ORIGINAL ARTICLE

Prevalence of Anxiety in Post-Treatment Ovarian Cancer Survivors

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Background: Ovarian cancer is a gynecologic malignancy that needs surgery and adjuvant chemotherapy. Anxiety and depression are common psychological distress among ovarian cancer survivors (OCS).

Objective: To assess the prevalence of anxiety among OCS and associated factors.

Materials and Methods: The present study was a descriptive study conducted at gynecologic oncology clinic at Thammasat University Hospital, Pathum Thani, Thailand. The period of the study was between November 2023 and April 2024. The subjects were OCS who attended the gynecologic oncology clinic. The Hospital Anxiety and Depression Scale (HADS) was used to assess psychological distress. Other demographic data and clinical character were also collected.

Results: Eighty-four OCS were recruited. The mean age of the participants was 55.5 years old. OC survivors with anxiety conditions were younger than those without anxiety at 45.4 versus 56.8 years old, with statistical significance. Three-quarters of the participants (62 out of 84) were diagnosed at an early stage of ovarian cancer. The average time after treatment (TAT) was 27.5 months. Only TAT was the significant factor associated with anxiety disorder in OCS. The prevalence of anxiety was 10.7%.

Conclusion: The findings highlight the importance of early psychological assessment and support for OCS. The authors recommended health care practitioners to be concerned about OCSs' psychological status during their first five months of TAT.

Keywords: Ovarian cancer; Anxiety; Chemotherapy; Survivorship; Mental health

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Ovarian cancer (OC) is the eighth most common malignancy among women globally, with an estimated incidence of approximately 4.7 cases per 100,000 women annually(1). In Thailand, around 2,900 new cases are diagnosed each year, making OC the third most prevalent gynecologic cancer after cervical and endometrial cancers(2,3). The standard treatment for OC involves surgical intervention, typically comprising total hysterectomy with bilateral salpingo-oophorectomy, lymph node sampling, and tumor debulking. This is commonly followed by adjuvant chemotherapy, with the primary goal of surgery being maximal tumor cytoreduction(4). The combination of carboplatin and paclitaxel remains the first-line chemotherapy regimen for OC(4). Adjuvant chemotherapy is administered over six cycles with common side effects including alopecia, peripheral neuropathy, and chronic fatigue(5). Following completion of chemotherapy, ovarian cancer survivors (OCS) continue routine follow-up at gynecologic oncology clinics for surveillance of disease recurrence. The cumulative impact of surgery, chemotherapy, and fear of recurrence can result in a substantial psychological burden, manifesting primarily as anxiety and depression.

Anxiety and depression are common psychological challenges experienced by OC patients during chemotherapy and the post-treatment phase(6). Anxiety is characterized by excessive worry, fear, or nervousness and often accompanied by physical symptoms such as a rapid heartbeat, sweating, and trembling(7). Anxiety levels are commonly evaluated using validated instruments such as the Hospital Anxiety and Depression Scale (HADS)(8) and the

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Generalized Anxiety Disorder 7-item scale (GAD-7)[9], both of which are widely used in clinical settings.

The side effects of chemotherapy significantly increase the risk of persistent anxiety and depression, highlighting the importance of comprehensive post-treatment care that addresses psychological, physical, and emotional needs[10].

Due to the short interval between disease resolution and recurrence, the present study aimed to investigate the prevalence of anxiety among OCS. Furthermore, an analysis was conducted to explore the relationship between demographic characteristics and psychological conditions.

Materials and Methods

The present study was designed as a cross-sectional descriptive study. It was approved by the Human Ethics Committee of Thammasat University (MTU-EC-OB-1-089/66) and registered with the Thai Clinical Trials Registry (TCTR20231012007). The study was conducted at the Gynecologic Oncology Outpatient Clinic, Thammasat University Hospital, Pathum Thani, Thailand, between November 2023 and April 2024. Participants were Thai women aged 18 years or older diagnosed with OC. All subjects had undergone surgical extirpation of cancer, received adjuvant chemotherapy with the duration of five years, attended follow-up appointments at the Gynecologic Oncology Outpatient Clinic, and were able to communicate in Thai. The exclusion criteria included women with recurrent cancer, those who declined to participate, those with a prior diagnosis of anxiety or depression, and those previously diagnosed with any other type of cancer. After applying the exclusion criteria, eligible subjects were thoroughly reviewed. Participants received detailed counseling and information about the study. Informed consent was obtained during their routine follow-up visits. If a participant exhibited high levels of anxiety or depression, a referral to a psychiatrist was arranged for appropriate management. All participants were informed of the study's objectives and voluntarily agreed to participate.

The questionnaire included demographic information and the HADS survey. Demographic data was collected in the first section of the survey. Additional clinical information related to obstetrics and gynecology was also collected. These included staging, percentage receiving chemotherapy, and number of palliative cases. Further psychiatric data required for calculating the HADS score were also collected. The HADS questionnaire included 14 items, seven items each for the anxiety and depression subscales. Each item was rated on a 4-point scale, ranging from 0 to 3, with a maximum score of 21 per subscale. A score of 11 or higher on either subscale indicated clinically significant anxiety or depression. Scores of 8 to 10 were considered borderline, while scores of 0 to 7 were considered normal.

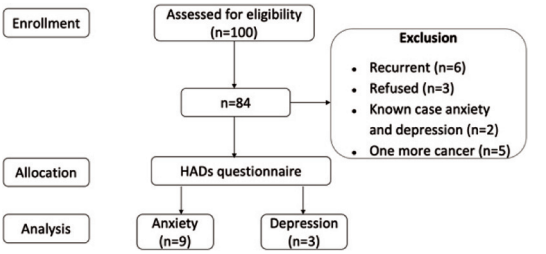

Figure 1. Flow study on the ovarian cancer survivors with anxiety and depression.

HADS: Hospital Anxiety and Depression Scale

The sample size was determined based on the prevalence of post-treatment anxiety among OCS, reported as 27.1% in Watts et al.'s study[11]. With a confidence level of 95% and a margin of error set at 10%, the calculated sample size needed was 84 cases. An additional 30% was added to compensate for potential data loss, resulting in a final sample size of 100 cases. However, 16 participants were excluded during the data collection process due to recurrent OC, refusal to participate, a pre-existing diagnosis of anxiety and depression, or having more than one type of cancer, resulting in 84 participants, as shown in Figure 1.

Statistical analyses were performed using the IBM SPSS Statistics, version 26.0 (IBM Corp., Armonk, NY, USA). Fisher's exact test was used for categorical data. Descriptive statistics were used to summarize the data, including mean, percentage, frequency, and standard deviation. Independent t-tests were applied to compare differences between groups. A two-tailed p-value of less than 0.05 was considered statistically significant. Variables for multivariable logistic regression were selected from those with a p-value less than 0.2 in the univariable analysis or based on clinical relevance, as identified from Table 1. Logistic regression analysis was performed to identify adjusted associations between these variables and anxiety.

Results

Eighty-four women diagnosed with OC were eligible for the study, as illustrated in Figure 1. Upon

Table 1. The association between demographic and clinical factors in non-anxious (n=75) and anxious (n=9) participants with ovarian cancer

	Total	Non-anxiety patient	Anxiety patient	p-value
Age (years); mean±SD	55.5±13.1	56.8±12.7	45.4±13.1	0.013
BMI (kg/m^2); mean±SD	24.3±5.4	24.2±5.4	25.2±6.4	0.612
Occupation; n (%)				0.263
Unemployed	26 (30.9)	25 (33.3)	1 (11.1)	
Employed	58 (69.1)	50 (66.7)	8 (8.9)	
FIGO staging; n (%)				1.000
Early (1 to 2)	62 (72.8)	55 (73.3)	7 (77.8)	
Advanced (3 to 4)	22 (26.2)	20 (26.7)	2 (22.2)	
Education; n (%)				0.549
Primary	20 (23.8)	19 (25.3)	1 (11.1)	
High school	34 (40.5)	29 (38.7)	5 (55.6)	
Bachelor	30 (35.7)	27 (36.0)	3 (33.3)	
Marital status; n (%)	39 (46.4)	38 (50.7)	1 (11.1)	0.033
Nulliparity; n (%)	44 (52.4)	39 (52.0)	1 (11.1)	0.031
Chemotherapy; n (%)	70 (83.3)	8 (88.9)	62 (82.7)	1.000
Buddhism; n (%)	83 (98.8)	74 (98.7)	9 (100)	1.000
Underlying disease; n (%)	47 (56.0)	45 (60.0)	2 (2.2)	0.039
TAT (months); mean±SD	27.5±18.1	30.3±17.0	4.2±2.3	<0.001
Epithelial cell type; n (%)	74 (88.1)	66 (88.0)	8 (88.9)	1.000

SD=standard deviation; BMI=body mass index; TAT=time after treatment
Anxiety: anxiety status (score ≥11)

completing the questionnaire, participants were categorized into two groups, the non-anxiety group, and the anxiety group. The prevalence of anxiety among OCS was 10.7% (95% CI 5.0 to 19.3). Table 1 shows the association between demographic and clinical factors among OCS in both groups. The mean age of participants was 55.5 years old. Those in the anxiety group were significantly younger than those in the non-anxiety group at 45.4 versus 56.8 years old (p=0.013). One-fourth of the participants (20 out of 84) had an educational level of primary school or below. Three-quarters of the participants (62 out of 84) were diagnosed during the early stage of OC. Half of the participants (47 out of 84) reported underlying health conditions, primarily hypertension, diabetes mellitus, and dyslipidemia. The average time after treatment (TAT) was 27.5 months. The participants with anxiety were younger, more likely to be alone, and had a lower number of nulliparous individuals compared to the participants with no anxiety. TAT in anxiety patients were higher compared to those who had no anxiety significantly. Other demographic data were comparable between the two groups, as shown in Table 1.

From Table 2, the exploration of potential risk factors by the uni- and multivariable logistic regression analysis were conducted. From univariable logistic regression analysis, age, TAT, and underlying disease were the possible risk factors associated with anxiety disorder in OCS. From multivariable logistic regression analysis, TAT was the only statistically significant risk factor associated with anxiety disorder in OCS (OR 0.51, 95% CI 0.27 to 0.97, p=0.039).

The relationship between TAT on the x-axis and the predicted likelihood ratio of a positive (LR+) diagnosis on the y-axis is depicted in Figure 2. The cut-off points for LR+ were 10, 1, and 0.1 at 5, 20, and 35 months, respectively.

Table 2 displays the results of the univariable and multivariable logistic regression analyses conducted to identify potential risk factors associated with anxiety. In the univariable analysis, age, TAT, and underlying diseases emerged as risk factors. In the multivariable analysis, TAT was the only statistically significant factor associated with anxiety among OCS (OR 0.51, 95% CI 0.27 to 0.97, p=0.039). Figure 2 illustrates the relationship between TAT (x-axis) and the predicted LR+ diagnosis of anxiety (y-axis). The LR+ cut-off points were 10, 1, and 0.1 at 5, 20, and 35 months, respectively.

Table 2. The association between factors related to the prevalence of anxiety in ovarian cancer patients by using regression coefficient and odds ratio (OR) based on logistic regression statistics

	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age (years)	0.94 (0.89 to 0.99)	0.021	0.92 (0.80 to 1.06)	0.259
BMI (kg/m^2)	1.03 (0.92 to 1.16)	0.608		
Education				
Primary	Reference			
High school	3.28 (0.35 to 30.27)	0.296		
Bachelor	2.11 (0.20 to 21.87)	0.531		
FIGO staging				
Early (1 to 2)	Reference			
Advanced (3 to 4)	0.79 (0.15 to 4.10)	0.775		
Marital status	0.12 (0.01 to 1.02)	0.052		
Nulliparity	8.67 (1.03 to 72.76)	0.047	1.37 (0.07 to 27.14)	0.834
Chemotherapy	1.68 (0.19 to 0.64)			
TAT (month)	0.61 (0.44 to 0.87)	0.005	0.54 (0.32 to 0.94)	0.029
Underlying disease	0.19 (0.04 to 0.98)	0.047	0.48 (0.04 to 4.91)	0.501
Epithelial cell type	1.09 (0.12 to 9.77)	0.938		

CI=confidence interval; BMI=body mass index; TAT=time after treatment

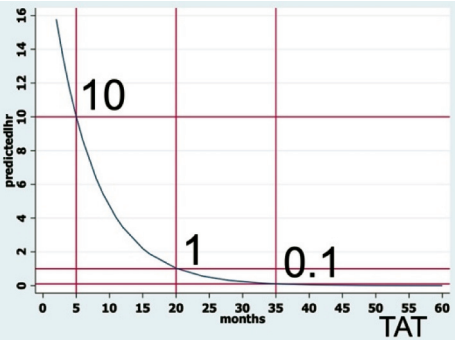

Figure 2. Relationship between the number of months after completing treatment ovarian cancer treatment and likelihood ratio.

TAT: time after treatment

Positive predicted likelihood ratio (LR+) at 5, 20, and 35 months were 10, 1, and 0.1, respectively.

Discussion

Among OCS in the present study, the prevalence of anxiety among OCS was 10.7% (95% CI 5.0 to 19.3) and depression was 3.5% (95% CI 0.7 to 10.1), respectively. From meta-analysis of depression and anxiety in OC in year 2016, post treatment of anxiety and depression were 27.1 and 12.7%, respectively[11]. Study from China, Poland and USA reported the post treatment anxiety ranged from 17% to 57%[12-16]. All five studies were conducted among OC cases during chemotherapy treatment. The current study was conducted using a questionnaire during post chemotherapy period. During chemotherapy patients usually suffered from nausea, vomiting, alopecia, anemia, numbness, fatigue, and loss of appetite[17]. During the pause period between chemotherapy courses, patients are concerned about cancer recurrence and elevated tumor markers. These might contribute to anxiety and depression in OC during their ongoing chemotherapy. The studies conducted during chemotherapy treatment revealed a high prevalence rate of anxiety and depression[12-16]. The studies from the Netherlands, U.K., and Thailand showed the prevalence of anxiety and depression post OC treatment period ranged from 3.9 to 14.9%, similar to the current study[18-20]. The findings from the current study supported the results of the above[18-20]. In the present study, after the completion of the chemotherapy course, check-ups at the cancer clinic were scheduled for OCS to detect any evidence of cancer recurrence. At post treatment check-ups, symptoms, namely nausea, vomiting, and numbness were no longer present. Alopecia, anemia, and fatigue usually returned to normal conditions by the time the questionnaire was given. The only concern for OCS during this period was the possibility of cancer recurrence. This concern could lead to psychological disorder. Anxiety and depression detected post chemotherapy period were usually less severe than those detected during chemotherapy treatment[15]. Mental health issues in OCS might be underreported in Thailand due to bad stigma association with mental health patients[21]. Strong social support systems might help to mitigate psychological distress[19]. Low education is another

factor affecting anxiety during chemotherapy, as observed in studies from Poland and China[12,15]. Patients with low education levels might not fully understand the treatment process, which could lead to fear and confusion. They might not know what to expect from chemotherapy or how to manage its side effects, making them feel overwhelmed and anxious. Studies from China and Poland also indicated that most patients undergoing chemotherapy were in the advanced stages of cancer[12,15]. The stage of cancer was a significant factor for anxiety in all these studies[12,15]. From the current study, the stage of cancer was not associated with the level of anxiety or depression. It might be that subjects in the current study had long TAT with average of 27.5 months. An advanced stage often meant a poorer prognosis, which caused fear and uncertainty about the future. Patients with an advanced stage cancer undergoing treatment might worry about the effectiveness of the treatment and their chances of recovery, leading to higher levels of anxiety. Finally, studies by Hongxia et al., Mielcarek et al., and Wall et al. found that being single was another factor that increased anxiety during chemotherapy[13,15,16]. OCS who lived alone might lack emotional support. Furthermore, not having someone to help with daily tasks or caregiving responsibilities makes things even more difficult. Chemotherapy often causes fatigue and other side effects, making it hard for patients to manage everyday activities. Additionally, OCS who lived alone received no financial support from a partner, which aggravated their financial stress. As shown in the present study, the only significant factor for anxiety was TAT, which aligned with the findings of Camara et al., Chittrakul et al., and Lakhiani et al.[18-20]. They reported no other significant factors associated with anxiety. All of these studies were conducted during the post-treatment period. Chittrakul et al. also attempted to compare the prevalence of anxiety in OCS with a control group and reported no significant difference[19]. As more time passed after chemotherapy treatment, anxiety tended to decrease because patients were more familiar with the treatment process and its side effects. OCS often developed coping strategies and built a routine that helped them manage their fears better[15]. Additionally, as OCS get further from the intense and uncertain time right after treatment, survivors might feel more hopeful and less anxious about their health and future. Over time, any immediate physical discomforts from chemotherapy would be lessened, leading to lower anxiety level.

The strength of the present research is that it was conducted over a lengthy period compared to previous studies. The current study collected the data after completing the courses of chemotherapy, at approximately 27.5 months. The data from the present research has never been collected at Thammasat Hospital before. The findings allowed the suggestion of a new guideline for more comprehensive OCS care.

While the HADS scale was widely used and well-validated in studies, it might not fully capture the psychological complexities of OCS. Self-reported measurement was then recommended in cultures that stigmatized mental health leading to underreporting.

The differences in anxiety and depression rates across all studies highlighted the need for culturally sensitive tools that could accurately reflect patients' psychological states. Small sample size might be the limitation of the present study. A larger sample size would have provided more robust insights into the factors influencing anxiety and depression among OCS. The findings from the present study suggested that healthcare providers should think of anxiety screening in OCS, particularly during the first five months following chemotherapy to effectively reduce the risk of developing anxiety.

In conclusion, the prevalence of anxiety among OCS was 10.7% (95% CI 5.0 to 19.3) and depression was 3.5% (95% CI 0.7 to 10.1), respectively. The only statistically significant risk factor associated with anxiety was TAT. The authors recommends that health care practitioners be highly concerned about OCSs' psychological status during their first five months of TAT.

What is already know about this topic?

OC is the eighth most common cancer among women worldwide. The standard treatment typically involves a combination of surgery and chemotherapy. Surgical menopause can lead to severe symptoms such as hot flashes, night sweats, and mood swings, which further contribute to psychological distress. Following the completion of chemotherapy, regular gynecologic oncology surveillance is essential for the early detection of cancer recurrence, which may contribute to ongoing psychological distress in survivors.

What does this study add?

The prevalence of anxiety and depression among OCS has been reported at 10.7% and 3.5%, respectively. The first five months following treatment are strongly associated with an increased risk of anxiety and depression in these population.

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Authors' contributions

All authors contributed equally to this study.

Conflicts of interest

There was no conflict of interest in this study.

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