Coping and Defending as Risk Factors for Breast Cancer in Patients with Breast Disease; a Prospective Case-control Study in Kuopio, Finland

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Abstract. *Background: The purpose of this study was to assess the role of coping and defending mechanisms as a risk factor for breast cancer. Women with breast symptoms were referred by physicians to the Kuopio University Hospital (Finland) and were asked to participate in this study. Patients and Methods: The women (n=115) were interviewed and all study variables were obtained before any diagnostic procedures were done, so neither the investigator nor the subject knew the final diagnosis of breast symptoms at the time of the interview. The research method used was the semistructured in-depth interview method. The investigator used the Montgomery-Asberg Depression rating scale (MADRS) to evaluate the depression of the study subjects. All study subjects were also asked to complete standardised questionnaires (Beck Depression Inventory and Spielberger Trait Inventory). The investigator used the modified coping and defence inventory made by Haan. This inventory is divided into ten scales, and each scale has subscales from grade 0 to grade 3. In addition, the researcher estimated the patients ability to cope (scale 1 to 5), the amount of defensiveness (scale 1 to 5) and fragmentation (scale 1 to 5). Results: Clinical examination and biopsy showed breast cancer (BC) in 34 patients, benign breast disease (BBD) in 53 patients, while 28 study subjects were healthy (HSS). The results indicated that breast cancer patients used more defending mechanisms; denial, intellectualising, rationalisation and reaction formation than the BBD and HSS groups. The defensive mechanisms were significantly associated with increased breast cancer risk (RR=1.7, CI=1.1-2.6). In addition, the breast cancer patients used less coping mechanisms; concentration, intellectuality, logical analysis, empathy, ambiguity tolerance, regression-ego, sublimation and substitution. Conclusion: The results of this study support a moderate association between unsatisfactory coping and defending mechanisms and increased breast cancer risk. The biological explanation of the association might be that coping and defending processes impact directly on the hormonal, immune and nervous systems, or indirectly by affecting behaviour such as diet, exercise or sleep.*

With one million new cases diagnosed in the world annually, breast cancer is by far the most common female cancer, comprising 21% of all new cancers in women (1,2). Breast cancer is the most common cancer in women in North America and in Western and Northern Europe (3). The highest age-adjusted incidence rate is reported for North America, being 86.3 per 100,000 women per year, while the lowest rate, reported in China, is only 11.8 (1). In Finland, 3774 new cases of female breast cancer were diagnosed in 2002, accounting for 32.6% of all cancer in women and corresponding to an age-adjusted incidence rate of 84.9 cases per 100,000 women per year. The overall 5-year survival rate of breast cancer patients is close to 80% in Finland, even though 848 breast cancer deaths were documented in 2001 (4).

Most of the risk factors for breast cancer relate to a woman's reproductive life and to increased or prolonged exposure to estrogen. Life-style factors, such as obesity and alcohol consumption, also seem to be relevant (5-9). Psychological factors, such as stressful life events, are widely thought to play a role in the etiology of cancer in general and breast cancer in particular (10-15). As in the case of stress, many case-control studies have investigated the relationship between anxiety, depression, the history of psychiatric symptoms and the risk of breast cancer in relation to supression of emotions in general and anger in particular (16-23). Breast cancer risk was prospectively investigated in relation to anxiety, depression, the history of

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Table I. *Characteristics of the study subjects. Results are shown for the patients with breast cancer (BC), for the patients with benign breast disease (BBD) and for the healthy study subjects (HSS).*

Variable	BC (n=34)	BBD (n=53)	HSS (n=28)	Statistics
Age (mean, years)	51.6	47.6	45.7	p=ns
Height (mean, cm)	164.4	162.3	160.8	p=ns
Body weight (mean, kg)	72.5	67.8	68.3	p=ns
Age at menarche (mean, yrs)	13.4	13.4	13.4	p=ns
Age at birth of first child (mean, yrs)	25.2	25.0	25.0	p=ns
Age at menopause (mean, yrs)	47.9	48.9	50.0	p=ns
No. of children (mean)	2.6	2.4	2.5	p=ns
Parity	31/34 (91%)	44/34 (83%)	23/28 (82%)	p=ns
Breast feeding (mean, months)	3.6	3.4	3.9	p=ns
Use of oral contraceptives	13/34 (38%)	25/34 (47%)	18/28 (64%)	p=ns
HRT*	27/34 (79%)	36/53 (68%)	14/28 (50%)	p=ns
Premenopausal	13/34 (38%)	28/53 (53%)	18/28 (64%)	p=ns
Postmenopausal	21/34 (62%)	25/53 (47%)	10/28 (36%)	p=ns
History of previous BBD	18/34 (53%)	22/53 (42%)	10/28 (36%)	p=ns
Family history of BC	1/34 (3%)	5/53 (9%)	5/28 (18%)	p=ns
Use of alcohol	21/34 (62%)	31/53 (58%)	13/28 (46%)	p=ns
Smoking	15/34 (44%)	21/53 (40%)	10/28 (40%)	p=ns

*HRT=use of hormonal replacement therapy

psychiatric symptoms and stressful and adverse life experiences among the patients with breast disease in the Kuopio Breast Cancer Study (24, 25). The results of our previous study support an overall association between stressful life events and breast cancer risk.

In addition to stressful life events, personality and depression, the other classes of psychological factors assumed to affect breast cancer risk are coping style and defending mechanisms. At present, relatively few valid reports exist either to support (10) or to disprove (14, 23, 26) these hypotheses, and the findings for coping style and breast cancer risk are inconsistent (27).

Our prospective study was carried out to examine the role of coping and defending as a risk factor for breast cancer in women with breast symptoms referred by physicians to the Kuopio University Hospital (Finland).

Patients and Methods

The Kuopio Breast Cancer Study is a multi-disciplinary cooperative project conducted by different departments of the University of Kuopio and Kuopio University Hospital. The subjects of the project included all women who were referred to Kuopio University Hospital for breast examination between April 1990 and December 1995. The Kuopio Breast Cancer Study follows the protocol of the International Collaborative Study of Breast and Colorectal Cancer coordinated by the European Institute of Oncology in Milan and was initiated as a SEARCH program in the International Agency for Research on Cancer. The collaborative study is based on the assumption that breast and colorectal cancer may have common risk factors. Study centers of the breast cancer

study are situated in Canada, Finland, Greece, Ireland, Italy, Russia, Slovakia and Switzerland (28). The participants of the Kuopio Breast Cancer Study consisted of subjects showing breast cancer symptoms (a lump in the breast or in the axilla, pain in the breast, bleeding from the nipple, nipple discharge and skin dimpling) or an abnormality of the breast detected during outpatient consultations, referred to the Surgical Outpatient Department of the Kuopio University Hospital, Finland. There had been no pre-selection of the study subjects, and the indications for referral in this study were in line with our previous results in the Breast Cancer Diagnostic Unit in Finland (29). We, therefore, feel that our study sample can be considered clinically representative for this type of prospective case-control study design.

This case-control study is an extension of the Kuopio Breast Cancer Study (30, 31). The study was approved by the Joint Committee of the University of Kuopio and Kuopio University Hospital. Participation was based on written consent. Women with breast symptoms or a suspect breast lump had been referred by a physician to the Kuopio University Hospital (Finland) during the study period from January 1991 to June 1992. Women were asked to participate in the study and were interviewed by a psychiatrist (P.O.) before any diagnostic procedures (clinical examination and biopsy), so neither the interviewer nor the patient knew the diagnosis at the time of the interview. The interviews were tape-recorded (P.O.) and the ratings were completed before the final diagnosis. Clinical examination, mammography and biopsy showed breast cancer (BC) in 34 (29.6%) patients, 53 (46.1%) patients with benign breast disease (BBD) and 28 (24.3) patients with healthy breasts (HSS) (Table I).

Assesment of life events and stress. The research method was a semi-structured in-depth interview. At the beginning of the interview the patients drew their "life lines" and a line describing being a woman, which supported the interview. In the "draw a line of your life" the

P.O. asked the patient to draw positive life experiences ("the good times") with lines pointing upwards and negative life experiences ("the hard times") with lines pointing downwards. Adverse and stressful life events were evaluated from the whole lifespan, with particular reference to the 10 years prior to admission. The adverse or stressful life events and the context surrounding them was marked on the "life line paper" during the interview. After the interview the P.O. then rated the life events according to the degree of threat or stress they were likely to pose to a particular study subject, and each adverse or stressful life event was graded on a 5-point scale, grade I (one point) indicating non-threatening event and grade V (5 points) severely threatening event. The used defences were also assessed on a 5-point scale, grade I (one point) indicating very defensive, denying and grade V (5 points) non-defensive. "Working through and actively confronting the stressful event"-variable was also rated on a 5-point scale, grade I (one point) indicating not resolved and grade V (5 points) fully resolved. These measurements were put together in the final statement, 1 to 2 points on a scale meaning little or mild loss or stress, and 5 meaning very severe loss or stress. The rated case record included the loss events from childhood (under 3 years of age and 4-12 years of age), adolescence (13-23 years of age), adulthood and especially the 10 years prior to the investigation.

Coping and defence strategies. The P.O. used a modified Haan coping and defence inventory (32). This inventory is divided into 10 scales, and each scale has subscales from grade 0 to grade 3. Zero means no definition, 1=coping, 2=defending and 3=fragmentation. In addition, the researcher estimated the patients' ability to cope (scale 1 to 5), the amount of defensiveness (scale 1 to 5) and fragmentation (scale 1 to 5).

Beck Depression Inventory (BDI). The women completed the Beck Depression Inventory (BDI) (33,34) with 21 variables. The investigator used a modified inventory divided into 3 grades; grade I (0-13), no depression, grade II (14-24), moderate depression and grade III (over 24), severe depression.

Spielberger Trait Inventory. All study subjects completed the Spielberger Trait Inventory (35). Trait anxiety was assessed using the subscale from the Inventory, the 10 items referring to how a person feels generally, with a higher total score reflecting higher trait anxiety (20-80 range). The investigator rated the test as follows: grade I (20-29), seldom anxious, grade II (30-49), sometimes anxious, grade III (50-69), often anxious and grade IV (70-80), always anxious.

Montgomery Asberg Depression Rating Scale (MADRS). The Montgomery Asberg Depression Rating Scale (MADRS) with 10 variables (scores from 0 to 6) was used to evaluate the depression of the study subjects (36). The test was rated as follows: grade I (0-6), no depression, grade II (7-19), mild depression, grade III (20-34), moderate depression and grade IV (35-60), severe depression.

Statistical analysis. The significance of the results was calculated with the SPSS/PC statistical package (SPSS Inc., Chicago, Illinois, USA). Correlations and differences between the study groups (BC group, BBD group and HSS group) were measured with the 2-sided Chi-square test and non-parametric Kruskal-Wallis variance analyses. The results were considered statistically significant at p-value<0.05.

All defending variables together as a sum and the breast cancer risk were analysed by unconditional logistic regression to estimate risk ratios (RRs) and 95% confidence intervals (CI).

Results

The mean (SD, range) age of the BC patients was 51.5 (11.1, 32-74) years. The corresponding figures for the BBD patients were 47.5 (mean 10.9, 25-75) years and for the HSS group 45.7 (median 13.2, 20-70) years. Althought the patients in the BC group were older than those in the BBD or HSS groups, the age difference was not statistically significant (p=0.12). The majority of the patients (85/115, 74%) were married or living in a steady relationship. Almost half of the women (41.7%) had graduated from primary school and 25% had a college education. By profession the patients represented industrial and service employees (25.2%), office employees (10.4%), health care employees (8.7%) and farmers (8.7%), while almost one quarter (23.5%) were retired. The combined mean gross income of both spouses in the patients with BC was 36,100 € per year. The corresponding figures for the patients with BBD was 27,714 € per year and for the HSS group 24,521 € per year. The patients with BC were significantly (p=0.03) wealthier than the patients with BBD and HSS, as estimated by the combined gross income of both spouses. The groups differed only slightly from each other in terms of factors related to the woman's reproductive life (Table I).

Psychological self-report questionnaires (BDI and Spielberger Trait) and MADRS. The mean (SD) BDI score of the BC group was 8.4(6.9), while the corresponding figures for the BBD and HSS groups were 8.8(7.4) and 7.1(7.3) (p=ns). The mean (SD) MADRS score of the BC group was slightly higher 11.4 (9.2) than the score of the BBD group at 10.7(9.2) and that of the HSS group at 8.4(9.7) (p=ns). The mean (SD) Spielberger Trait Inventory differed only slightly between the BC group, 40.1(8.6) the BBD group, 41.5(7.2) and the HSS group, 39.1(6.4) (p=ns).

The attention-focusing functions and cognitive functions of the ego process according to the modified Haan classification in the BC, BBD and HSS groups. The P.O. used a modified coping and defending inventory by Haan, divided into 10 scales, each scale having subscales from grade 0 to grade 3. Zero corresponds to no definition, 1=coping, 2=defending and 3=fragmentation. The attention-focusing and cognitive functions of the ego process according to the modified Haan classification in the BC, BBD and HSS groups are presented in Table II. The BC group reported more defence mechanisms; denial (Function I, "Selective awareness"), intellectualising (Function III, "Detachment") and rationalisation (Function IV, "Means-end symbolisation") than the BBD or HSS groups. In addition, the BC group

Table II. *The results of the attention-focusing functions(I) and cognitive (II-IV) functions of the ego process in the BC, BBD and HSS groups according to the classification by Haan.*

Study functions	BC		BBD		HSS		p-value
	n	%	n	%	n	%	(overall)
I Selective awareness							
0 No definition	3	8.8	3	5.7	1	3.6	ns
1 Concentration	17	50.0	37	69.8	17	60.7	
2 Denial	11	32.4	11	20.8	8	28.6	
3 Distraction	3	8.8	2	3.8	2	7.1	
II Discrimination							
0 No definition	1	2.9	-	-	-	-	ns
1 Objectivity	17	50.0	25	47.2	18	64.3	
2 Isolation	14	41.2	25	47.2	8	28.6	
3 Concretism	2	5.8	3	5.7	2	7.1	
III Detachment							
0 No definition	4	11.8	2	3.8	4	4.3	0.07
1 Intellectuality	12	32.3	30	56.6	15	53.6	
2 Intellectualising	6	47.1	20	37.7	9	32.1	
3 Neologism	1	2.9	-	-	-	-	
IV Means-end symbolisation							
0 No definition	1	2.9	1	1.9	2	7.1	0.03
1 Logical analysis	8	23.5	26	49.1	11	39.3	
2 Rationalisation	24	70.6	26	49.1	15	53.6	
3 Confabulation	1	2.9	-	-	-	-	

Scale: 0=no definition, 1=coping, 2=defending, 3=fragmentation.
The overall *p*-value is shown between the BC *vs.* the BBD and HSS groups together.

Table III. *The results of the reflexive-intraceptive functions(V-VII) of the ego process in the BC, BBD and HSS groups according to the classification by Haan.*

Study functions	BC		BBD		HSS		p-value
	n	%	n	%	n	%	(overall)
V Sensitivity							
0 No definition	9	26.5	9	17.0	8	28.6	ns
1 Empathy	17	44.1	30	56.6	14	50.0	
2 Projection	7	26.5	14	26.4	6	21.4	
3 Delusional	1	2.9	-	-	-	-	
VI Delayed response							
0 No definition	9	26.5	3	5.7	3	10.7	ns
1 Ambiguity tolerance	15	44.1	36	67.9	16	57.1	
2 Doubt	9	26.5	11	20.8	7	25.0	
3 Immobilisation	1	2.9	3	5.7	2	7.1	
VII Time reversion							
0 No definition	5	14.7	-	-	-	-	ns
1 Regression-ego	12	32.3	32	60.4	13	46.4	
2 Regression	13	38.2	19	35.8	13	46.4	
3 Decompensation	4	11.8	3	5.7	1	3.6	

Scale: 0=no definition, 1=coping, 2=defending, 3=fragmentation.
The overall *p*-value is shown between the BC *vs.* the BBD and HSS groups together.

Table IV. *The results of the affective-impulse regulations (VIII-X) of the ego process in the BC, BBD and HSS groups according to the classification by Haan.*

Study functions		BC		BBD		HSS		*p*-value
		n	%	n	%	n	%	(overall)
VIII	Diversion							
0	No definition	10	29.4	8	15.1	6	21.4	ns
1	Sublimation	18	52.9	37	69.8	16	57.1	
2	Displacement	5	14.7	8	15.1	6	21.4	
3	Affective preoccupation	1	2.9	-	-	-	-	
IX	Transformation							
0	No definition	7	20.6	7	13.2	3	10.7	0.01
1	Substitution	10	29.4	30	56.6	13	46.4	
2	Reaction formation	15	44.1	16	30.2	12	42.9	
3	Unstable alternation	2.	5.8	-	-	-	-	
X	Restraint							
0	No definition	1	2.9	-	-	1	3.6	ns
1	Supression	20	58.8	36	67.9	19	67.9	
2	Repression	12	32.3	17	32.1	8	28.6	
3	Depersonalisation	1	2.9	-	-	-	-	

Scale: 0=no definition, 1=coping, 2=defending, 3=fragmentation.
The overall *p*-value is shown between the BC *vs.* the BBD and HSS groups together.

reported less coping mechanisms; concentration (Function I), intellectuality (Function III) and logical analysis (Function IV). The groups differed only slightly from each other regarding the other study variables in Table II.

The receptive-intraceptive functions of the ego process according to the modified Haan classification in the BC, BBD and HSS groups. Table III shows the receptive-intraceptive functions (Functions V-VII) of the ego process according to the modified Haan classification in the BC, BBD and HSS groups. The BC group reported slightly more fragmentation mechanisms; decompensation (Function VII, "Time reversion") than the BBD and HSS groups. In addition, the BC group reported less coping mechanisms; empathy (Function V) and ambiguity tolerance (Function VI) than the BBD and HSS groups. The groups differed only slightly from each other regarding the other study variables in Table III.

The affective-impulse regulations of the ego process according to the modified Haan classification in the BC, BBD and HSS groups. The BC group reported more defending mechanisms; reaction formation (Function IX, "Transformation", Table IV) than the BBD or HSS groups. In addition, the BC group reported less coping mechanisms; sublimation (Function VIII), substitution (Function IX) and supression (Function X) than the BBD and HSS groups. The groups differed only slightly from each other regarding the other study variables in Table IV.

The mean scores (SD) of each ego process function according to the classification by Haan are given in Table V. The BC group reported higher mean scores in Function I ("Selective awareness"), III ("Detachment"), VII ("Time reversion"), X ("Restraint"), and the mean scores were significantly higher in Function IV ("Means-end symbolisation") and Function IX ("Transformation") than the mean scores in the BBD and HSS groups. Taking all defending variables together (the sum variable), these defensive mechanisms were significantly associated with increased breast cancer risk (RR=1.7, CI=1.1-2.6, *p*=0.02).

Discussion

Epidemiological research on coping style, personality and breast cancer risk has been motivated by theories of a so-called "cancer-prone personality" (37). Case-control and cohort studies take into account coping, personality and confounding factors at the individual level. Epidemiological studies of these factors and breast cancer risk are more common, because they are easier, quicker and cheaper to carry out than case-control and cohort studies.

The important bias related to case-control studies is recall bias, which occurs, for example, if cases report their life experiences differently from controls. This may happen because subjects have often thought about their previous experience in order to find causes for their breast cancer. To avoid the recall bias, this case-control study

Table V. *The results of the attention-focusing (I), the cognitive (II-IV) and the reflexive-intraceptive functions(V-VII) of the ego process in the BC, BBD and HSS groups according to the classification by Haan.*

Study functions		BC mean score (SD)	BBD mean score (SD)	HSS mean score (SD)	*p*-value (overall)
I	Selective awareness	1.55(0.68)	1.30(0.54)	1.44(0.64)	ns
II	Discrimination	1.55(0.62)	1.58(0.60)	1.43(0.63)	ns
III	Detachment	1.62(0.56)	1.40(0.49)	1.38 (0.49)	ns
IV	Means-end symbolisation	1.79(0.48)	1.50(0.50)	1.58(0.50)	0.04
V	Sensitivity	1.36(0.57)	1.32(0.47)	1.30(0.47)	ns
VI	Delayed response	1.44(0.58)	1.34(0.59)	1.44(0.65)	ns
VII	Time reversion	1.72(0.70)	1.47(0.61)	1.54(0.58)	ns
VIII	Diversion	1.29(0.55)	1.18(0.39)	1.27(0.46)	ns
IX	Transformation	1.70(0.61)	1.35(0.48)	1.48(0.51)	0.02
X	Restraint	1.42(0.56)	1.32(0.47)	1.30(0.47)	ns

Scale: 0=no definition, 1=coping, 2=defending, 3=fragmentation.

was conducted with a so-called "limited prospective study design"; women were asked to participate in the study and were interviewed and reports on the psychological factors were obtained before any diagnostic procedures, so neither the investigator nor the subject knew the diagnosis at the time of the interview. One potential bias comes from age as a confounding factor, and some studies have been criticised on such methodological grounds because of limited control for age (38). In our study, the BC group was 4.0 years and 5.9 years older than than the BBD group and the HSS group, respectively. However, no statistically significant age difference between these groups was found (*p*=0.12).

Coping is defined (39) as "the cognitive and behavioural efforts made to master, tolerate or reduce external and internal demands and among them." The Coping Strategies Inventory by Folkman and Lazarus (39) distinguishes between problem-focused coping, which deals with the source of the stress and emotion-focused coping, which regulates stressful emotions. We only found five studies with adequate design, directly addressing the coping strategies in relation to breast cancer risk. In a limited prospective study of women undergoing biopsy, Schwarz and Geyer (40) measured "action-control" as an indicator of reactions to stress and found no association with breast cancer. Using a 38-item version of the Ways of Coping Checklist, Edwards *et al.* (41) found no association between

breast cancer risk and either individual items or the 4 coping scales produced *via* factor analysis.

Cooper and Faragher (26) asked an undefined sample to describe methods used to cope with stressful events, creating a checklist of the 36 most commonly reported items based on the Ways of Coping Checklist. The 171 women subsequently diagnosed with breast cancer did not differ from those with no breast disease in relation to any coping strategies. One small case-control study by Chen *et al.* (10) which, contrary to the expectations of the investigators, revealed that women who reported coping with the stress of adverse events by confrontation and focusing on the problem had a 3.1-fold (95% CI 1.18-8.19) increased risk of breast cancer compared with women who used other coping mechanisms.

A well-conducted Australian study by Price *et al.* (14) tested the hypothesis that breast cancer risk would be affected not by life events alone, but in the presence of 'vulnerability factors' (emotional control, social support, coping style). However, this large case-control study found no differences between cases and controls in terms of problem- and emotion-focused coping styles.

In summary, the findings of earlier case-control studies of the coping characteristics vary from no association to some association in one study and, therefore, the evidence is insufficient to conclude that coping strategies contribute to breast cancer. The P.O. used the modified coping and defence inventory made by Haan to evaluate the functioning of ego.

The BC, BBD and HSS groups differed only slightly from each other as to the characteristics of the different variables of fragmentation. However, the three groups did differ from each other as to the characteristics of the coping and defending mechanisms. The BC group used significantly more defending mechanisms; denial, intellectualising, rationalisation and reaction formation than the BBD and HSS groups, and the defence mechanisms were significantly associated to increased breast cancer risk. The breast cancer patients used less coping mechanisms; concentration, intellectuality, logical analysis, empathy, ambiguity tolerance, regression-ego, sublimation and substitution.

In conclusion, our findings of a moderate relationship between coping mechanisms and the risk of breast cancer are in line with the findings of the study by Chen *et al.* (10), who recently specifically investigated coping and breast cancer risk. The biological explanation of the association might be that the coping and defending processes impact directly on hormonal, immune and nervous functioning, or indirectly by affecting behaviour such as diet, exercise or sleep, which are linked to the hormonal and immune systems.

Acknowledgements

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