



Quality of life and sexuality comparison between sexually active ovarian cancer survivors and healthy women

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Objective: To compare quality of life (QoL) and sexual functioning between sexually active ovarian cancer survivors and healthy women.

Methods: A cross-sectional study was performed in 103 successfully treated ovarian cancer survivors and 220 healthy women. All women had engaged in sexual activity within the previous 3 months, and ovarian cancer survivors were under surveillance after primary treatment without evidence of disease. QoL and sexual functioning were assessed using three questionnaires; the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30), Ovarian Cancer Module (EORTC QLQ-OV28), and the Female Sexual Function Index (FSFI). Propensity score matching was used to adjust covariates between the ovarian cancer survivor and healthy women groups. In total, 73 ovarian cancer survivors and 73 healthy women were compared.

Results: Poorer social functioning (mean, 82.4 vs. 90.9; $p=0.010$) and more financial difficulties (mean, 16.4 vs. 7.8; $p=0.019$) were observed among ovarian cancer survivors than among healthy women. Sexuality, both in terms of desire, arousal, lubrication, orgasm, satisfaction, and pain and in terms of interest in sex, sexual activity, and enjoyment of sex (EORTC QLQ-OV28) were similar between the groups. However, vaginal dryness was more problematic in ovarian cancer survivors, with borderline statistical significance ($p=0.081$).

Conclusion: Sexuality was not impaired in ovarian cancer survivors who were without evidence of disease after primary treatment and having sexual activities, compared with healthy women, whereas social functioning and financial status did deteriorate. Prospective cohort studies are needed.

Keywords: Cross-Sectional Studies; Ovarian Neoplasms; Quality of Life; Sexuality; Survivors

INTRODUCTION

In 2014, ovarian cancer is estimated to comprise 1.7% (2,271) of all new female cancers and to be the eighth leading cause of female cancer deaths in Korea [1]. Due to a lack of effective screening tools, ovarian cancer tends to be diagnosed at an

advanced stage and has relatively high recurrence and mortality rates, compared with other gynecologic malignancies [2,3]. For maximal ovarian cancer survival, extensive cytoreductive surgery, and adjuvant chemotherapy are required [4-9]. At the same time, patients' quality of life (QoL) becomes a major issue among survivors.

Sexuality, or sexual functioning, has been recognized as an important QoL component [10]. Sexuality is a multidimensional concept involving the physical, psychological, and social aspects of an individual's life [11,12]. Survivors of gynecologic malignancies are at high risk of developing disturbed sexuality owing to the treatment modality, treatment-related

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genital deformities, and hormonal changes [13,14]. According to previously published studies, more than a half of ovarian cancer survivors frequently experience sexuality changes, including decreased sexual interest, activity, and enjoyment [15-17].

However, heterogeneity in study designs, populations, and survey tools exist among the studies, making their interpretation difficult. Moreover, most of the literature has described deteriorated sexual functioning only among ovarian cancer survivors. Studies comparing the sexuality of survivors with that of healthy women have not yet been reported. Data describing the exact differences between these groups would be clinically informative and useful. Thus, this study compared QoL and sexual functioning between ovarian cancer survivors and healthy women.

MATERIALS AND METHODS

This cross-sectional, case-control study was conducted after the approval by the National Cancer Center Institutional Review Board (NCCNCS-12685).

Among the women who visited the outpatient clinic of National Cancer Center between February 2013 and April 2014, ovarian cancer survivors and healthy women who met

the eligibility criteria were enrolled. The eligibility criteria for ovarian cancer survivors were age over 18 years, ability to understand Korean, sexual activity within the previous 3 months, and under surveillance after primary treatment without any evidence of disease. Healthy women were defined as women without any invasive cancer in their medical records, and who had also engaged in sexual activity within the previous 3 months. Women who declined to provide written informed consent were excluded from the study.

Demographic data of the enrolled participants were collected by reviewing medical records and interviewing. The participants were requested to complete three individual questionnaires. Then, propensity score matching was performed to adjust covariates, including age, and marital, educational, economic, and occupational status between ovarian cancer survivors group and healthy women group.

The questionnaires were used to measure QoL and sexual functioning, and included the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30) [18], Ovarian Cancer Module (EORTC QLQ-OV28) [19], and the Female Sexual Function Index (FSFI) [20].

The EORTC QLQ-C30, developed to assess cancer patients' general QoL, is a 30-item cancer-specific questionnaire. This questionnaire assesses five functional scales (physical, role,

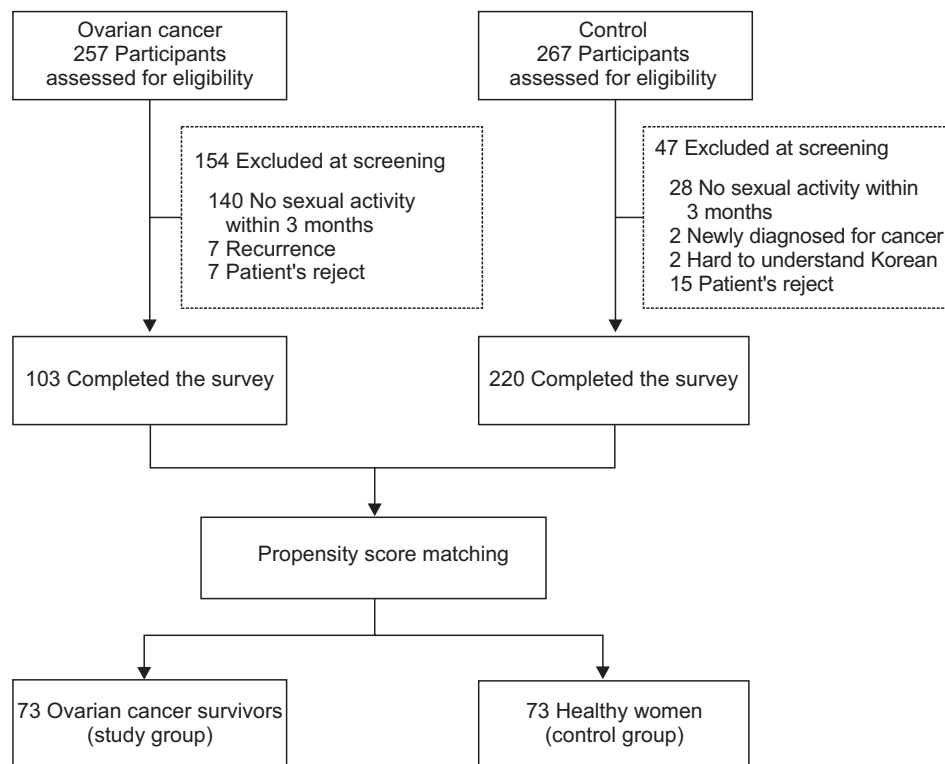


Fig. 1. Flow diagram depicting the selection of study population.

emotional, cognitive, and social), three symptom scales (fatigue, pain, and nausea and vomiting), a scale for global health and overall QoL, single-items regarding additional symptoms commonly reported by cancer patients (dyspnea, insomnia, appetite loss, constipation, and diarrhea), and perceived financial difficulties. The scales and single-item measures are scored from 0 to 100. In the functional and global health scales, higher scores represent better functioning or status. In contrast, higher scores on the symptom scales and for the single-items reflect more problematic symptoms [18].

The EORTC QLQ-OV28 was developed to supplement the EORTC QLQ-C30 for the more specific assessment of ovarian cancer patients' QoL. It is composed of 28 items, assigned to seven scales, measuring abdominal/gastrointestinal symptoms, peripheral neuropathy, other chemotherapy side effects, hormonal/menopausal symptoms, body image, attitude towards disease and treatment, and sexual function. For the symptom and attitude scales, higher scores reflect higher levels of problems. In contrast, high functional scale scores (body image and sexual function) reflect better QoL [19].

Table 1. Demographic characteristics of ovarian cancer survivors and healthy women

Characteristic	Ovarian cancer survivors (n=73)	Healthy women (n=73)	p-value
Age (yr)	50.7±8.3	52.0±7.2	0.290
Marital status			
Single/separated/widowed	3 (4.1)	5 (6.8)	0.719
Married	70 (95.9)	68 (93.2)	
Education			
≤Middle school	10 (13.7)	13 (17.8)	0.650
≥High school	63 (86.3)	60 (82.2)	
Family income (\$/mo)			
<2,000	8 (11.0)	10 (13.7)	0.765
2,000–4,000	34 (46.6)	30 (41.1)	
>4,000	31 (42.5)	33 (45.2)	
Occupational status			
Yes	26 (35.6)	26 (35.6)	0.863
No	47 (64.4)	47 (64.4)	
Menopause status			
Yes	66 (90.4)	65 (89.0)	1.000
No	7 (9.6)	8 (11.0)	
Regular exercise			
Yes	45 (61.6)	41 (56.2)	0.614
No	28 (38.4)	32 (43.8)	

Values are presented as mean±SD or number (%).

The FSFI is composed of 19 items designed to assess sexual functioning in women, with a specific focus on six domains: desire, arousal, lubrication, orgasm, satisfaction, and pain. A higher score in each domain indicates better status [20].

The Korean versions of the EORTC QLQ-C30 and the FSFI have been validated, and were used in this study [21,22]. The Korean translation of the EORTC QLQ-OV28 was available at the EORTC group website (<http://groups.eortc.be/qol>), and was used with permission.

Statistical analyses were performed to test differences, between the two groups, in patient characteristics and questionnaire scores. The Student t-test and Mann-Whitney U-test were used to compare continuous variables. The Pearson chi-square test, Fisher exact test, and Kruskal-Wallis test were used to compare categorical variables. R statistical software version 2.12 (<http://www.r-project.org>) was used for the statistical analyses. A p<0.05 was considered statistically significant.

RESULTS

Among the 257 ovarian cancer patients screened, 103 women

Table 2. Clinical characteristics of ovarian cancer survivors (n=73)

Characteristic	Value
FIGO stage	
I	38 (52.1)
II	7 (9.6)
III	24 (32.9)
IV	4 (5.5)
Type of treatment	
S only	16 (21.9)
S+C	57 (78.1)
Type of surgery	
Laparotomy	56 (76.7)
Laparoscopy	16 (21.9)
Convert to laparotomy	1 (1.4)
Lymphadenectomy	
PLND only	7 (9.6)
PLND+PALND	51 (69.9)
Retrieved LN	
Pelvic	18.4±10.8 (0–56)
Para-aortic	14.8±8.5 (0–37)

Values are presented as number (%) or mean±SD (range). C, six cycles of taxane- and platinum-based adjuvant chemotherapy; FIGO, International Federation of Gynecology and Obstetrics; LN, lymph node; PALND, para-aortic lymph node dissection; PLND, pelvic lymph node dissection; S, cytoreductive surgery.

satisfied the eligibility criteria for ovarian cancer survivors group, and 220 women were included in the healthy women group. All women, in both groups, completed the three questionnaires. After propensity score matching, a total of 73 ovarian cancer survivors (study group) and 73 healthy women (control group) were compared in the current study (**Fig. 1**).

The demographic characteristics of both groups are presented in **Table 1**. As propensity score matching were performed, the following factors were not statistically different between ovarian cancer survivors and healthy women: age (mean, 50.7 years vs. 52.0 years; $p=0.290$), marital status, education, family income, occupational status, menopause status, and regular exercise. Among the ovarian cancer survivors, the median interval from diagnosis to survey was 38.0 months, with a mean of 56.9 months (range, 5 to 261 months).

Table 2 shows that the proportion of cancer survivors at International Federation of Gynecology and Obstetrics (FIGO)

stages I, II, III, and IV were 52.1%, 9.6%, 32.9%, and 5.5%, respectively. Cytoreductive surgery followed by six cycles of taxane- and platinum-based chemotherapy was performed on 78.1% of the ovarian cancer survivors; 21.9% underwent surgery only. During cytoreductive surgery, lymphadenectomy was performed on 79.5% of the survivors; 9.6% received pelvic lymph node dissection only, and 69.9% received both pelvic and para-aortic lymph node dissection. The mean harvested numbers of pelvic lymph nodes and para-aortic lymph nodes were 18.4 and 14.8, respectively.

The results of the EORTC QLQ-C30 and -OV28 questionnaires for both groups are shown in **Table 3**. In the EORTC QLQ-C30 survey, only the scores for social functioning and financial difficulties were significantly different between the groups, with worse social functioning (mean, 82.4 vs. 90.9; $p=0.010$) and more financial difficulties (mean, 16.4 vs. 7.8; $p=0.019$) being reported by the ovarian cancer survivors than by the healthy

Table 3. Quality of life comparison between ovarian cancer survivors and healthy women

Domain	Ovarian cancer survivors (n=73)	Healthy women (n=73)	p-value
EORTC QLQ-C30			
Physical functioning	81.5±11.5	82.3±13.2	0.688
Role functioning	84.5±17.9	87.7±15.7	0.253
Emotional functioning	76.4±19.1	78.9±18.5	0.421
Cognitive functioning	77.6±19.3	78.8±15.8	0.696
Social functioning	82.4±22.5	90.9±16.2	0.010
Fatigue	31.7±18.8	35.2±22.5	0.308
Nausea and vomiting	8.0±15.0	6.6±12.0	0.543
Pain	15.8±18.6	18.7±22.2	0.383
Dyspnea	8.2±14.5	11.4±18.6	0.249
Insomnia	23.7±25.7	26.0±27.9	0.608
Appetite	6.4±14.3	9.1±16.9	0.293
Constipation	25.1±27.7	21.9±27.9	0.488
Diarrhea	7.8±18.0	10.0±19.8	0.467
Financial difficulties	16.4±25.5	7.8±18.0	0.019
Global health status	65.4±21.5	62.6±20.2	0.411
EORTC QLQ-OV28			
Body image	67.8±28.9	74.9±20.6	0.091
Sexuality	40.9±19.5	44.6±20.6	0.301
Attitude to disease	49.5±27.9	62.1±20.4	0.002
Abdominal/GI symptoms	19.8±15.4	17.8±15.3	0.443
Peripheral neuropathy	25.7±22.7	20.1±15.9	0.085
Hormonal/menopausal symptoms	20.5±19.9	20.1±20.4	0.891
Other chemotherapy side-effects	21.5±16.5	20.6±14.5	0.735

Values are presented as mean±SD.

EORTC QLQ-C30, The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30; EORTC QLQ-OV28, The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Ovarian Cancer Module; GI, gastrointestinal.

Table 4. Sexuality comparison between ovarian cancer survivors and healthy women

Domain	Ovarian cancer survivors	Healthy women	p-value
EORTC QLQ-OV28			
Interest in sex	33.3±24.9	33.3±24.2	1.000
Sexual activity	31.1±22.5	33.3±23.6	0.550
Enjoyment of sex	41.6±35.0	49.8±40.1	0.189
Dry vagina	67.1±37.1	78.1±38.2	0.081
FSFI			
Desire	2.5±1.0	2.8±1.2	0.194
Arousal	2.9±1.4	3.1±1.7	0.517
Lubrication	3.6±1.6	3.8±1.9	0.612
Orgasm	3.3±1.6	3.5±1.9	0.540
Satisfaction	3.7±1.1	3.8±1.3	0.618
Pain	3.9±1.8	3.9±2.1	0.838
Total	19.9±7.0	20.8±8.5	0.489

Values are presented as mean±SD. EORTC QLQ-OV28, The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Ovarian Cancer Module; FSFI, The Female Sexual Function Index.

women.

In the EORTC QLQ-OV28, the attitude towards disease and treatment score was significantly lower, suggesting a better attitude in the ovarian cancer survivor group than in the healthy women group (mean, 49.5 vs. 62.1; $p=0.002$). Meanwhile, the other six scales (abdominal/gastrointestinal symptoms, peripheral neuropathy, other chemotherapy side effects, hormonal/menopausal symptoms, body image, and sexual function) were not statistically different between the two groups (Table 3).

In the sexuality comparison, all the six domains (desire, arousal, lubrication, orgasm, satisfaction, and pain) of the FSFI were not statistically different between the two groups; neither were the total FSFI score (mean, 19.9 vs. 20.8; $p=0.489$) (Table 4). The sexual function scale of the EORTC QLQ-OV28 was subdivided into individual items (interest in sex, sexual activity, enjoyment of sex, and dry vagina) and compared between the two groups. Only vaginal dryness was more problematic in the ovarian cancer survivor group, compared with the healthy women group, having borderline statistical significance ($p=0.081$) (Table 4).

DISCUSSION

In the current study, we showed that sexuality was not impaired in ovarian cancer survivors who did not show evidence

of disease after primary treatment and had engaged in sexual activity, compared with healthy women.

Sexual dysfunction may occur due to several aspects of ovarian cancer treatment. Surgery, including oophorectomy, causes menopause in premenopausal women, and results in decreased estrogen and androgen production. The decreased hormonal production results in vaginal atrophy, vaginal dryness, dyspareunia, frequent urinary tract infections, hot flashes, mood swings, and irritability. Chemotherapy also influences the patient's general condition by causing, for example, increased fatigue. Psychological factors also contribute to sexual problems. Depression and anxiety decrease sexual desire, and hysterectomy and abdominal scarring may distort an individual's body image [23-25].

According to Stewart et al. [15], more than half (57%) of ovarian cancer survivors reported that the cancer and its treatment worsened their sexual functioning. In advanced stage ovarian cancer (FIGO stages III and IV), decreased sexual interest was reported in 31% of survivors, and decreased sexual activity was observed in 46% of survivors [16]. Even in early stage (FIGO stages I and II), Matulonis et al. [17] reported that the proportions of survivors with an interest in sexual relations, and those involved in sexual activity were only 10%, and 9%, respectively.

However, in the current study, statistical difference were not observed between the study and control groups with regards to their sexuality; the total scores and the scores for each of the six FSFI domains (desire, arousal, lubrication, orgasm, satisfaction, and pain), and the individual items relating to sexual function in the EORTC QLQ-OV28 (interest in sex, sexual activity, enjoyment of sex, and dry vagina) were similar.

The discrepancy in the results, compared with previous studies, may be explained by one or more of the following possibilities. First, the eligibility criteria for the study populations were different among the studies. In the current study, early and advanced stage diseases were not considered separately; 61.6% and 38.4% of the ovarian cancer survivors were early (FIGO stages I and II) and advanced (FIGO stages III and IV) stage disease, respectively. Second, the time intervals between diagnosis and the survey were different among the studies. Third, the proportion of women excluded due to the absence of recent sexual activity was also much higher among ovarian cancer survivors (140 out of 257, 54.5%) than among the healthy women (28 out of 267, 10.5%). This observation may be explained by the tendency of gynecologic cancer survivors to be more reluctant to engage in sexual activity because of a fear that sexual activity might increase the risk of disease recurrence [26]. Lastly, as Asians are considered to be more sexually conservative than Western populations, Korean women generally show low levels of sexual interest and activ-

ity, possibly counterbalancing the differences between the groups [27].

Thus, although sexuality was similar between the groups, sexual problems among survivors should be considered and properly managed during treatment time and surveillance. For example, despite showing borderline statistical significance ($p=0.081$), vaginal dryness was more problematic for ovarian cancer survivors than for healthy women. This symptom may be improved by applying vaginal lubricants and/or local estrogen cream.

In QoL comparison between the two groups, we also found that components of the EORTC QLQ-C30 and -OV28 were not different between ovarian cancer survivors and healthy women, except with respect to social functioning, financial status, and attitude towards disease. It is well known that both the surgery and chemotherapy have negative impacts on ovarian cancer patients' QoL [28]. Nevertheless, according to the previously published studies, QoL may improve significantly throughout the treatment period, particularly after completion of chemotherapy [29,30]. In a longitudinal study, significant improvements in the EORTC QLQ-C30 questionnaire were also associated with continued survival [31]. In a recent prospective study which examined survivors' QoL 10 years posttreatment using the same questionnaire, the long-term survivors showed similar QoL scores compared with the reference group [32].

However, worse social functioning in the study group, compared with controls, suggests that recovery of social functioning may be retarded compared with other functions. Although financial conditions were not precisely evaluated, we can predict that the survivors incurred treatment-related costs that may have influenced their financial situation. Additionally, long-term cancer survivors frequently experience work changes, such as unemployment, during treatment [33,34]. Interestingly, better disease-specific attitudes among ovarian cancer survivors might reflect the survivors' confidence and optimism regarding their disease after having endured difficult treatment, overcome the disease, and successfully achieved a disease-free status.

Despite efforts to clarify eligibility criteria and to adjust covariates using propensity score matching between the two groups, there were several limitations to this study. First, as a cross-sectional, case-control study design, some selection bias is inevitable. Second, as clinical data were collected using self-reported patient surveys, questionnaire-related issues may exist. Third, during propensity score matching, not all possible confounding factors were considered. Fourth, impact of lymphadenectomy was not evaluated. Impact of pelvic lymph node dissection-related nerve injury on sexuality was needed

to be investigated in near future. Lastly, the ovarian cancer survivors might have undergone different types of surgery (for example, low anterior resection or Hartmann's operation for bowel surgery), resulting in different side effects; surgical details were not collected in this study.

In conclusion, this study suggests that sexuality was similar between health women and ovarian cancer survivors who were without evidence of disease and having sexual activity. However, the study group did demonstrate deteriorated social functioning and financial status, compared with controls. Further prospective cohort studies are warranted. Especially, as only sexually active cancer survivors were included in the current study, the studies elucidating factors that hinder ovarian cancer survivors from having sexual activity are necessary to completely understand sexuality issues affecting ovarian cancer survivors and to provide clinically informative advice.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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REFERENCES

1. Jung KW, Won YJ, Kong HJ, Oh CM, Lee DH, Lee JS. Prediction of cancer incidence and mortality in Korea, 2014. *Cancer Res Treat* 2014;46:124-30.
2. Lim MC, Moon EK, Shin A, Jung KW, Won YJ, Seo SS, et al. Incidence of cervical, endometrial, and ovarian cancer in Korea, 1999-2010. *J Gynecol Oncol* 2013;24:298-302.
3. Lee JY, Kim EY, Jung KW, Shin A, Chan KK, Aoki D, et al. Trends in gynecologic cancer mortality in East Asian regions. *J Gynecol Oncol* 2014;25:174-82.
4. Bristow RE, Tomacruz RS, Armstrong DK, Trimble EL, Montz FJ. Survival effect of maximal cytoreductive surgery for advanced ovarian carcinoma during the platinum era: a meta-analysis. *J Clin Oncol* 2002;20:1248-59.
5. Chi DS, Franklin CC, Levine DA, Akselrod F, Sabbatini P, Jarnagin WR, et al. Improved optimal cytoreduction rates for stages IIIc and IV epithelial ovarian, fallopian tube, and primary peritoneal cancer:

- a change in surgical approach. *Gynecol Oncol* 2004;94:650-4.
6. Wimberger P, Wehling M, Lehmann N, Kimmig R, Schmalfeldt B, Burges A, et al. Influence of residual tumor on outcome in ovarian cancer patients with FIGO stage IV disease: an exploratory analysis of the AGO-OVAR (Arbeitsgemeinschaft Gynaekologische Onkologie Ovarian Cancer Study Group). *Ann Surg Oncol* 2010;17:1642-8.
 7. Song YJ, Lim MC, Kang S, Seo SS, Park JW, Choi HS, et al. Total colectomy as part of primary cytoreductive surgery in advanced Mullerian cancer. *Gynecol Oncol* 2009;114:183-7.
 8. Lim MC, Lee HS, Jung DC, Choi JY, Seo SS, Park SY. Pathological diagnosis and cytoreduction of cardiophrenic lymph node and pleural metastasis in ovarian cancer patients using video-assisted thoracic surgery. *Ann Surg Oncol* 2009;16:1990-6.
 9. Lim MC, Seo SS, Kang S, Kim SK, Kim SH, Yoo CW, et al. Intraoperative image-guided surgery for ovarian cancer. *Quant Imaging Med Surg* 2012;2:114-7.
 10. Tierney DK. Sexuality: a quality-of-life issue for cancer survivors. *Semin Oncol Nurs* 2008;24:71-9.
 11. Basson R. Sexual function of women with chronic illness and cancer. *Womens Health (Lond Engl)* 2010;6:407-29.
 12. Shifren JL, Monz BU, Russo PA, Segreti A, Johannes CB. Sexual problems and distress in United States women: prevalence and correlates. *Obstet Gynecol* 2008;112:970-8.
 13. Ratner ES, Foran KA, Schwartz PE, Minkin MJ. Sexuality and intimacy after gynecological cancer. *Maturitas* 2010;66:23-6.
 14. Gilbert E, Ussher JM, Perz J. Sexuality after gynaecological cancer: a review of the material, intrapsychic, and discursive aspects of treatment on women's sexual-wellbeing. *Maturitas* 2011;70:42-57.
 15. Stewart DE, Wong F, Duff S, Melancon CH, Cheung AM. "What doesn't kill you makes you stronger": an ovarian cancer survivor survey. *Gynecol Oncol* 2001;83:537-42.
 16. Mirabeau-Beale KL, Kornblith AB, Penson RT, Lee H, Goodman A, Campos SM, et al. Comparison of the quality of life of early and advanced stage ovarian cancer survivors. *Gynecol Oncol* 2009;114:353-9.
 17. Matulonis UA, Kornblith A, Lee H, Bryan J, Gibson C, Wells C, et al. Long-term adjustment of early-stage ovarian cancer survivors. *Int J Gynecol Cancer* 2008;18:1183-93.
 18. Fayers P, Bottomley A; EORTC Quality of Life Group; Quality of Life Unit. Quality of life research within the EORTC-the EORTC QLQ-C30. European Organisation for Research and Treatment of Cancer. *Eur J Cancer* 2002;38 Suppl 4:S125-33.
 19. Greimel E, Bottomley A, Cull A, Waldenstrom AC, Arraras J, Chauvenet L, et al. An international field study of the reliability and validity of a disease-specific questionnaire module (the QLQ-OV28) in assessing the quality of life of patients with ovarian cancer. *Eur J Cancer* 2003;39:1402-8.
 20. Rosen R, Brown C, Heiman J, Leiblum S, Meston C, Shabsigh R, et al. The Female Sexual Function Index (FSFI): a multidimensional self-report instrument for the assessment of female sexual function. *J Sex Marital Ther* 2000;26:191-208.
 21. Yun YH, Park YS, Lee ES, Bang SM, Heo DS, Park SY, et al. Validation of the Korean version of the EORTC QLQ-C30. *Qual Life Res* 2004;13:863-8.
 22. Kim HY, So HS, Park KS, Jeong SJ, Lee JY, Ryu SB. Development of the Korean-version of Female Sexual Function Index (FSFI). *Korean J Androl* 2002;20:50-6.
 23. Carmack Taylor CL, Basen-Engquist K, Shinn EH, Bodurka DC. Predictors of sexual functioning in ovarian cancer patients. *J Clin Oncol* 2004;22:881-9.
 24. Michael A, O'Keane V. Sexual dysfunction in depression. *Hum Psychopharmacol* 2000;15:337-45.
 25. Bodurka-Bevers D, Basen-Engquist K, Carmack CL, Fitzgerald MA, Wolf JK, de Moor C, et al. Depression, anxiety, and quality of life in patients with epithelial ovarian cancer. *Gynecol Oncol* 2000;78(3 Pt 1):302-8.
 26. Reis N, Beji NK, Coskun A. Quality of life and sexual functioning in gynecological cancer patients: results from quantitative and qualitative data. *Eur J Oncol Nurs* 2010;14:137-46.
 27. Nicolosi A, Glasser DB, Kim SC, Marumo K, Laumann EO; GSSAB Investigators' Group. Sexual behaviour and dysfunction and help-seeking patterns in adults aged 40-80 years in the urban population of Asian countries. *BJU Int* 2005;95:609-14.
 28. Sun CC, Ramirez PT, Bodurka DC. Quality of life for patients with epithelial ovarian cancer. *Nat Clin Pract Oncol* 2007;4:18-29.
 29. Hess LM, Stehman FB. State of the science in ovarian cancer quality of life research: a systematic review. *Int J Gynecol Cancer* 2012;22:1273-80.
 30. Meraner V, Gamper EM, Grahmann A, Giesinger JM, Wiesbauer P, Sztankay M, et al. Monitoring physical and psychosocial symptom trajectories in ovarian cancer patients receiving chemotherapy. *BMC Cancer* 2012;12:77.
 31. Gupta D, Braun DP, Staren ED, Markman M. Longitudinal health-related quality of life assessment: implications for prognosis in ovarian cancer. *J Ovarian Res* 2013;6:17.
 32. Greimel E, Daghofer F, Petru E. Prospective assessment of quality of life in long-term ovarian cancer survivors. *Int J Cancer* 2011;128:3005-11.
 33. Mols F, Thong MS, Vreugdenhil G, van de Poll-Franse LV. Long-term cancer survivors experience work changes after diagnosis: results of a population-based study. *Psychooncology* 2009;18:1252-60.
 34. Yoo SH, Yun YH, Park S, Kim YA, Park SY, Bae DS, et al. The correlates of unemployment and its association with quality of life in cervical cancer survivors. *J Gynecol Oncol* 2013;24:367-75.

