Posttraumatic growth and psychological distress in Chinese early-stage breast cancer survivors: a longitudinal study

Jun-E Liu[1]*, Hui-Ying Wang[1], Mu-Lan Wang[1], Ya-Li Su[2] and Pi-Lin Wang[2]

[1]*School of Nursing, Capital Medical University, Beijing, China*

[2]*Breast Cancer Center, Beijing Tiantan Hospital affiliated to Capital Medical University, Beijing, China*

*Correspondence to: School of Nursing, Capital Medical University, You An Men, Beijing 100069, China. E-mail: liujune66@163.com

Abstract

Objective: To describe the dynamic changes in posttraumatic growth (PTG) and psychological distress in hospitalized early-stage breast cancer (BC) survivors over a 6-month period.

Methods: A longitudinal study design was adopted. The PTG inventory (PTGI) and distress management screening measure were used 3 months after diagnosis, then again at 6 and 9 months after diagnosis. For baseline data, 155 BC patients who were receiving chemotherapy were selected from four first-class tertiary hospitals in Beijing from April 2010 to March 2011 using a purposive sampling method. Of these, 120 BC patients completed the follow-up investigation. A repeated measures analysis of variance, followed by least significant difference post-hoc analysis, was used to compare PTG and psychological distress.

Results: The total score of the PTGI was 62.72 ± 14.66 in BC survivors at 3 months after diagnosis. There was a weak negative relationship between PTG and psychological distress ($r = -0.282$, $p < 0.001$). PTG increased and psychological distress decreased from 3 to 9 months after diagnosis. The PTGI scores were 63.24 ± 14.21, 68.26 ± 15.29, and 70.29 ± 16.07 at 3, 6, and 9 months after diagnosis, respectively, with distress thermometer scores of 3.62 ± 1.98, 2.59 ± 2.00, and 2.51 ± 1.00, respectively.

Conclusions: At 3 months after diagnosis, BC survivors develop PTG at a low level while they are receiving chemotherapy. PTG showed a weak negative association with psychological distress. The level of PTG shows an increasing tendency, whereas the degree of psychological distress exhibits a downward trend in the 9 months after diagnosis.

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Introduction

Breast cancer (BC) is the most common cancer among women throughout the world [1]. Although China is a low-incidence country, rates have increased at an average of 3% per year [2], whereas the global incidence of BC is increasing at a rate of 0.5% annually [3]. The diagnosis and treatment of BC lead to a series of psychological distress symptoms such as anxiety, depression, potential feelings of social isolation, and fear of cancer recurrence [4,5]. Studies have reported that psychological distress occurs in 7%–46% of women with early-stage BC [6,7]. In China, approximately 50% of women experience prolonged psychological distress for years following diagnosis [8].

Meanwhile, posttraumatic growth (PTG) [9] has attracted increased attention as a positive psychological concept. PTG is defined as the 'positive psychological change experienced as a result of the struggle with highly challenging life circumstances' [10]. The PTG inventory (PTGI) was developed by Tedeschi and Calhoun in 1996 [9], who reported a total score of 81.60 ± 21.09 in women with trauma such as bereavement, injury producing accident, and divorce [10]. The PTGI consists of five subscales: 'personal strength', 'new possibilities', 'relating to others',

'appreciation of life', and 'spiritual change'. Many studies have focused on a patient's PTG after a BC diagnosis; in these studies, the reported PTGI scores ranged from 47 to 73 [11–13]. The existing studies confirm that PTG is common among BC survivors.

Personal gain can occur through suffering, but there is still insufficient empirical and theoretical evidence to determine how this growth emerges and develops [14]. Ho and colleagues [15] found that PTG was negatively related to anxiety and depression. Mystakidou *et al.* [16] reported that depression is negatively associated only with the 'new possibilities' subscale of the PTGI. However, some studies in the USA [17], Malaysia [18], and Holland [19] showed no relationship between them. A meta-analysis by Sawyer and colleagues [20] demonstrated that PTG was correlated with increased positive mental health, reduced negative mental health, and better subjective physical health. Therefore, the relationship between positive PTG and negative psychological distress deserves further exploration.

Most studies of PTG and psychological distress in BC survivors have been cross section. The period from diagnosis to the investigation of each participant differed in the studies, so it is difficult to observe the dynamic PTG development from these cross-sectional studies.

The results of a longitudinal study by Manne *et al.* [12] showed that the PTG of BC patients appeared within 2 months of diagnosis and gradually increased over time. This was supported by research by Bower *et al.* in 763 BC survivors [21]. This is a reminder that participants should be recruited shortly after diagnosis, and a longitudinal perspective should be used to observe PTG dynamically.

From the literature review, we know that distress and PTG coexist in BC survivors and reflect the negative psychological stress level positive psychological adjustment, respectively. Therefore, we can measure the psychological condition of BC survivors from distress, which indicates passive psychological change, and PTG that indicates positive psychological change. Both the PTG and distress can change during the disease trajectory. The present study had two aims (i) to examine the relationship between PTG and psychological distress and (ii) to identify the longitudinal course of PTG and psychological distress in early-stage BC survivors during a 6-month period. The hypotheses of the study were that (i) there is a negative relationship between PTG and psychological distress and (ii) the level of PTG will increase in early-stage BC survivors during a 6-month follow-up, whereas the level of psychological distress will decrease over the same period.

Methods

Design and participants

This study used a descriptive longitudinal research design. According to a previous longitudinal report [12] in the literature, we considered that the PTGI score might change by 3 points over a 3-month period. The significance level was set at $\alpha = 0.05$, $\beta = 0.10$. The sample size was 92, and we employed repeated measurement data methods in PASS 2008 HOME (NCSS, Kaysville, UT) sample size calculation software. Considering 20% sample loss, the sample size should be more than 110. A purposive sampling method was used to recruit 155 BC survivors between April 2010 and March 2011 who were being treated at four tertiary hospitals in Beijing, China. The inclusion criteria were as follows (i) 18 years or older; (ii) definitive histopathological diagnosis of BC; and (iii) a primary diagnosis with a TNM classification of stage I or stage II BC. The exclusion criteria were (i) recurrent or metastatic BC survivors or (ii) a history of mental illness from medical records, survivors' self-reports, or their relatives.

Measures

Simplified Chinese version of the posttraumatic growth inventory

A simplified Chinese version of the PTGI (PTGI-SC) was translated, modified, and validated. It was based on the original English version of the PTGI developed by Tedeschi and Calhoun [9], and the Hong Kong Chinese version (PTGI-C) was developed by Ho *et al.* [15]. Two bilingual nursing experts independently completed forward and backward translation of the original English PTG to develop the original Chinese Mainland version and then compared it with the PTGI-C. Consistent items in the PTGI-C were retained, and the inconsistent items were modified by adjusting the idiomatic expressions. Then, a preliminary evaluation of the PTGI-SC was undertaken in seven BC survivors with different educational levels and three nursing experts in a tertiary hospital in Beijing. Words that were expressed unclearly or that did not fit with Chinese idiomatic expressions were adjusted. The final PTGI-SC retained a total of 21 items from the original English and Hong Kong versions, whereas four items were modified (items 1, 3, 5, and 21) from the PTGI-C [22]. The PTGI-SC is composed of 21 items with responses ranging on a scale from 0 to 5 ('0' indicates 'I did not experience this change at all' and '5' indicates 'I experienced this change to a very great degree'). The PTGI-SC measures five domains of growth: 'relating to others' (seven items), 'new possibilities' (five items), 'personal strength' (four items), 'appreciation of life' (three items), and 'spiritual change' (two items). We invited four expert nurses in BC care to rate how adequately the items matched the PTG domain using the following 4-point scale: (i) irrelevant; (ii) somewhat relevant; (iii) very relevant (relevant but needs minor alteration); or (iv) very relevant and succinct. The content validity index [23] was calculated by summing the percentage agreement of all items that were given a rating of '3' or '4' by the experts. The content validity index of the PTGI-SC was 0.980. Cronbach's α for the total PTGI-SC was 0.92 in the preliminary investigation of 20 BC survivors selected from a tertiary hospital in Beijing using a purposive sampling method, and the construct validation of the five factors was confirmed in another study of 1227 BC survivors [22].

Distress management screening measure

The National Comprehensive Cancer Network [24] recommends using their distress management screening measure to assess psychological distress. It consists of two parts: the distress thermometer (DT) and a problem list. The DT is a simple self-report measure that includes a line indicating a 0 to 10 scale in which '0' indicates 'no distress' and '10' indicates 'extreme distress'. The cutoff point is '4'. The DT has a sensitivity of 80.9% and a specificity of 60.2% for depression, a sensitivity of 77.3% and specificity of 56.6% for anxiety, and a sensitivity of 77.1% and specificity of 66.1% for broadly defined distress [25]. The Chinese version of the DT has a reported sensitivity of 80%, a specificity of 70%, and a test–retest reliability of 0.77% [26]. The problem list consists of 36 items composed of five subscales: (i) physical problems; (ii) practical problems;

(iii) problems with relatives; (iv) emotional problems; and (v) philosophical problems.

Procedure

The study was approved by the University's Institutional Review Board (code number: 2010 SY24). From the literature review [27], after BC survivors had undergone surgery or chemotherapy, they would become medically stable. This occurred at nearly 3 months after diagnosis. Therefore, the first investigation was carried out 3 months after diagnosis (Time 1) during their hospitalization. After providing written informed consent, all participants completed the PTGI and a distress management screening measure. Investigators immediately checked the completeness of the scales and requested that survivors complete any missing items. We followed up with the patients on two points that were spaced 3 months apart when they returned for a reexamination. Therefore, we followed up with the patients at 6 months after diagnosis (Time 2) and at 9 months after diagnosis (Time 3). At the first follow-up, we were missing 16 participants, which included five survivors who refused to participate in the study and 11 survivors who we lost contact with. The loss rate was 10.32%. In the second follow-up, 12 survivors refused to continue, and we lost contact with seven survivors. The loss rate was 13.67%. The comparison between follow-up and missing participants with regard to available variables such as age, birthplace, operation, and education level showed no significant differences. Finally, there were 120 participants who completed the follow-up.

Statistical analyses

We entered data into Epidata 3.0 software (The Epidata Association, Odense, Denmark). After systematic logic error detection, the database was imported into SPSS 16.0 software. The Pearson's correlation coefficient was calculated between PTG and DT. Repeated measures analysis of variance, followed by least significant difference post-hoc analysis were used to compare PTG and DT. Statistical significance was set at $p < 0.05$.

Results

Sociodemographic and clinical characteristics of participants

The average age of the participants was 51.27 ± 8.72 years with a range of 30–72 years. Table 1 displays the other characteristics of the study participants.

Posttraumatic growth in early-stage breast cancer survivors

The total score for the PTGI in the BC survivors at 3 months after diagnosis was 62.72 ± 14.66. The relative

scores were obtained by dividing the mean score by the highest possible score and multiplying this result by 100. This conversion of scores to the centesimal system is used to distinguish the levels of the five domains in the PTGI. The 'personal strength' subscale had the highest relative score of 68.70, followed by the 'relating to others' subscale score of 66.60, and 'appreciation of life' subscale score of 62.87; whereas the 'new possibilities' and 'spiritual change' subscales had the lowest scores of 46.52 and 45.90, respectively (Table 2).

Psychological distress and common problems

At 3 months after diagnosis, mild distress affected 49.2% of survivors and moderate-to-severe distress affected 46.7%. Five survivors reported no distress. The average distress score was 3.62 ± 1.98.

Three months after diagnosis, the most common physical problems were fatigue (66.5%), memory decline (56.8%), and nausea (55.5%). In the five practical problems, 41.9% of survivors considered their ability to do housework as mostly impacted; 75.5% of survivors felt worried about their disease concerning problems with relatives; 9.0% of survivors thought they had communication problems with their children or parents; and 20.0% of survivors had problems with their spiritual beliefs.

Relationship between posttraumatic growth and psychological distress

The Pearson correlation coefficient between PTG and psychological distress was –0.282. All the PTGI subscales were negatively correlated with psychological distress, apart from the subscale of 'spiritual change' (Table 3).

Dynamic changes of posttraumatic growth and psychological distress

A test of sphericity by Mauchly [28] showed that the sphericity assumption had been violated. This finding indicated that there were significant differences between the variances of the differences. Therefore, modifications needed to be made to the degrees of freedom so that a valid F-ratio could be obtained. We used the Huynh–Feldt epsilon correction to modify the degrees of freedom. The results showed that the PTGI scores were 63.24 ± 14.21, 68.26 ± 15.29, and 70.29 ± 16.07, and the DT scores were 3.62 ± 1.98, 2.59 ± 2.00, and 2.51 ± 1.00 at Times 1, 2, and 3, respectively. The scores of the PTGI and its subscales increased over time—apart from the subscale of 'personal strength'—whereas psychological distress decreased (Table 4). Figure 1 shows the plots of the longitudinal trends of PTG and psychological distress. Least significant difference post-hoc analysis demonstrated that PTG and psychological distress at Times 2 and 3 were

Table 1. Descriptive statistics for sociodemographic and clinical characteristics (n = 120)

Characteristic	n (%)	Characteristic	n (%)
Occupation		Religion	
Worker	83 (69.2)	Yes	11 (9.2)
Officer/Teacher	21 (17.5)	No	109 (90.8)
Farmer	10 (8.3)	Marital status	
Unemployed	6 (5.0)	Married	107 (89.2)
Education level		Unmarried	1 (0.8)
Primary school or lower	7 (5.8)	Divorced/Separated	3 (2.5)
Middle school	85 (70.8)	Widow	9 (7.5)
College school or above	28 (23.4)	TNM stage	
Per capita household income		1	32 (26.7)
High (>5000 RMB)	15 (12.5)	2	88 (73.3)
Middle (1000–5000 RMB)	86 (71.7)	Operation	
Low (<1000 RMB)	19 (15.8)	Breast conserving	31 (25.8)
		Mastectomy	89 (74.2)

Table 2. Descriptive statistics for posttraumatic growth inventory (n = 120)

Scale	Mean ± SD	Range	Possible range	Relative score
Total PTGI	62.72 ± 14.66	31–102	0–105	59.73
Personal strength	13.74 ± 3.02	5–20	0–20	68.70
Relating to others	23.31 ± 4.91	10–35	0–35	66.60
Appreciation of life	9.43 ± 2.81	2–15	0–15	62.87
New possibilities	11.63 ± 5.25	2–23	0–25	46.52
Spiritual change	4.59 ± 2.01	0–10	0–10	45.90

Table 3. Correlation between posttraumatic growth inventory and psychological distress

	Psychological distress	
Subscale	r	P
Total PTGI	−0.282	<0.001**
Relating to others	−0.238	0.002**
New possibilities	−0.279	<0.001**
Personal strength	−0.308	<0.001**
Spiritual change	−0.019	0.154
Appreciation of life	−0.220	0.009**

**$p < 0.001$.

significantly different from Time 1. However, there were no significant differences in PTG and psychological distress between Times 2 and 3.

Discussion

In our study, PTG was reported in survivors within 3 months after diagnosis. The survivors realized their positive strength, felt closer to others, and appreciated their lives more. However, they did not report understanding spiritual matters better. Spirituality is used to describe an inner, subjective experience that 'makes us feel a strong interest in understanding the meaning of things in life' [29]. A change in spirituality comes from new internal insights and new external stimuli [30]. It requires time, experience, testing, and adjustment. Therefore, in the first 3 months after a BC diagnosis, the survivors could not appreciate spiritual things better. It was also, during this period, that they struggled with the disease, its treatment, and the treatment side effects. Therefore, they may not have had much time to think about their new possibilities after a BC diagnosis.

Psychological distress was reported by 95.9% of BC survivors. Of these, almost half reported a moderate-to-severe degree of psychological distress. Among the BC survivors in the recovery stages, the levels of psychological distress in the current study were much higher than in other studies [31,32]. As a stressor, the diagnosis and treatment of BC can impact many aspects of survivors' lives, which can cause a multilevel psychological distress experience [33], especially shortly after diagnosis. That the popularization of BC-related knowledge, including screening methods and prognosis, is not as good as those in western countries [2] might also be a reason. However, according to the National Comprehensive Cancer Network guidelines, cancer patients with a DT score of '4' or greater should be treated. This is a reminder that psychological support and intervention should be given without delay to survivors who report moderate-to-severe psychological distress.

Posttraumatic growth after BC is negatively correlated with psychological distress; however, the correlation coefficient in this study was low according to the widely accepted standards established by Cohen [34]. Two explanations may be offered for this finding. First, the lower correlation may indicate that some moderators exist between PTG and psychological distress. It has been reported that people with different personality traits always tend to develop different and habitual modes and methods of coping with stress and upsetting emotions [35]. Moreover, coping strategies can influence the development of PTG [13,36]. Therefore, the survivor's personality and coping strategies may be important moderators between PTG and psychological distress. Different personalities may lead to different coping strategies when facing distress after a BC diagnosis and its treatment. This may lead to a different psychological procedure and psychological distress, which eventually influence the development of PTG. The existence of moderators may lower the correlation between PTG and psychological distress. Second, the results may have been influenced by the sample size.
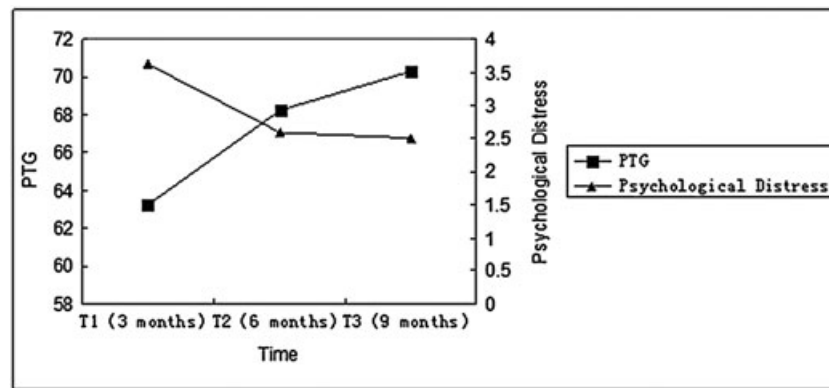
Posttraumatic growth increased and psychological distress decreased significantly between 3 and 6 months after diagnosis. In China, the treatment course for stage I and stage II BC is generally 6 to 7 months. Therefore, 3 to 6 months is the period when the treatment course is nearing completion. Survivors and their families are relaxed and waiting for a good outcome or a happy future. Therefore, they may feel closer to others and be more thankful about life, new

Table 4. Follow-up of posttraumatic growth and psychological distress (Mean ± SD, n = 120)

	T1	T2	T3	F	p	Post Hoc Test (LSD), p<0.05
Total PTGI	63.24 ± 14.21	68.26 ± 15.29	70.29 ± 16.07	13.387	0.000	T1-T2;T1-T3
Relating to others	23.42 ± 4.81	24.67 ± 4.87	25.03 ± 5.21	9.058	0.001	T1-T2;T1-T3
New possibilities	11.73 ± 5.26	13.52 ± 5.27	13.71 ± 5.86	7.502	0.003	T1-T2;T1-T3
Personal strength	13.91 ± 3.05	14.64 ± 3.07	13.86 ± 4.05	2.967	0.087	—
Spiritual change	4.63 ± 1.92	5.35 ± 1.82	4.58 ± 1.97	7.054	0.009	T1-T2;T2-T3
Appreciation of life	9.55 ± 2.69	10.08 ± 2.67	10.40 ± 2.88	5.967	0.009	T1-T2;T1-T3
Psychological distress	3.62 ± 1.98	2.59 ± 2.00	2.51 ± 1.00	18.591	0.000	T1-T2;T1-T3

LSD: least significant difference; T1: time 1; T2: time 2; and T3: time 3.

Figure 1. Follow-up of posttraumatic growth and psychological distress

possibilities in the future, and have a better understanding of their spirituality. Thus, PTG increases as psychological distress decreases.

Posttraumatic growth increased and psychological distress decreased insignificantly between 6 and 9 months after diagnosis. The period from 6 to 9 months is the time after treatment ends, which is described as 'transitional survivorship' by Miller *et al.* [37]. In transitional survivorship, celebration is blended with worry and loss as the survivor pulls away from the treatment team. Survivors will try their best to find a new 'normal life' after their diagnosis and treatment. However, this may be a much slower recovery period than they expected. As expressed in a Chinese idiom, 'diseases come on wings and depart on foot'. The end of treatment does not mean that the survivors are free from the effects of cancer. They have to adjust to body changes brought on by surgery or by treatment that have impacted their physical and psychological abilities. They may experience fatigue, insomnia, and cognitive dysfunction [38]. These may be the reason why psychological distress at 6 months after diagnosis was not significantly different from psychological distress at 9 months after diagnosis. The insignificant decrease in psychological distress and the insignificant increase in PTG are two accumulated quantitative stages of psychological adjustment and adaptation during the recovery stage.

Several limitations of this study should be mentioned. First, the convenient sampling method we used may have decreased the representativeness of the sample. Second, the follow-up period was insufficient because of multiple constraints, including funding, manpower, and participant loss. However, future studies can still refer to the results of our study. To reveal the trajectory of PTG development, replication of this longitudinal study with a more rigorous research design is needed, such as a larger sample size, a more general population that covers from phase I to phase IV BC survivors, and a longer follow-up period.

Conclusion

This longitudinal study examined PTG in early-stage BC survivors in China. It demonstrated that BC survivors could develop PTG shortly after receiving a diagnosis. In particular, 'personal strength' and 'relating to others' are two domains in which growth develops relatively easily compared with other domains. There was a weak negative relationship between PTG and psychological distress. Increased PTG and decreased psychological distress occurred was observed at the 6-month follow-up. Therefore, health workers should focus on developing effective interventions to deal with psychological distress and to promote PTG development after BC diagnosis. Motivating their social support system and properly providing them with psychological support may promote the development of 'personal strength' and 'relating to others' shortly after diagnosis. Providing more entertainment

and social support to decrease their psychological distress can also promote PTG development. Helping BC survivors explore new opportunities for their future life and accept and appreciate themselves can improve the development of other aspects of PTG.

Acknowledgement

Ethical approval

The University of Institutional Review Board approved this study, and informed consent was obtained from each subject.

Conflict of interest

None declared.

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