Anger in Health, Benign Breast Disease and Breast Cancer: A Prospective Case–Control Study

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Abstract. Background: The State-Trait Anger Expression Inventory 2 (STAXI-2) is a psychometric instrument measuring anger experience and expression. Associations between the STAXI-2 and risk of breast cancer (BC) are rarely considered together in a prospective study. Patients and Methods: A total of 117 women with breast symptoms referred for breast examination were selected and assessed before any diagnostic procedures. Results: Twenty-four patients with BC, 44 with benign breast disease (BBD) and 49 healthy individuals (HHS) were included. Scores for parameters state anger/feel like expressing anger physically (SANGP) were significantly higher in the HHS group (HHS vs. BBD: p=0.027; HHS vs. BC: p=0.025). BC patients showed a trend to lower scores in almost all scales of STAXI-2, except for the scales trait anger/angry temperament (TANGT), anger expression-in (AX-I), and anger control-out (AC-O), that were higher than the two other groups’ scores. Conclusion: The results of this study do not support a specific link between STAXI-2 and breast cancer risk.

The interplay among psychosocial factors, psychiatric comorbidity, and chronic emotional distress as possible associated features or co-factors in the onset, course, and clinical expression of breast cancer (BC) has gained attention in research strategies pursued by different specialties. Among psychosocial factors, inadequate family functioning and conflicting relationships, maladaptive coping styles ("hopelessness-helplessness" and "anxious preoccupation"), and dysfunctional emotional control have been indicated as possible predictors of psychopathological symptoms in patients with BC (1-4). Regarding psychiatric comorbidity, women with BC had higher levels of anxiety, depression and general psychopathological symptoms compared with unaffected individuals (5-7).

Regarding emotional distress, research shows that negative emotions and emotional repression can influence immune responses and hormonal levels, possibly contributing to the mechanisms underlying the regulation of carcinogenesis, with higher cancer incidence and faster progression (8, 9). Among negative emotions, anger suppression in particular was a predictor of higher levels of symptoms related to immune function and cardiovascular arousal (e.g., mouth sores and heart palpitations) during chemotherapy for BC, also influencing maladaptive coping styles (10).

Anger is a negative emotion conceptualized either as a “state” condition, reactive to unpleasant or frustrating events, or as a “trait” feature, which represents a stable component of personality. Within this conceptual frame, a reliable measure of anger experience and expression, the State-Trait Anger Expression Inventory – Second edition - STAXI-2, has been developed (11). To the best of our knowledge, this psychometric instrument has been rarely used in BC research, and therefore the present prospective study was designed to evaluate the role of STAXI-2 in a sample of women with breast symptoms referred for breast examination to the University Hospital of Messina, Italy.

Patients and Methods

Participants. Women with breast symptoms referred for breast examination to the Department of Radiological Sciences of the University Hospital of Messina, from January 2012 to December 2012, were consecutively selected and enrolled in the study.

Women were asked to participate in the study and were interviewed by a psychiatrist 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 ratings were completed before the final diagnosis.
Table I. Clinicodemographic features of the study participants.

<table>
<thead>
<tr>
<th></th>
<th>BC (n=24)</th>
<th>BBD (n=44)</th>
<th>HHS (n=49)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), mean±SD</td>
<td>52.2±6.2</td>
<td>48.5±11.1</td>
<td>49.1±7.8</td>
<td>0.258b</td>
</tr>
<tr>
<td>Age at menarche (years), mean±SD</td>
<td>12.4±1.1</td>
<td>12.4±0.9</td>
<td>12.5±1.1</td>
<td>0.832b</td>
</tr>
<tr>
<td>Family history of BC, number (%)</td>
<td>1 (4%)</td>
<td>4 (9%)</td>
<td>9 (18%)</td>
<td>0.162a</td>
</tr>
<tr>
<td>Use of oral contraceptives, number (%)</td>
<td>6 (25%)</td>
<td>14 (32%)</td>
<td>17 (35%)</td>
<td>0.704a</td>
</tr>
<tr>
<td>Smoking, number (%)</td>
<td>8 (33%)</td>
<td>8 (23%)</td>
<td>10 (20%)</td>
<td>0.464a</td>
</tr>
</tbody>
</table>

BC: Breast cancer; BBD: benign breast disease; HHS: healthy breasts. aANOVA; bχ²-test.

All participants provided written informed consent after a full explanation of the study design which had been approved by the local Ethic Committee (Prot. E 37/11-23.05.2011).

Measures. All subjects were assessed by the following psychometric instruments: STAXI 2 (11): A 57-item self-report inventory which measures the intensity of anger as an emotional state (trait anger; SANG), how the individual is disposed to anger feelings as a personality trait (trait anger), and anger expression and control. The SANG consists of 15 items measuring how intensely an individual experiences anger during either the testing period, or a time or situation specified by the examiner and consists of three subscales: state anger/feeling anger (SANGF), state anger/feel like expressing anger verbally (SANGV), and state anger/feel like expressing anger physically (SANGP). The Likert scale for SANG ranges from 1 (not at all) to 4 (very much so). Trait anger (TANG) comprises 10 items measuring an individual’s proneness to experiencing angry feelings. The Likert scale for this measure ranges from 1 (almost never) to 4 (almost always). Two subscales are used to comprise the TANG: trait anger/angry temperament (TANGT) and trait anger/angry reaction (TANGR). The final part of this inventory measures the ways in which an individual expresses and controls anger. These scales consist of 32 items using the same Likert scale as for the TANG. The following make up this final part of the STAXI-2: the anger expression-out (AX-O) scale, the anger expression-in (AX-I) scale, the anger control-out (ACO) scale, the anger control-in (AC-I) scale, and the anger expression index (AX). The STAXI has been validated on a variety of normal and clinical populations and both the original and the Italian version has good psychometric properties. The internal consistency of the STAXI TANG scale for our sample was acceptable (alpha=0.82).

Hamilton Rating Scale For Depression (HDRS) (12): The HDRS is a 17-item semi-structured interview that assesses depressive symptoms such as depressed mood, health concerns, loss of interests, insomnia or psychomotor retardation. The items were rated on 3- or 5-point scales and scores on the scale can range from 0 to 53, with a higher score indicative of a higher level of depression. Scores ranging from 0 to 7 suggest no or minimal symptoms of depression, 8-17 indicate mild depression, 18-25 suggest moderate depression, and scores of 26 and above are associated with severe depression. The internal consistency of the scale in this study was acceptable (alpha=0.79).

Paykel Life Events Scale (13): This was used to measure subjective stress. The scale is a 63-item instrument and covers a comprehensive range of recent life events, their timing and severity for the subject with scores from 1 to 20. It has two time frames for evaluation: (i) life events that occurred during the six months before the assessment; (ii) those that occurred before the past six months.

Statistical analysis. Data obtained from the study underwent checking and quality control and, subsequently, descriptive and inferential statistical analysis. Continuous data are expressed as the mean±SD (standard deviation) and significant differences among groups was assessed using the one-way analysis of variance (ANOVA) with post hoc comparisons (Bonferroni); non-continuous data are expressed as percentages and the comparison among the study groups was performed by using the χ²-test. The significance level for the test was p<0.05. The statistical analysis was performed with Statistical Package for the Social Sciences – SPSS 16.0 software (SPSS Inc, Chicago, IL, USA).

Results

A total of 117 women agreed to participate in the study. The clinical examination, mammography and biopsy showed BC in 24 (20.5%) patients, benign breast disease (BBD) in 44 (37.6%) and healthy breasts (HHS) in 49 (41.9%). Clinicodemographic features of the study participants are reported in Table I. Although the patients in the BC group were older than individuals in the BBD and HHS groups (mean age=52.2 vs. 48.5 vs. 49.1), the difference was not statistically significant (p=0.258). The majority of patients (84/117, 71.8%) were married or living in a stable relationship. Regarding the level of education, 14.5% (n=17) of the sample had 5 years of education, 27.4% (n=32) had 8 years of education, 41% (n=48) had 13 years of education, 17.1% (n=20) were graduates.

Anger assessment by STAXI-2. Anger experience and expression, as measured by STAXI-2, are shown in Table II. Mean scores for each STAXI scale and subscale were within the normal range. Nevertheless, there was a trend in women with BC to have lower scores than those of BBD and HHS groups for almost all subscales of the STAXI-2; the few exceptions in this observed trend concerned the following subscales: TANGT, AX-I, and AC-O, whose mean scores were higher than the two other groups’ scores. Statistically significant differences among subgroups emerged only
regarding the variable SANGP, which was higher in the HHS group (Bonferroni post-hoc test: HHS vs. BBD: \( p = 0.027 \); HHS vs. BC: \( p = 0.025 \)).

Regarding the frequencies (expressed in percentages) of those who reported scores in the clinical range in the three groups (Table III), statistically significant differences among subgroups emerged only regarding the variable SANGV (\( \chi^2 = 6.871; p = 0.032 \)), with only four individuals (9.1%) from the BBD group showing pathological scores for this subscale.

**Other psychiatric measures.** No clinically significant differences between groups were recorded regarding mood assessment (BC group vs. BBD group vs. HHS group: 12±8.1...
for different psychological measures, including emotional
not detect differences between those with BC and controls
attitude toward helplessness or hopelessness, Price
unassertiveness, difficulty in expressing emotions, and an
‘cancer prone personality’ (25), characterized by
with an increased risk of BC.
examined emotional features was significantly associated
their study, the authors demonstrated that none of the
patients with BC compared to healthy individuals (24). In

directed toward other people or objects), and “control” in
suppressed), “expression – out” (when negative emotions are
held in or
depression, as well as the way of dealing with them:
“expression – in” and emotional “expression – out” (26).
More recently, it was shown that patients with BC tended to
have an increased risk for bearing the ‘high commitment’
characteristic and this pattern could contribute to cancer risk
through immune and hormonal pathways (27).

On the other hand, previous findings showed evidence of
anger suppression and repression to be associated with BC
development and progression (28, 29). A review investigating
the interaction between psychosocial factors and BC
highlighted that social support, anxious-depressive symptoms
and personality factors were not related to cancer
development, with the only exception being anger repression
(30). Nevertheless, most of the reviewed studies suffered from
selection biases regarding factors such as participants’ age and
possible knowledge of diagnosis at the time of recruitment.

In our sample, women with BC were older than those of
BBD and HHS groups, but there was no significant age
difference between these subgroups. Moreover, the assessment
of anger was conducted in a screened population showing BC
symptoms or breast abnormalities before definitive diagnosis.

There are a number of limitations to this study that should
be considered. The sample size is relatively small, and
recruited individuals were from a geographically restricted
area, so this may limit the generalizability and validity of
these findings. Therefore, the results obtained should be
replicated in a larger sample more representative of the
general population. Furthermore, the results obtained in our
study are based on the use of a self-report psychometric
measure, which may have been influenced by extraneous
events such as the use of a defensive response style, filtered
and subjective rater perceptions, social desirability, self-
serve biases regarding positive personal traits and “halo
effect” (no discrimination among behaviors), all individual
factors which may interfere with the validity of self-
evaluation instruments, preventing the evaluation of the true
anger level.

In conclusion, our study has confirmed the findings of the
literature showing that measures of anger have a relatively poor
association with risk of BC. Therefore anger as an emotion,
when taken as an isolated factor, cannot be considered as a
predisposing factor for this disease. Nevertheless, it is possible
that anger dimensions, or other negative emotions, although
having no direct impact on the development of breast
carcinoma, may represent vulnerability factors that compromise
the adjustment to the diagnosis of a serious illness. For this
reason, further studies should investigate this controversial area
of research, also evaluating the association with other important
medical and behavioral risk factors for cancer, such as physical
inactivity, smoking, obesity, alcohol abuse.

Finally, according to our results, the hypothesis that
STAXI-2 may be a useful psychometric tool for assessing
anger as a predictive feature in the development of BC was
not supported.

**Discussion**

The present study was designed to assess anger in a sample
of patients who had breast symptoms but had not yet been
given a definitive diagnosis; after diagnostic procedures, the
study sample was divided into three groups: BC, BBD, and
HHS. We found that levels of anger, measured by STAXI-2
scales and subscales, were within normal range in all three
groups. There was only one significant difference in anger
scores: HHS women experienced more state anger
(expressed by behaviors consisting in physical expressions
like hitting someone or breaking objects) due to unpleasant
or frustrating events, than did BC and BBD groups.

Although not statistically significant, women with BC had
lower levels of anger experience and expression than BBD
and HHS groups for almost all STAXI-2 scales, except for
three scales measuring angry temperament, inwardly
expressed anger, and outward control of anger, whose mean
scores were higher than the two other groups’ scores.

In general, this findings support the hypothesis that there
is no association between different dimensions of anger and
development of BC.

Although the line of research aimed to evaluate possible
relationships between socio-psychological factors and the
risk of breast cancer has involved depression, anxiety and
anger (14-18), discordant results have emerged on the role
of negative emotions and stressful life events (19-22).

The findings of the current study are consistent with those
of White et al., who showed that there was no significant
association between the dimension of anger control or
negative emotions and the risk of BC and other types of
tumoral diseases (23).

Our results further support the study by Bleiker et al. that
assessed several negative emotions such as anxiety, anger,
depression, as well as the way of dealing with them:
“expression – in” (when negative emotions are held in or
suppressed), “expression – out” (when negative emotions are
directed toward other people or objects), and “control” in
patients with BC compared to healthy individuals (24). In
their study, the authors demonstrated that none of the
examined emotional features was significantly associated
with an increased risk of BC.

In a previous study examining the theoretical model of
‘cancer prone personality’ (25), characterized by
unassertiveness, difficulty in expressing emotions, and an
attitude toward helplessness or hopelessness, Price et al. did
not detect differences between those with BC and controls
for different psychological measures, including emotional

vs. 9.2±5.1 \textit{vs.} 9±5.2; ANOVA: F=2.35, df=2, \( p=0.099 \)), and
life events (BC group \textit{vs.} BBD group \textit{vs.} HHS group:
12.7±13.1 \textit{vs.} 18.1±19.1 \textit{vs.} 16.3±23.7; ANOVA: F=0.552,
df=2, \( p=0.577 \)).
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References


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