Predictors of symptom distress in women with breast cancer during the first chemotherapy cycle

By Marcia M. Boehmke and Jean K. Brown

Abstract

Purpose: To determine the extent to which personal characteristics and "person factors" predict symptom distress during the first cycle of chemotherapy.

Design: Prospective, longitudinal, correlational.

Sample and setting: 120 women with Stage I and II breast cancer starting their first cycle of chemotherapy were recruited from six diverse oncology settings.

Methods: Self-report questionnaires were completed prior to the beginning, the nadir, and the end of the first chemotherapy cycle.

Main research variables: Personal characteristics, "person factors", and symptom distress.

Findings: Optimism and external locus of control predicted low symptom distress levels at the both the nadir and at the end of the first cycle. Fatigue, appearance, and insomnia caused the greatest distress with higher symptom distress scores reported at the nadir with a mean item score of 1.98 on a five-point Likert scale.

Conclusions: Women who maintained a positive outlook, and trusted their health care providers experienced lower levels of symptom distress. Findings suggest that most women experienced some symptom distress, particularly during the middle of the first cycle of chemotherapy.

The diagnosis of breast cancer evokes considerable stress in a woman from diagnosis through treatment completion. Each woman's journey with breast cancer and treatment is unique and has come to be termed "symptom distress" (Rhodes & McDaniel, 1999). While symptoms and adverse effects of treatments may be

similar, an individual's response to these symptoms may be very different. Identification of those women at greatest risk for the development of symptom distress is imperative, because high levels of symptom distress can affect the quality of life for those who have been treated for breast cancer. Quality of life might be enhanced if symptom distress during treatment is minimized as much as possible. The purpose of this study was to determine the extent to which personal characteristics and "person factors" predict symptom distress in women with breast cancer during the first cycle of chemotherapy.

Theoretical framework

Lazarus and Folkman's Theoretical Model of Stress and Coping, encompassing the four concepts of stress, appraisal, response, and outcomes (Lazarus & Folkman, 1984) was used to guide this study. This theoretical framework incorporates the concept of cognitive appraisal between the stress encounter (breast cancer) and the outcome (symptom distress). Through cognitive appraisal, an individual evaluates the significance of a stressful encounter and determines if the stressful encounter will affect their well-being. Lazarus and Folkman have demonstrated that appraisal-related processes are influenced by personal characteristics (such as age, marital status, and socioeconomic status) as well as "person factors" (such as optimism and locus of control) and can shape the reaction of individuals to the encounter. The relationship of personal characteristics and "person factors" as predictors of a woman's appraisal of the diagnosis of breast cancer and resultant symptom distress was the primary focus of this study. Based on this theory, it was expected that appraisal of a threat (breast cancer) and the outcome (symptom distress) would be related to a combination of personal characteristics (age, marital status, and socioeconomic status) and "person factors" (optimism and locus of control).

Literature review

Symptom distress has been defined as "the degree of discomfort reported by patients in relation to their perception of the symptoms being experienced (McCorkle & Young, 1978) and as the physical and mental anguish or suffering that results from the experience of symptom occurrence or perception of feeling states (Rhodes & Watson, 1987). Research findings have demonstrated that symptom distress can hamper self-care, threaten independence, alter social

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relationships and decrease adherence to treatment protocols, thereby decreasing survival (Degner & Sloan, 1995; Kukull, McCorkle & Driever, 1986).

Research studies have identified four variables significantly related to symptom distress reported by patients with cancer. These variables are: age, gender, type of cancer and cancer treatment. Younger patients (Cimprich, 1999; Degner & Sloan, 1995; Pasacrete, 1997; Sarna & Brecht, 1997) and women (Degner & Sloan, 1995; Tishelman, Taube, & Sachs, 1991) reported higher levels of symptom distress. Certain types of cancer, specifically lung cancer, have been associated with higher levels of symptom distress (Degner & Sloan, 1995; Sarna & Brecht, 1997). Higher symptom distress levels have also been correlated with stage of cancer (Ehlke, 1988), recurrence (Munkres, Oberst, & Hughes, 1992), and with diminished survival (Kukull, McCorkle, & Driever, 1986).

Family, as well as support from others, has been postulated to affect symptom distress levels (Tishelman, et al., 1991), with unmarried patients reporting higher levels of symptom distress. Marital status and its relationship to symptom distress have been infrequently examined.

Similarly, the relationship of education and socioeconomic status with symptom distress has been insufficiently examined. Higher education could be an important variable, conjecturing that those with higher education might ask more questions/seek more information about their malignancy. This information-seeking or problem-solving approach could, in turn, either increase or decrease levels of symptom distress. Sarna and Brecht (1997) examined educational levels and found that those with higher educational levels reported lower scores for outlook on the symptom distress scale (Sarna & Brecht, 1997). Likewise, socioeconomic status may affect access to care. As health care costs escalate, delay in care may affect outcomes and symptom distress experienced. To date, no studies have examined socioeconomic status.

Ehlke (1988) studied symptom distress in women with breast cancer and found internal locus of control was correlated with lower symptom distress. This confirmed the work of Lazarus and Folkman (1984) who postulated that personal characteristics and "person factors" reflected the essence of the person and affected an individual's appraisal and response to stress.

The variables of age, gender, type of cancer and type of treatment have been examined at length. In contrast, marital status, education and socioeconomic status have been examined in only a few studies and, therefore, their relationship with symptom distress is speculative at best. The psychosocial variables of optimism and locus of control affecting symptom distress have likewise been inconsistently studied in patients with cancer. This is of concern because other disciplines such as psychosocial and behavioural psychology have found appraisal, perception, and attitudes influence optimism and locus of control and are significantly related to stressful events (Lazarus & Folkman, 1984). Investigating optimism and locus of control may prove important because "perception" is a key concept in most definitions of symptom distress, namely, "discomfort in relation to perception" (McCorkle & Young, 1978) and "perception of feeling states" (Rhodes & Watson, 1987).

Purpose

The purpose of this study was to determine the extent to which personal characteristics and "person factors" predict symptom distress during the first cycle of chemotherapy. There were two research questions: (a) To what extent do baseline personal characteristics (age, marital status, and

socioeconomic status) and "person factors" (optimism and locus control) predict symptom distress levels at the nadir and at the end of the first chemotherapy cycle, as well as change scores in symptom distress during the first chemotherapy cycle? and (b) What is the frequency of symptoms and intensity of symptom distress during the first cycle of chemotherapy?

Methods

Design and setting

A prospective, longitudinal, correlational design was used to recruit women from six sites: five private medical oncology offices (four located in suburban Buffalo, New York, and one located in urban Buffalo) and Erie County Medical Center, a public teaching medical oncology clinic located in the city of Buffalo. These six sites were selected to provide a socioeconomic and educational diversity in the sample. Women newly diagnosed with breast cancer and about to start chemotherapy were followed for the first cycle of adjuvant chemotherapy. This particular timeframe was selected for this study based on personal communication with Ruth McCorkle, RN, PhD (personal communication February 10, 2001). McCorkle postulated that women experience the greatest number of side effects and resultant symptom distress during the first seven to 14 days (nadir) after the start of chemotherapy, however little research had been done studying the nadir of the chemotherapy cycle.

Sample

The convenience sample included 120 women. Inclusion criteria were histologically confirmed stage I or II breast cancer, about to begin adjuvant chemotherapy, over 18 years old, able to understand and read English, and able to understand and complete the informed consent and questionnaires. The exclusion criteria were a previous or concurrent malignancy, receiving any other type of adjuvant treatment, a co-morbid disease that is incapacitating (e.g., multiple sclerosis, COPD, arthritis) and determined by the principal investigator (PI) to affect the distress level of the woman in addition to breast cancer, previous or current psychiatric history (documented in the medical records or evidenced by current medications), experienced a recent catastrophic event within the last 30 days (e.g., divorce, death in the family, loss of employment) or unable to accurately complete study questionnaires. The sample size of 120 was based on 0.80 power, a medium effect size, and an alpha of .05 for multiple regression with six independent variables as described by Cohen (1992).

Instruments

Symptom distress. The McCorkle Symptom Distress Scale (SDS) was used to measure symptom distress and consists of a 13-item, five-point Likert scale with range of 13 (low distress) to 65 (high distress) (McCorkle & Young, 1978). Internal consistency and test-retest reliability are well-established for the SDS. In this study, the alpha coefficient for all three data collection points was 0.82, 0.80 and 0.80 respectively. This instrument has been widely used in measuring symptom distress in cancer patients and has well-established validity.

Age and marital status. Age and marital status of the participants were obtained from the medical record or by interview.

Socioeconomic status. Socioeconomic status was calculated using two factors, education and occupation, from the Hollingshead Four-Factor Index of *Social status* (Hollingshead, 1975). This formula was selected because it integrates education and occupation and was designed by estimating positions occupied by

individuals within the structure of a complex, industrial, urban society. Education is operationalized in terms of the number of years of schooling an individual has completed and is scored using a seven-point scale ranging from “less than seventh grade” (score of one) to “graduate professional training or graduate degree” (score of seven). The individual’s occupation is graded on a nine-step scale, using the 1970 U.S. Census for occupational titles and codes (Hollingshead, 1975). The nine-step scale ranges from “higher executives, proprietors of large businesses and major professionals” (nine) to “farm labourers/menial service workers” (one).

The status score was calculated by multiplying the education by a weight of three and the occupation score by a weight of five. The scores were then summed to determine the status score. Computed scores on this index have a possible range from eight to 66. The higher the score, the higher the individual’s status is in our society (Hollingshead, 1975). Although reliability and validity have not been reported for this instrument, it has been used extensively as a measure of socioeconomic status. To ensure accuracy, only the PI scored the subjects in this study and calculations were rechecked to confirm scoring at time of data entry.

Optimism. The Scheier and Carver Life Orientation Scale (LOT) was used to measure optimism (Scheier & Carver, 1985). The self-report instrument was designed to measure optimism and dispositional self-consciousness in coping effectiveness and consists of eight items (four positive and four negative), offering a Likert-scale of five response options ranging from one (strongly agree) to five (strongly disagree). Scoring of the instrument is accomplished by assigning points to each score: 1 = 4 points, 2 = 3 points, 3 = 2 points, 4 = 1 point, 5 = 0 points. The points are then totalled to obtain a final optimism score: 32 points indicated “most optimistic” and 0 points indicated “most pessimistic”. Test-retest reliability (over a 12-month interval) has been established at .74, suggesting that the LOT possesses reasonable stability across time (Carver et al., 1993).

Locus of control. The Multidimensional Health Locus of Control (MHLOC) Form-C was used to measure locus of control (Wallston et al., 1994). An 18-item self-report questionnaire, the MHLOC rates individuals’ beliefs regarding control, specifically to health and contains two six-item subscales (internality and chance externality) and two independent three-item subscales (doctors and other people). Each item is a six-point Likert scale (6 = strongly agree, 1 = strongly disagree). Item scores are summed for total subscale scores. Internality and externality subscales were only used in this study.

Procedure

After receiving approval from the Health Sciences Human Subjects Review Committee, University at Buffalo, The State University of New York, women were recruited from the six sites by the principal investigator (PI). After explaining the study to the women, informed consent was obtained. All data were collected during the first cycle of chemotherapy at three time points, before the first dose of chemotherapy, seven to 14 days after the first dose (nadir), and at the end of the first cycle of chemotherapy. Demographic information (including age, marital status and socioeconomic status) was obtained from the medical record or by interview. Baseline data for optimism, locus of control, and symptom distress were obtained during the time interval when the subject was waiting for her first dose of chemotherapy (Time one). Symptom distress was measured again at the nadir of the first chemotherapy cycle (actual range for this study was nine to 11 days after the start of chemotherapy)

(Time two), and again at the end of the first cycle of chemotherapy (approximately 30 days after initiation of chemotherapy) (Time three).

Analysis

SPSS Version 10.0 for Windows was used in the statistical analysis. The level of statistical significance for the study was set at .05. Descriptive statistics were calculated to summarize the demographic variables as well as the independent and dependent variable scores. Individual linear regression slopes for each subject were calculated and used as scores of change in symptom distress over time (Kraemer & Thieman, 1989). Simultaneous multiple regressions were computed by regressing change scores for SDS as well as total SDS scores for Time two and Time three on the independent variables of age, marital status and socioeconomic status, optimism and locus of control (internality and externality).

Results

Sample characteristics. During recruitment, 137 women were approached to participate in the study. Of these, nine women refused to participate in the study. The primary reasons for refusal were “too many questions”, “too anxious” or “have filled out too many forms already”. In addition, five women started filling out the questionnaires and then stopped, feeling the questions were too intrusive. Three subjects who completed Time one questionnaires did not return Time two questionnaires and were subsequently dropped from the study. The final sample size consisted of 120 women with stage I or II breast cancer undergoing their first cycle of adjuvant chemotherapy. Demographic and clinical characteristics of those who refused to participate in the study and/or withdrew mirrored those of the study sample. Women recruited for the study were primarily white (96%), had some college education (80%), and were employed. Clinically, most of the women had stage 1A infiltrating ductal carcinoma and had undergone a lumpectomy. Fifty-two per cent of the women had no co-morbid condition and had tolerated surgery well, incurring no post-operative complications. All women had been assigned to one of two chemotherapy regimens: cyclophosphamide, doxorubicin, and 5-fluorouracil or cyclophosphamide, methotrexate and 5-fluorouracil. Forty-two per cent of the women had been told that their chemotherapy was optional, but they had elected to undergo treatment prophylactically. Forty per cent of the women planned on receiving radiation after their chemotherapy.

Personal characteristics and person factors as predictors of symptom distress

Women in this study had an age range of 37 to 83 years (Mean = 59, SD = 11.62) and the majority were married (87%). Seventy-seven per cent were considered middle class based on the Hollingshead Two-Factor Index, with a mean score of 38 (SD = 12.4) out of a range of eight to 66. Most of the women in this study were optimistic, with a mean score of 23 (SD = 4.9) with a potential range of one to 32. Locus of control was equally split between internality (X = 17, SD = 6) and externality (X = 18, SD = 6). Results of person factors and symptom distress (T1, T2, and T3) are shown in Table One.

In order to determine if person factors and personal characteristics predicted symptom distress during the first cycle of chemotherapy, symptom distress scores (total SDS scores for Time two, Time three and change scores, scores that reflect change in measurement over time) were simultaneously regressed on personal characteristics, optimism and locus of

control. Zero order correlations are shown in Table Two. Statistically significant inverse correlations were found between the LOT and SDS scores at Time two and Time three ($r = -.27$ and $-.23$ respectively).

When Time two total symptom distress scores were regressed on age, marital status, socioeconomic status, optimism, and internal and external locus of control, the R^2 was .15, ($F = 3.21$; $df = 6,113$; $p < .01$). Optimism and externality made the only statistically significant contributions (optimism: $\beta = -.34$, $t = -3.73$, $p < .01$; external locus of control: $\beta = -.20$, $t = -2.24$, $p < .03$) (see Table Three).

When Time three total symptom distress scores were regressed on age, marital status, socioeconomic status, optimism, and internal and external locus of control, the R^2 was .14, ($F = 3.07$; $df = 6,113$; $p < .01$). Again, optimism and external locus of control made the only statistically significant contributions (optimism: $\beta = -.31$, $t = -3.41$, $p < .01$; externality: $\beta = -.21$, $t = -2.38$, $p < .02$) (Table Three).

When SDS change scores were regressed on age, marital status, socioeconomic status, optimism, and internal and external locus of control, the R^2 was .05, ($F = 1.05$; $df = 6,113$; $p > .05$), only external locus of control made a statistically significant contribution (external locus of control: $\beta = -.19$, $t = 1.99$, $p < .05$) (Table Three).

Symptom distress levels during the first cycle of chemotherapy

Symptom distress scores were generally low with a potential range of 13 to 65 the mean was 23 ($SD = 4.2$). At baseline, the most distressing symptoms were insomnia, fatigue, and pain occurrence. At the nadir, the most distressing symptoms were fatigue, appearance, and insomnia. At the end of the first cycle, the most distressing symptoms were fatigue, insomnia, and appearance. As anticipated, the total symptom distress scores were lowest at the start of chemotherapy, peaked at the nadir and began to decline toward the end of the first cycle of chemotherapy (see Table Four).

Discussion

The theoretical framework of Lazarus and Folkman (1984) purports that an individual's perception of stress/distress is related to their appraisal (judgment, options and awareness) of the situation. Based on this theory, it was expected that personal characteristics and person factors would predict symptom distress for women with breast cancer. This was partially supported in this study in that only optimism and external locus of control were found to be significant predictors of low symptom distress at both Time two (nadir) and Time three (end of cycle) with high scores for optimism and external locus of control correlated with low scores for symptom distress.

This study's finding that symptom distress was greater in pessimistic women, supports the work of Carver (1993) who, in studying women with breast cancer, found that pessimism enhanced a woman's risk for adverse psychological reactions to the diagnosis of and treatment for breast cancer. The significant finding that external locus of

control was related to lower symptom distress does not support Ehlke's (1988) findings that internal locus of control was a significant predictor of lower symptom distress scores. Women in her study reported perceived control over the situation, whereas women in this study expressed a more fatalistic attitude with strong faith in their health care providers.

None of the personal characteristics studied predicted symptom distress. This does not support previous findings that younger patients report higher levels of symptom distress (Cimprich, 1999; Degner & Sloan, 1995; Pasacreta, 1997; Sarna & Brecht, 1997) or

Table One: Descriptive statistics for person factors and T1, T2 and T3 symptom distress scores

Variable	Potential Range	Actual Range	Mean	Standard Deviation
Optimism (LOT)	0 to 32	12 to 32	23.05	4.89
Locus of Control (MHLOC-internality scale)	6 to 36	6 to 34	16.88	6.01
Locus of Control (MHLOC-externality scale)	6 to 36	6 to 36	17.76	6.03
Symptom Distress (SDS) T1	13 to 65	17 to 37	19.52	5.09
Symptom Distress (SDS) T2	13 to 65	17 to 37	24.71	4.12
Symptom Distress (SDS) T3	13 to 65	17 to 37	22.91	3.32

Table Two: Pearson correlations among study variables

	A	MS	HH	LOT	Int	Ext	SDS s	SDS 2	SDS 3
Age	1.00								
Marital status	.32*	1.00							
Hollingshead (SES)	-.54*	-.12	1.00						
Optimism (LOT)	-.04	-.06	.17	1.00					
Internality (MHLOC)	-.02	-.03	-.16	.09	1.00				
Externality (MHLOC)	-.13	-.06	-.08	-.22*	-.06	1.00			
SDS slope	.02	.07	.03	.08	.08	.14	1.00		
SDS total T2	.05	.02	.08	-.27*	-.08	-.16	-.22*	1.00	
SDS total T3	-.04	.03	.16	-.23*	-.03	-.17	-.02	.86*	1.00
a. Marital status was dummy coded as 0=married and 1=unmarried * $p < .05$.									

that spousal/family support accounted for lower levels of symptom distress (Northouse, Dorris & Charron-Moore, 1995; Tishelman, Taube & Sachs, 1991). This latter discrepancy could be attributed to the fact that 87% of women in this study were married and verbalized support.

The moderate scores on the Hollingshead Factor Index indicated that most women in this study were fairly well-educated and from a middle socioeconomic class. No relationship was found between socioeconomic status and symptom distress levels experienced. While this is interesting, it should be noted that validity and/or reliability psychometrics have been published using this instrument.

Table Three: Regression coefficients (beta) of age, marital status, socioeconomic status, optimism and internal and external locus of control on symptom distress (SDS scores T2, T3 and Change)

Variable	Beta for T2 SDS Score	Beta for T3 SDS Score	Beta for SDS Change Scores
Age	.12	.02	.08
Marital status	-.03	.02	.07
Socioeconomic status (Hollingshead Index)	.18	.21	.09
Optimism	-.34*	.31*	.11
Internal locus of control	-.03	.02	.10
External locus of control	-.20*	-.22*	.19*
* p < .05.			

Table Four: Symptom distress item means for T1, T2 & T3 using the McCorkle SDS

	T1 Mean (SD)	T2 Mean (SD)	T3 Mean (SD)
Fatigue	1.98 (.0730)	2.95 (.482)	2.38 (.568)
Appearance	1.43 (0.666)	2.55 (.563)	2.13 (.387)
Insomnia	2.02 (1.016)	2.47 (.819)	2.25 (.770)
Outlook	1.75 (.635)	2.40 (.556)	2.03 (.533)
Concentration	1.48 (.739)	2.32 (.663)	1.97 (.614)
Nausea occurrence	1.28 (.566)	2.27 (.576)	2.07 (.370)
Nausea degree	1.36 (.703)	2.05 (.548)	1.70 (.630)
Appetite	1.33 (.582)	2.04 (.353)	1.85 (.461)
Pain occurrence	1.80 (1.005)	1.66 (.845)	1.56 (.838)
Pain degree	1.35 (.558)	1.42 (.602)	1.32 (.518)
Bowel problems	1.32 (.631)	1.27 (.576)	1.26 (.572)
Cough	1.28 (.548)	1.23 (.514)	1.22 (.476)
Breathing	1.15 (.474)	1.15 (.461)	1.17 (.455)
Note: potential item range was from 1 = no symptom distress to 5 = highest symptom distress			

The lack of relationships between personal characteristics and symptom distress could be attributed to the fact that the target population in this study was women with breast cancer, limiting variability of both gender and diagnosis. In several of the previous studies, gender and diagnosis were not controlled. Generally low variability in scores could also account for the lack of significance of the relationships of symptom distress with marital status and socioeconomic status. Another possible explanation for the difference in results of this study and previous research on personal characteristics and symptom distress may be due to sample size. Previous studies that reported correlations between various personal characteristics and symptom distress had smaller sample sizes (Tishelman, 1991; DeKeyser, 1998).

Personal characteristics, optimism and locus of control did not predict change in symptom distress over the three measurement times during the first cycle of chemotherapy. This could be attributed to the generally low levels of change in symptom distress reported by subjects across the measurement continuum.

This study also examined symptom distress experienced during the first cycle of chemotherapy. While most women in this study were determined to be in relatively good health, all experienced some level of symptom distress. As anticipated, the greatest amount of symptom distress was experienced at the nadir of the chemotherapy cycle, yet symptom distress scores were generally low, and corroborated the findings of Ehlke (1988) and Boehmke (2004). The low scores could be attributed to the feelings and experiences of these women who were receiving relatively non-taxing chemotherapy protocols or to the inaccuracy of measurement of symptom distress by currently available instruments (Ehlke, 1988; Boehmke, 2004).

Limitations of the study

Despite the use of six socially diverse settings, convenience sampling resulted in the accrual of a homogeneous sample. Women were primarily white, married, and middle class. This homogeneity of the sampling limits the ability to generalize. The use of medications, including antiemetics and antidepressants, was not measured or controlled in this study, and could possibly account for the overall low symptom distress scores. Subjects were followed for only the first cycle of adjuvant chemotherapy and, while a strength of this approach was that few were lost to the study because of neutropenia, infection, or treatment delays, the use of this narrow timeframe provides only an abbreviated picture of the experience of women undergoing adjuvant chemotherapy for breast cancer.

Implications for future research

Replication of this study using a more diverse sample over a longer time period would add valuable information regarding symptom distress experienced by today's women with breast cancer. Further investigation about the role of optimism and locus of control is warranted. A future qualitative study could provide more information on the symptom experience and severity of symptom distress experienced by women with breast cancer without being bound to specific questions of a quantitative instrument. Adjuvant treatment for breast cancer will evolve as new chemotherapy agents are added to treatment protocols, resulting in different symptoms and symptom distress. Complaints of bone and joint pain, assorted neuropathies, and menopausal symptoms are commonplace with current chemotherapy protocols, yet

none of these symptoms are measured by currently available symptom distress instruments, many of which were developed in the 1970s and 1980s. This disparity of symptoms experienced and symptoms measured warrants the development of a more valid instrument to measure symptom distress in today's women with breast cancer.

Clinical implications

Enhancing a sense of optimism and control, two variables shown in this study to be significantly related to symptom distress levels could assist women at risk to have a better quality of life and cancer experience. Fatigue, appearance and insomnia were symptoms reported as causing the highest symptom distress levels during the first cycle of chemotherapy. Though women in this study reported low levels of symptom distress, health care providers should not

dismiss this as a non-issue, because even women who were considered healthy prior to the diagnosis of breast cancer experienced higher levels of symptom distress as they began to incur the effects of the chemotherapy around the nadir (approximately on the tenth day of the cycle). Knowledge of when the symptom distress experience interval is highest during the first cycle of chemotherapy affords the health care provider with a crucial timeframe to provide patient information and education before symptoms peak, empowering women to become partners in their care-team. Identifying those at risk for the development of high levels of symptom distress could assist the health care provider to provide specific information on how to manage distressful symptoms in these women before symptoms and resulting distress occurs.

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