

Assessment of General Anxiety in Patients with Breast Disease and Breast Cancer Using the Spielberger STAI Self Evaluation Test: A Prospective Case–Control Study in Finland

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Abstract. *Background: Trait anxiety (T-Anxiety) was assessed using the subscale from the Spielberger State-Trait Anxiety Inventory test (STAI form Y-2), with statements referring to how a person generally feels, and a higher total score reflecting a higher T-Anxiety. To the authors' knowledge, the associations between the STAI test and the risk of breast cancer (BC) are rarely considered together in a prospective study. Patients and Methods: In an extension of the Kuopio Breast Cancer Study 115 women with breast symptoms were evaluated for anxiety using the STAI form Y-2 test before any diagnostic procedures were carried out. Results: The clinical examination and biopsy showed BC in 34 patients, benign breast disease (BBD) in 53 patients and 28 individuals were shown to be healthy study subjects (HSS). There was a trend for the HSS women to have less severe anxiety in the STAI test (1/28 patients, 3.6%) than those in the BBD (7/53 patients, 13.2%) and BC groups (4/34 patients, 11.8%). The subjects in the HSS group reported being significantly more happy in the STAI test (STAI mean score, 1.54) than the BBD group (STAI mean score, 1.98) and the BC group (STAI mean score, 2.00) ($p=0.01$). The subjects in the HSS group also reported being more content in the STAI test (STAI mean score, 1.68) than the BBD group (STAI mean score, 1.87) and the BC group (STAI mean score, 1.97). Conclusion: Patients with BC and BBD tend to have more unhappy and uncontent feelings, but no specific link between the STAI test (form Y-2) and breast cancer risk is supported.*

The Spielberger State-Trait Anxiety Inventory (STAI) (1, 2), a relatively brief and objective self-evaluation instrument for

assessment of anxiety, has been used extensively in research and clinical practice. It consists of separate self-reported scales for measuring state and trait anxiety. Anxiety states are characterized by subjective feelings of apprehension, nervousness, tension and worry, at a given moment in time, and by activation or arousal of the autonomic nervous system. In contrast, trait anxiety (T-Anxiety) refers to the relatively enduring differences between people in the tendency to perceive stressful situations as threatening and to respond to such situations with elevations in the intensity of their state anxiety (S-Anxiety) reactions.

Because breast cancer (BC) is a hormonally responsive neoplasm and one with great psychological impact, it has been the most extensively investigated tumour for possible psychological variables associated with risk and survival (3). Hormonal factors, such as early age at menarche, later age at menopause, later age at first full-term pregnancy and hormone replacement therapy, are known to be the main risk factors for sporadic BC (4). In addition, life-style factors, such as obesity, smoking, alcohol consumption and lack of physical activity, appear to contribute to the increased risk for this malignancy, although the results concerning such factors are inconsistent (4-10). Psychological factors, such as stressful and adverse life events, are widely thought to play a role in the etiology of BC (11-28). To the authors knowledge, the associations between the STAI test and the risk of breast cancer are rarely considered together, and therefore this was a prospective study to examine the role of the STAI test in women with breast symptoms referred by physicians to the Kuopio University Hospital (Finland).

Patients and Methods

The Kuopio Breast Cancer Study was a multidisciplinary cooperative project conducted by different departments of the University of Kuopio and Kuopio University Hospital, and included all women who were referred to the hospital for breast examination between April 1990 and December 1995. The Kuopio Breast Cancer Study followed the protocol of the International Collaborative Study of

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Key Words: STAI test, form Y-2, cancer risk, breast cancer, anxiety.

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

Variable	HSS (n=28)	BBD (n=53)	BC (n=34)	p-Value
Age (mean, years)	45.7	47.6	51.6	0.12
Height (mean, cm)	160.8	162.3	164.4	0.75
Body weight (mean, kg)	68.3	67.8	72.5	0.25
Age at menarche (mean, years)	13.4	13.4	13.4	0.99
Age at birth of I child (mean, years)	25.0	25.0	25.2	0.92
Age at menopause (mean, years)	50.0	48.9	47.9	0.53
No. of children (mean)	2.5	2.4	2.6	0.27
Parity	23 (82%)	44 (83%)	31 (91%)	0.50
Breast feeding (mean, months)	3.9	3.4	3.6	0.77
Use of oral contraceptives	18 (64%)	25 (47%)	13 (38%)	0.12
HRT	14 (50%)	36 (68%)	27 (79%)	0.44
Premenopausal	18 (64%)	28 (53%)	13 (38%)	0.10
Postmenopausal	10 (36%)	25 (47%)	21 (62%)	0.12
History of previous BBD	10 (36%)	22 (42%)	18 (53%)	0.37
Family history of BC	5 (18%)	5 (9%)	1 (3%)	0.21
Use of alcohol	13 (46%)	31 (58%)	21 (62%)	0.44
Smoking	10 (36%)	21 (40%)	15 (44%)	0.80

HRT, Use of hormonal replacement therapy.

Breast and Colorectal Cancer coordinated by the European Institute of Oncology in Milan, and was initiated as a SEARCH program of the International Agency for Research on Cancer. The collaborative study is based on the assumption that breast cancer and colorectal cancer may have common risk factors. Study centers for the breast cancer study are situated in Canada, Finland, Greece, Ireland, Italy, Russia, Slovakia, Spain and Switzerland (29). The study participants showed breast cancer symptoms (a lump in the breast or in the axilla, pain in the breast, bleeding from the nipple, nipple discharge and/or skin dimpling), or an abnormality of the breast and the indications for referral in this study were in line with our previous investigations in a Breast Cancer Diagnostic Unit in Finland (30).

This case-control study was an extension of the Kuopio Breast Cancer Study (31, 32) and was approved by the Joint Committee of the University of Kuopio and Kuopio University Hospital. The women referred from January 1991 to June 1992 were included. Participation was based on written consent. One hundred and fifteen women participated and were interviewed (to determine the level of emotional depression) by a psychiatrist (P.O.) before any diagnostic procedures, so neither the interviewer nor the patient knew the diagnosis at the time of the interview. The interviews were recorded and the ratings were completed before the final diagnosis. The clinical examination, mammography and biopsy showed BC in 34 (29.6%) patients, benign breast disease (BBD) in 53 (46.1%) patients and 28 (23.4) patients with healthy study subjects (HSS) (Table I).

Assessment of life events and stress. The research method was a semistructured in-depth interview that was described previously (18). After the interviews the life events were rated (by P.O.) according to the degree of threat or stress they were likely to pose, and each adverse or stressful life event was graded on a 5-point scale (18). The defences used were also assessed on a five-point scale (18). The 'working through and actively confronting the stressful event' variable was also rated on a five-point scale (18).

Coping and defence strategies. A modified Haan coping and defence inventory (33) was used. This inventory is divided into ten scales, and each scale has subscales from grade 0 to grade III: with 0 meaning no definition, I: coping, II: defending and III: fragmentation.

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

Forsen inventory (FI). The women completed the Forsen Inventory (11) with 11 variables. The investigator used the FI inventory divided into three grades: grade 0, no psychiatric symptoms; grade 1, moderate psychiatric symptoms; grade 2, severe psychiatric symptoms.

Spielberger trait inventory (STAI Form Y-2 test). All the study participants completed the Spielberger trait inventory using the STAI Form Y-2 test (2) with 20 statements referring to how a person generally feels, with a higher total score reflecting a higher anxiety trait (20-80 range).

Montgomery Åsberg depression rating scale (MADRS). The MADRS (35) with ten variables (scores from zero to six) was used to evaluate the depression of the study participants.

Statistical analysis. Significance of the results was calculated with the SPSS/PC statistical package (SPSS Inc., Chigaco, IL, USA). Correlations and differences between the study groups (BC, BBD and HSS groups) were measured with the two-sided Chi-square test and non-parametric Kruskal-Wallis variance analyses. Results were considered statistically significant at a *p*-value <0.05.

Table II. *The Spielberger Trait self-evaluation questionnaire (STAI Form Y-2).*

Variable	HSS (n=28)		BBD (n=53)		BC (n=34)		<i>p</i> -value
	mean	(SD)	mean	(SD)	mean	(SD)	
I feel pleasant (4,3,2,1)*	1.93	(0.66)	2.04	(0.73)	1.97	(0.58)	0.77
I feel nervous and restless (1,2,3,4)	2.11	(0.57)	2.15	(0.57)	2.26	(0.71)	0.56
I feel satisfied with myself (4,3,2,1)	2.07	(0.38)	2.09	(0.53)	2.21	(0.59)	0.52
I wish I could be as happy as others seem to be (1,2,3,4)	2.00	(0.82)	1.98	(0.75)	2.00	(0.82)	0.52
I feel like a failure (1,2,3,4)	1.89	(0.63)	1.89	(0.64)	1.68	(0.68)	0.28
I feel rested (4,3,2,1)	2.14	(0.65)	2.25	(0.62)	2.15	(0.78)	0.73
I am calm, cool and collected (4,3,2,1)	2.07	(0.78)	1.87	(0.71)	1.82	(0.72)	0.37
I feel that difficulties are piling up so that I cannot overcome them (1,2,3,4)	1.57	(0.57)	1.74	(0.68)	1.71	(0.91)	0.62
I worry too much over something that really doesn't matter (1,2,3,4)	2.36	(0.68)	2.45	(0.77)	2.12	(0.91)	0.16
I am happy (4,3,2,1)	1.54	(0.58)	1.98	(0.75)	2.00	(0.70)	0.01
I have disturbing thoughts (1,2,3,4)	2.25	(0.59)	2.66	(0.85)	2.44	(0.99)	0.11
I lack self-confidence (1,2,3,4)	1.96	(0.58)	2.32	(0.85)	2.00	(0.89)	0.09
I feel secure (4,3,2,1)	1.79	(0.69)	1.72	(0.77)	1.71	(0.63)	0.89
I make decisions easily (4,3,2,1)	2.39	(0.74)	2.62	(0.84)	2.29	(0.68)	0.15
I feel inadequate (1,2,3,4)	2.00	(0.39)	1.96	(0.48)	2.09	(0.51)	0.48
I am content (4,3,2,1)	1.68	(0.72)	1.87	(0.65)	1.97	(0.72)	0.25
Some unimportant thought runs through my mind and bothers me (1,2,3,4)	2.07	(0.38)	2.23	(0.70)	2.09	(0.71)	0.48
I have disappointments so keenly that I can't put them out of my mind (1,2,3,4)	1.93	(0.72)	2.17	(0.85)	1.85	(0.61)	0.13
I am a steady person (4,3,2,1)	1.89	(0.83)	2.06	(0.84)	1.85	(0.82)	0.49
I get in a state of tension or turmoil as I think over my recent concerns and interests (1,2,3,4)	1.46	(0.69)	1.58	(0.69)	1.82	(0.87)	0.15

STAI Form Y-2 statements; 1=almost never, 2=sometimes, 3=often, 4=almost always. *Scoring key for STAI Form Y-2 in parenthesis. HSS=Healthy study participants, BBD=benign breast disease, BC=breast cancer.

Results

The mean age of the BC patients was 51.5 years. The corresponding figure for the patients with BBD was 47.5 years and for the HSS group 45.7 years. Although 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 patients (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%) and almost 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 were 27,714 € per year and for the healthy study subjects (HSS) were 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 as to the factors of the reproductive life of the women (Table I).

The psychiatric symptoms in STAI Form Y-2 test. The psychiatric symptoms assessed in the STAI Form Y-2 test in healthy study subjects (HSS), in patients with benign breast

disease (BBD) and in patients with breast cancer (BC) are shown in Table II. There was a trend for the women with HSS to have less severe anxiety in the STAI test (1/28 patients, 3.6%) than these of the BBD (7/53 patients, 13.2%) and BC groups (4/34 patients, 11.8%). The HSS group reported significantly more happiness in the STAI Form Y-2 test (STAI mean score, 1.54) than the patients in the BBD group (STAI mean score, 1.98) and in the BC group (STAI mean score, 2.00) ($p=0.01$). The subjects in the HSS group also reported being more content in the STAI Form Y-2 test (STAI mean score, 1.68) than the patients in the BBD group (STAI mean score, 1.87) and the patients in the BC group (STAI mean score, 1.97). The mean sum (mean, SD) of the scores of the STAI test variables were lower in the HSS group (39.1, 6.4) than in the BBD (41.5, 7.2) or BC group (40.1, 8.6). However, the scores for the STAI for HSS, BBD and BC differed only slightly when the STAI variables were considered in four different categories (Figure 1).

Discussion

Although the first definitions of fear and anxiety date back to Greek antiquity, when Galen (130-200) noticed that women with melancholy mood due to an increased rate of black bile were prone to develop BC (36), concerns about fear and anxiety are as old as humanity itself. Sigmund Freud first

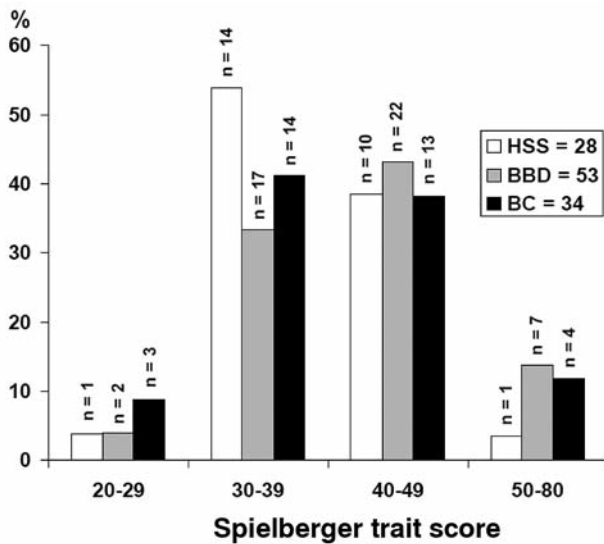


Figure 1. The distribution of the mean sum of the Spielberger Trait Scores in four separate categories for patients with breast cancer (BC), for those with benign breast disease (BBD) and for the healthy study participants (HSS).

proposed a critical role for anxiety in personality theory and in the etiology of psychosomatic disorders. For Freud, “anxiety” was the fundamental phenomenon and the central problem of neurosis (37).

The concepts of state and trait anxiety were first introduced by Cattell and have elaborated by Spielberger. An emotional state exists at a given moment in time and a particular level of intensity. In contrast to the transitory nature of emotional states, personality traits can be conceptualized as relatively enduring differences among people in specific tendencies to perceive the world in a certain way and in dispositions to react or behave in specific manner. Personality traits have the characteristics of a class of constructs that is called “motives” or “acquired behavioural dispositions.” T-Anxiety, like potential energy, refers to individual differences in reactions. The Spielberger State-Trait Anxiety Inventory (STAI) has been used extensively in research and clinical practice. It consists separate self-report scales for measuring state and trait anxiety. The development of STAI test procedures was initiated at Vanderbilt University in 1964 by Spielberger and Gorsuch. The initial goal was to develop a relatively brief and objective self-evaluation instrument to assess state and trait anxiety in college students. STAI test activities were shifted in 1967 to Florida State University and the goal broadened to include testing high school students and emotionally disturbed persons. The test form X was published in 1970 and a children’s form, the State-Trait Anxiety Inventory for Children (STAIC), was developed to

assess anxiety in 9-12-year-old children (1). College students generally require about 5-6 minutes completing either the S-Anxiety or the T-Anxiety scale, and approximately 10 minutes to complete both. Emotionally disturbed persons may require 10 minutes to complete one of the scales and about 20 minutes to complete both. About half of the statements in the STAI inquire about negative characteristics (feeling nervous and restless, feeling failure, feeling worry) and some people are reluctant to admit having these characteristics because they regard them as signs of weakness. In research settings the study subjects generally respond more accurately and objectively if they are informed that their responses will be kept confidential, and if they are promised feedback about their test results.

The patients in the BC, BBD and HSS groups differed only slightly from each other regarding the STAI assessment. However, the subjects in the HSS group tended to be happier and more content than the subjects in the BBD and BC groups. The mean sum of the scores of the STAI variables was slightly lower in the HSS group than in the BBD or BC groups. To our knowledge, there is no previous reports with this study design available for sufficient comparative evaluation and to examine the role of STAI in patients with breast disease and breast cancer.

From the popular belief that psychological factors have a significant role in the carcinogenesis of the breast, it follows that study subjects with breast cancer may be more prone than healthy subjects to report prior stress and other psychological problems in an effort to explain their breast cancer. This could lead either to a false positive association between psychological factors and breast cancer risk or to the overestimation of true positive associations. Therefore, the study was designed to reduce the recall bias; the reports on psychological factors were obtained from the study subjects who had breast cancer symptoms, but had not yet been given a definitive diagnosis.

One potential bias arises from age being a confounding factor, and some of the earlier studies have been criticized on such methodological grounds as limited controlling for age (38). In the present study, the BC group was 4.0 years and 5.9 years older than the BBD group and the HSS group, respectively. However, no statistically significant age difference between these groups was found in our study ($p=0.12$).

In summary the patients with BC and BBD tended to have more unhappy and discontent feelings. The results of this study do not support a specific link between STAI Form Y-2 test and breast cancer risk.

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