.1. Prevalence of CAM use

Data on CAM use were complete for 3254 women (97.3%) with 1306 (40.1%) reporting use of CAM since the time of diagnosis. Of these, 686 (52.5%) had used more than one type of CAM.

3.2. Predictors of CAM use

The socio-demographic and health-related predictors of CAM use are shown in Table 1 (step 1 of the analysis), disease- and treatment-related predictors in Table 2 (step 2) and data on the relationship between CAM use and health behaviours, BMI and physical function in Table 3 (step 3).

3.3. Univariate analyses

Relationships found to be significant by univariate analysis, *but not* when adjusting for age, were found for household net-wealth per person, nodal status, hormone receptor status and menopausal status.

3.4. Age-adjusted analyses

Adjusting for age, binary logistic regression analysis of socio-demographic and health-related factors at step 1 showed CAM use to be predicted by no comorbidity, higher educational level, higher income, higher social status, being divorced or separated and living in the Copenhagen centre or suburbs. Analysing clinical factors at step 2, only chemotherapy was a significant determinant of increased CAM use when adjusting for age. Increased use of CAM was also found for women allocated to radiotherapy or hormone therapy, but

Table 1 – Socio-demographic and health-related predictors of CAM use.[a]

	CAM use				
	No. of users	Age-adjusted		Fully adjusted[b]	
	(% within category)	OR	(95% CI)	OR	(95% CI)
Age	$P < .001$		$P < .001$ (unadjusted)		$P < .001$
18–35	62 (66.0%)	5.22	3.33–8.17	0.96	0.95–0.97
36–49	454 (51.0%)	2.80	2.31–3.39		
50–59	516 (41.1%)	1.88	1.57–2.24		
60–69	274 (27.1%)	1.00	(Referent)		
Marital status	$P < .001$		$P = .006$		$P = .06$
Married or cohabiting	979 (39.4%)	1.00	(Referent)	1.00	(Referent)
Divorced, separated or married – single	187 (46.5%)	1.38	1.11–1.71	1.30	1.03–1.64
Widow – single	44 (25.1%)	0.79	0.55–1.14	0.78	0.55–1.16
Never married – single	92 (50.0%)	1.27	0.93–1.73	1.17	0.83–1.65
Children	$P = .22$		$P = .75$		$P = .57$
No	161 (43.0%)	1.00	(Referent)	1.00	(Referent)
Yes	1145 (39.8%)	0.97	0.77–1.21	1.07	0.84–1.38
Education (ISCED 97 based)	$P < .001$		$P < .001$		$P < .001$
Lower secondary general (7 years)	135 (25.9%)	1.00	(Referent)	1.00	(Referent)
Lower secondary general (8–10 years)	167 (36.3%)	1.11	0.83–1.47	1.07	0.80–1.44
Upper secondary (11–13 years)	506 (39.0%)	1.32	1.04–1.67	1.23	0.96–1.58
Tertiary < master degree (14–17 years)	392 (50.3%)	1.97	1.53–2.54	1.90	1.42–2.54
Tertiary master degree ($\geqslant$18 years)	87 (55.4%)	2.37	1.61–3.47	2.09	1.35–3.24
Social status (ISCO-88 based)	$P = .004$		$P = .001$		$P = .28$
Top manager or employee – upper level	193 (51.3%)	1.83	1.32–2.54	0.99	0.63–1.53
Employee – medium level	258 (46.9%)	1.44	1.06–1.97	0.86	0.57–1.29
Employee – basic level	356 (44.4%)	1.34	1.00–1.80	1.08	0.74–1.57
Employee – others or in education	122 (37.5%)	1.09	0.78–1.54	0.93	0.62–1.38
Self-employed or assisting spouse	58 (46.8%)	1.77	1.14–2.73	1.30	0.80–2.11
Unemployed, recipient of temporary allowance-, cash- or pre-retirement benefits, etc.	193 (31.8%)	1.18	0.87–1.60	0.91	0.64–1.28
Old age pension	30 (18.5%)	0.81	0.50–1.32	0.68	0.41–1.14
Recipients of early retirement pension, rehabilitation- or sickness benefits	92 (30.5%)	1.00	(Referent)	1.00	(Referent)
Personal income	$P < .001$		$P < .001$		$P = .23$
$\leqslant$20.000 $	134 (27.3%)	1.00	(Referent)	1.00	(Referent)
>20.000 $ and $\leqslant$30.000 $	215 (35.6%)	1.35	1.03–1.75	1.32	0.98–1.77
>30.000 $ and $\leqslant$40.000 $	258 (38.2%)	1.20	0.92–1.56	1.12	0.81–1.53
>40.000 $ and $\leqslant$55.000 $	405 (46.7%)	1.61	1.25–2.07	1.31	0.94–1.81
>55.000 $	290 (47.5%)	1.68	1.29–2.20	1.17	0.82–1.68
Household net – wealth per person	$P = .002$		$P = .39$		$P = .68$
<0 $	307 (46.2%)	1.00	(Referent)	1.00	(Referent)
$\geqslant$0 $ and <20.000 $	246 (41.8%)	0.99	0.79–1.25	1.00	0.79–1.27
$\geqslant$20.000 $ and <55.000 $	234 (38.2%)	0.87	0.69–1.10	0.87	0.69–1.11
$\geqslant$55.000 $ and <120.000 $	265 (36.7%)	0.92	0.74–1.16	0.88	0.69–1.11
$\geqslant$120.000 $	250 (38.0%)	1.09	0.86–1.37	0.94	0.73–1.20
Urbanicity (municipality size)	$P = .004$		$P = .007$		$P = .24$
<10.000 inhabitants	208 (38.1%)	1.00	(Referent)	1.00	(Referent)
$\geqslant$10.000 and <50.000	456 (38.6%)	1.09	0.88–1.35	1.07	0.86–1.33
$\geqslant$50.000 and <300.000	270 (38.1%)	1.06	0.84–1.34	1.01	0.79–1.29
Copenhagen – suburbs	219 (42.9%)	1.32	1.02–1.70	1.23	0.95–1.60
Copenhagen – centre	149 (49.3%)	1.60	1.20–2.14	1.31	0.96–1.79
Ethnicity	$P = .55$		$P = .73$		$P = .80$
Not immigrant or descendant	1259 (40.0%)	1.00	(Referent)	1.00	(Referent)
Immigrant or descendant	43 (43.0%)	1.07	0.71–1.62	0.95	0.62–1.45
Psychiatric history	$P = .88$		$P = .97$		$P = .94$
No	1217 (40.1%)	1.00	(Referent)	1.00	(Referent)
Yes	89 (40.6%)	1.01	0.76–1.34	0.99	0.73–1.34

(*continued on next page*)

Table 1 – (*continued*)

	CAM use				
	No. of users	Age-adjusted		Fully adjusted[b]	
	(% within category)	OR	(95% CI)	OR	(95% CI)
Charlson Comorbidity Index (CCI)	*P* < .001		*P* < .001		*P* = .004
No comorbidity	1209 (41.7%)	1.00	(Referent)	1.00	(Referent)
CCI score = 1	85 (29.4%)	0.68	0.52–0.90	0.71	0.54–0.95
CCI score > 1	8 (14.0%)	0.31	0.15–0.96	0.36	0.17–0.80

[a] No. of users = prevalence of CAM use (% of users within variable category). OR = odds ratio. CI = confidence interval.
[b] Adjusted for all other socio-demographic variables, psychiatric history and comorbidity (*N* = 3208).

Table 2 – Clinical predictors of CAM use.[a]

	CAM users				
	No. of users	Age-adjusted		Fully Adjusted[b]	
	(% within category)	OR	(95% CI)	OR	(95% CI)
Tumour size	*P* = .49		*P* = .45		*P* = .44
⩽20 mm	804 (41.0%)	1.00	(Referent)	1.00	(Referent)
>20 mm and ⩽50 mm	457 (38.9%)	0.91	0.79–1.06	0.91	0.77–1.06
>50 mm	38 (39.2%)	0.87	0.57–1.34	0.87	0.56–1.35
Nodal status	*P* = .04		*P* = .15		*P* = .10
0	607 (38.0%)	1.00	(Referent)	1.00	(Referent)
1–3	442 (41.8%)	1.16	0.98–1.36	1.16	0.98–1.37
>3	253 (42.9%)	1.15	0.94–1.40	1.21	0.99–1.49
Tumour grade	*P* = .10		*P* = .65		*P* = .78
I	284 (37.4%)	1.00	(Referent)	1.00	(Referent)
II	478 (40.9%)	1.13	0.93–1.37	1.07	0.87–1.31
III	295 (43.3%)	1.10	0.88–1.36	0.97	0.76–1.23
Non-ductal carcinoma	236 (38.4%)	1.06	0.84–1.32	1.04	0.82–1.31
ER/PR receptor status	*P* = .01		*P* = .06		*P* = .83
ER- and PR-negative	273 (44.5%)	1.00	(Referent)	1.00	(Referent)
ER- or PR-positive	1019 (39.0%)	0.84	0.70–1.01	1.03	0.81-1.30
Menopausal status	*P* < .001		*P* = .13		*P* = .70
Pre-menopausal	660 (51.8%)	1.00	(Referent)	1.00	(Referent)
Post-menopausal	642 (32.6%)	0.83	0.65–1.05	0.95	0.73–1.24
Type of surgery	*P* = .47		*P* = .42		*P* = .27
Mastectomy	718 (40.7%)	1.00	(Referent)	1.00	(Referent)
Lumpectomy	586 (39.5%)	0.94	0.82–1.09	0.92	0.79–1.07
Chemotherapy	*P* < .001		*P* = .001		*P* < .001
No chemotherapy	597 (32.9%)	1.00	(Referent)	1.00	(Referent)
In treatment (CEF or CMF)	705 (49.4%)	1.34	1.13–1.59	1.39	1.17–1.66
Radiotherapy	*P* < .001		*P* = .003		*P* = .58
No radiotherapy	266 (39.9%)	1.00	(Referent)	1.00	(Referent)
To be treated after chemotherapy	581 (49.9%)	1.14	0.93–1.40	1.04	0.79–1.38
Has been treated with radiotherapy	455 (32.2%)	0.83	0.68–1.01	0.88	0.69–1.13
Hormone therapy	*P* < .001		*P* = .04		*P* = .83
No hormone therapy	480 (40.0%)	1.00	(Referent)	1.00	(Referent)
To be treated after chemotherapy (TAM)	433 (53.2%)	1.18	0.97–1.45	1.03	0.82–1.30
In treatment (TAM + FEM)	379 (31.3%)	0.88	0.73–1.05	1.06	0.85–1.33

[a] No. of users = prevalence of CAM use (% of users within variable category). OR = odds ratio. CI = confidence interval.
[b] Adjusted for chemotherapy and socio-demographic variables (age, marital status, children, education, urbanicity, social status, personal income, household net-wealth and ethnicity), psychiatric history and comorbidity.

this was only true for women in current chemotherapy. Health behaviour-related variables predictive of CAM use were: Being an ex-drinker or drinking occasionally but less than 3 drinks per day, smoking fewer than 10 cigarettes per day, being normal- or overweight and having moderate physical function. No statistically significant associations were

Table 3 – Use of CAM and self-reported health behaviours, BMI and physical function.[a]

	CAM users				
	No. of users	Age-adjusted		Fully adjusted[b]	
	(% within category)	OR	(95% CI)	OR	(95% CI)
Smoking status	*P* < .001		*P* < .001		*P* = .002
Never smoker	535 (41.3%)	1.00	(Referent)	1.00	(Referent)
Ex-smoker	437 (45.3%)	1.13	0.95–1.34	1.10	0.92–1.33
1–9 per day	63 (36.4%)	0.85	0.61–1.20	0.89	0.62–1.26
10–19 per day	150 (33.3%)	0.68	0.54–0.86	0.76	0.59–0.97
⩾20 per day	105 (33.2%)	0.62	0.48–0.81	0.66	0.50–0.88
Alcohol	*P* < .001		*P* = .02		*P* = .05
Never drinker	100 (30.5%)	1.00	(Referent)	1.00	(Referent)
Ex-drinker	82 (47.4%)	1.84	1.24–2.71	1.65	1.09–2.51
<1 drink per day	581 (43.8%)	1.56	1.19–2.03	1.45	1.10–1.93
⩾1 and <2 drinks per day	311 (39.7%)	1.47	1.11–1.95	1.31	0.96–1.77
⩾2 and <3 drinks per day	142 (38.1%)	1.49	1.08–2.05	1.36	0.96–1.92
⩾3 drinks per day	78 (34.5%)	1.27	0.88–1.84	1.06	0.71–1.57
Body Mass Index (BMI)	*P* < .001		*P* = .001		*P* = .03
Underweight (⩽18.5)	30 (37.5%)	1.29	0.77–2.16	1.28	0.75–2.20
Normal weight (>18.5 and < 25)	822 (44.0%)	1.60	1.25–2.04	1.45	1.12–1.89
Overweight (⩾25 and <30)	327 (37.1%)	1.31	1.01–1.71	1.23	0.93–1.63
Obese or severely obese (⩾30)	116 (31.5%)	1.00	(Referent)	1.00	(Referent)
Physical function (SF-36 PF)	*P* = .002		*P* = .04		*P* = .06
100	191 (36.3%)	1.00	(Referent)	1.00	(Referent)
>90 and < 100	341 (42.6%)	1.26	1.00–1.59	1.24	0.97—1.58
>80 and ⩽90	335 (40.8%)	1.19	0.95–1.51	1.23	0.97–1.58
>70 and ⩽80	237 (44.9%)	1.44	1.12–1.86	1.47	1.12–1.92
⩾0 and ⩽70	193 (34.9%)	1.07	0.83–1.39	1.40	1.06–1.86

[a] No. of users = prevalence of CAM use (% of users within variable category). OR = odds ratio. CI = confidence interval.

[b] Adjusted for all clinical factors (tumour size, nodal status, tumour grade, ER/PR receptor status, menopausal status, surgery, chemotherapy, radiotherapy and hormone therapy) and all socio-demographic variables (age, marital status, children, education, urbanicity, social status, personal income, household net-wealth and ethnicity), psychiatric history and comorbidity.

found between CAM use and ethnicity, number of children, psychiatric history, tumour size, tumour grade and type of surgery.

3.5. *Multivariate analyses*

Younger age, no comorbid diseases and higher educational level (tertiary degree) were found to be independent predictors of CAM use when entering socio-demographic and health-related variables in the logistic regression at step 1 (see Table 1). When clinical and treatment-related variables were adjusted for chemotherapy and all variables from step 1, no significant differences were found. Chemotherapy thus remained the only significant cancer- or treatment-related predictor of CAM use (see Table 2). Health behaviour-related predictors of CAM use, fully adjusted for variables from step 1 and step 2, were non-smoking and normal BMI (see Table 3).

3.6. *Characteristics predictive of specific type of CAM use*

The distribution of users according to specific types of CAM is shown in Fig. 1.

The age-adjusted characteristics significantly ($P < 0.05$) associated with the use of individual CAM types compared to use of any other CAM are summarised in Table 4. Tables with all statistical details can be retrieved online.

Use of all individual types of CAM, except kinesiology and meditation, was predicted by younger age. The age-adjusted characteristics associated with the use of individual CAM types were generally found to vary between CAM types. Factors unrelated to use of specific types of CAM were ethnicity, psychiatric history, tumour size, tumour grade, type of surgery and physical function.

3.7. *Perceived efficacy of CAM on breast cancer*

A total of 219 (18.6%) CAM users were absolutely certain that the CAM or combination of CAM types used would have a positive effect on their breast cancer, 177 (15.1%) were relatively certain, 458 (39.0%) believed an effect was possible and 321 (27.3%) did not believe in an effect on the disease course. To ensure that responses obtained were referring to a specific CAM, only participants using a single type of CAM ($N = 620$) were included in the analyses, when exploring the relationship between individual CAM types and perceived efficacy. Compared to use of the remaining CAM types, use of herbal medicine ($rpb = .121$; $P = .006$) and dietary/exercise counselling ($rpb = .117$, $P = .01$) were associated with the highest perceived efficacy. Use of relaxation or yoga ($rpb = -.088$, $P = .04$); massage/ manipulation ($rpb = -.115$, $P = .009$); and needle acupuncture ($rpb = -.087$, $P = .04$) were related to lower anticipated effect on the cancer itself.

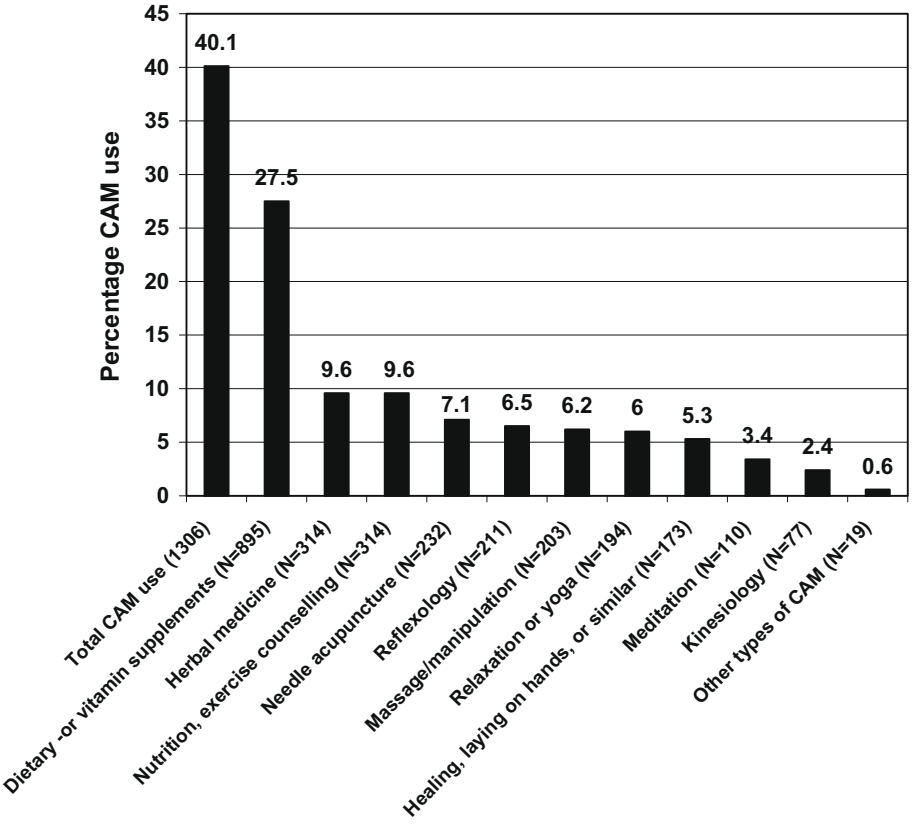

Fig. 1 – Prevalence of CAM use. *Note*: Percentages do not add up to 100%, as participants may be users of more than one type of CAM.

4. Discussion

The results of this first comprehensive analysis of a nationally representative sample of newly diagnosed breast cancer patients showed that 40.1% of the patients had used one or more types of CAM since the time of diagnosis. This is a considerably higher prevalence rate than the 28.1% found in the early comparable study of CAM use among newly diagnosed U.S. breast cancer patients three months after surgery.[20] As previously reported, however, questionnaire responders in the cohort were generally younger, had fewer comorbid diseases and more education than non-responders.[26] As our results show these variables were also predictors of higher rates of overall CAM use. The true prevalence's of CAM use among Danish women with early breast cancer are therefore likely to be somehow lower. It should be noted, however, that other studies are likely to be prone to the same type of bias that could only be identified because of our detailed knowledge about non-responders. In concordance with the results from previous Danish[9,10] and other European studies,[8] dietary or vitamin supplements were the most commonly used CAMs followed by herbal medicines and dietary/exercise counselling, with kinesiology and meditation being the least used.

4.1. *Perceived benefits*

Approximately one third of CAM users were certain or relatively certain that CAM would have a positive effect upon the cancer itself. This is consistent with previous findings.[19,38,39] Our study, however, is the first to show that believed efficacy varies with the individual type of CAM used. The largest anticipated effect of CAM on breast cancer was found among the users of herbal medicine and dietary/exercise counselling, whereas users of relaxation or yoga, massage/manipulation and acupuncture anticipated smaller effects. This suggests that many users may turn to CAM to satisfy other needs than cure, and that use of individual CAM types may be associated with different motives. Only little is known about the anticipated and perceived effectiveness of specific CAM types, in relation to both the cancer itself and other potential user motives, including symptom management and health-related quality-of-life (HR-QoL).[8] Although some women expect beneficial effects on the disease, the wide-spread use along with the potentially harmful effects found to be associated with some herbal medicines and dietary or vitamin supplements[1] indicates a need for studying user motives and characteristics, perceived benefits, efficacy and safety of specific types of CAM.

4.2. *Predictors of use*

Consistent with the previous results,[13,21,40] the CAM users in our study were younger than non-users; a finding that was consistent across most individual types of CAM, with the exception of kinesiology and meditation. Compared to older patients, younger patients may find it more difficult to cope

Table 4 – Characteristics (age-adjusted) significantly ($p < .05$) associated with use of specific CAM types.[a]

Predictor[b]	Dietary/vitamin suppl. N = 895	Herbal medicine N = 314	Nutrition/exercise counselling N = 314	Acupuncture N = 232	Reflexology N = 211	Massage N = 203	Yoga, relaxation or similar N = 194	Healing N = 173	Meditation N = 110	Kinesiology N = 77
Age	–	–	–	–	–	–	–	–		
Marital status	–		–			–			–	
Children			–			–			–	
Income	+[c,d]		+	+	+[c]					
Household net-wealth					+/-[e]			+/–[f]		
Social status			+[g]	+[h]	+[g]		+			
Educational level	+		+	+	+/-[i]		+		+	
Municipality size			+	+		+			+	
Comorbidity	–		–							
Nodal status				+		–				
Treatment	+[k]			+[k]		–[j]				
Menopausal status				–						
Hormone receptor positive	–									
BMI	+/–[l]		+/–[l]				+/–[l]			
Smoking	+/–[m]		+/–[m]				+/–[m]			
Alcohol				+/–[n]						

[a] Results of multiple, binary age-adjusted logistic regression analyses with use of the individual CAM type versus use of other CAM types as the dependent variable.
[b] –, Negative relationship; +, positive relationship.
[c] >40.000 and ⩽55.000 $.
[d] >20.000 and ⩽30.000 $.
[e] Not ⩾0 and <20.000 $.
[f] Not ⩾20.000 and < 55.000 $.
[g] Self-employed or ⩾medium level social status.
[h] ⩾Basic level employee.
[i] Not lower secondary general.
[j] No radiotherapy.
[k] Chemotherapy.
[l] Normal weight.
[m] Not smoking ⩾20 cigarettes per day.
[n] Ex-drinker.

up with their cancer[41,42] and more likely to perceive the diagnosis as a threat to their future plans.[43] Younger patients could therefore be more willing to seek out all available treatment options, including CAM.

Also in accordance with the previous studies, use of the majority of CAM types was associated with higher educational level.[15,16,44,45] A possible explanation could be that patients with higher education are more aware of available types of CAM and more resourceful in terms of seeking out possible additional support in relation to their illness. When exploring the socio-economic status of CAM users, we replicated previous findings of higher income levels among CAM users.[13,14,21] However, income was not an independent predictor of CAM use. It is possible that the relatively low level of socio-economic inequality and free health care services in Denmark make CAM more affordable to low-income patients. In addition, we found that while household net-wealth per person was a significant univariate predictor, this was not the case when adjusting for age. Likewise, social status and urbanicity were significantly related to CAM use when adjusting for age, but not in the fully adjusted analysis.

Previous research indicates that one motive for CAM use could be to reduce the side-effects of chemotherapy.[8,9,46,47] This possibility is supported by the present results showing use of needle acupuncture and dietary or vitamin supplements to be associated with allocation to chemotherapy. Chemotherapy was, in fact, the only clinical- or treatment-related predictor of overall CAM use in the adjusted analysis. Our results are thus discordant with the previous findings that users of CAM are at more progressed stages of disease than non-users.[14,20,40] CAM users in the present study were also generally less likely to suffer from physical comorbidity and more likely to be non-smokers and within normal weight range. This could indicate that physical condition and disease stage may not be the main incentives for CAM use. It should be noted, however, that only women with early breast cancer were included in the present study. It cannot be ruled out that observed patterns would have been different among women with more advanced disease. Future studies could benefit from moving beyond socio-demographic, treatment and disease characteristics by including quality-of-life parameters when seeking to provide a more elaborated profile of CAM users. One of the limitations of the present study is indeed the lack of information about reasons, motives and expectations for CAM use. Another limitation is the lack of knowledge about previous CAM use. Thus, we do not know if CAM use is a continued or new behaviour initiated as a response to the cancer diagnosis.

5. Conclusion

In contrast to previous results, this first nationwide study suggests healthier lifestyles among CAM users. Our results also indicate that different user patterns for individual CAMs may be overlooked when CAM research collapse specific CAM types into one homogeneous category. Furthermore, our results demonstrate the advantages of large studies employing multivariate statistics, enabling adjustment for potential confounders when attempting to identify independent socio-demographic, lifestyle-, disease- and treatment-related factors associated with CAM use.

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Conflict of interest statement

None declared.

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Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.ejca.2009.09.005.

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