Anxiety and depression symptoms among ovarian cancer patients in China: a cross-sectional study[†]

Original article

Jing Chen, De-Rong Long*, Xiu-Jing Guo, Yi Liu, Hua-Xuan You

Department of Gynaecology Nursing, West China Second University Hospital, Sichuan University, Chengdu, Sichuan 610041, China

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Abstract: **Objective:** To investigate the prevalence of cancer-related depression and anxiety in western China among patients with ovarian cancer and analyze their influencing factors.

Methods: In this prospective cross-sectional study, qualified patients were asked to fill in questionnaires. Multivariate analysis and binary logistic regression analysis were used to test the associations among symptoms of depression and anxiety, coping styles, and influencing factors.

Results: A total of 270 ovarian cancer inpatients who met the criteria for participation in the study completed the questionnaires. The levels of depression and anxiety that prevailed in ovarian cancer patients were 47.03% and 57.77%, respectively. Among them, 90.38% of cancer-related anxiety patients and 91.33% of cancer-related depression patients showed mild symptoms. The chi-square test showed that there were statistically significant differences ($P < 0.05$) in the fields of education level and income. *T*-test showed that cancer-related depression and anxiety were associated with coping style, and the difference had statistical significance ($P < 0.05$). Furthermore, multivariate analysis showed that the education level and coping style were the independent influencing factors of depression and anxiety.

Conclusions: The present study suggested that about half of the ovarian cancer patients had with depression and anxiety symptoms. The majority of the cancer-related depression and symptoms were mild. Educational level and coping style should be considered during the interventions of cancer-related depression and anxiety.

Keywords: ovarian cancer • depression • anxiety • coping style

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1. Introduction

The International Cancer Research Agency (IARC), the American Cancer Society (ACS), and the International Union for Cancer Control (UICC) reported in the third edition of the “Atlas of Cancer” that the number of new

cancer cases in the world will reach 29 million in 2040, and the cancer burden is expected to increase by 60%, of which China reports the largest number of new cancer cases (4.3 million cases, 24% of the total) and deaths

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* Corresponding author.

E-mail: 552396141@qq.com (D.-R. Long).

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(2.9 million cases, 30% of the total).¹ As of the end of 2017, malignant tumors have become the first major mortality rate of urban residents (26.11%) and the second-highest mortality rate of rural residents (23.07%) in China.² Among female patients, ovarian cancer has the second-highest incidence of cancer, and the mortality rate ranks first in gynecological malignant tumors.³ According to the latest statistics in China, 52,000 new cases of ovarian cancer have been detected, and about 22,000 deaths have occurred. Due to a lack of effective screening methods, nearly 75% of the patients get it diagnosed only in late stages. The 5-year survival rate is only 41.8%.^{4,5} Different stages have different survival rates, 90% in the early stage, but only 30% in the advanced stage.⁶ However, it is difficult to diagnose ovarian cancer at an early stage (I/II) due to the nonspecific symptoms, and there is no recommended screening test. So, the majority of ovarian cancer patients are diagnosed only at an advanced stage.

As a result of high incidence rates in advanced stages and high mortality of the disease, patients who are suffering from ovarian cancer have to tolerate not only the physical pain but also the enormous psychological pressure and a huge financial burden.^{7,8} Some studies have indicated that depression and anxiety are two common types of psychological disorders in cancer patients.^{9–11} Anxiety is often described as the emotion of fear, involving the feelings of tension, nervousness, worry, apprehension, and dread for something perceived as threatening in the future. Depression has been defined as an emotion of sadness, hopelessness, lack of energy, and gloom.¹² Among many types of cancer patients, the degree of anxiety in female patients was significantly higher than in male patients, and gynecological cancer patients were found to have the highest level of anxiety.¹³ In the past, a poor mental state is often regarded as a normal phenomenon accompanied by the disease, which led medical workers to ignore these symptoms. But anxiety, depression, and other adverse psychological states will not only affect the patient's subjective feelings and quality of life but also the disease progression and prognosis.¹⁴ Especially for patients with gynecological oncology, the disease often causes the loss of function or organism that represents female characteristics, which make the patients feel ashamed. So gynecological cancer patients are more likely to suffer from a poor mental state and interruption treatment than other cancer patients.¹⁵ Several previous studies have shown that a monitoring coping style is related to reduce the psychological impact on ovarian cancer.^{16,17} So, identifying the influencing factors associated with poor psychological status is important to develop appropriate target interventions for ovarian cancer patients.^{18,19} Therefore, we conducted this cross-sectional study to

assess the prevalence of depression and anxiety in ovarian cancer patients in western China and analyze the related influencing factors.

2. Methods

2.1. Study design and recruitment criteria

We carried out a cross-sectional study to assess the symptoms of anxiety and depression among ovarian cancer patients and influencing factors. According to the epidemiology of sample size estimates, the required sample size is 10 times the research factors and the number of related factors in our study is 14. Meantime, considering the 20% loss rate, 168 participants are needed to be enrolled. Pre-survey showed that the prevalence of cancer-related anxiety and depression was about 50%, and the actual sample should be more than 240 cases.

Inclusion criteria were (a) being pathologically diagnosed as epithelial ovarian cancer; (b) able to read and understand the questionnaire in Chinese; (c) with clear consciousness; and (d) above 18 years old. Exclusion criteria were patients (a) with a history of the psychiatric disease; (b) unable or unwilling to fill in the informed consent or communicate with study staff; and (c) complicated with other kinds of cancers.

2.2. Instruments

2.2.1. Hospital Anxiety and Depression Scale

We adopted the Hospital Anxiety and Depression Scale (HADS)²⁰ to measure the degree of anxiety and depression symptoms. This 14-item questionnaire includes two subscales, such as anxiety subscales (seven items) and depression subscales (seven items). Responses for each question ranges from 0 to 3 (0 = completely not; 1 = a little; 2 = somewhat; and 3 = very much). The total score point ranges from 0 to 21. The higher the score is, the more severe the anxiety and depression symptom is. The score "<8" is within the normal range, "8–10" suggests possible clinical anxiety or depression, and ">10" indicates probable anxiety or depression mood disorder. The instrument has been widely used in China with sufficient reliability. The internal reliability alpha values for the symptoms of anxiety and depression are 0.828 and 0.901, respectively, in the current study.

2.2.2. Simplified Coping Style Questionnaire

Coping style was measured by the 20-item Simplified Coping Style Questionnaire (SCSQ).²¹ Each item is

rated as four points on the Likert scale (0 = never do; 1 = seldom do; 2 = often do; and 3 = always do). This instrument is a self-report questionnaire that contains 20 items and consists of two subscales: positive and negative coping. The high score of each dimension indicated frequent usage of this type of coping. The internal reliability alpha values for the positive and negative coping styles were 0.793 and 0.835, respectively, in the current study.

2.3. Data collection

This survey was conducted from March 2016 to March 2017 and was demonstrated in West China Second University Hospital, Sichuan University, China.

2.4. Statistical analysis

The survey data were entered into Epidata 2.1, and specialized software was used for managing data Endnote X8. This program facilitates interactive entry and data correction and maintains consistent and accurate trial data. SPSS 17.0 software package was used for statistical analyses. A chi-squared test or *T*-test was used to analyze the statistical differences of quantitative data. Significance was set at $P < 0.05$. In the multivariate analysis, binary logistic regression analysis was used and odds ratios (ORs) with 95% confidence intervals (CIs) were calculated.

3. Results

We surveyed 483 patients and eliminated 13 questionnaires because some patients' diagnoses were not clear, and the effective questionnaire recovery rate of this study was 95.4%. Finally, a total of 270 hospitalized ovarian cancer patients were enrolled in the study. Table 1 presented the patients' characteristics of demographic and clinical variables. Among 270 ovarian cancer patients, there were 148 (54.81%) patients who were 45–60 years old, and patients in the age range 18–82 years (53.54 ± 5.49 , 95.18%) were married. A total of 65.55% of patients graduated from primary and high school, and only 52 patients (19.26%) earned more than 5,000 Yuan per month. The majority of ovarian cancer patients were under stage-III, accounting for 72.22%, 197 patients (72.96%) spent 20,000–40,000 Yuan when they were hospitalized.

3.1. The prevalence of cancer-related depression and anxiety

The prevalence of cancer-related depression was 47.03% and cancer-related anxiety was 57.77% among

the 270 ovarian cancer patients. Approximately 90.38% of cancer-related anxiety and 91.33% of cancer-related depression were both mild (Table 2).

3.2. Associations of demographic and clinical variables with symptoms of depression and anxiety

As shown in Tables 3 and 4, the prevalence of cancer-related depression and anxiety was associated with education level and income, there were statistically significant differences in education level (depression:

Variable	Number (n)	Percentage (%)
<i>Age, years</i>		
18–44	87	32.22
45–60	148	54.81
≥60	35	12.97
<i>Marital status</i>		
Unmarried	13	4.82
Married	257	95.18
<i>Education level</i>		
Primary or high school	177	65.55
Bachelor degree or master	93	34.45
<i>Family income, Yuan/month</i>		
≤3,000	115	42.59
3,000–5,000	103	38.15
≥5,000	52	19.26
<i>Cancer staging</i>		
III	195	72.22
IV	75	27.78
<i>Medical costs, Yuan</i>		
20,000–40,000	197	72.96
≥40,000	73	27.04

Table 1. Clinical and social-demographic data of patients ($N = 270$).

Variable	Distribution		n	Morbidity (%)
	Degree	Constituent ratio (%)		
<i>Anxiety</i>			156	57.77
	Mild	141	90.38	
	Moderate	13	8.33	
	Severe	2	1.29	
<i>Depression</i>			127	47.03
	Mild	116	91.33	
	Moderate	10	7.88	
	Severe	1	0.79	

Table 2. The incidence of cancer-related anxiety and depression ($N = 270$).

Variable	Number (n)	Anxiety				Depression			
		n	%	χ^2	P	n	%	χ^2	P
Age, years				1.043	0.594			1.673	0.433
18–44	87	49	56.32			36	41.37		
45–60	148	84	56.75			74	50.00		
≥60	35	23	65.71			17	48.57		
Marital status				0.079	1.000			1.153	0.395
Unmarried	13	8	61.53			8	61.53		
Married	257	148	57.58			119	46.30		
Education level				7.087	0.009*			17.398	<0.001*
Primary or high school	177	92	51.97			67	37.85		
Bachelor degree or master	93	64	68.81			60	64.51		
Family income, Yuan/month				11.003	0.004*			9.394	0.009*
≤3,000	115	57	49.56			46	40.00		
3,000–5,000	103	59	57.28			47	45.63		
≥5,000	52	40	76.92			34	65.38		
Cancer staging				0.328	0.587			0.373	0.589
III	195	110	56.41			89	45.64		
IV	75	46	61.33			38	50.66		
Medical costs, Yuan				0.365	0.580			0.009	1.000
20,000–40,000	197	116	58.88			93	47.20		
≥40,000	73	40	54.79			34	46.57		

Note: * $P < 0.05$.

Table 3. Relationship between various factors and cancer-related anxiety and depression.

Variable	n	Active style	T	P	Negative style	T	P
Anxiety			2.77	0.006*		−6.019	<0.001*
Yes	156	20.60 ± 5.224			13.07 ± 3.943		
No	114	22.68 ± 7.075			10.18 ± 3.940		
Depression			2.15	0.032*		−4.906	<0.001*
Yes	127	20.63 ± 4.577			13.11 ± 3.776		
No	143	22.23 ± 7.198			10.73 ± 4.138		

Note: * $P < 0.05$.

Table 4. Relationship between coping style and cancer-related depression and anxiety.

$P = 0.000$, anxiety: $P = 0.009$) and income (depression: $P = 0.009$, anxiety: $P = 0.004$). Cancer-related depression and anxiety were associated with coping style among the 270 ovarian cancer patients, there were statistically significant differences (depression: $P = 0.032$ for active style and $P = 0.000$ for negative style, anxiety: $P = 0.006$ for active style and $P = 0.000$ for negative style).

3.3. Multivariate analysis of factors associated with cancer-related depression and anxiety

Binary logistic regression showed that there were statistically significant differences in education level (OR = 0.307, 95% CI = 0.157–0.603), active style (OR = 0.903, 95% CI = 0.859–0.948), and negative style

(OR = 1.298, 95% CI = 1.195–1.410) in cancer-related depression (Table 5). The multivariate analysis also showed that cancer-related anxiety was associated with education level (OR = 0.189, 95% CI = 0.096–0.371), active style (OR = 0.926, 95% CI = 0.883–0.971), and negative style (OR = 1.248, 95% CI = 1.155–1.348) (Table 6).

4. Discussion

4.1. Ovarian cancer patients have relatively higher levels of anxiety and depression

We find that the prevalence of ovarian cancer-related depression was 47.03% while cancer-related anxiety was 57.77%. Chun found that the prevalence of ovarian cancer-related depression was 47% and the anxiety was 51.5%, which was similar to the present study (Liu et al., 2017). But Price et al. performed a prospective cohort study, which enrolled 798 Australian ovarian cancer patients, and reported that the clinical anxiety

was 15% and depression was only 5.9%.²² And a meta-analysis indicated that the prevalence of symptoms of depression and anxiety in Chinese cancer patients was 54.90% and 49.69%,²³ respectively, which was not limited to ovarian cancer. Moreover, a systematic review has shown that the prevalence of depression and anxiety in women with ovarian cancer is significantly higher than healthy females.²⁴ Therefore, it suggests that Chinese ovarian cancer patients have relatively higher levels of anxiety and depression. Besides, in our study, the ovarian cancer-related anxiety level was slightly higher than the depression level. It is consistent with the results of Mielcarek et al. (2016), which also found that the level of anxiety was higher than the level of depression in patients from Poland with advanced ovarian cancer, and the prevalence of pathological anxiety was the highest (74%) before surgery.²⁵ All the patients who participated in our study were in the advanced-stage of ovarian cancer, too. Another study showed that the prevalence of depression in Chinese patients with malignant tumors was 54.90%.²³ Hu Hong reviewed 35 studies involving cancer-related depression in China, where a total of 7,445 cases of cancer patients were included, and found that the prevalence of cancer depression was ranged from 19% to 95%.²⁶ So, there is no doubt that the sample size, stage of cancer, and choice of assessment tools are the factors that lead to the different results between our study and previous studies. In developed countries, the improved recognition of the psychological impact of ovarian cancer may lead workers to seek mental treatment and other social supports actively.

4.2. Education and coping style were independent influencing factors

In our study, we also found that education and coping styles were independent influencing factors. Binary logistic regression analysis showed that education level, active style, and negative style were the influencing factors with cancer-related anxiety and depression. Liu et al. found that ovarian cancer patients with higher education levels were tended to have a lower prevalence of cancer-related depression.¹⁰ But another study reported the opposite result which was consistent with the findings of our study. The reason may be that the patients with higher educational levels often took the initiative to get cancer-relevant information, but the poor prognosis of ovarian cancer gave rise to the symptoms of depression and anxiety.²⁷ Patients with lower educational levels were dependent on medical institutions and medical staff more and cooperate with the diagnosis and treatment actively. Wang found that the symptoms of depression and anxiety in ovarian cancer patients were positively correlated with negative

Variable	P	OR	95% CI	
			Lower	Upper
Age, years	0.302	1.263	0.811	1.965
Marital status	0.469	0.614	0.164	2.299
Education level	0.001*	0.307	0.157	0.603
Income	0.852	0.864	0.381	1.958
Cancer staging	0.990	1.013	0.131	7.831
Medical costs	0.900	0.875	0.111	6.904
Active style	<0.001*	0.903	0.859	0.948
Negative style	<0.001*	1.298	1.195	1.410

Note: *P < 0.05.

Table 5. Multivariate analysis of factors associated with cancer-related depression.

Variable	P	OR	95% CI	
			Lower	Upper
Age, years	0.080	1.487	0.954	2.318
Marital status	0.581	1.462	0.379	5.648
Education level	<0.001*	0.189	0.096	0.371
Income	0.593	1.378	0.616	3.083
Cancer staging	0.264	3.371	0.400	28.430
Medical costs	0.281	0.307	0.036	2.631
Active style	0.002*	0.926	0.883	0.971
Negative style	<0.001*	1.248	1.155	1.348

Note: *P < 0.05.

Table 6. Multivariate analysis of factors associated with cancer-related anxiety.

coping and negatively correlated with positive coping which were consistent with the findings of our study.²⁸ The reason may be that coping style has played a regulatory and mediating role between stress and psychological response. Previous studies have shown that patients who are actively coping with problems are prone to optimism emotion.²⁹ Several studies have provided evidence of the influence of positive psychological factors in cancer patients,^{30–32} and a meta-analysis has shown that psychological intervention can significantly reduce the anxiety and depression of ovarian cancer patients.³³ This means that clinical staff should make more efforts to provide health education on coping styles and psychological interventions to ovarian cancer patients.

5. Conclusions

Our findings highlight that about half of the ovarian cancer patients suffered from cancer-related depression and anxiety, while more than 90% of depression and anxiety were mild. Among their education level, coping styles were significant and independent determinants. It is essential to ensure that the health care system provides efficient health education, psychological intervention, and support. In particular, clinical staff should pay more attention to the mood of ovarian cancer patients, early detection of cancer-related depression and anxiety, and promote the mental health of ovarian cancer patients.

Limitations

Our study has several limitations. First, we did not compare the differences between anxiety and depression levels in patients with early and advanced ovarian cancer and explore the associations between the psychological and stage of ovarian cancer. Second, we only focused

on the symptoms of depression and anxiety, while other psychological disorders, such as post-traumatic stress disorders, obsession, and inferiority, have not been investigated. Third, the original design of this survey was to adopt a multi-center sampling survey method in the alliance hospitals in the western region, but the feedback results of the preliminary test, in the end, were not ideal. Therefore, this study only selected one mother and child specialist hospital. It can only represent the incidence of anxiety and depression symptoms of a small number of female patients who were treated in the mother and child specialist hospital. The incidence of anxiety and depression in ovarian cancer patients treated in hospitals or oncology specialties in general hospitals has promotion limitations. So, additional well-designed studies with multi-center and rigorous methodologies are required.

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Ethical approval

The study was approved by the Ethics Committee of West China Second University Hospital, Sichuan University. All participants in the survey filled in and signed the informed consent.

Conflicts of interest

All contributing authors declare no conflicts of interest.

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