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Symptom Profiles, Work Productivity and Quality of Life among Chinese Female Cancer Survivors

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Abstract

Background: Cervical and breast cancer are very common forms of malignancy among women. With increasingly long survivorship rates, it is essential to explore the impact of cancer survivorship on the work productivity and quality of life (QOL) of cancer survivors.

Objectives: This study aimed to assess the symptom prevalence, work productivity and QOL among Chinese breast cancer survivors (BCS) and cervical cancer survivors (CCS), and to explore factors related to their work productivity and QOL.

Methods: A cross-sectional study design was used. Chinese women with a history of primary breast or cervical cancer were included.

Results: A total of 192 subjects joined the study. Participants reported a mean reduction in work productivity of 16%, although these women reported relatively good QOL compared with EORTC reference values. Significant predictors for work productivity loss included depression symptoms and cognitive limitations. Job stress, disease stage, anxiety symptoms, cognitive limitations, and physical functioning levels were statistically significant predictors of global QOL. These variables accounted for 55.4% of variance of QOL.

Conclusion: This study found that cancer survivors reported higher levels of anxiety and cognitive limitations, and lower levels of work productivity and QOL. Cognitive symptoms were significantly related to cancer survivors' work limitation and QOL.

Implications for practice: Nurses and other healthcare professionals should be aware that BCS and CCS reported higher levels of work limitations and lower levels of QOL. Future research should develop relevant interventions to maximize cancer survivors' work productivity and QOL.

Keywords: Cervical cancer; Breast cancer; Symptom profiles; Work productivity; Quality of life

Introduction

Breast and cervical cancer are very common forms of malignancy among women in China [1]. According to the 2012 China Annual Oncology report, women younger than 30 were less often diagnosed with cervical cancer in the past, however, more and more of these cases are now appearing [1]. Globally, breast cancer is the most frequently diagnosed cancer, currently accounting for more than one in four of all cancers in women [2]. With 529,800 new cases every year, cervical cancer is the fourth most common cancer affecting women worldwide, after breast, colorectal, and lung cancer [3].

Due to earlier detection of cancer by screening and improved treatment programs, survival rates continue to increase for women with breast and cervical cancer. The relative five-year survival rate in the U.S. for early stage breast and cervical cancer is 90.6% and 80% respectively [4]. In China, hospital-based studies show a five-year overall survival rate for breast cancer of up to 87.7% [5,6]. The overall five-year survival rate for all stages of cervical cancer among Chinese women has been estimated at 70.93% [7].

With long survivorship rates, it is essential to explore the impact of long-term and late effects of treatments on the work productivity and quality of life (QOL) of cancer survivors. Cognitive impairment is a clinically significant problem among breast cancer survivors [8], who reported the most common cognitive changes affected both memory and concentration, and included feelings of mental slowness [9]. The prevalence of cognitive impairment among cancer survivors ranged from 17% to 75%, summarized by two review studies [10,11]. Even mild cognitive impairment can impact a person's QOL and work ability [9,12].

Various factors are negatively associated with reduced work productivity and QOL among cancer survivors. These factors are related to socio-demographics (e.g., old age, low education, low income), the disease (e.g., tumor site, tumor stage, types of treatment) and work-related characteristics (e.g., job stress, physical work demands) [13-15]. Some studies have demonstrated that breast cancer survivors experience persistent problems, such as poorer physical, emotional and role functioning, which will have a significant effect on QOL [16,17]. Other studies have indicated that functional and work limitations can last up to several years after cancer diagnosis [18,19]. While there is a growing body of studies conducted in Western countries, to our best knowledge there were no studies conducted in mainland Chinese cancer survivors.

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Study aims

The aims of this study were to assess the symptom prevalence, psychological well-being, work productivity and QOL among Chinese breast cancer survivors (BCS) and cervical cancer survivors (CCS), and to explore factors related to lower levels of work productivity and QOL among cancer survivors while working. Understanding determinants of work productivity and QOL in this population could help to identify strategies to maximize these women's work productivity, improve their QOL and promote comprehensive survivorship care.

Conceptual framework

In order to conduct a comprehensive evaluation of problems related to work among occupationally active BCS and CCS, this study was framed by the Cancer and Work Model proposed by Feuerstein et al. [20]. This model provides a framework to aid in conceptualizing problems related to work among cancer survivors, and identifies a set of factors that represents personal (e.g. cancer survivors' characteristics), micro- (e.g. medical factors, workplace demands), and macro-level (cultural, legal, and organizational factors) [20]. The domains and components of this model are listed in Table 1. This study mainly focused on personal and micro-levels of work-related problems among breast and cervical cancer survivors, although it is still important to investigate the macro-level factors and their relevance among cancer survivors in future research.

Methods

A cross-sectional study design was used. Inclusion criteria were Chinese adult cancer survivors (at least 18 years old), with a history of primary breast or cervical cancer, who had completed primary cancer treatment at least two years prior and were currently working. The "survivor" participants were defined as individuals with a primary cancer diagnosis who had completed the initial course of treatment [21]. Exclusion criteria included women with a cancer diagnosis rather than breast and cervical cancer, being active cancer treatment or completed primary cancer treatment within 2 years and not occupationally active after cancer treatment.

Measures

General information sheet: This part of the questionnaire was used to measure personal characteristics of breast and cervical cancer survivors. This sheet includes three parts: subjects' demographic characteristics, diagnosis and treatment information, and work-related information. Demographic characteristics included questions regarding age, education level, marital status and whether or not a woman had given birth. The second part included cancer types, disease stage, treatment received (e.g., Surgery, Radiation, Chemotherapy), and years since cancer diagnosis and completion of primary cancer treatment. Work-related questions included participants' job type, job status (part-time or full-time), current level of job stress, and length of time in current job.

Levels	Domains	Components
Personal	Cancer survivor characteristics	Age, gender, race, marital status, socio-economic status etc.
Micro-	Health and wellbeing	Medical, behavioral, and social wellbeing
	Symptoms	Fatigue, cognitive, distress, pain, sleep problems, dyspnea, etc.
	Function and work demands	Physical, cognitive, emotional, and interpersonal demands
	Work environment	Job stress, climate and support etc.
	Work outcomes	Return to work, work ability, work performance (e.g. level of productivity), and sustainability (i.e. remaining employed for a period of time)
Macro-	Policies, procedures, and economic factors	Organizational, legal, and financial-related issues etc.

Table 1: The cancer and work model.

Hospital anxiety and depression scale (HADS): The HADS was used to measure the health and well-being of cancer survivors. This scale is a 14-item self-assessment scale for a screening instrument to assess patients' anxiety and depression levels. Each item is scored from 0 to 3. The anxiety and depression sub-scores are both on scales of 0 to 21. Scores of 8 to 10 indicate mild cases, 11 to 15 indicate moderate cases and 16 or above indicate severe cases [22]. The HADS has previously been used in studies of long-term cancer survivors [23]. The HADS has been reported to have acceptable internal consistency, and high levels of sensitivity and positive predictive values when used with cancer survivors [24]. This HADS was widely applied to Chinese in patients with cancer [25-27]. The internal reliability of the HADS Anxiety subscale and HADS Depression subscale was 0.67 and 0.69, respectively. Exploratory factor analysis shows that 14 items had loadings ranging from 0.43 to 0.72. The total explained variance was 51.50%.

Cognitive symptom checklist (CSC): The CSC was used to measure the domain of cognitive function at work. The short form of CSC consists of work-related cognitive symptoms for 21 items and three separate subscales (Working Memory, Executive Function, and Task Completion) [28]. In this instrument validation study, findings resulted in a 21-item, self-report measure referred to as the Cognitive Symptom Checklist-Work-21 (CSC-W21). The CSC-W21 demonstrated internal reliability (α=.88). Construct validity of the CSC-W21 is supported by significant positive correlations with cancer stage, job stress, and affective state [28]. By forward and back-forward translation, the CSC was translated into Chinese and demonstrated good content validity [29]. In this study, the internal consistency of CSC-W21 was established by Cronbach's alpha at 0.91. The construct validity was established by exploratory factor analysis, and the 21-item CSC was resolved into a three-factor solution and explained 63.11% of variance.

Work limitation questionnaire (WLQ): The WLQ was used to measure work outcomes of work productivity loss in participants. The WLQ is a 25-item self-reporting measure of work limitations. In this measure, work limitation is inversely related to work productivity. The measure is composed of four subscales: time demands, physical demands, mental-interpersonal demands, and output demands" [30]. This measure has been used with employees who are cancer survivors, such as breast cancer survivors [30]. Higher scores (i.e., more limitations) are indicative of lower productivity. In a recent methodological study, the WLQ was found to have acceptable reliability and validity among cancer survivors [31]. The Chinese version of WLQ-25 was translated by the Mapi Research Institute. WLQ-25 was first applied to Chinese women with breast and cervical cancer. The internal reliability by Cronbach's alpha was 0.94. Exploratory factor analysis shows that 25 items of WLQ had loadings ranging from 0.65 to 0.92. Total explained variance was 76.60%.

Quality of life measurement: The QOL measure was used to assess the domain of symptoms and participants' general health. Quality of life was measured by the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire C30 (EORTC QLQ-C30) version 3. The EORTC QLQ-C30 is a cancer-specific 30-item questionnaire that yields one measure of global health status,

five functional scales (physical, role, emotional, cognitive, social) and nine symptom scales (fatigue, nausea and vomiting, pain, dyspnoea, insomnia, appetite loss, constipation, diarrhea, financial difficulties) [32]. Scale scores were calculated and transformed according to the EORTC scoring manual [33]. Scores are all on a 0 to 100 scale. A high score for a functional scale represents a high level of functioning, whereas a high score for a symptom scale or item represents a high level of symptomatology or problems. For the regression analyses presented in this paper, we only used the Global Health Status scale. This EORTC QLQ-C30 was widely applied in the sample of Chinese cancer survivors [34-36].

Data collection: Data were collected from November 2013 - May 2014. Before data collection, the study protocol was evaluated and approved by two tumor hospitals' Ethical Committees for Human Subjects. Physicians in the hospitals' outpatient clinics referred patients to the research nurse, who delivered the questionnaire and collected the data. The time frame for completing the questionnaire was about 40 minutes. A cash coupon was given to each research participant. A patient's voluntary participation was always observed. All data were coded and no personal identifier appeared in the computerized data set.

Data analysis: All the data were entered and analyzed using SPSS version 20.0 for Windows. Descriptive statistics were used to describe participants' demographic, clinical and work characteristics, mean HADS, CSC, WLQ and QOL scores. Two stepwise linear regression models were used to identify the predicting factors of work productivity loss or global QOL of Chinese BCS and CCS. Reliability analysis of internal consistency by Cronbach's alpha was performed for each scale. Scales' construct validity was established by factor analysis.

Results

A total of 350 subjects were approached, and 192 subjects agreed to join the study, giving a response rate of 54.8%. Common reasons for not participating in the study included no time, questionnaire length and lack of interest.

All participants were Chinese adult women with a diagnosis of breast or cervical cancer. More than half of women (n=102, 53.4%) were aged 40 to 49 years old. Almost all of the women were married (n=167, 87.9%), and almost all had given birth (n=181, 96.8%) (Table 2). A majority of participants were breast cancer survivors (n=163, 84.9%). Nearly half of the women (n=77, 41.0%) were diagnosed at an early stage of the disease. More than half (n=99, 53.2%) were treated with a combination of surgery, radiation and chemotherapy. The mean of years since cancer diagnosis was 3.51 (Table 3). Nearly one third of the women (n=50, 32.5%) were working as support/service staff. Most of the women were working full-time. The length of time at their current job was relatively short (Mean=1.25 years, SD=0.65) (Table 4).

From Table 5, mean of anxiety score was 5.71 (SD=3.95), and 34.7% of the women belonged to possible cases ranging from mild to severe levels. The mean of depression score was 5.37 (SD=6.73). The mean of work-related cognitive symptoms was 5.37 (SD=6.73). The mean of work limitation questionnaire productive loss scores (WLQPLS) was 0.16, indicating the percentage of work productivity loss was 16% (Table 4). The mean of global QOL, functioning levels and symptoms scale scores was listed in Table 6.

Hierarchical multiple regression analyses were performed to identify important predictors for work limitations or global QOL of cancer survivors. All categorical variables were transformed into dummy variables (age was recorded as <50 years old or ≥ 50; education was recorded as below college, or college level and above; job stress was recorded as never/seldom or sometimes/often; marital status was recorded as married or other; disease stage was recorded as stage I or stage II/III; treatment type was recorded as single type of treatment or ≥ 2 types of treatment). Relevant screening procedures were also performed. The residuals among these regression models had no outliers and no evidence of singularity. For regression model 1 (Table 7), the dependent variable was a mean of WLQPLS, and independent variables were entered into five steps. Statistically significant predicting factors included depression levels and levels of work-related cognitive symptoms. The variable of cognitive symptoms accounted for 35.8% of the variance. When turning to the predicting factors of global QOL of cancer survivors, Table 8 shows the results of regression model 2. The variables of job stress, disease stage, anxiety levels, CSC total scores, physical functioning and symptom clusters were statistically significant predictors. These variables contributed to 58.4% of variance.

Discussion

The survivors in this study, who had completed all treatment for stage I to III breast or cervical cancer at least two years before enrollment, reported relatively good wellbeing and global quality of life. When compared with the Hansen et al. study [19], the mean of anxiety levels was lower and the mean of depression higher in the

Variables	n (%)
Age (years)	
20-29	2 (1.0)
30-39	25 (13.1)
40-49	102 (53.4)
50-60	62 (32.5)
Highest education	
Primary school and below	71 (37.9)
High school	47 (25.1)
Community college	33 (17.6)
University and above	36 (19.3)
Marital status	
Single	3 (1.6)
Married	167 (87.9)
Divorce/separated	29 (10.0)
Widowed	1 (0.5)
Whether having child or not	
No	6 (3.2)
Yes	181 (96.8)

Table 2: Demographic characteristics.

Variables	n(%)	M (SD)
Cancer type		
Breast cancer	29 (15.1)	
Cervical cancer	163 (84.9)	
Disease stage		
Stage I	77 (41.0)	
Stage II	97 (51.6)	
Stage III	14 (7.4)	
Treatment type		
Surgery only	14 (7.5)	
Radiation early	19 (10.2)	
Surgery + Radiation	46 (24.7)	
Radiation + Surgery	8 (4.3)	
Surgery + Radiation + Chemotherapy	99 (53.2)	
Years since cancer diagnosis		3.51 (2.74)
Years of completed primary cancer treatment		2.79 (3.43)

Table 3: Diagnosis and treatment characteristics.

Variables	n(%)	M (SD)
Job type		
Managerial staff (e.g. government, army staff)	44 (28.6)	
Professional staff (e.g. doctors, nurses, technicians)	36 (23.4)	
Supportive / service staff (e.g. clerk, sales, procurement staff)	50 (32.5)	
Others (e.g. farmers, self-employment)	25 (16.1)	
Job status		
Part-time (<40 working hours/week)	29 (18.7)	
Full-time (≥ 40 working hours/week)	126 (81.3)	
Job stress		
Never/seldom	100 (59.9)	
Sometimes	43 (25.7)	
Often	24 (14.4)	
Time at current job (years)		1.25 (0.65) (1-5)
Work productivity loss		0.16 (0.02)

Table 4: Work characteristics.

Variables	n(%)	M (SD)
HADS Anxiety (0-21)		**5.71 (3.95)**
Normal cases (0-7)	120 (66.3)	
Mild cases (8-10)	40 (19.9)	
Moderate cases (11-15)	18 (10.0)	
Severe cases (16-21)	3 (1.7)	
HADS Depression (0-21)		**4.87 (3.82)**
Normal cases (0-7)	130 (71.4)	
Mild cases (8-10)	35 (19.2)	
Moderate cases (11-15)	17 (9.2)	
Cognitive Symptom Checklist (21 items) (0-21)		5.37 (6.73)

Table 5: Symptom profile.

Variables	M(SD)	Transformed M(SD)
Global health status/QOL		74.24 (20.16)
Functional scales		
Physical functioning		85.47 (17.22)
Role functioning		89.51 (20.02)
Emotional functioning		81.83 (18.98)
Cognitive functioning		83.04 (18.86)
Social functioning		81.55 (34.33)
Symptom scales /items	Raw average item score	
Fatigue	1.64 (0.65)	21.46 (21.69)
Nausea and vomiting	1.14 (0.42)	4.80 (14.01)
Pain	1.39 (0.58)	13.23 (19.35)
Dyspnoea	1.32 (0.55)	10.67 (18.53)
Insomnia	1.79 (0.89)	26.44 (29.91)
Appetite loss	1.35 (0.92)	11.73 (30.68)
Constipation	1.47 (0.71)	15.81 (23.85)
Diarrhoea	1.22 (0.58)	7.44 (19.52)
Financial difficulties	1.60 (0.77)	20.25 (25.95)

Table 6: EORTC QLQC30 raw and transformed scores.

current study. Possible differences could be due to sample inclusion criteria. This study only included cancer survivors beyond two years' treatment, while Hansen et al. study included breast cancer survivors within two years' treatment plus cancer survivors two years and beyond. When compared with Chinese breast cancer survivors undergoing active cancer treatment [37], the percentages of possible cases of anxiety and depression in this study were obviously lower than Zhang et al.'s study (Anxiety 34.7% vs.36.1%; Depression 28.6% vs. 43.5%)[37]. A mean reduction in work productivity among subjects in this study was 16%, which was higher than Lavigne et al.'s study (3.1%) [38]. Possible reasons could be that this study included both breast and cervical cancer survivors, as cervical cancer survivors were mainly from a working group of low social status.

Compared with the reference value manual of EORTC QLQ-C30, cancer survivors in this study reported relatively better global health status/QOL, functioning levels and most symptoms. There were only two symptoms - diarrhea and financial difficulties - that were worse than the reference value of European cancer survivors for breast cancer survivors of all stages. As China is a developing country, economic conditions are obviously lower than in European countries, and QOL studies among breast cancer survivors conducted in mainland China also identified that income levels were a significant factor associated with QOL [34]. In terms of gastrointestinal side-effects, such as

	Adjusted R^2	F	*p*
Step			
1.General characteristics	.050	4.019	.050
2. HADS	.143	4.170	.010
3. CSC	.401	10.553	<.001
4. Functional levels	.548	8.666	<.001
5. Symptoms	.538	7.641	<.001
Variables		**Std β**	***p***
Age (0, <50 years old; 1, 50 or above)		.259	.050
HADS Anxiety		-.269	.136
HADS Depression		.491	**.008**
CSC total score		-.552	**<.001**
Physical functioning		-.182	.233
Role functioning		.201	.159
Emotional functioning		.370	.095
Cognitive functioning		.171	.381
Social functioning		-.012	.956
Symptom clusters		-.037	.901

Std β, standardized β coefficient
HADS, Hospital Anxiety and Depression Scale; CSC, Cognitive Symptom Checklist

Table 7: Factors related to work productivity loss by stepwise regression.

	Adjusted R^2	F	*p*
Step			
1.General characteristics	.089	5.346	.006
2.HADS	.217	7.153	<.001
3.CSC	.260	7.238	<.001
4.Functional levels	.554	12.055	<.001
5.Symptoms	.584	12.341	<.001
Variables		**Std β**	***p***
Job stress (0, never/seldom; 1, sometimes/often)		-2.37	**.025**
Disease stage (0, stage1; 1, stage2/3)		-.231	**.025**
HADS Anxiety		-.343	**.015**
HADS Depression		-.055	.690
CSC total score		-.240	**.017**
Physical functioning		.283	**.013**
Role functioning		.067	.529
Emotional functioning		.208	.154
Cognitive functioning		.008	.947
Social functioning		.197	.153
Symptom clusters		-.430	**.012**

Std β, standardized β coefficient
HADS, Hospital Anxiety and Depression Scale; CSC, Cognitive Symptom Checklist; QOL, quality of life

Table 8: Factors related to global QOL by stepwise regression.

diarrhea, the mean of this symptom was higher than EORTC QLQ-C30 reference value for breast cancer survivors in all stages. Diarrhea symptoms could be related to pelvic radiation cancer treatments [39]. Practice guidance on the management of gastrointestinal problems has recently been published. Andreyev et al. [40] provided evidence-based treatments for gastrointestinal problems resulting from cancer treatment, which would help these cancer survivors to achieve symptom control. According to its average item score of symptoms, the most prominent symptom among this study population was "insomnia". In consequence, nurses need to provide relevant interventions to help breast and cervical cancer survivors to relieve their sleep problems.

This study found that cognitive symptoms were statistically significant predictors for work productivity and global QOL. Previous studies also found that cognitive changes had a negative impact on the work capacity of breast cancer survivors [8,19,38]. Study findings also revealed that depression was significantly associated with lost work productivity. Hence, this finding should help sensitive healthcare providers to regularly assess breast and cervical cancer survivors' cognitive changes and depression levels, and provide relevant interventions for these women's cognitive impairment and depressive symptoms. Many variables, such as job stress, disease stages, anxiety levels and physical functioning did not explain the variance in work productivity losses, but these variables were statistically significant predictors of global QOL in cancer survivors. Future longitudinal studies should be conducted to document the trajectory of these relationships over time.

Study Limitations

This study has several limitations. First, due to the nature of cross-sectional study design, causal relationships among subjects' general characteristics, symptom burden with work productivity and QOL could not be excluded. Future studies should investigate this relationship with a longitudinal design. Second, since this study focused on cancer survivors who continued to work, as was the study intent, these breast cancer survivors could be higher functioning and would likely have a better prognosis. Thirdly, only 55% of the cancer survivors were included in the current analysis. It may result in an inclusion bias. Future research should take strategies in enhancing the response rate. Last but not least, this study included relatively long-term cancer survivors who would have become accustomed to their symptoms and have begun to regard them as 'normal' over time - a phenomenon described as the response-shift phenomenon [39-41]. Thus, future research needs to use the mixed method of combining quantitative and qualitative study, which allows for in-depth exploration of the response-shift phenomenon.

Conclusions and Implications

This study found that breast and cervical cancer survivors reported higher levels of anxiety and cognitive limitations, and lower levels of work productivity and QOL. Cognitive symptoms were significantly related to breast and cervical cancer survivors' work productivity capacity and global QOL when working following treatment.

Implications for nursing research

Given that depressive symptoms were negatively associated with work productivity loss and anxiety-related symptoms negatively predicted global QOL, future research should develop relevant interventions to manage these symptoms and maximize the subjects' work productivity and global QOL. According to the cancer and work model, the macro-level of policies, procedures and economic factors, such as organizational and legal issues, can be directly related to cancer survivors' work and health outcomes. Thus, further research should also explore the macro-level of organizational and cultural factors related to cancer and work outcomes for this study population.

Implications for nursing practice

Implications for nursing practice include the importance of inquiring about and managing cancer survivors' cognitive symptoms, which were significantly associated with both work productivity and global QOL. Nurses and other healthcare professionals should be aware of the level of cognitive symptoms at work, and their relationship to the work challenges that can be experienced by breast and cervical cancer survivors who remain in the workplace. Specific intervention strategies should be developed for cervical cancer survivors. While nearly the same number of breast and cervical cancer survivors were approached, fewer cervical cancer survivors were occupationally active, in comparison to breast cancer survivors, at the time of subject recruitment. Thus, relevant interventions should be developed in order to increase the rate of cervical cancer survivors' return to work. While enhancing the rate of cancer survivors' return to work requires a multidisciplinary team, nurses should collaborate with occupational rehabilitation counselors to assist cancer survivors with return to work management. In the process of managing cancer survivors' return to work, Verbeek et al. indicated four essential strategy aspects, including "medical knowledge of the disease process and treatment of the patient, continuity of care, intervention for cancer-related complaints such as cancer-related fatigue, and interventions to improve relations at work"[42].

This study also made unique contributions to applying a cancer and work model in the area of nursing research. While this model focuses only on providing a framework to aid in conceptualizing problems related to work [20], nurses - as one of the appropriate professionals on the cancer rehabilitation team - should not only educate breast and cervical cancer survivors in order to prevent and manage on-the-job problems - they should also help cancer survivors enhance their overall health outcomes in a more holistic way. This model can also be modified into nursing theory development, specifically in the area of cancer survivorship nursing.

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