Submitted: 08 August, 2022 Accepted: 13 April, 2023 Published: 15 August, 2023 DOI:10.22514/ejgo.2023.049

ORIGINAL RESEARCH

European Journal of Gynaecological Oncology

Analysis of NCCN-distress thermometer in patients with ovarian cancer: results of 150 patients prior to cytoreductive ovarian cancer surgery

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Abstract

This analysis aimed to describe the psychological stress in patients with ovarian cancer prior to radical surgery, with a particular focus on age. The National Comperhensive Cancer Network (NCCN) Distress Thermometer (DT) was administered to 150 women undergoing surgery for ovarian cancer last week prior to surgery. We compared our data, which is a subanalysis from the "Role of Predictive Markers for Severe Postoperative Complications in Gynecological Cancer Surgery" (RISC-Gyn)-Trial with a multicenter epidemiological study as a control group, including 1913 female cancer patients from Germany. Overall, 150 patients with ovarian cancer were enrolled, of which 126 patients (82.4%) with advanced-stage disease International Federation of Gynecology and Obstetrics (FIGO III–IV), and 55 patients (37%) $\geq$65 years. Younger patients reported more fears, worries, and sadness and wished to be more involved in treatment decisions. Worries were three times more frequently reported by patients with a university degree. These patients had more emotional problems such as fears, worries, sadness, and nervousness than the control group. Sustainable psychological support and professional advice in school, work, and financial management could help ovarian cancer patients reduce their stress factors especially the younger women under the age 65. Empowering patients by involving them in treatment decisions seems to be one of the crucial issues we need to address in our future clinical work.

Keywords

Distress; Psychological stress; Ovarian cancer; Elderly

1. Introduction

The diagnosis of ovarian cancer usually comes unexpectedly and causes a major disruption in the patients' life. In most cases, the disease is diagnosed at an advanced stage and is associated with a poor prognosis [1]. Complex surgical procedures and adjuvant cancer therapy, including chemotherapy and maintenance therapy, are the treatment's cornerstones. The diagnosis of cancer causes great anxiety and stress [2–5]. Uncertainties, regardless of prognosis, affect patients' mental well-being [6]. Psychosocial distress is associated with lower quality of life of the patients and can significantly impact the upcoming treatment and recovery [7–9]. Cohen *et al.* [10] showed that women with increased distress before surgery reported more pain and accordingly needed more morphine. Therefore, the psychological stress, in addition to the physical stress, should also be recorded in the patients' history pretreatment. Several guidelines recommend the routine use of psychological screening methods prior to cancer therapy to describe patients' psychological stress [11, 12]. There are various screening tools available as screening methods [13, 14]. The most widely used method worldwide is the "Distress Thermometer" developed by the NCCN [15]. The distress thermometer has been translated and validated in 46 languages, including German [14]. To date, it has been scientifically proven that psycho-oncological interventions during the treatment are helpful, can reduce stress, and thus contribute to an improvement in the quality of life in cancer patients [16].

Despite its importance, there is a lack of data regarding the results of distress screening before cytoreductive surgery in patients with ovarian cancer. From our preliminary work, we already know that needs vary with age and the stages of life, so we have focused on age. This analysis aimed to describe the psychological stress in these patients' prior treatment with a particular focus on age in order to register age-related differences.

2. Methods

This subgroup analysis has evolved from the prospective study "Role of Predictive Markers for Severe Postoperative Complications in Gynecological Cancer Surgery" (RISC-Gyn Trial)

[17]. The RISC-Gyn Trial was a prospective study and included patients aged 18 years and older with gynecologic cancer who underwent surgery. This sub analysis evaluates 150 patients with ovarian cancer with primary and first recurrant disease out of 226 patients with gynecological cancer. The patients with recurrent disease had surgery and chemotherapy before Demographic data, comorbidities summarized as the Charlson comorbidity index (CCI) [18], Eastern Cooperative Oncology Group performance status (ECOG) [19], and American Society of Anesthesiologists physical status (ASA) [20] were collected prospectively.

2.1 Measures

Psychological distress was measured using the NCCN DT. This tool is a self-reporting measurement of psychological distress, which consists of a visual scale ranging from 0 (no distress) to 10 (extreme distress). Additionally, the NCCN has a problem list for five columns: practical problems, family problems, emotional problems, physical problems, and spiritual/religious problems. Patients were asked by the study team about their distress within the last week before surgery and documented all 34 problem items.

2.2 Statistical analyses

In this sub-analysis, we grouped the patients according to age under 65 and older 65 years and looked for variance in their distress thermometer results. We used data from a multicenter epidemiological study as a comparison group [21]. They measured psychological distress in 3724 cancer patients (mean age 58 years; 57% women) in a cross-sectional multicenter study. They enrolled adult cancer patients from comprehensive cancer centers (CCC) of acute care hospitals, outpatient cancer care facilities, and cancer rehabilitation clinics in five diverse study centers across Germany. Of the 1913 female patients, 295 patients had gynecological cancer and 849 had breast cancer 769 had lung-, hematological-pancreas-, thyroid, stomach, kidney, bladder cancer in Stage I to IV—the median time since current cancer diagnosis was 13.5 months.

A *t*-test was used to compare the groups. Logistic regression analysis was done for adjusted odds ratios (ORs) with a corresponding 95% confidence interval (95% CI). For the multivariate analysis, the discrepant results in young and old patients were adjusted for advanced tumor stage (FIGO III + IV) and CCI >2. The analysis was performed stepwise with $p_{in} = 0.05$ and $p_{out} = 0.10$. Missing data were extracted from the multivariable analyses (<5%). Statistically significant was considered as $p < 0.05$. For our statistical analysis, we used IBM® SPSS® Statistics 25 (SPSS Inc., an IBM Company, Chicago, IL, USA).

3. Results

The median age of our cohort was 58 years (range: 18–87 years). Fifty-five out of 150 patients enrolled in the study were 65 years and older. One hundred and sixteen patients (75.3%) were married or in a relationship and had at least one child. The patients 65 years and older had obviously more comorbidities (CCI >2; 47% *vs.* 19%; $p < 0.001$), and ECOG >1 was present more often in this group (41% *vs.* 26%, $p = 0.03$ and 9% *vs.* 7%; $p = 0.01$, respectively). Ovarian cancer in advanced stage (FIGO III–IV) was registered in 126 patients (82.4%). The detailed characteristics are shown in Table 1.

3.1 Comparison of the NCCN distress thermometer for 150 patients with ovarian cancer (RISC-Gyn Trial) and the NCCN distress thermometer for 1913 female cancer patients in Germany

Patients in the RISC-Gyn Trial had a significantly higher rate of family problems than the patients in the epidemiological study (26.7% versus 9.8%, $p < 0.001$). Especially emotional problems such as fears (68.7% versus 50.5%, $p < 0.001$), nervousness (46% versus 38.2%, $p < 0.001$), sadness (57.3% versus 48.5%, $p = 0.04$) and worries (71.3% versus 52.1%, $p < 0.001$) in our cohort with ovarian cancer patients showed significantly higher scores. Patients from the RISC-Gyn Trial scored noticeably higher on physical problems. Except for changes in urination, all items on the problem list were higher in the German group.

Further differences are shown in Tables 2 and 3.

3.2 Comparison of the NCCN distress thermometer for 150 patients with ovarian cancer (RISC-Gyn Trial) for age <65 and age ≥65 years

Patients <65 years rated their distress higher than older patients (6 points versus 5 points, $p = 0.02$). They reported more stress about their finances (15.5% versus 0, $p < 0.001$) and work (15.5% versus 0, $p < 0.001$). They also wished to be more involved in treatment decisions (21.6% versus 7.5%, $p = 0.04$).

Emotional problems such as fears (76.3 % versus 54.7%, $p = 0.01$), sadness (66% versus 41.5%, $p = 0.006$) and worries (78.4% versus 58.5%, $p = 0.01$) were significantly higher in the younger group. Except for more sexual problems, all problem list items were similar in both groups.

Further differences are listed in Tables 2 and 3.

3.3 Logistic regression of items of distress thermometer adjusted to advanced disease and comorbidities

The items with significant discrepancies between the subgroups of patients for under 65 and 65 years and older, such as involvement in treatment decisions, fears, sadness, and worries, were adjusted for age <65 years, university degree, married/relationship, comorbidities according to CCI >2, advanced tumor stage FIGO stages III and IV and recurrent disease. Sadness was higher (OR: 2.38, 95% CI: 1.10–5.12, $p = 0.03$) in patients <65 years and married patients (OR: 2.34, 95% CI: 1.01–5.43, $p = 0.05$). Patients with university degrees were more worried (OR: 3.19, 95% CI: 1.20–8.52, $p = 0.02$) Other Odd Ratios (OR) are listed in detail in Table 4.

TABLE 1. Baseline characteristics.

	Total n = 150 (range or %)	Age under 65 years n = 100 n (range or %)	Age 65 years and older n = 50 n (range or %)	*p*-value
Single	14 (9.1)	11 (11.0)	3 (5.6)	
Married/Relationship	116 (75.3)	79 (79.0)	37 (68.6)	0.050
Divorced	13 (8.4)	7 (7.0)	6 (11.1)	
Widowed	11 (7.1)	3 (3.0)	8 (14.8)	
Having a Child/Children	116 (75.3)	72 (72.0)	44 (80.0)	0.300
Education				
None/other	10 (6.5)	2 (2.0)	8 (15.1)	
Secondary school (5–10 yr)	72 (47.1)	44 (44.0)	28 (52.8)	<0.001
Secondary school (10–13 yr)	16 (10.5)	11 (11.0)	5 (9.4)	
University Degree	55 (35.9)	43 (43.0)	12 (22.6)	
ECOG PS >1	12 (7.7)	7 (7.0)	5 (9.1)	0.010
Charlson Comorbidity Index >2	45 (29.0)	19 (19.0)	26 (47.3)	<0.001
Recurrent Disease	49 (31.6)	36 (36.0)	13 (23.6)	0.200
FIGO Stage I–II	27 (17.6)	20 (20.4)	7 (12.7)	0.300
FIGO Stage III–IV	126 (82.4)	78 (79.6)	48 (87.3)	

ECOG PS: Eastern Cooperative Oncology Group scale of performance status; FIGO: International Federation of Gynecology and Obstetrics.

4. Discussion

This analysis aimed to describe the psychological stress in patients with primary and recurrent ovarian cancer prior to radical surgery.

Despite several methodological limitations of the comparison with the cohort of women from an epidemiological study in Germany, we emphasize in particular that patients with ovarian cancer have a great need for psycho-oncological support especially prior surgery. We already know, that the cancer patients have distress and decrease in QoL under chemotherapy, but we want to point especially the time before surgery. We believe that this analysis is helpful and provides further information for prospective trials.

First, the women in our sample were heterogeneous in the disease situation, including women with a primary diagnosis of ovarian cancer and recurrent disease in mixed stagings. Studies controversially show relations between psychological distress and recurrent status, whereas our regression analysis for the RISC-Gyn patients did not find a significant effect [22]. The time period between diagnosis and reporting was short; the self-reporting distress thermometer was administered last week before surgery.

The results showed that the patients with ovarian cancer compared with female cancer patients from Germany have more emotional problems, including fears, worries, sadness, and nervousness. The problem list with several symptoms such as fatigue, memory impairment, dry skin, and sexual problems was higher in the control group than in ovarian cancer patients. We assume that this is because the patients in the epidemiological study were under or after chemotherapy, since the study data were collected from acute care hospitals, outpatient cancer care facilities, and cancer rehabilitation clinics.

The younger patients in the RISC-Gyn Trial reported more fears, worries, and sadness, wished to be more involved in treatment decisions, and reported problems managing school, work, and financial issues. This is because we assume that the older cohort over 65 is retired in Germany and of course no longer attends school. Additionally, patients with university degrees reported having worries three times more.

TABLE 2. NCCN distress thermometer and problem list for patients.

	CCCs Germany n = 1913	RISC-Gyn Trial n = 150 n (range or %)	*p*-value	RISC-Gyn Trial Age under 65 years n (range or %)	RISC-Gyn Trial Age 65 years and older n (range or %)	*p*-value
Distress Thermometer (1–10) visual rating scale		6 (0–10)		6 (0–10)	5 (0–10)	0.020
Practical Problems						
Child care	62 (3.2)	7 (4.7)	0.400	6 (6.2)	1 (1.9)	0.400
Housing	187 (9.8)	11 (7.3)	0.300	9 (9.3)	2 (3.8)	0.300
Insurance/financial	136 (7.1)	15 (10.0)	0.200	15 (15.5)	0	0.001
Transportation	124 (6.5)	9 (6.0)	0.800	7 (7.2)	2 (3.8)	0.500
Work/school	199 (10.4)	15 (10.0)	0.800	15 (15.5)	0	0.001
Treatment decisions		25 (16.7)		21 (21.6)	4 (7.5)	0.040
Family Problems						
Dealing with children		7 (4.7)		6 (6.2)	1 (1.9)	0.400
Dealing with partner		11 (7.3)		8 (8.2)	3 (5.7)	0.800
Ability to have children		8 (5.3)		8 (8.2)	0	0.050
Family health issues		22 (4.7)		15 (15.5)	7 (13.2)	0.800
Summation of Family Problems	187 (9.8)	40 (26.7)	<0.001			
Emotional Problems						
Depression	336 (17.6)	21 (14.0)	0.300	17 (17.5)	4 (7.5)	0.100
Fears	967 (50.5)	103 (68.7)	<0.001	74 (76.3)	29 (54.7)	0.010
Nervousness	731 (38.2)	69 (46.0)	<0.001	48 (49.5)	21 (39.6)	0.300
Sadness	927 (48.5)	86 (57.3)	0.040	64 (66.0)	22 (41.5)	0.006
Worry	997 (52.1)	107 (71.3)	<0.001	76 (78.4)	31 (58.5)	0.010
Loss of interest in usual activities	462 (24.2)	29 (19.3)	0.200	20 (20.6)	9 (17.0)	0.700
Spiritual/religious concerns	118 (6.2)	9 (6.0)	0.900	7 (7.2)	2 (3.8)	0.500

CCC: Comprehensive Cancer Centers; RISC-Gyn Trial: Role of Predictive Markers for Severe Postoperative Complications in Gynecological Cancer Surgery-Trial.

TABLE 3. NCCN distress thermometer and problem list for patients and physical problems.

	CCCs Germany n = 1913	RISC-Gyn Trial n = 150	*p*-value	RISC-Gyn Trial Age under 65 years	RISC-Gyn Trial Age 65 years and older	*p*-value
Appearance	360 (18.8)	27 (18.0)	0.800	19 (19.6)	8 (15.1)	0.700
Bathing/dressing	250 (13.1)	7 (4.7)	0.003	5 (5.2)	2 (3.8)	1.000
Breathing	430 (22.5)	30 (20.0)	0.500	18 (18.6)	12 (22.6)	0.700
Changes in urination	292 (15.3)	33 (22.0)	0.030	20 (20.6)	13 (24.5)	0.700
Constipation	420 (22.0)	27 (18.0)	0.300	18 (18.6)	9 (17.0)	1.000
Diarrhea	399 (20.9)	27 (18.0)	0.400	18 (18.6)	9 (17.0)	1.000
Eating	512 (26.8)	45 (30.0)	0.400	30 (30.9)	15 (28.3)	0.900
Fatigue	1.237 (64.7)	76 (50.7)	<0.001	50 (51.5)	26 (49.1)	0.900
Feeling swollen	505 (26.4)	35 (23.3)	0.400	18 (18.6)	17 (32.1)	0.070
Fevers	89 (4.7)	5 (3.3)	0.500	4 (4.1)	1 (1.9)	0.700
Getting around	957 (50.0)	38 (25.3)	<0.001	26 (26.8)	12 (22.6)	0.700
Indigestion	613 (32.0)	40 (26.7)	0.200	28 (28.9)	12 (22.6)	0.500
Memory/concentration	769 (40.2)	28 (18.7)	<0.001	22 (22.7)	6 (11.3)	0.100
Mouth sores	320 (16.7)	14 (9.3)	0.020	11 (11.3)	3 (5.7)	0.400
Nausea	489 (25.6)	29 (19.3)	0.090	21 (21.6)	8 (15.1)	0.400
Nose dry/congested	459 (24.0)	21 (14.0)	0.005	13 (13.4)	8 (15.1)	0.800
Pain	997 (52.1)	70 (46.7)	0.200	48 (49.5)	22 (41.5)	0.400
Sexual problems	434 (22.7)	15 (10.0)	<0.001	15 (15.5)	0	0.001
Skin dry/itchy	633 (33.1)	27 (18.0)	<0.001	19 (19.6)	8 (15.1)	0.700
Sleeping	1.092 (57.1)	87 (58.0)	0.800	56 (57.7)	31 (58.5)	1.000
Tingling in hands/feet	639 (33.4)	26 (17.3)	<0.001	15 (15.5)	11 (20.8)	0.500

CCC: Comprehensive Cancer Centers; RISC-Gyn Trial: Role of Predictive Markers for Severe Postoperative Complications in Gynecological Cancer Surgery-Trial.

TABLE 4. NCCN distress thermometer and problem list for patients adjusted to age, partnership, education, advanced stage and comorbidities.

	Involving in Treatment Decision		Fears		Sadness		Worry	
	OR CI 95%	*p*-values	OR CI 95%	*p*-values	OR CI 95%	*p*-values	OR CI 95%	*p*-values
Age <65 yr	2.70 (0.80–9.08)	0.10	2.04 (0.92–4.52)	0.08	2.38 (1.10–5.12)	0.03	2.32 (1.02–5.31)	0.05
Married/Relationship	0.51 (0.18–1.49)	0.20	1.40 (0.58–3.32)	0.50	2.34 (1.01–5.43)	0.05	2.97 (1.20–7.39)	0.02
University Degree	1.44 (0.53–3.92)	0.50	2.13 (0.85–5.26)	0.10	1.19 (0.53–2.68)	0.70	3.19 (1.20–8.52)	0.02
Advanced Stage (FIGO III–IV)	0.3 (0.11–0.82)	0.20	1.13 (0.41–3.15)	0.80	0.35 (0.13–0.99)	0.05	1.20 (0.42–3.39)	0.70
Recurrent Disease	2.26 (0.84–6.08)	0.10	1.93 (0.79–4.71)	0.20	1.15 (0.52–2.53)	0.70	0.70 (0.29–1.67)	0.40
Charlson Comorbidity Index >2	0.68 (0.21–2.23)	0.50	0.74 (0.31–1.74)	0.50	1.21 (0.52–2.82)	0.70	0.84 (0.35–2.02)	0.70

FIGO: International Federation of Gynecology and Obstetrics; OR: Odd Ratio; CI: confidence interval.

The results of a large sample study in women with gynecologic cancer using the DT also demonstrated similar findings, namely that younger women and women with higher levels of education experienced higher levels of distress [4]. A smaller study with 143 patients with ovarian cancer also describes that younger patients under 60 years are likely to experience distress and mentioned that singles were more distressed in contrast to our study [23]. Further, a meta-analysis of 18 studies showed strong evidence of a relationship between younger age, advanced disease, more physical symptoms, and shorter time period since diagnosis with increased anxiety and/or depression [2]. In our RISC-Gyn Trial, we screened the patients shortly after diagnosis, only a few days prior to surgery. This screening period could be the reason for higher emotional stress compared to the control group from the epidemiological study, with a mean screening time of 13.5 months after the cancer diagnosis [21]. Psychological distress is highly linked to a patient's quality of life, and both can affect treatment outcomes [24]. We demonstrated in previous works that quality of life parameters have a negative impact on surgical outcome [8, 17]. Especially younger women were more restricted in their emotional and social domains of daily life [25]. A good care pathway for psycho-oncological counseling has been established in Germany [26]. Several medical societies demand that all cancer patients be offered psycho-oncological consultations in cancer centers [11]. Appointments should be made as soon as possible, especially if the patients show a high level of stress during the screening. Psycho-oncological counseling can help affected patients mobilize their various resources [27]. In order to empower patients and reduce their stress it is also important to create supplementary offers such as yoga, sport, or even music or writing courses to process their feelings associated with the illness [28–32].

Even years after therapy, the fears persist during the follow-up, especially monitoring the tumor marker cancer antigen (CA)-125 triggers fears in the patients. Findings of studies suggest that if women are well informed about their disease, worrying about CA125 levels may affect the patients moderately [33].

Another study pointed out that patients with ovarian cancer had a 4-fold, whereas patients with cervical cancer had a 3-fold and endometrium cancer patients had a 2-fold increased risk for antidepressant use one year after diagnosis. This risk persisted eight years after diagnosis with ovarian cancer and was associated with advanced disease, low educational level, and comorbidities [34]. It seems that we need long-term concepts in caring for ovarian cancer patients [35]. In particular, long-term survivors of ovarian cancer have several issues, such as fatigue, depression, and chronic fear of recurrence [34–36]. Our results emphasize that the patients want to be involved in therapy decisions. Modern patient-centered patient care demonstrates that patient involvement in treatment decisions empower patients, decrease distress, and improve the quality of life of women with ovarian cancer [33, 37]. Involvement in decision-making is crucial for patient empowerment and is highly recommended by the World Health Organization [38–40]. Patients' support, education, and information are also part of newer programs, such as prehabilitation prior surgery [41].

In our current study, we have not measured patient empowerment and the status of information and knowledge; therefore,

further studies are needed to prospectively analyze the value of the distress thermometer within this context. Furthermore, it would be interesting to investigate how distress changes depending on the physical outcome after the surgery.

5. Conclusions

Clinicians should be aware of the psychological distress of patients with ovarian cancer, particularly younger women, and involve psych-oncological support early on. Early psychological support, information, education, social support, and professional advice about school, work, and financial management could help and should be integrated into managing women with ovarian cancer, especially the younger ones to reduce patients' stress. Empowering patients by involving them in treatment decisions seems to be one of the crucial issues we need to address in our future clinical work.

ABBREVIATIONS

RISC-Gyn Trial, "Role of Predictive Markers for Severe Postoperative Complications in Gynecological Cancer Surgery" Trial; NCNN, National Comprehensive Cancer Network; DT, Distress Thermometer; CCI, Charlson Comorbidity Index; ECOG, Eastern Cooperative Oncology Group performance status; ASA, American Society of Anesthesiologists physical status; OR, Odds ratio; 95% CI, Confidence interval.

AVAILABILITY OF DATA AND MATERIALS

Raw data were generated at Charité Universitätsmedizin Berlin. Data are available upon reasonable request from the corresponding author.

AUTHOR CONTRIBUTIONS

MGI—Study Conception, Literature review, Data Collection, Data analysis and interpretation, writing of the manuscript; ML—Manuscript review and editing; HW—Manuscript review and editing; RR—Statistical analysis; UG—Manuscript review and editing; JS—Data review and analysis, Manuscript review and editing.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Charité's Ethics Committee (approval ID EA2/122/15). It was performed following the Declaration of Helsinki. All participants provided written informed consent prior to enrolment in the study.

ACKNOWLEDGMENT

Special thanks for her outstanding personal engagement to Monika Schremm, the president of the ALLIMOGI-Foundation.

FUNDING

This study was funded by the ALLIMOGI- Foundation.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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How to cite this article: Melisa Guelhan Inci, Marlene Lee, Hannah Woopen, Rolf Richter, Ute Goerling, Jalid Sehouli. Analysis of NCCN-distress thermometer in patients with ovarian cancer: results of 150 patients prior to cytoreductive ovarian cancer surgery. European Journal of Gynaecological Oncology. 2023; 44(4): 6-13. doi: 10.22514/ejgo.2023.049.