Original Article
The effect of health-related quality of life on the survival of women with ovarian cancer

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Abstract: Background: Since China had the most cases of ovarian cancer from 2015 to 2018, the outcomes of ovarian cancer treatment are important for patients and doctors. Aim: To evaluate the relationship between health-related quality of life and overall survival among advanced-stage ovarian cancer patients. Materials and Methods: We collected the data from the medical records database of our hospital and included patient-reported, health-related quality of life indicators and cancer outcomes. Our participants included 97 individuals who were diagnosed with ovarian cancer which remained at the advanced-stage. Result: Among 97 patients with advanced-stage ovarian cancer, 51 (52.6%) patients underwent surgery. Health-related quality of life scores were significantly associated with undergoing surgery and overall survival. The HRQOL results and overall survival had an interactional relationship of statistical significance. Regarding difficulties with the activities of daily living, bathing, eating, dressing, sitting to standing, and toilet use were significantly associated with survival. Conclusion: Pre-diagnosis HRQOL is predictive of undergoing surgery and overall survival.

Keywords: Ovarian cancer, health-related quality of life, surgery, survival, women

Introduction

Health-related quality of life (HRQOL) is a concept from patient-reported data that can be affected by the demographic characteristics of a patient and the patient's clinical status [1, 2]. Based on some studies, the overall survival among the study cohorts was associated with measures of HRQOL [3, 4]. Additionally, three factors were observably associated with health-related quality of life in clinical trials of ovarian cancer patients: race, income, and age [5, 6]. In cancer care, patient-reported outcomes have become increasingly important because they can influence nursing efficacy in the cancer care process [7-9].

In the study of epithelial ovarian cancer, some studies found that lower global quality of life (QoL) scores or specific QoL domain scores have important associations with decreased survival [10, 11]. However, in these studies, the association of HRQOL with survival may have been underestimated, so the influence of HRQOL remains unknown in regard to the outcome of ovarian cancer [12, 13]. The aim of this study was to assess the relationship between the functional status of patients who receive surgery and the precancer diagnosis HRQOL and the overall survival of women who had advanced epithelial ovarian cancer in China.

Materials and methods

Data

Chart 1 is our study flowchart, and it shows every step of our study. Our researchers collected data from the ovarian cancer medical records database of The First Affiliated Hospital of Jinan University from 2010 through 2019. The data included the linked patient-reported HRQOL indicators and cancer outcomes, and only the medical staff of the hospital has access to these data, such as the Medicare Health Outcomes Survey results and the surveillance recordings.

Participants

All participants (n = 122) were ovarian cancer patients who were diagnosed between May
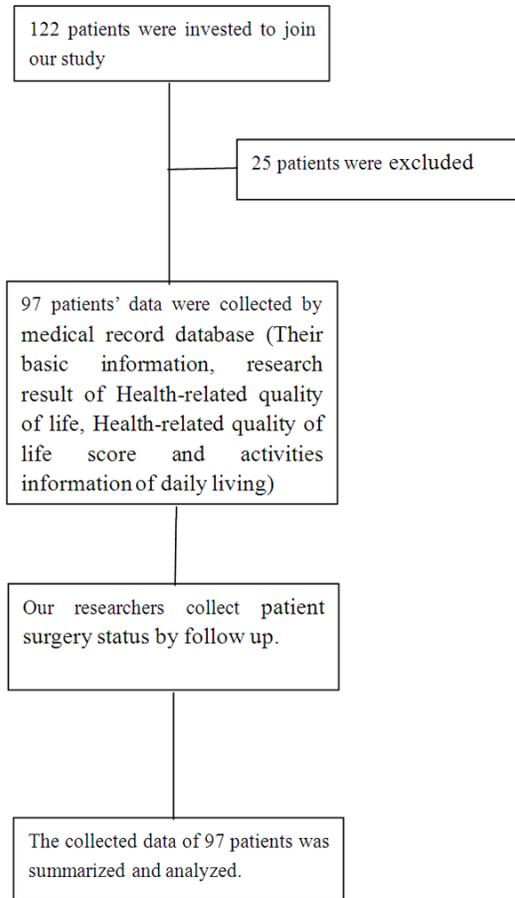
Chart 1. Study flow.

2010 and November 2017. Among the participants, we excluded 17 (14%) patients because they did not have any epithelial histology data available in their medical records. Additionally, 8 (7%) were excluded because they did not have medical records associated with advanced-stage disease. Finally, we diagnosed the advanced-stage ovarian cancer patients (n = 97), all of whom were 50 years of age or older.

Measures

We collected information regarding surgery among the patients because the patients had a strong association between overall survival, HRQOL and undergoing surgery. Additionally, the survival of the participants was calculated as the number of months between the cancer diagnosis and date of death. In addition, HRQOL was assessed using the MOS 36-item short-form health survey (SF-36) [14], which was included in the medical records database; un-

fortunately, not all eligible patients completed the SF-36. The SF-36 had 2 parts, namely the Physical Component Summary (PCS) and the Mental Component Summary (MCS). The outcome of the SF-36 was determined by eight subscales, namely physical functioning, role-physical, bodily pain, general health, vitality, mental health, role-emotional, and social functioning [15].

Statistical analysis

The statistical analysis was performed using SPSS 24.0. We assessed the data using t-tests and chi-square tests to compare the different groups; these tests were used to compare the numerical and categorical data, respectively (statistical significance, P < 0.05).

Results

The research results were determined from the medical record database and the follow up data. The medical record database provides the patients' basic information, the status of their activities of daily living before the cancer diagnosis and the HRQOL score before the cancer diagnosis. Additionally, our researchers collected the patients' surgery situation through the follow up data.

The participant characteristics are shown in **Table 1**, which includes information on whether the patient underwent surgery, the demographic characteristics, and the comorbidity status. Based on **Table 1**, all the participants were advanced-stage disease patients. The proportion of women in the surgery group was greater than the proportion of women in the non-surgery group, and the women in the surgery group were younger and had higher education levels. Additionally, the surgery group had a lower prevalence of heart disease and type 2 diabetes (T2D) than the other group.

According to **Table 2**, there were associations between better HRQOL scores and increased odds of undergoing surgery, with the odds ratios ranging from 1.03 to 1.71. The HRQOL scores are better as the scores increase on the SF-36, and all odds ratios were above 1.0. Therefore, increased HRQOL scores had a strong influence on increasing the odds of undergoing surgery.

Table 1. Participant characteristics

	Total cohort (n = 97)	Surgery (n = 51)	No Surgery (n = 46)	P value
Age				< 0.0001
50-59	15 (15.5%)	14 (27.5%)	1 (2.2%)	
60-69	26 (26.8%)	18 (35.3%)	8 (17.4%)	
70-79	34 (35.1%)	15 (29.4%)	19 (41.3%)	
80+	22 (22.7%)	4 (7.8%)	18 (39.1%)	
Level of Education				0.53
Some high school	40 (41.2%)	15 (29.4%)	25 (54.3%)	
Some college	26 (26.8%)	20 (39.2%)	6 (13.0%)	
More than college	31 (32.0%)	16 (31.4%%)	15 (32.6%)	
Missing	-	-	-	
Household income				0.02
< $10,000	17 (17.5%)	9 (17.6%)	8 (17.4%)	
$10,000-$29,999	48 (49.5%)	26 (51.0%)	22 (47.8%)	
$30,000-$49,999	19 (19.6%)	11 (21.6%)	7 (15.2%)	
$50,000+	13 (13.4%)	7 (13.7%)	6 (13.0%)	
Smoking status				0.81
Never	67 (69.1%)	39 (76.5%)	28 (60.1%)	
Former	18 (18.6%)	10 (19.6%)	8 (17.4%)	
Current	12 (12.4%)	8 (15.7%)	4 (8.7%)	
Comorbid conditions				
Hypertension	64 (66.0%)	36 (70.6%)	28 (60.9%)	
Heart disease	31 (32.0%)	17 (33.3%)	19 (41.3%)	
Stroke	6 (6.2%)	2 (3.9%)	3 (6.5%)	
COPD	12 (12.4%)	5 (9.8%)	8 (17.4%)	
Arthritis	57 (58.8%)	22 (43.1%)	25 (54.3%)	
Sciatica	33 (34.0%)	19 (37.3%)	14 (30.4%)	
T2D	24 (24.7%)	10 (19.6%)	14 (30.4%)	
IBD	5 (5.2%)	-	-	

COPD = Chronic obstructive pulmonary disease; IBD = Inflammatory bowel disease; T2D = Type 2 diabetes.

Table 3 shows the adjusted hazard ratios for the 5-point increments in the mental component summary, the physical component summary and the results of the 8 subscales of the SF-36. Based on the results that most of the hazard ratios were below 1.0, the risk of patient death decreased as HRQOL increased.

Based on the results of difficulty with the activities of daily living, 'difficulty' was associated with increases in the risk of death. Hazard ratios remained high in magnitude when the difficulty response categories were collapsed, and the results were significant (**Table 4**). Additionally, the adjusted hazard ratio of eating was 1.56 (95% CI 0.73-3.12, P = 0.541), and difficulty eating had an effect on the risk of death, but it was not statistically significant.

Discussion

The objective of this study was to evaluate the relationship between the HRQOL measures of patients and overall survival among patients with advanced-stage epithelial ovarian cancer. The likelihood of undergoing surgery was higher as HRQOL scores based on the SF-36 increased. However, the relationship was not statistically significant between the HRQOL measures and survival. The daily living activities before the cancer diagnosis were associated with the overall survival of the participants, and difficulty with toilet use was statistically significant, and other difficulties were also statistically significant.

Based on the cancer care report, the patient-reported data had bigger role than it did in the past [16], and the information of people who were older than 50 years accounts for more cancer patients in China [17, 18]. Based on the results of this study, the relationship between the HRQOL of patients before diagnosis and overall survival were statistically significant. The result is similar to those of two prior landmark studies. Based on the report of Wenzel, von Gruenigen et al., the associations between overall survival and the HRQOL measures among ovarian cancer patients were positive [3, 19, 20]. The two studies and our study are different in terms of the HRQOL measures and the survey timing in the key. However, this result is in contrast to Kim's report, although the HRQOL measures were similar [21]. In particular, the difference between this study and Kim's study are the odds ratios and the hazard ratio, such as the odds ratio between HRQOL and undergoing surgery, and the hazard ratio between 'difficulty' and the risk of death. In the odds ratio between

Table 2. The association between the HRQOL before the cancer diagnosis and the subsequent surgery

	Total cohort (n = 97)	2 years or more between HRQOL survey and diagnosis (n = 68)	2 years or less between HRQOL survey and diagnosis (n = 29)
	5 pt-OR (95% CI)	5 pt-OR (95% CI)	5 pt-OR (95% CI)
MCS	1.09 (0.98-1.26)	1.18 (0.94-1.42)	1.34 (1.04-1.74)
PCS	1.22 (1.05-1.43)	1.38 (1.11-1.74)	1.15 (0.84-1.49)
Physical function	1.18 (1.04-1.36)	1.31 (1.04-1.57)	1.18 (0.96-1.51)
General health	1.27 (1.08-1.50)	1.71 (1.27-2.31)	1.16 (0.87-1.66)
Role physical	1.11 (0.97-1.24	1.33 (1.09-1.53)	1.09 (0.88-1.38)
Role emotional	1.07 (0.96-1.17)	1.18 (0.94-1.44)	1.14 (0.91-1.42)
Mental health	1.21 (1.05-1.37)	1.32 (1.04-1.64)	1.33 (1.05-1.70)
Social function	1.09 (0.99-1.28)	1.26 (1.02-1.55)	1.25 (0.97-1.56)
Body pain	1.13 (0.96-1.29)	1.29 (1.06-1.59)	1.09 (0.84-1.43)
Vitality	1.21 (1.06-1.41)	1.36 (1.07-1.66)	1.31 (0.99-1.67)

OR = Odds ratio for every 5-point change in HRQOL score; MCS = Mental Component Summary of SF-36; PCS = Physical Component Summary of SF-36.

Table 3. The association between the HRQOL before the cancer diagnosis and overall survival

	Total cohort (n = 97)	2 years or more between HRQOL survey and diagnosis (n = 68)	2 years or less between HRQOL survey and diagnosis (n = 29)
	5 pt-HR (95% CI)	5 pt-HR (95% CI)	5 pt-HR (95% CI)
MCS	0.96 (0.91-2.46)	0.99 (0.91-2.44)	0.97 (0.87-1.12)
PCS	0.96 (0.92-2.41)	0.94 (0.86-2.33)	1.05 (0.91-1.22)
Physical function	0.94 (0.88-2.42)	0.95 (0.86-2.36)	0.94 (0.85-1.06)
General health	0.92 (0.85-2.32)	0.94 (0.85-2.32)	1.00 (0.87-1.16)
Role physical	0.97 (0.87-2.41)	0.96 (0.89-2.40)	0.98 (0.89-1.12)
Role emotional	1.01 (0.92-2.42)	1.00 (0.92-2.47)	0.96 (0.85-1.05)
Mental health	0.98 (0.88-2.43)	0.95 (0.88-2.43)	1.00 (0.87-1.12)
Social function	0.99 (0.90-2.42)	0.97 (0.87-2.36)	0.97 (0.86-1.09)
Body pain	0.94 (0.87-2.34)	0.94 (0.84-2.40)	1.09 (0.95-1.26)
Vitality	0.93 (0.84-2.33)	0.93 (0.87-2.38)	1.02 (0.89-1.14)

HR = Hazard ratio for every 5-point change in HRQOL score; MCS = Mental Component Summary of SF-36; PCS = Physical Component Summary of SF-36.

Table 4. Associations between the activities of daily living before the cancer diagnosis and overall survival

Difficulty with activities of daily living	HR	95% CI	P value
Bathing	1.46	0.97-2.21	< 0.005
Dressing	1.54	0.98-2.50	0.023
Eating	1.56	0.73-3.12	0.541
Sitting to standing	1.35	0.92-1.79	0.023
Walking	1.07	0.78-1.57	0.035
Toilet use	1.84	1.02-3.17	0.041

HR - Hazard ratio from the Cox proportional hazard model adjusted.

HRQOL and the odds of undergoing surgery, Kim's data shows that not all of the ratios are above 1.0, and the odds ratio of MCS is 0.88 (Our odds ratio for MCS was 1.09). So Kim's result shows that the mental health status of patients do not strongly affect their odds of undergoing surgery. Our results are different from Kim's because the patients have different life actions, and they have different reactions to the same mental status. There are many differences in the cultures and values of the respondents, and most of our respondents were Chinese, but most of Kim's respondents were Americans. In addition, regard-

ing the hazard ratio, Kim's toilet use hazard ratio was lower than ours (1.26 vs 1.84). However, Kim's bathing hazard ratio was higher than ours (1.72 vs 1.46). The life habits and living environments of the respondents are different. Most Americans use toilets, and they excrete by sitting. But some Chinese often use squat toilets, so they have to excrete by squatting. The bathing habit also is different between our respondents and Kim's, as few Chinese have bathtubs in their homes, so most of them bathe by taking a shower.

In this study, better HRQOL scores were shown to increase the ratio of patients who underwent surgery, and surgery can improve survival. Therefore, this relationship provides support for the relationship between overall survival and HRQOL. However, the lack of surgery data and the small population size limited our ability to assess the associations between overall survival and HRQOL in our research. Our study also had other deficiencies, including a lack of available data on the extent of the surgical effort or receipt of chemotherapy and the small sample size. Nurses reduce patients' death rate by guiding their lifestyle. The nurses should also provide related suggestions in order to change the life habits of patients to improve their quality of life and consequently to achieve the effect of reducing patient's death rate.

Disclosure of conflict of interest

None.

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