Original Article
Postoperative depression in female patients with breast cancer surgery: an analysis of risk factors and assessment of the efficacy of comprehensive nursing intervention

Linli Sun[1], Jin Yan[2], Ling Wang[3]

Departments of [1]General Surgery, [2]Nursing, [3]Thyroid Breast Surgery, The Third Xiangya Hospital of Central South University, Changsha, Hunan Province, China

Abstract: Objective: To analyze the risk factors of postoperative depression in female breast cancer patients and to explore the effect of comprehensive nursing on improving postoperative depression and quality of life. Methods: Firstly, 174 female breast cancer patients who underwent surgery from January to December 2016 were enrolled. The patients were examined by the Self-rating Depression Scale (SDS) and were divided into the case group and the control group according to whether depression occurred, to analyze the risk factors for postoperative depression. Secondly, 140 female patients after breast cancer surgery were admitted between January 2017 and October 2017 were divided into two groups, which received comprehensive nursing intervention and routine nursing respectively. Based on the previously identified risk factors for depression. They were evaluated for the impact of comprehensive nursing intervention on their depression and quality of life. Results: In female breast cancer patients, the incidence of postoperative depression was 46.55%; univariate analysis showed that younger age, lower education level and economic level, radical or simple resection operation and postoperative radiotherapy and chemotherapy may be associated with postoperative depression; further multivariate logistic regression analysis showed that younger age, lower education level and economic level were independent risk factors for postoperative depression with the adjusted OR of 1.76 (95% CI: 1.15-2.26), 1.64 (95% CI: 1.07-2.24) and 1.90 (95% CI: 1.23-2.45), respectively. Compared with the routine nursing group, the depression SDS score, and the improvements in the physiological status, emotional status, additional attention and total quality of life in the FACT-B quality of life score in the comprehensive psychological intervention group were significantly better than those in the routine nursing group. Conclusion: Younger age, lower education level and economic level are independent risk factors for postoperative depression in female breast cancer patients. Compared with the routine nursing, the comprehensive psychological nursing can improve the patients' depression and the quality of life of patients.

Keywords: Female breast cancer patients, postoperative depression, comprehensive nursing, quality of life

Introduction

Breast cancer is one of the malignant tumors that seriously endangers women's health, and it is also a leading cause of cancer death in women from developing countries [1]. Due to environmental pollution, aging, and especially lifestyle changes, the incidence of breast cancer in Chinese women continues to increase, and has a tendency to become younger [2]. In 2013, the number of new cases of breast cancer in Chinese women reached 278,800, so breast cancer is one of the most common female malignant tumors [3]. Endocrine therapy, radiotherapy, surgical treatment, biological and chemical drugs are the main treatments for breast cancer. Surgical treatment is the only radical treatment to be expected to cure breast cancer patients [4]. Because of the changes in body, sexual characteristics, and endocrine disorders during the treatment process, female breast cancer patients are prone to depression, anxiety and other adverse emotions after surgery, which further affects their quality of life [5]. Previous studies have shown that age, income, marital status, education level, and

clinical factors of cancer including staging and treatment are related to the occurrence of postoperative depression in women with breast cancer, but the results are not completely consistent [6-9]. Analysis of risk factors for depression in women with breast cancer can help to provide evidence to develop interventions for depression in patients.

A number of studies have shown that psychological nursing, cognitive behaviors and comprehensive nursing interventions can alleviate negative emotions such as depression and anxiety in women with breast cancer, and improve their quality of life. However, due to differences in research design and evaluation indicators, the results are not identical [10-13]. Several meta-analyses suggest that nursing interventions can effectively improve depression in patients [10, 14]. However, some other studies have not found that the cognitive behavioral therapy significantly improves depression in patients compared with controls [15, 16].

This study plans to enroll female postoperative patients with breast cancer to analyze the risk factors of depression, and to evaluate the intervention effect of comprehensive psychology nursing on depression and quality of life, in order to clarify the effect of intervention, so as to provide evidence for the nursing effect of postoperative patients with breast cancer in women.

Materials and methods

The research subjects consisted of 314 female breast cancer patients who underwent breast surgery in the Department of The Third Xiangya Hospital of Central South University from January 2016 to October 2017. Inclusion criteria: Eighteen years old and over; breast cancer diagnosed clinically and pathologically, firstly undergoing radical mastectomy or breast-conserving surgery [17]; no mental illness and disturbance of consciousness before surgery; signed informed consent approval. Exclusion criteria: male breast cancer patients; previous cognitive or mental dysfunction or other mental illness; other concomitant serious diseases. This study has been approved by the Ethics Committee of The Third Xiangya Hospital of Central South University.

Research design

Investigation of risk factors of postoperative depression in patients with breast cancer surgery: Firstly, 174 female breast cancer patients who underwent surgery between January and December 2016 were enrolled after they had been admitted to the hospital, their demographic and clinically relevant information (the method of surgery, clinical stage, chemoradiotherapy or not, etc.) were collected. Patients were divided into the case group and the control group according to whether depression occurred during the study period, and the case-control study was used to analyze the risk factors of depression in female breast cancer patients.

Evaluation of intervention effect of comprehensive nursing on depression and quality of life in female patients with breast cancer

A total of 140 female postoperative patients with breast cancer who were admitted between January 2017 and October 2017 were set as subjects. Patients were randomized into the comprehensive nursing group and the routine nursing group according to a random number table, with 70 cases in each group. The patients in the routine nursing group was hospitalized for routine treatment and care, including routine health education, nutritional guidance, perioperative precautions, postoperative basic rehabilitation training, etc. [18]. Subsequent treatment or regular follow-up were offered to patients after discharge. On the basis of routine nursing and follow-up, in the comprehensive nursing group, comprehensive nursing based on psychological intervention was carried out, including: (1) health education: Regular lectures about breast cancer-related health education were conducted by department physicians and nurses during the hospitalization period once or twice every week. The education content included breast cancer disease treatment related knowledge and psychological adjustment technology; (2) psychological intervention: after admitted to the hospital, through the communication with the patients and their family, the patient's psychological stress was understood. According to the literature reports and the risk factors found in previous research, the severity of the patient's risk of depression was determined, and the individualized behav-

Table 1. Univarite analysis of count data in the case group and the control group (n, %)

Characteristic	Control group (n=93)	Case group (n=81)	χ^2	P
Age				
<45	42 (45.16)	53 (65.43)	7.176	0.007
≥45	51 (54.84)	28 (34.57)		
Education level				
High school and below	38 (40.86)	49 (60.49)	6.675	0.010
College and above	55 (59.14)	32 (39.51)		
Residence				
Rural	43 (46.24)	40 (49.38)	0.172	0.679
Urban	50 (53.76)	41 (50.62)		
Family monthly income				
<6,000	35 (37.63)	46 (56.79)	6.385	0.012
≥6,000	58 (62.37)	35 (43.21)		
Working condition				
No	14 (15.05)	22 (27.16)	3.867	0.049
Yes	79 (84.95)	59 (72.84)		
Marital status				
Unmarried/widowed/divorced	7 (7.53)	9 (11.11)	0.666	0.414
Married	86 (92.47)	72 (88.89)		
Surgical method				
Breast conserving surgery	27 (29.03)	13 (16.05)	4.122	0.042
Radical or simple resection	66 (70.97)	68 (83.95)		
Clinical stage				
0-I stage	37 (39.78)	40 (49.38)	2.028	0.363
II stage	39 (41.94)	31 (38.27)		
III stage	17 (18.28)	10 (12.35)		
Treatment method				
Surgery + endocrine therapy	24 (25.81)	11 (13.58)	4.027	0.045
Surgery + radiotherapy and/or chemotherapy	69 (74.19)	70 (86.42)		
Menopause				
No	48 (51.61)	47 (58.02)	0.718	0.397
Yes	45 (48.39)	34 (41.98)		

ioral cognitive psychological care was given. The nursing staff guided the patients to gradually learn to respond reasonably, correctly understand themselves, strive for social support and rebuild self-esteem, mobilize the subjective initiative, and guided the patient to carry out progressive relaxation training; (3) continuing nursing: after discharge from the hospital, weekly follow-up by phone, or WeChat was carried out. A more comprehensive assessment of the patient's condition was provided, and the continuing nursing plan was revised based on the assessment. The main content included guiding patients to do self-care, such as physical exercise, rational medication, nutritional guidance, and continuing to guide patients to carry out relax training. In addition, a patients' WeChat group was established to communicate with or guide patients in real time.

Outcome measures

Depression score: The depression status was assessed using the Self-rating Depression Scale (SDS) 1-2 days before the patient was discharged from the hospital [19]. For some patients in the evaluation of the intervention effect, their depression status was evaluated again 6 months after discharge. SDS score <50 is classified as no depression, 50-59 as mild depression, 60-69 moderate depression, and >70 severe depression.

Table 2. Multivariate analysis of risk factors for postoperative depression in patients with breast cancer

Characteristic	Adjusted OR[*]	95% CI	P
Age			
≥45	Reference		
<45	1.76	1.15-2.26	0.033
Education level			
College and above	Reference		
High school and below	1.64	1.07-2.24	0.042
Family monthly income			
≥6,000	Reference		
<6,000	1.90	1.23-2.45	0.031

Note: [*]Adjusted working condition, surgical method, treatment method.

Quality of life

For patients who participated in the evaluation of the comprehensive intervention effect, the quality of life was assessed using the Chinese version (V4.0) of the Breast Cancer Patient Specific Scale (FACT-B) 1-2 days before discharge and 6 months after discharge, respectively [20]. This scale contains 36 entries in 5 fields, namely physiological status (7), social/family status (7), emotional status (6), functional status (7), and additional attention (9). The scores of each item were calculated separately, and totaled up to obtain the total score of quality of life. The higher the score, the higher the quality of life is. This scale has good reliability and validity [21].

Statistical analysis

Continuous data is expressed as mean ± standard deviation, and the mean between the two groups was compared using a two-sample independent t test. Categorical variables are expressed as a composition ratio, and the difference between the two groups was compared using a two-sided χ^2 test. In the first part of the study, multivariate logistic regression was used to analyze the risk factors of depression in patients. Based on the maximum local likelihood, the likelihood ratio test was used to gradually select the independent variables. In the intervention evaluation of depression and quality of life, paired t-test was used to compare the changes of depression and quality of life scores before and after intervention in the two groups. Two-sample independent t-test was used to compare the difference between the two

groups in the changes of depression and quality of life. The significant level was set to two-sided 0.05. Statistical analysis was performed using SPSS 20.0 software.

Results

Incidence of postoperative depression in female breast cancer patients

Among the 174 female patients with breast cancer, who were admitted between January and December 2016, 81 patients showed depression (46.55%). Among them, 59 patients was mild depression (33.91%) and 22 patients were moderate depression (12.64%).

Analysis of risk factors for postoperative depression in female patients with breast cancer

The individual and clinical characteristics of 81 patients with depression (the case group) and 93 patients with non-depression (the control group) were shown in **Table 1**. The proportions of patients in the case group under 45 years old, had received educational of high school and below, and family monthly income below 6,000 were 65.43%, 60.49% and 56.79%, respectively, which were significantly higher than those in the control group 45.16% (P=0.007), 40.86% (P=0.010) and 37.63% (P=0.012). In addition, the proportion of unemployed patients in the case group was significantly higher than that in the control group (27.16% vs. 15.05%, P=0.049). Among the clinical factors, the proportions of patients undergoing radical surgery or simple resection and chemoradiotherapy were 83.95% and 86.42%, respectively in the case group, which were significantly higher than those in the control group (P=0.042, P=0.045).

Table 1 shows that younger age, lower education level and economic level, radical or simple resection and postoperative chemoradiotherapy may be associated with postoperative depression in breast cancer patients. Incorporating the above factors into logistic regression analysis found that younger age, lower education level and economic level were independent risk factors for postoperative depression in female breast cancer patients, and their adjusted OR were 1.76 (95% CI: 1.15-2.26), 1.64 (95% CI: 1.07-2.24) and 1.90 (95% CI: 1.23-2.45) respectively (**Table 2**).

Table 3. General characteristics between the comprehensive nursing group and the routine nursing group (n, %)

Characteristic	Comprehensive nursing group (n=70)	Routine nursing group (n=70)	χ^2	P
Age				
<45	39 (55.71)	32 (45.71)	1.400	0.237
≥45	31 (44.29)	38 (54.29)		
Education level				
High school and below	36 (51.43)	30 (42.86)	1.032	0.310
College and above	34 (48.57)	40 (57.14)		
Family monthly income				
<6,000	41 (58.57)	33 (47.14)	1.835	0.176
≥6,000	29 (41.43)	37 (52.86)		
Working condition				
No	11 (15.71)	18 (25.71)	2.131	0.144
Yes	59 (84.29)	52 (74.29)		
Surgical method				
Breast conserving surgery	28 (40.00)	37 (52.86)	2.326	0.127
Radical or simple resection	42 (60.00)	33 (47.14)		
Treatment method				
Surgery + endocrine therapy	29 (41.43)	22 (31.43)	1.511	0.219
Surgery + radiotherapy and/or chemotherapy	41 (58.57)	48 (68.57)		

Table 4. Depression improvement between the comprehensive nursing group and the routine nursing group via SDS

Intervention condition	Comprehensive nursing group (n=70)	Routine nursing group (n=70)	t	P
Before intervention	56.21±8.62	57.34±8.91	0.763	0.470
After Intervention	53.71±7.74	57.92±8.47		
Difference	2.50±4.33	0.58±2.69	3.151	0.002
t	4.831	1.804		
P	<0.001	0.076		

Note: SDS, Self-rating Depression Scale.

from 56.21 (± 8.62) to 53.71 (± 7.74), which was a significant decrease (P<0.001). The SDS scores of the routine nursing group increased slightly during the follow-up period, but did not reach significant levels. The decrease of SDS score in the comprehensive nursing group was significantly greater than that in the routine nursing group (P=0.002).

Effect of comprehensive nursing on postoperative depression and quality of life in patients with breast cancer surgery.

There was no significant difference in individual and clinical characteristics between the two groups (**Table 3**).

Table 4 shows the changes in depression scores before and after intervention in the two groups of patients. There was no significant difference in the depression score between the two groups before the intervention (P>0.05). After 6 months of intervention, the SDS score of the comprehensive nursing group decreased

There were no significant differences in each item of quality of life and total scores of quality of life between the two groups before the intervention (both P>0.05). The functional status scores of the two groups were significantly improved after the intervention, but there was no significant difference in the degree of improvement between the two groups (P= 0.419). In addition to the social family status score, the physical status, emotional status, and additional attention of the comprehensive nursing group were significantly improved (all P<0.05), while the routine nursing group showed no significant changes, and the improvement of the comprehensive nursing

Table 5. Improvements in quality of life between the comprehensive nursing group and the routine nursing group

Quality of life	Comprehensive nursing group (n=70)	Routine nursing group (n=70)	t	P
Physiological status				
Before intervention	14.21±5.34	13.96±4.58	0.383	0.767
After Intervention	15.34±5.41	13.41±4.33		
Difference	1.13±4.02	-0.55±2.36	3.015	0.003
t	2.352	1.950		
P	0.022	0.055		
Social/family status				
Before intervention	20.32±6.15	20.75±6.29	1.533	0.128
After Intervention	20.90±7.02	20.14±6.56		
Difference	0.58±2.49	-0.11±1.90	1.843	0.067
t	1.859	0.484		
P	0.068	0.630		
Emotional status				
Before intervention	15.79±5.47	15.42±5.51	0.399	0.691
After Intervention	16.67±5.92	15.63±6.04		
Difference	0.88±2.31	0.19±0.98	2.301	0.023
t	3.187	1.622		
P	0.002	0.109		
Functional status				
Before intervention	12.14±4.09	13.08±4.72	1.259	0.210
After Intervention	12.99±5.22	13.86±5.81		
Difference	1.25±3.36	0.80±3.21	0.810	0.419
t	2.251	2.086		
P	0.003	0.041		
Additional attention				
Before intervention	19.67±6.54	18.83±5.92	0.797	0.427
After Intervention	21.30±6.87	18.65±5.74		
Difference	1.63±3.76	-0.18±1.03	3.884	<0.001
t	3.627	1.462		
P	0.001	0.148		
Total scores of quality of life				
Before intervention	82.13±16.18	82.04±17.31	0.032	0.975
After Intervention	87.20±18.37	81.79±16.85		
Difference	5.07±9.14	-0.25±0.96	4.843	<0.001
t	4.641	2.179		
P	<0.001	0.033		

group was significantly better than the routine nursing group (P<0.05). After the balance of various fields, the total scores of quality of life in the comprehensive nursing group were significantly improved, while the routine nursing group showed a significant decline. The difference between the two groups after the intervention was also significant (P<0.001) (**Table 5**).

Discussion

Psychological disorders are one of the common complications of cancer patients, and include depression and anxiety. Due to the unique psychophysiological characteristics of women and the effects of breast cancer surgery on the body and physical functions, the incidence of depression in breast cancer patients is very high [22]. At present, the incidence of postoperative depression in breast cancer is reported to be between 1% and 56% due to differences in measurement tools, study population, and the sample size [23]. In this study, the incidence of postoperative depression in breast cancer was 46.6%, slightly lower than the 57.9% reported in another study in China, but higher than other studies [22]. However, the latter's research subjects were not limited to patients undergoing surgery [6].

Understanding the risk factors for postoperative depression in breast cancer patients may help to provide a basis for the development of goal-directed nursing interventions, but the current research results are not always consistent. A study in China found that low income, marital status, comorbidity and low quality of life were independent risk factors for depression in breast cancer patients, but menstrual status, hormonal status, disease stage or cancer-related treatment are not significantly associated with it [6]. In the current study, younger age, lower education and economic level were independent risk factors for depression in postoperative women with breast cancer, similar to those in other studies. The association between age and depression in breast cancer patients was also

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inconsistent. Some studies have found that older age increases the risk of depression in breast cancer patients, but most studies suggest that the risk of younger age is greater, because younger patients are more worried about marriage, family and work, and are more concerned about their appearance [24-26]. In addition, although the surgical methods and treatment in univariate analysis of this study were associated with the risk of depression, no significant association was found in the multivariate analysis, and the results were similar in other studies [25, 27].

In breast cancer patients, there is a significant association and interaction between depression and quality of life [28]. Studies have shown that the more severe the postoperative depression and anxiety of breast cancer patients are, the worse their quality of life are [5]. Similar to the above studies, in the current study, the quality of life in the routine nursing group also decreased significantly during the study period.

The American Society of Clinical Oncology has not recommend preferred drugs or regimens in its cancer survivors' anxiety and depression guidelines, but rather emphasized screening assessments and supportive care services. Supportive care including behavioral cognitive therapy carried out for patients with mild to moderate depression [29]. Similarly, the implementation of nursing intervention in postoperative patients with breast cancer is of great significance to improve patients' bad mood and improve their quality of life. A variety of nursing interventions have been evaluated in control of depression in breast cancer patients, including behavioral cognitive therapy, music therapy, physical and mental therapy, etc. [30, 31]. In the current study, based on the results of previous case-control studies and other studies, especially patients with younger age, lower education and economic income as high-risk individuals, comprehensive nursing interventions including health education, cognitive behavior and delayed intervention were carried out in the intervention group, showing that depression and quality of life of the comprehensive nursing group and the routine nursing group 6 months after the intervention were significantly improved, compared with those before discharge. The main reason was that comprehensive nursing can improve the nega-

tive emotions of patients, relieve their psychological stress, and alleviate the body condition and improve their discomfort through continuous relaxation training, thereby improving their quality of life. In contrast, the quality of life of the control group decreased significantly during the study period, similar to the results of other randomized controlled studies and some meta-analyses [14, 32]. For example, a meta-analysis in China analyzed the results of 17 cognitive behavioral intervention studies and found that the depression score and quality of life of postoperative patients with breast cancer were significantly improved compared with the control group [32]. However, not all studies reported positive results. In a US study, the effect of cognitive behavioral intervention was 0.27 compared with the control group, with no statistically significant [15]. The inconsistency of the above results may be related to the differences in sources of patients, intervening measure, measurement tools and analytical methods. Therefore, the effect of comprehensive nursing on depression in postoperative patients with breast cancer needs further study. However, this study also has some limitations. For example, in the case-control study, not all reported factors were taken into account, blind methods were not implemented in the project design, and the case-control study design had its inherent bias, and so on. Therefore, prospective studies should be performed to further explore the risk factors for postoperative depression after breast cancer surgery, and a large prospective randomized controlled trial will be conducted to evaluate the effect of comprehensive nursing on postoperative depression in breast cancer.

In summary, this study used a case-control study to determine the risk factors of postoperative depression in female breast cancer patients. We also found that comprehensive nursing intervention based on cognitive behavioral intervention and continuous nursing could reduce the severity of postoperative depression and improve the quality of life of female breast cancer patients, thus providing an evidence for postoperative nursing of female breast cancer patients.

Disclosure of conflict of interest

None.

Address correspondence to: Ling Wang, Department of Thyroid Breast Surgery, The Third Xiangya Hospital of Central South University, No.138 Tongzipo Road, Yuelu District, Changsha 410013, Hunan Province, China. Tel: +86-15274940253; E-mail: wangling346@163.com

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