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ORIGINAL RESEARCH

A Study on the Psychological Factors Affecting the Quality of Life Among Ovarian Cancer Patients in China

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Purpose: We aim to test whether resilience mediates the association of fear of progression (FoP) with quality of life (QoL) among ovarian cancer patients in China.

Methods: We collected 230 questionnaires from the First Affiliated Hospital of China Medical University in Liaoning Province, and 209 completed the questionnaire survey. The survey instrument consisted of four questionnaires: a sociodemographic and clinical characteristics questionnaire, the Functional Assessment of Cancer Therapy general instrument, the Fear of Progression Questionnaire-Short Form and the Connor-Davidson Resilience Scale. Hierarchical regression analysis was used to examine the relationship among FoP, resilience, and QoL, including physical well-being, social well-being, emotional well-being, and functional well-being. We used asymptotic and resampling strategies to examine the indirect effect of resilience.

Results: FoP was negatively associated with resilience (r=−0.543, P<0.01) and QoL (physical well-being: r=−0.537, P<0.01; social well-being: r=−0.426, P<0.01; emotional well-being: r=−0.487, P<0.01; functional well-being: r=−0.529, P<0.01). Resilience was positively related with QoL (physical well-being: r=0.449, P<0.01; social well-being: r=0.548, P<0.01; emotional well-being: r=0.430, P<0.01; functional well-being: r=0.655, P<0.01). Resilience partly mediated the association between FoP and physical well-being (a×b=−0.05, BCa 95% CI: −0.09, −0.02), social well-being (a×b=−0.21, BCa 95% CI: −0.29, −0.14), emotional well-being (a×b=−0.05, BCa 95% CI: −0.08, −0.02), and functional well-being (a×b=−0.24, BCa 95% CI: −0.32, −0.17). The proportion of the mediating effect accounted for by resilience were 22.57%, 57.22%, 26.02%, 53.42% for physical well-being, social well-being, emotional well-being and functional well-being, respectively.

Conclusion: The study showed that resilience could mediate the association between fear of progression and quality of life. It suggests that resilience might provide a potential target for intervention in quality of life with ovarian cancer.

Keywords: mediating role, fear of progression, quality of life, resilience, ovarian cancer patients

Introduction

Ovarian cancer is a gynecological malignancy disease which was the seventh most frequent cancer diagnosis worldwide, and the eighth leading cause of cancer mortality.[1] The mortality rate of ovarian cancer is the highest in gynecological tumors.[2] Many patients with ovarian cancer are in the middle and advanced stage when they are found, so the 5-year survival rate was less than 20%.[3] In China, ovarian cancer is the second most common cancer in women behind cervical cancer, and the mortality

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rate is 21.6%, ranking as the deadliest cancer among women.[4] About 70% of ovarian cancer is advanced, even after complete remission through surgery and chemotherapy, about 70% of ovarian cancer eventually recurs.[5] Surgery combined with chemotherapy is currently an effective treatment for ovarian cancer, and the prognosis and survival rate has been significantly improved.[6] However, surgery and chemotherapy inevitably bring physical pain and psychological changes to patients and also affect the quality of life of patients.[7]

Quality of life is defined as the "individual's perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns".[8] The quality of life is often better than the survival rate in reflecting the treatment of cancer patients.[9] Gynecological tumor itself and the corresponding treatment will have a serious negative impact on the physical, psychological, social, and spiritual aspects of patients.[10] Ovarian cancer survivors experience a series of sequelae that may last for a long time and have a negative impact on their quality of life.[11] Research showed that whether the cancer itself, or the side effects of surgery or adjuvant therapy, etc., would affect the quality of life of patients.[12] Besides improving the cancer survival rates, there is an increasing need to develop interventions for improving the quality of life of cancer survivors.[13]

However, in addition to cancer surgical treatment and other physiological factors, the negative psychological factors of patients will also have a negative impact on the quality of life. Cancer patients in the final stage not only suffer from physical pain but also face complex psychosocial problems, which will seriously affect the quality of life of patients.[14] Fear of progression is biopsychosocial consequences of fear of disease progression or the recurrence of fear of disease.[15] The incidence of fear of progression among cancer survivors ranges from 22% to 99%.[16] Study found that fear of progression was the most important psychological pain of 1721 cancer patients.[17] Among newly diagnosed gynecological cancer patients, the incidence of fear of progression was as high as 47%.[18] Study also reported the recurrence fear of ovarian cancer patients, and found that the fear of ovarian cancer patients was more serious.[19] Long-term and/or excessive fear can affect the quality of life and social functions of cancer patients.[20]

Resilience generally refers to a pattern of functioning indicative of positive adaptation in the context of significant risk or adversity.[21] Resilience research suggests there was a potential association with certain psychological characteristics and optimal outcomes, such as higher quality of life, better mental health and so on.[22] In recent years, with the development of positive psychology, many scholars began to explore the positive psychological changes of individuals after traumatic events.[23] As a part of positive psychology, resilience can effectively reduce the risk of mental illness.[24] Some studies have shown that there is a positive correlation between the level of psychological resilience of patients and the quality of life.[25] For example, patients with high level of psychological resilience have relatively good quality of life in all aspects,[26] and improving the resilience can promote the quality of life of ovarian cancer patients.[27] Resilience also has been reported to mitigate the negative psychological factors and contribute to increase the quality of life of cancer patients.[28] From these studies, resilience was suggested as a possible mediator of quality of life. With this background, we hypothesized that resilience would mediate the relationship between fear of progression on quality of life for patients with ovarian cancer.

Methods

Ethics Statement

The Committee for Human Trials of China Medical University has reviewed and provided the ethical approval for this study, and the trial procedures were in accordance with the ethical standards. All the patients have submitted their written consent after learning the study protocol. They were all voluntary and anonymous during the process. We protected the privacy of patients in dealing with personal data and maintained confidentiality of individual records.

Study Design and Sample

A cross-sectional survey was conducted in Liaoning Province, China, during January–May 2019. We recruited patients with ovarian cancer from the First Affiliated Hospital of China Medical University, which is important provider of cancer treatment services in Liaoning Province of China. The survey instrument consisted of four questionnaires: a sociodemographic and clinical characteristics questionnaire, the Functional Assessment of Cancer Therapy general instrument, the Fear of Progression Questionnaire-Short Form and the Connor-Davidson Resilience Scale. Initially, a total of 230 patients were enrolled. Finally, we received effective responses from 209 ovarian cancer patients, and the effective response rate is 90.8%.

Measurement of Quality of Life

The Functional Assessment of Cancer Therapy general (FACT-G) instrument is appropriate for all cancer sites,

and it is included as the general cancer core questionnaire for each FACT cancer site-specific instrument.[29] The FACT-G is a cancer-targeted QoL measure that features four subscales, each representing a key dimension of QoL: physical well-being (PWB), social well-being (SWB), emotional well-being (EWB), and functional well-being (FWB). Each FACT-G item has a recall period of the past 7 days and is rated as "Not at all" (0), "A little bit" (1), "Somewhat" (2), "Quite a bit" (3), or "Very much" (4). Item responses are summed to create subscale scores with the following ranges: PWB = 0 to 28; SWB = 0 to 28; EWB = 0 to 24; and FWB = 0 to 28. Then, subscale scores are summed to create a total FACT-G score ranging from 0 to 108. For all subscales and the FACT-G, higher scores indicate better QoL. It has good reliability and validity.[30] In this study, the Cronbach's α coefficient of these four subscales were 0.85, 0.89, 0.80, and 0.90, respectively.

Measurement of Fear of Progression

Fear of Progression (FoP) was measured with the Fear of Progression Questionnaire-Short Form (FoP-Q-SF).[31] FoP-Q-SF was developed by Mehnert in 2006 and Sinicized by Qi Yun et al in 2015, with good reliability and validity.[32] The scale contains 12 items and divided into two dimensions: physical health (items 1, 2, 3, 5, 9, 10) and social family (items 4, 6, 7, 8, 11, and 12). Likert Scale 1–5 scoring method was used to evaluate patients' self-assessment. One point was "never", and five points was "always". Scores ranged from 12 to 60, and the higher the score, the more fearful the patient was of disease progression. If the score is greater than or equal to 34, this means that the patient has a mental disorder.[33] In this study, the Cronbach's α coefficient was 0.92.

Measurement of Resilience

Resilience was measured with the Connor-Davidson Resilience Scale (CD-RISC).[34] The CD-RISC comprises 25 statements on how one has felt over the past month (eg, I can adapt to change; I have at least one close and safe person to help me when faced with pressure and so on). The response scale has a 5-point range: 0 (not true at all), 1 (rarely true), 2 (sometimes true), 3 (often true), and 4 (true nearly all of the time). Scores are added up to a maximum score of 100, meaning high resilience. The Chinese version of the scale was widely tested by Xiao Nan, and it has good reliability and validity.[35] In this study, the Cronbach's α coefficient for the resilience was 0.82.

Demographic and Clinical Characteristics

In our study, there are four demographic variables and three clinical variables. Age was divided into three types: "≤45", "46–59", and "≥60". Marital status was divided into two cases: "Married/cohabited", "Single/separated". Education level was divided into four levels: "Primary school", "Middle school", "High school", "Junior college or above". Family monthly income (RMB: Yuan) included "≤2000", "2001–3000", "3001–4000", and "≥4001". According to the International Federation of Gynecology and Obstetrics (FIGO),[36,37] the study divided cancer stage into four types. Treatment type included "no treatment", "chemotherapy", "surgery", and "combined treatment (a combination of different kinds of treatment)". Whether the cancer is recurrence is also considered as a clinical variable.

Statistical Analysis

Mean, standard deviation (SD), number (n) and percentage (%) were used to describe the demographic and clinical characteristics. Independent sample *t*-test or one-way ANOVA were applied to examine group differences of continuous variables. Correlations among continuous variables were examined by Pearson's correlation. Hierarchical regression analysis was used to prove the relationship of FoP and resilience with QoL and to examine the mediating role of resilience on the association of FoP with QoL. In addition, we used asymptotic and resampling strategies to examine whether the indirect effect of resilience was significant.[38] FoP was modeled as independent variable, with QoL as the outcomes, resilience as mediators. The "c path" refers to the relationship between FoP and QoL; the "a × b path" represents the mediation of resilience. If the absolute value of "c' path" coefficient shrinks than that of the "c path", the mediation role of resilience may exist. Five thousand bootstrap samples were used to estimate the present study. We suppose that if bias-corrected and accelerated 95% confidence interval (BCa 95% CI) do not include 0, the mediation is significant. All statistical analyses were conducted by IBM SPSS Statistics 21.0 (IBM, Asia Analytics Shanghai), and a two-tailed $P<0.05$ was considered to have statistical significance.

Results

Descriptive Statistics

Demographic and clinical characteristics of the participants are presented in Table 1. In our research, of the 209 respondents, age ranged from 20 to 92, and the average age was 55.87±9.99 years. There was no significant

Table 1 Demographic and Clinical Characteristics (N=209)

Variables	N (%)	PWB		SWB		EWB		FWB	
		Mean±SD	*p*	Mean±SD	*p*	Mean±SD	*p*	Mean±SD	*p*
Age (Years)									
≤45	20(9.50)	25.15±2.91	0.430	20.31±7.91	0.325	19.35±3.76	0.562	20.25±9.09	0.566
46–60	112(53.60)	23.97±4.37		20.33±8.14		19.46±3.89		20.37±8.02	
>60	77(36.90)	24.45±3.89		18.52±8.75		18.85±3.99		19.09±8.54	
Marital Status									
Married/cohabited	188(90.40)	23.86±4.50	0.636	19.11±7.46	0.751	19.14±3.54	0.922	17.62±8.71	0.187
Single/separated	21(9.60)	24.30±4.04		19.72±8.47		19.23±3.96		20.14±8.24	
Educational Level									
Primary school	48(22.97)	22.46±5.11	0.005	20.82±7.09	0.036	18.12±4.69	0.056	19.98±7.74	0.109
Junior high school	73(34.93)	24.70±3.55		18.46±8.80		19.12±3.85		19.30±8.23	
Senior high school	57(27.27)	24.72±3.75		18.44±9.57		19.62±3.41		18.81±9.56	
Junior college or above	31(14.83)	25.17±3.32		22.95±5.37		20.45±3.22		23.12±6.06	
Income (Yuan per Month)									
≤2000	59(28.23)	23.00±4.89	0.001	19.06±7.59	0.272	18.07±4.93	0.046	19.18±7.97	0.138
2001–3000	72(34.45)	25.34±3.36		20.76±8.71		19.83±3.35		21.34±7.88	
3001–4000	52(24.88)	24.99±3.28		20.04±7.93		19.78±3.36		20.04±9.01	
>4000	26(12.44)	22.64±4.23		17.20±9.64		19.04±3.30		17.14±8.26	
Stage of Cancer									
I	52(24.88)	24.42±3.73	0.938	19.14±9.17	0.796	18.90±4.05	0.786	19.48±9.24	0.742
II	53(25.36)	24.26±4.88		20.24±7.33		19.40±3.55		20.63±7.55	
III + IV	104(49.76)	24.17±3.82		19.63±8.48		19.30±4.04		19.71±8.22	
New Diagnosis									
Yes	159(76.08)	24.40±4.02	0.377	19.80±8.48	0.676	19.34±3.80	0.458	20.44±8.25	0.084
No	50(23.92)	23.81±4.27		19.23±8.01		18.86±4.27		18.12±8.29	
Treatment Method									
No treatment	39(18.66)	25.64±2.29	0.009	25.13±3.68	0.001	20.59±3.53	0.089	24.87±4.20	0.001
Chemotherapy	22(10.53)	22.01±4.80		20.49±7.92		19.51±2.75		19.85±6.74	
Surgery	25(11.96)	24.52±4.67		19.68±7.36		18.94±4.20		21.28±7.89	
Combined treatment	123(58.85)	24.17±4.11		17.77±8.95		18.80±4.07		18.03±8.95	

Abbreviations: SD, standard deviation; PWB, physical well-being; SWB, social well-being; EWB, emotional well-being; FWB, functional well-being.

difference in the effect of age, marital status, stage of cancer and recurrence on quality of life in the descriptive statistics (p>0.05). There were significant differences in the influence of educational level, income and treatment method on quality of life in the descriptive statistics (p>0.05).

Correlations Among Continuous Variables

Pearson's correlation coefficients were calculated between FoP, resilience, and QoL. As shown in Table 2, FoP was negatively associated with resilience and the four dimensions of quality of life. Resilience was positively related with the four dimensions of quality of life.

Hierarchical Regression Analyses

Table 3 shows the results of the hierarchical regression analysis. In the first step, the demographic and clinical variables were added. And we set dummy variables for the discontinuous variables. In the second step, FoP was added. Finally, resilience was added in the last step. After controlling for age, educational level, income, and treatment method, FoP was negatively associated with physical well-being, social well-being, emotional well-being and functional well-being, and explained 24.8%, 13.8%, 21.6%, 23.1% of the variance, respectively. While resilience was positively associated with physical well-being, social well-being, emotional well-being and functional well-being, and explained 2.1%, 15.8%, 3.6%, 20.2% of

Table 2 Mean, SD, and Correlations Among Study Variables

Variables	Mean	SD	1	2	3	4	5
FoP	25.64	9.70	1				
Resilience	73.94	17.95	−0.543**	1			
PWB	24.26	4.08	−0.537**	0.449**	1		
SWB	19.66	8.36	−0.426**	0.548**	0.170*	1	
EWB	19.22	3.91	−0.487**	0.430**	0.607**	0.362**	1
FWB	19.89	8.30	−0.529**	0.655**	0.334**	0.836**	0.456**

Notes: *P<0.05; **P<0.01 (two-tailed).
Abbreviations: SD, standard deviation; FoP, fear of progression; PWB, physical well-being; SWB, social well-being; EWB, emotional well-being; FWB, functional well-being.

the variance, respectively. In addition, after adding resilience in the regression model, the regression coefficient (absolute value of regression coefficient when it is negative) for FoP reduced. Hence, we preliminarily consider that resilience might play a mediating role between fear of progression and quality of life. However, this point still needs further test by asymptotic and resampling strategies.

Asymptotic and Resampling Strategies of the Mediating Role of Resilience

Path coefficients a (between FoP and mediator) and b (between mediator and QoL), a×b products are presented in Table 4. Consistent with the results from hierarchical multiple regression analysis, resilience was significantly and positively associated with QoL after controlling for age, educational level, income, treatment method and FoP. Each BCa 95% CI for a×b of resilience excluding 0 indicated its significant mediation when it is added in the model. Thus, significant mediating role of resilience on the associations between FoP and physical well-being, social well-being, emotional well-being, and functional well-being were revealed among patients with ovarian cancer. We used the formula (a×b/c) to calculate the proportion of mediation role. The proportion of the mediating effect accounted for by resilience was 22.57%, 57.22%, 26.02%, 53.42% for physical well-being, social well-being, emotional well-being, and functional well-being, respectively.

Discussion

We explored the associations of fear of progression, resilience with quality of life (physical well-being, social well-being, emotional well-being, and functional well-being), as well as examined the mediating effect of resilience in this relationship among Chinese patients with ovarian cancer. The present results indicate that fear of progression negatively correlates with quality of life among Chinese ovarian cancer patients in accordance with prior studies. Previous study showed that there was a high correlation between the level of fear of progression and quality of life in patients with gynecological tumors, and the higher the degree of fear, the lower the quality of life.[39,40] According to a study on the disease fear of chemotherapy patients with colorectal cancer, patients with the fear of cancer disease also have a serious impact on their quality of life.[41] Many cancer patients are difficult to maintain normal life easily and freely under the influence of disease fear, eager to get more help.[42]

In addition, our results show that resilience positively correlated with quality of life among patients with ovarian cancer concordant with prior results.[27,43] The same conclusion also exists in patients with breast cancer and liver cancer although different samples.[26,44] The results of the asymptotic and resampling strategies in our study indicate that resilience act as mediator in the association between fear of progression and quality of life including physical well-being, social well-being, emotional well-being, and functional well-being in Chinese patients with ovarian cancer. Although fear of progression led to low scores of quality of life, resilience mitigated the negative effect of fear of progression on quality of life in the present study. The result was concordant with our hypothesis. Our findings are in close agreement with the proposed role of resilience against negative psychological factors and quality of life despite different samples. For instance, resilience mediates the relationship between cancer symptom distress and quality of life,[28] and patients with higher resilience levels experienced a smaller decrease in health-related quality of life as depressive symptoms increased.[45] In brief, resilience was an independent facilitating factor for quality of life.[46–48] It is necessary to enhance the level of resilience for improving the quality of life of ovarian cancer patients. Therefore, we can apply cognitive behavioral therapy, which includes information support, relaxation training, music therapy, reading therapy,

Table 3 Hierarchical Linear Regression for Exploring the Associated Variables of QoL

Variables	PWB			SWB			EWB			FWB		
	Block 1	Block 2	Block 3	Block 1	Block 2	Block 3	Block 1	Block 2	Block 3	Block 1	Block 2	Block 3
Age	0.108	0.069	0.057	0.001	−0.029	−0.063	0.030	−0.007	−0.023	0.019	−0.018	−0.057
Educational level	0.263**	0.210**	0.197**	0.103	0.063	0.027	0.198*	0.148*	0.131	0.149	0.097	0.057
Income (yuan per month)	−0.081	−0.014	−0.022	−0.083	−0.033	−0.054	0.019	0.081	0.071	−0.114	−0.050	−0.074
Treatment Method												
Dummy_1	−0.292**	−0.196**	−0.176*	−0.169*	−0.097	−0.043	−0.091	−0.001	0.025	−0.186*	−0.094	−0.032
Dummy_2	−0.116	−0.009	−0.014	−0.022**	−0.142	−0.158*	−0.154	−0.054	−0.062	−0.156	−0.052	−0.070
Dummy_3	−0.216*	−0.091	−0.092	−0.439**	−0.345**	−0.349**	−0.247**	−0.130	−0.131	−0.418**	−0.297**	−0.301**
FoP		−0.513**	−0.417**		−0.383**	−0.122		−0.479**	−0.355**		−0.495**	−0.200**
Resilience			0.176*			0.483**			0.229**			0.546**
F	4.117**	15.924**	15.182**	4.636**	10.063**	17.935**	2.627*	11.635**	11.982**	4.559**	15.464**	30.808**
Adjusted R^2	0.082	0.334	0.353	0.095	0.234	0.394	0.045	0.264	0.297	0.093	0.327	0.534
ΔR^2	0.109	0.248	0.021	0.121	0.138	0.158	0.072	0.216	0.036	0.119	0.231	0.202

Notes: Dummy_1, chemotherapy versus no treatment; Dummy_2, surgery versus no treatment; Dummy_3, combined treatment versus no treatment. *P<0.05; **P<0.01 (two-tailed).
Abbreviations: QoL, quality of life; FoP, fear of progression; PWB, physical well-being; SWB, social well-being; EWB, emotional well-being; FWB, functional well-being.

Table 4 Asymptotic and Resampling Strategies of the Indirect Effect of Resilience on the Relation Between FoP and QoL

Dependent Variable	Path Coefficients				a*b (BCa 95% CI)
	c	a	b	c'	
PWB	−0.23	−1.00	0.05	−0.18	−0.05(−0.09, −0.02)
SWB	−0.37	−1.00	0.21	−0.16	−0.21(−0.29, −0.14)
EWB	−0.20	−1.00	0.05	−0.15	−0.05(−0.08, −0.02)
FWB	−0.45	−1.00	0.24	−0.21	−0.24 (−0.32, −0.17)

Notes: c: the association of FoP with QoL; a: the association of FoP with resilience; b: the association of resilience with QoL; c': the association of FoP with QoL after adding resilience as a mediator; a*b: the product of a and b; BCa 95% CI: the bias-corrected and accelerated 95% confidence interval.
Abbreviations: QoL, quality of life; FoP, fear of progression; PWB, physical well-being; SWB, social well-being; EWB, emotional well-being; FWB, functional well-being.

coping skills training and postoperative rehabilitation.[49] Mindfulness-based therapy, through meditation training and experiencing the present, can relax the body and mind of patients and sense the value, thus reducing the pressure and improving the psychological resilience.[50] We recommend laughter therapy for patients, once every 2 weeks, 60 mins each time, which can effectively improve the resilience and quality of life of cancer patients.[51] We can also implement Stress Management and Resilience Training, including 90 mins group intervention, personalized interview and three telephone follow-up, a total of 12 weeks and it showed that the patients' resilience and quality of life are improved obviously by this way.[52]

There are some limitations in our study. First, the present study was a cross-sectional study. Hence, we could not determine the exact causal relationship between variables. Second, we only recruited patients with ovarian cancer from one hospital in Liaoning Province, China, and only included 209 patients. Thirdly, the relevant factors we included were not comprehensive enough. Despite of limitations, we have drawn important evidence on the effect of fear of progression on quality of life in Chinese patients with ovarian cancer. We also have tested whether resilience mediates the effect of fear of progression on quality of life by bootstrapping method. In the future, we will make further research: to use longitudinal designing methods to infer causality; to recruit ovarian patients from the south and west regions in China and include more patients, to study more relevant factors.

Conclusion

The results of this study support the hypothesis that resilience serves as a mediator between fear of progression and quality of life in patients with ovarian cancer. In order to improve the quality of life of women with ovarian cancer, medical staff should strengthen the communication

with patients, help patients to improve their coping ability, create counseling measures and health education related to disease fear. And it is necessary to attempt to implement some intervention programs or strategies to help patients enhance the level of resilience.

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Author Contributions

All authors contributed to data analysis, drafting or revising the article, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

Disclosure

The authors declare that they have no conflicts of interest in this work.

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