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ORIGINAL RESEARCH

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Quality of life in patients with cervical cancer and endometrial cancer during adjuvant treatment—similarities and differences useful in personalized care

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Abstract

Background: The most important goal of oncological therapy is to cure or achieve long-term survival while maintaining good quality of life. Currently the new idea appears that cervical cancer and endometrial cancer belong to uterus associated tumors group. **Methods**: The retrospective study enrolled 62 patients: 22 with cervical cancer and 40 with endometrial cancer. In this study standardized questionnaires were applied: European Organization for Research and Treatment of Cancer (EORTC) quality of life questionnaires: QLQ (Quality of life questionnaires)-C30 and QLQ-CX24 modules for cervical cancer and QLQ-EN24 for endometrial cancer. Spearman's rank correlation test was used to investigate the second aim. **Results**: The two studied cancers were similar with respect to global health status and functional scales. They differed in terms of emotional functioning with better functioning in endometrial cancer and some symptoms like nausea and vomiting which were more severe in women with cervical cancer. The age of the subjects, chemotherapy and the frequency of hospitalization significantly reduced the quality of life in patients in both groups ($p < 0.05$). **Conclusions**: While planning holistic care for a patient with cervical or endometrial cancer during adjuvant treatment, it is important to understand the factors that may significantly affect the general health condition and quality of life. Some side effects that appear during treatment, *e.g.*, nausea and vomiting, require appropriate adjuvant therapy.

Keywords

Quality of life; Cervical cancer; Endometrial cancer; Adjuvant therapy

1. Introduction

The cervical and endometrial cancers are common malignant tumors. Currently, their standardized incidence rates in Poland are 12/100,000 and 25/100,000 respectively [1].

Previously they were treated as completely different tumors taking into account their etiology, symptomatology and treatment. With the introduction of immunotherapy in combination with chemotherapy they received new label: "uterine associated tumors" which shows less pronounced responses to chemotherapy than ovarian cancer, underlining the need for further therapies including immunotherapy [2]. Previously, these two cancers were treated as completely different ones with respect to etiology, age and their characteristics like obesity, hypertension and diabetes. Among cervical and endometrial cancer patients many demonstrated long term survivals since curability in these two cancers is high. Therefore, quality of life (QoL) is very important factor. The originality of presented study is not only the fact that it is dealing with two cancers but also wide spectrum of adjuvant therapy modalities like radiotherapy, chemotherapy, radiochemotherapy. The previous studies based on differences of endometrial and cer-

vical cancer treatment were devoted only to one of therapeutic modalities. The quality of life in women with oncological diseases is studied to optimize treatment methods in order to select methods that bring benefits with respect to quality of life [3]. These studies are conducted primarily in single-cancer populations and often involve separate comparisons of two or more therapies for cervical cancer [4–8] and endometrial cancer [9–11]. For two common gynecological cancers: cervical cancer and endometrial cancer, European Organization for Research and Treatment of Cancer (EORTC) has created separate modules QLQ-CX24 and QLQ-EN24, which complement the general QLQ-C30 core. Previous studies have examined the quality of life using EORTC modules in groups of patients with cervical cancer and in groups with endometrial cancer. In the present study, we decided to assess the quality of life of patients with these cancers treated simultaneously. This decision resulted from the fact that these two cancers were treated in the same center, at the same time and at the same level of evolution of treatment methods. An additional factor was the similarity of items in the QLQ-CX24 and QLQ-EN24 questionnaires. In the literature, only three studies deal with a simultaneous study of the quality of life in cervical and endometrial cancer [3, 12, 13]. Two of these studies concerned long-term survival in cervical cancer and endometrial cancer [3, 12]. One of them was a longitudinal study covering a 3-month period [13]. Multimodal adjuvant treatment is a serious challenge to the quality of life of patients undergoing it. The quality of life of such patients is related to the continuation of basic life activities, fulfilling professional roles and maintaining good family and partner relationships. Our study aims to show similarities and differences in the quality of life of women with gynecological cancer located in the cervix and endometrium in cross-sectional study during the time of adjuvant treatment. We realize that difference of quality of life in two studied tumors may be not only the result of the cancer type per se but differences in primary and adjuvant therapies, and their toxicities. Namely, adjuvant therapy in cervical cancer is usually accompanied by simultaneous radio and chemotherapy whereas in endometrial cancer—initially chemotherapy is performed followed by radiotherapy with brachytherapy [14, 15]. Additionally, the selection of demographic and clinical parameters that were used to assess correlation with quality of life parameters was aimed at examining whether the quality of life depended only on the type of cancer. The studied parameters were age, Body Mass Index (BMI), place of residence, marital status, professional activity, time since diagnosis, number of hospital stays and previous adjuvant therapy cycle, International Federation of Gynecology and Obstetrics (FIGO) clinical stage, type of adjuvant therapy, coexisted diseases and comorbidities. The quality of life of cancer patients reflects performing basic life activities, fulfilling professional roles and maintaining good family and partner relationships. According to World Health Organization (WHO), quality of life is complex physical, mental and social well-being and not just the absence of disease. Quality of life can be investigated by means of questionnaires.

The EORTC QLQ-C30 questionnaire was constructed by EORTC (European Organization for Research Treatment of Cancer). This tool is validated also in Polish assessing the quality of life, and is characterized by high validity and reliability [5, 10].

We decided to widely check all possible correlations and to present only that which appeared statistically significant.

2. Hypothesis

(1) There were no differences in the assessment of quality of life and general health status in two studied cancers assessed by the EORTC QLQ-C30, QLQ-CX24 and QLQ-EN24 questionnaires.

(2) Quality of life assessments do not correlate with clinical data such as age, place of residence, marital status, body mass index, comorbidities, stage of advancement and applied treatment.

3. Aim

The study aimed to compare the quality of life in patients with cervical and endometrial cancer during adjuvant treatment. We intended to identify functional scales and incidence of disease symptoms in cervical and endometrial cancer, as well as to assess the correlation between responses to questionnaires and selected variables.

4. Material and method

The inclusion criteria included being a patient undergoing adjuvant therapy of cervical cancer or endometrial cancer at the Clinical Oncology Clinic with the Gynecological Oncology Sub-Department of Frederic Chopin University Clinical Hospital in Rzeszów, Poland between the period from October 2022 to January 2023. The study group included 22 patients with cervical cancer and 40 patients with endometrial cancer undergoing adjuvant treatment. We did not record any refusal to answer the questionnaires.

4.1 Methods

The research method was a survey. The tool adopted in the study was EORTC QLQ-C30 questionnaire which was completed by all patients supplemented by a second form appropriate to the type of cancer intended for women with cervical cancer QLQ-CX24 and endometrial cancer QLQ-EN24. Each patient also completed a questionnaire including a sociodemographics including such data as: age, BMI, number of previous adjuvant therapy cycles, time since diagnosis, place of residence, marital status. The survey was supplemented with information about FIGO clinical stage, treatment methods, professional activity and comorbidities. Statistical calculations were developed using the research key, which was used with the consent of the EORTC Organization.

Among questionnaires used in the study, EORTC QLQ-C30 is a preliminary core item constructed by EORTC version 3.0. The questionnaire contains functional scales (physical, role, emotional, cognitive and social ones) and symptom scales (fatigue, pain, dyspnoea, nausea and vomiting, insomnia, appetite loss, constipation, diarrhoea, financial difficulties due to disease) as well as scales determining global health status and overall quality of life. The QLQ-C30 form uses a 4-

point response scale to assess every item of functioning and symptom (from not at all to very much). Every scale is converted into a score ranging from 0 to 100. The higher the score on the functional scale, the better the functionality. However, a high score on the symptom scale represents increased severity of disease symptoms [6, 10, 11, 16]. The EORTC QLQ-CX24 module includes functionality scales: sexual functioning, sexual enjoyment and symptom scales: symptom experience, body image, vaginal functioning, lymphedema, peripheral neuropathy, menopausal symptoms and sexual worry. Items referring to symptoms and functioning concerned the last week before completing the questionnaire and the last 4 weeks. If respondents had been sexually active over the last 4 weeks, they were advised to provide further answers regarding their sexuality [6, 8, 17]. The EORTC QLQ-EN24 module includes questions on symptoms such as lymphedema, urological symptoms, gastroenterological symptoms, body image, sexual worry, back and pelvic pain, muscle tingling/numbness, joint pain, hair loss, taste change. This module also includes a functioning scale: sexual interest, sexual activity and sexual enjoyment. Some symptoms and functionalities were related to the last week or last 4 weeks. Similarly to the QLQ-CX24 module, if sexual activity occurred over the last 4 weeks, the survey was supplemented with additional questions about sexuality [10, 11, 18, 19]. Both tools, *i.e.*, EORTC QLQ-CX24 and QLQ-EN24, use a 4-point response scale (1—not at all, 2—a bit, 3—significantly 4—very much). The results are transformed into a scale from 0 to 100, where higher scores indicate greater severity of symptoms, while higher scores in sexual functioning represent a higher level of functioning [6, 10].

4.2 Statistical analysis

The obtained data were subjected to statistical analysis. The Mann-Whitney test, Kruskal-Wallis test and Spearman's rho correlation coefficient were used in the study. The choice of non-parametric methods resulted from the lack of normality of variable distributions, which was checked with the Kolmogorov-Smirnov test. The significance level of $p < 0.05$ was assumed. Calculations were performed with IBM SPSS (Statistical Package for Social Sciences, Statistics 22, San Francisco, CA, USA).

The following designations were adopted: N—number of subjects, SD—standard deviation, *p*—level of statistical significance, Me—median, *R*—Spearman's correlation coefficient value.

If the value of the latter *R* coefficient was greater than 0, it meant better functioning for the functionality scales and greater severity of symptoms on the symptom scales. A value less than 0 meant worse functionality and less severe symptoms.

5. Results

Demographic, social and clinical characteristics are presented in Table 1. Women from our study group who suffered from endometrial cancer were older than women with cervical cancer: 64.35 ± 8.65 *vs.* 57.91 ± 10.89 ($p = 0.0145$). It was found that radiochemotherapy was used statistically significantly more often in women with cervical cancer than in women with endometrial cancer (54.5% *vs.* 2.5%, $p < 0.0001$). There were no statistically significant differences in the remaining parameters (Table 1).

Table 2 presents FIGO staging in two groups of patients with cervical cancer and endometrial cancer. The highest percentages were found in stage 2b in cervical cancer and stage 2 endometrial cancer.

Table 3 compares the quality of life of patients with cervical cancer and endometrial cancer using the EORTC QLQ-C30 questionnaire. Overall quality of life was similar in the two cancers (51.52 ± 27.05 *vs.* 54.17 ± 24.17, $p = 0.8355$). However, a more detailed analysis indicated that women with endometrial cancer rated their emotional functioning better than those with cervical cancer (72.08 ± 20.55 *vs.* 47.35 ± 31.43, $p = 0.0033$) and that in the group of patients treated for cervical cancer, there was a greater severity of side effects (nausea and vomiting) than in the group of endometrial cancer patients (25.76 ± 32.01 *vs.* 11.67 ± 22.07, $p = 0.0194$).

The quality of life of patients in both groups assessed using the EORTC QLQ-CX24 and QLQ-EN24 modules dedicated to these groups is presented in Tables 4 and 5.

These modules are not completely identical and therefore a straight comparison is impossible. However, their four analogous scales regarding body image, lymphoedema, sexual activity and enjoyment can be compared.

Among the functioning scales, patients with cervical cancer rated their sexual activity and enjoyment better than women treated for endometrial cancer: 1.32 ± 0.57 *vs.* 1.05 ± 0.23, 1.91 ± 1.22 *vs.* 1.00 ± 0.60 respectively.

On symptom scales, patients with cervical cancer perceived their body image worse than patients with endometrial cancer (56.06 ± 32.25 *vs.* 29.58 ± 27.34). Lymphedema was greater in patients with endometrial cancer than in women with cervical cancer (16.25 ± 20.50 *vs.* 1.59 ± 0.91).

Looking for the relationship between quality of life and various factors, we examined the correlations between basic data on demographic characteristics and the results of the EORTC QLQ-C30 scales in two groups: cervical cancer N = 22 and endometrial cancer N = 40 (**Supplementary Table 1**).

Older patients with cervical cancer demonstrated better emotional functioning ($R = 0.624$, $p = 0.0019$). However, in patients with endometrial cancer, physical functioning deteriorated with increasing age ($R = -0.323$, $p = 0.0422$).

In patients with cervical cancer, a longer time since diagnosis was associated with reduced financial difficulties ($R = -0.585$, $p = 0.0043$). However, in patients with endometrial cancer, with longer duration of the disease, the performance of social roles deteriorated ($R = -0.414$, $p = 0.0079$) and the frequency of shortness of breath symptoms increased ($R = 0.476$, $p = 0.0019$).

In the group of patients with cervical cancer, higher body weight had a better impact on many functions and symptoms: performing social roles ($R = 0.541$, $p = 0.0094$), emotional functioning ($R = 0.457$, $p = 0.0327$), memory and concentration ($R = 0.573$, $p = 0.0053$), social functioning ($R = 0.610$, $p = 0.0026$), health status and quality of life ($R = 0.519$, $p = 0.0132$). Such patients were less likely to experience symptoms of fatigue ($R = -0.464$, $p = 0.0297$), nausea and vomiting

TABLE 1. Demographic, social and clinical characteristics by the type of cancer: cervical cancer N = 22, endometrial cancer N = 40.

Variable	Type of cancer		*p*
	Cervical cancer N = 22	Endometrial cancer N = 40	
Age	57.91 ± 10.89	64.35 ± 8.65	0.0145*
BMI	28.38 ± 7.42	30.27 ± 7.49	0.2421
Place of residence			
Urban	36.4% (8)	52.5% (21)	0.2231
Rural	63.6% (14)	47.5% (19)	
Marital status			
Single	4.5% (1)	12.5% (5)	0.0824
Widow	18.2% (4)	32.5% (13)	
Married (in relation)	77.3% (17)	55.0% (22)	
Professional activity			
Yes	18.2% (4)	25.0% (10)	0.7665
No	81.8% (18)	75.0% (30)	
Number of previous adjuvant therapy cycles	3.45 ± 2.28	3.68 ± 2.47	0.7427
Time since diagnosis (mon)	14.86 ± 21.34	14.63 ± 20.10	0.7789
FIGO stage			
Stage I	13.6% (3)	30.0% (12)	0.1237
Stage II	36.4% (8)	22.5% (9)	
Stage III	27.3% (6)	40.0% (16)	
Stage IV	22.7% (5)	7.5% (3)	
Chemotherapy			
Yes	68.2% (15)	72.5% (29)	0.7200
No	31.8% (7)	27.5% (11)	
Radiotherapy			
Yes	45.5% (10)	52.5% (21)	0.5955
No	54.5% (12)	47.5% (19)	
Radiochemotherapy			
Yes	54.5% (12)	2.5% (1)	<0.0001*
No	45.5% (10)	97.5% (39)	
Coexisting hipertension			
Yes	31.8% (7)	57.5% (23)	0.0529
No	68.2% (15)	42.5% (17)	
Coexisting diabetes			
Yes	9.1% (2)	27.5% (11)	0.1683
No	90.9% (20)	72.5% (29)	
Coexisting depression			
Yes	13.6% (3)	2.5% (1)	0.2430
No	86.4% (19)	97.5% (39)	
Other comorbidities			
Yes	9.1% (2)	20.0% (8)	0.4493
No	90.9% (20)	80.0% (32)	
No comorbidities			
Yes	54.5% (12)	30.0% (12)	0.0576
No	45.5% (10)	70.0% (28)	

**Statistically significant values. BMI: Body Mass Index; FIGO: International Federation of Gynecology and Obstetrics.*

TABLE 2. FIGO stage by cancer type: cervical cancer N = 22, endometrial cancer N = 40.

FIGO stage	Type of cancer	
	Cervical cancer N = 22	Endometrial cancer N = 40
1	0.0% (0)	2.5% (1)
1a	0.0% (0)	12.5% (5)
1b	4.5% (1)	15.0% (6)
1b2	4.5% (1)	0.0% (0)
1b3	4.5% (1)	0.0% (0)
2	0.0% (0)	22.5% (9)
2b	36.4% (8)	0.0% (0)
3	9.1% (2)	20.0% (8)
3a	4.5% (1)	0.0% (0)
3b	13.6% (3)	0.0% (0)
3c	0.0% (0)	12.5% (5)
3c1	0.0% (0)	2.5% (1)
3c2	0.0% (0)	5.0% (2)
4	4.5% (1)	5.0% (2)
4a	9.1% (2)	0.0% (0)
4b	9.1% (2)	2.5% (1)

FIGO: International Federation of Gynecology and Obstetrics.

TABLE 3. Comparison of the quality of life of patients with cervical cancer and endometrial cancer measured by the core EORTC QLQ-C30 questionnaire (cervical cancer N = 22, endometrial cancer N = 40).

Type of cancer	Cervical cancer N = 22					Endometrial cancer N = 40					*p*
Scales	Mean	Me	SD	Min.	Max.	Mean	Me	SD	Min.	Max.	
Physical functioning	64.55	73.33	28.76	0.00	100.00	73.83	80.00	21.16	20.00	100.00	0.1935
Role functioning	61.36	66.67	32.69	0.00	100.00	72.08	66.67	27.32	0.00	100.00	0.1757
Emotional functioning	47.35	54.17	31.43	0.00	100.00	72.08	75.00	20.55	8.33	100.00	0.0033*
Cognitive functioning	71.21	66.67	24.76	16.67	100.00	80.42	83.33	21.97	16.67	100.00	0.1312
Social functioning	56.06	58.33	37.64	0.00	100.00	63.33	66.67	30.24	0.00	100.00	0.5497
Global health status/QoL	51.52	50.00	27.05	0.00	100.00	54.17	50.00	24.17	0.00	100.00	0.8355
Fatigue	50.51	50.00	33.37	0.00	100.00	34.17	33.33	24.57	0.00	100.00	0.0559
Nausea and vomiting	25.76	16.67	32.01	0.00	100.00	11.67	0.00	22.07	0.00	66.67	0.0194*
Pain	40.15	33.33	33.59	0.00	100.00	25.00	16.67	29.48	0.00	100.00	0.0689
Dyspnoea	27.27	0.00	39.36	0.00	100.00	8.33	0.00	16.45	0.00	66.67	0.0623
Insomnia	50.00	50.00	33.73	0.00	100.00	35.00	33.33	26.09	0.00	100.00	0.0584
Appetite loss	33.33	33.33	35.63	0.00	100.00	20.00	0.00	28.04	0.00	100.00	0.1550
Constipation	37.88	33.33	37.51	0.00	100.00	24.17	33.33	26.14	0.00	100.00	0.1953
Diarrhoea	21.21	0.00	33.41	0.00	100.00	13.33	0.00	25.93	0.00	100.00	0.3843
Financial difficulties	30.30	33.33	33.98	0.00	100.00	31.67	33.33	29.19	0.00	100.00	0.7082

**Statistically significant values. Me: median; SD: standard deviation; QoL: quality of life; Min.: Minimum; Max.: Maximum.*

TABLE 4. Quality of life in patients with cervical cancer measured by the EORTC questionnaire with the QLQ-CX24 module (cervical cancer N = 22).

EORTC QLQ-CX24	Cervical cancer (N = 22)				
Scales	Mean	Me	SD	Min.	Max.
Symptom experience	23.83	18.18	16.18	3.03	48.48
Body image†	56.06	50.00	32.25	0.00	100.00
Sexual/vaginal functioning	15.15	0.00	31.36	0.00	100.00
Lymphoedema†	1.59	1.00	0.91	1.00	4.00
Peripheral neuropathy	1.86	2.00	0.99	1.00	4.00
Menopausal symptoms	2.59	2.50	1.18	1.00	4.00
Sexual worry	2.41	2.50	1.26	1.00	4.00
Sexual activity†	1.32	1.00	0.57	1.00	3.00
Sexual enjoyment†	1.91	1.00	1.22	1.00	4.00

†*Identical scales in EORTC QLQ-CX24 and QLQ-EN24 modules. EORTC: European Organization for Research and Treatment of Cancer; QLQ: quality of life questionnaire; Me: median; SD: standard deviation; Min.: Minimum; Max.: Maximum.*

TABLE 5. Quality of life of patients with endometrial cancer measured by the EORTC questionnaire with the QLQ-EN24 module (endometrial cancer N = 40).

EORTC QLQ-EN24	Endometrial cancer (N = 40)				
Scales	Mean	Me	SD	Min.	Max.
Sexual interest	1.08	1.00	0.27	1.00	2.00
Sexual activity†	1.05	1.00	0.23	1.00	2.00
Sexual enjoyment†	1.00	1.00	0.60	0.00	2.00
Lymphoedema†	16.25	0.00	20.50	0.00	66.67
Urological symptoms	20.63	16.67	20.50	0.00	66.67
Gastrointestinal symptoms	17.17	13.33	17.86	0.00	73.33
Poor body image†	29.58	33.33	27.34	0.00	100.00
Sexual/vaginal problems	7.07	0.00	15.93	0.00	44.44
Pain in back and pelvis	1.78	2.00	0.83	1.00	4.00
Tingling/numbness	1.98	2.00	0.97	1.00	4.00
Muscular pain	2.03	2.00	0.95	1.00	4.00
Hair loss	2.28	2.00	1.30	1.00	4.00
Taste change	1.73	1.50	0.91	1.00	4.00

†*Identical scales in EORTC QLQ-CX24 and QLQ-EN24 modules. EORTC: European Organization for Research and Treatment of Cancer; QLQ: quality of life questionnaire; Me: median; SD: standard deviation; Min.: Minimum; Max.: Maximum.*

($R = -0.549$, $p = 0.0081$), pain ($R = -0.471$, $p = 0.0270$), loss of appetite ($R = -0.454$, $p = 0.0339$) and diarrhoea ($R = -0.515$, $p = 0.0142$). In patients with endometrial cancer, higher BMI was associated with less constipation ($R = -0.406$, $p = 0.0094$).

More previous adjuvant therapy cycles in cervical cancer patients were connected with increased nausea and vomiting ($R = 0.455$, $p = 0.0333$). Meanwhile, in endometrial cancer, the number of previous adjuvant therapy cycles had no effect on these parameters.

In the next stage, we examined correlation between social and clinical data from the interview (professional activity, comorbidities, adjuvant therapy), and data from the EORTC QLQ-C30 questionnaire, taking into account the type of cancer (**Supplementary Tables 2a and 2b**).

Supplementary Tables 2a and 2b include data from the medical history that statistically significantly correlated with functioning and/or symptoms assessed with the EORTC QLQ-C30 questionnaire. These factors differed in the study groups. In the cervical cancer group, these were professional activity, absence of comorbidities and radiochemotherapy. However, in the endometrial cancer group, there are two typical comorbidities, *i.e.*, diabetes and hypertension, as well as the presence of other diseases.

In the cervical cancer group, professional activity was associated with better quality of life (77.08 ± 7.98 *vs.* 45.83 ± 26.55, $p = 0.0194$) and less fatigue (19.44 ± 13.98 *vs.*

57.41 ± 32.62, p = 0.0257). The absence of comorbidities in patients with cervical cancer was associated with worse emotional functioning (62.50 ± 19.74 *vs.* 34.72 ± 34.42, p = 0.0426) and more frequent occurrence of fatigue (34.44 ± 24.26 *vs.* 63.89 ± 34.86, p = 0.0426). Arterial hypertension also worsened the quality of life in this group (63.73 ± 17.16 *vs.* 47.10 ± 26.43, p = 0.0148).

On the other hand, the absence of comorbidities was associated with better quality of life (65.28 ± 17.35 *vs.* 49.40 ± 25.35, p = 0.0421). The occurrence of other diseases in the group of patients with endometrial cancer was associated with worse physical functioning (55.83 ± 30.01 *vs.* 78.33 ± 15.97, p = 0.0465), better memory and concentration (58.33 ± 26, 73 *vs.* 85.94 ± 16.99, p = 0.0061), worse social functioning (37.50 ± 31.81 *vs.* 69.79 ± 26.59, p = 0.0166), more frequent pain (50.00 ± 40.82 *vs.* 18.75 ± 22.70, p = 0.0426) and dyspnoea (25.00 ± 23.57 *vs.* 4.17 ± 11.20, p = 0.0247).

To assess the impact of various factors on the quality of life of women with the two analysed cancers, correlations were made between variables such as age, number of previous adjuvant therapy cycles, time since diagnosis and BMI—Table 6. Table 7 demonstrates correlations with other factors. Both tables include only those factors that statistically significantly correlated with the scales of the EORTC QLQ-CX24 and QLQ-EN24 modules. Tables 8 and 9 present the results of more in depth analysis of results in Table 7.

Younger women with cervical cancer were more likely to worry about the sexual sphere (R = −0.596, p = 0.0034). Frequent hospitalizations in this group were associated with worse body image (R = 0.688, p = 0.0004) and greater sexual worry (R = 0.431, p = 0.0450). A longer time since the diagnosis of the disease in these patients was associated with worse sexual and vaginal functioning (R = 0.745, p = 0.0085) and high BMI resulted in fewer menopausal symptoms (R = −0.484, p = 0.0225). The more often patients with endometrial cancer were hospitalized, the greater the severity of sexual-vaginal problems (R = 0.697, p = 0.0172), tingling and numbness (R = 0.355, p = 0.0246) and hair loss (R = 0.478, p = 0.0018). A longer time from diagnosis correlated with worse urological symptoms (R = 0.369, p = 0.0191), tingling and numbness (R = 0.400, p = 0.0106) and hair loss (R = 0.338, p = 0.0327). Higher BMI was accompanied by greater muscle pain (R = 0.378, p = 0.0162) (Table 6).

An apparent difference between women with cervical cancer and women with endometrial cancer was that the latter did not complete answers to questions about interest, activity, sexual enjoyment and sexual-vaginal problems after radiochemotherapy. Those who had depression did not answer questions about

TABLE 6. Significant statistical correlations between the EORTC QLQ-CX24 (N = 22) and QLQ-EN24 (N = 40) module scales and data from medical history: age, number of previous adjuvant therapy cycles, time since diagnosis and BMI.

Variable	Scale		Age	No. of previous adjuvant therapy cycles	Time since diagnosis (mon)	BMI
EORTC QLQ-CX24						
	Body image	R	−0.327	0.688	0.367	−0.333
		p	0.1374	0.0004*	0.0931	0.1295
	Sexual/vaginal functioning	R	−0.301	0.212	0.745	−0.017
		p	0.3690	0.5324	0.0085*	0.9596
	Menopausal symptoms	R	−0.392	0.215	0.014	−0.484
		p	0.0714	0.3357	0.9502	0.0225*
	Sexual worry	R	−0.596	0.431	0.377	−0.263
		p	0.0034*	0.0450*	0.0837	0.2375
EORTC QLQ-EN24						
	Urological symptoms	R	0.007	0.102	0.369	0.105
		p	0.9653	0.5299	0.0191*	0.5181
	Sexual/vaginal problems	R	−0.299	0.697	0.432	−0.526
		p	0.3711	0.0172*	0.1840	0.0966
	Tingling/numbness	R	0.008	0.355	0.400	0.066
		p	0.9613	0.0246*	0.0106*	0.6837
	Muscular pain	R	0.056	0.157	0.245	0.378
		p	0.7311	0.3333	0.1275	0.0162*
	Hair loss	R	−0.077	0.478	0.338	−0.106
		p	0.6371	0.0018*	0.0327*	0.5155

**Statistically significant values. EORTC: European Organization for Research and Treatment of Cancer; QLQ: quality of life questionnaire; No.: number; BMI: Body Mass Index.*

TABLE 7. Correlations between the results of individual scales of the EORTC modules QLQ-CX24 (N = 22) and QLQ-EN24 (N = 40) and marital status, FIGO stage, chemotherapy, radiochemotherapy and comorbidities.

Variable	Scale	Marital status	FIGO stage	chemoth-erapy	radiochem-otherapy	Coexisting hiperten-sion	Coexisting depres-sion	Without comor-bidities	Other diseases
EORTC QLQ-CX24									
	Body image	0.0246*	0.4779	0.0213*	0.8212	0.0465*	0.2649	0.0249*	0.9524
	Lymphoedema	0.8795	0.0557	0.6298	0.0249*	0.2101	0.7870	0.3463	0.9524
	Sexual worry	0.0477*	0.2426	0.2982	0.1802	0.0911	0.3078	0.0071	0.1385
EORTC QLQ-EN24									
	Sexual interest	0.4918	0.8285	0.6360	-	0.3408	0.9474	0.5048	0.8195
	Sexual activity	0.6506	0.6129	0.7567	-	0.5295	0.9474	0.3904	0.7923
	Sexual enjoyment	1.0000	0.4318	0.3636	-	0.4848	-	0.4318	1.0000
	Lymphoedema	0.9678	0.7888	0.3530	0.5500	0.2315	0.5500	0.1819	0.0247*
	Urological symptoms	0.2188	0.9360	0.9287	0.6000	0.5697	0.8000	0.4223	0.8036
	Gastrointestinal symptoms	0.2399	0.8095	0.5703	0.4000	1.0000	0.7000	0.3731	0.1743
	Poor body image	0.7778	0.2585	0.4019	0.7500	0.2315	0.3500	0.5502	0.0097*
	Sexual/vaginal problems	0.6303	0.3290	0.7273	-	0.4286	-	0.3290	0.7273
	Pain in back and pelvis	0.7984	0.5374	0.9050	0.4500	0.3855	0.4500	0.5699	0.0271*
	Tingling/numbness	0.7778	0.0574	0.0051	0.9000	0.4319	0.4000	0.6729	0.0121*
	Hair loss	0.6768	0.0201*	0.0094*	0.3000	0.1409	0.3000	0.3731	0.8294

**Statistically significant values. FIGO: International Federation of Gynecology and Obstetrics; EORTC: European Organization for Research and Treatment of Cancer; QLQ: quality of life questionnaire.*

TABLE 8. Statistically significant correlations between the results assessing the EORTC QLQ-CX24 module and marital status, treatment, comorbidities (N = 22).

Variable	EORTC QLQ-CX24	Body image	Lymphoedema	Sexual worry
	Cervical cancer			
Marital status				
	Single	28.89 ± 24.34*	1.80 ± 1.30	1.40 ± 0.89*
	Married (in relation)	64.05 ± 30.31*	1.53 ± 0.80	2.71 ± 1.21*
Chemotherapy				
	No	31.75 ± 19.70*	1.57 ± 1.13	2.00 ± 1.00
	Yes	67.41 ± 30.99*	1.60 ± 0.83	2.60 ± 1.35
Radiochemotherapy				
	No	52.22 ± 23.45	2.10 ± 1.10*	2.00 ± 1.15
	Yes	59.26 ± 38.88	1.17 ± 0.39*	2.75 ± 1.29
Coexisting hipertension				
	No	65.93 ± 31.84*	1.53 ± 1.06	2.73 ± 1.28
	Yes	34.92 ± 22.62*	1.71 ± 0.49	1.71 ± 0.95
Without comorbidities				
	No	37.78 ± 21.08*	1.60 ± 0.52	1.60 ± 0.84
	Yes	71.30 ± 32.64*	1.58 ± 1.16	3.08 ± 1.16

**Statistically significant values. EORTC: European Organization for Research and Treatment of Cancer; QLQ: quality of life questionnaire.*

TABLE 9. Statistically significant correlations between the results assessing the EORTC QLQ-EN24 module and FIGO stage, therapy, comorbidities (N = 40).

Variable	EORTC QLQ-EN24 Endometrial cancer	Lymphoedema	Poor body image	Pain in back and pelvis	Tingling/numbness	Hair loss
FIGO stage						
	Stage I–II	13.49 ± 15.47	23.81 ± 22.71	1.67 ± 0.73	1.67 ± 0.80	1.81 ± 1.25*
	Stage III–IV	19.30 ± 25.01	35.96 ± 31.06	1.89 ± 0.94	2.32 ± 1.06	2.79 ± 1.18*
Chemotherapy						
	No	10.61 ± 17.12	22.73 ± 22.70	1.73 ± 0.79	1.27 ± 0.47	1.36 ± 0.92*
	Yes	18.39 ± 21.52	32.18 ± 28.84	1.79 ± 0.86	2.24 ± 0.99	2.62 ± 1.27*
Other comorbidities						
	No	11.98 ± 17.57*	22.92 ± 21.06*	1.59 ± 0.67*	1.75 ± 0.80*	2.25 ± 1.32
	Yes	33.33 ± 23.57*	56.25 ± 34.43*	2.50 ± 1.07*	2.88 ± 1.13*	2.38 ± 1.30

**Statistically significant values. EORTC: European Organization for Research and Treatment of Cancer; QLQ: quality of life questionnaire; FIGO: International Federation of Gynecology and Obstetrics.*

sexual enjoyment and sexual-vaginal problems (Table 7). Lack of interest in sex may be the result not only of mental attitude but also anatomical difficulties and doctors' recommendations.

Among patients treated for cervical cancer, worse body image was found in married women or those remaining in relationship (64.05 ± 30.31 *vs.* 28.89 ± 24.34, $p = 0.0246$), patients treated with chemotherapy (67.41 ± 30.99 *vs.* 31.75 ± 19.70, $p = 0.0213$), treated for hypertension (65.93 ± 31.84 *vs.* 34.92 ± 22.62, $p = 0.0465$) and without comorbidities (71.30 ± 32.64 *vs.* 37.78 ± 21.08, $p = 0.0249$). Married or remaining in relationship women were more likely to worry about the sexual sphere (2.71 ± 1.21 *vs.* 1.40 ± 0.89, $p = 0.0477$). Radiochemotherapy treatment was associated with less lymphedema (1.17 ± 0.39 *vs.* 2.10 ± 1.10, $p = 0.0249$) (Tables 7 and 8).

Among the patients treated for endometrial cancer, more frequent hair loss was reported by those with FIGO stage III and IV (2.79 ± 1.18 *vs.* 1.81 ± 1.25, $p = 0.0201$) and those who were subjected to chemotherapy (2.62 ± 1.27 *vs.* 1.36 ± 0.92, $p = 0.0094$). Patients who had comorbidities other than hypertension, diabetes and depression were more likely to have lymphedema (33.33 ± 23.57 *vs.* 11.98 ± 17.57, $p = 0.0247$) and worse body image (56.25 ± 34.43 *vs.* 22.92 ± 21.06, $p = 0.0097$) and more frequent back and pelvic pain (2.50 ± 1.07 *vs.* 1.59 ± 0.67, $p = 0.0271$) as well as more frequent tingling and numbness (2.88 ± 1.13 *vs.* 1.75 ± 0.80, $p = 0.0121$) (Tables 7 and 9).

6. Discussion

Our cross sectional study comprises of 62 patients treated in 4-month period in a single oncological center. The study group consists of 40 patients with endometrial cancer and 22 patients with cervical cancer. The current study is a pioneering study assessing the quality of life during complex adjuvant treatment of two studied cancers. The only available work assessing the quality of life of patients treated for cervical and endometrial cancer simultaneously is the work of Pisani *et al.* [3]. However, it only analyzes the impact of adjuvant radiotherapy and uses only the core questionnaire EORTC QLQ-C30 and QLQ-CX24 because at the time of their publication, according to the authors of this study QLQ-EN24 module was not available. Therefore, it is not fully possible to compare the results from this study with our work. Pisani's work was conducted in the long-term survival group with a mean follow up of 4.5 years. This group consisted of 124 patients, including 100 with endometrial cancer and 24 with cervical cancer. All patients were treated with external beam radiotherapy (EBRT). 85 of them had vaginal pulsed dose rate brachytherapy (BRT). In our study group radiotherapy was used in 45.5% of patients with cervical cancer and 52.5% of patients with endometrial cancer. Pisani found that the quality of life was very good in most patients. In our study, the overall quality of life was assessed in cervical cancer and endometrial cancer as 51.52 ± 27.05 and 54.17 ± 24.17, respectively. The differences in quality of life between Pisani's work and ours may result due to differences in the frequency of radiotherapy. Another study using the EORTC QLQ-C30 questionnaires, QLQ-CX24 and QLQ-EN24 was published by Jeppesen *et al.* [13]. The authors theoretically conducted this longitudinal study at an average interval of three months. Practically, this time ranged from 85 to 208 days due to postponement of treatment. The study included 44 patients with cervical cancer and 52 patients with endometrial cancer. Before treatment, both groups had worse emotional functioning, which improved after treatment. However, after treatment, greater lymphedema and urogynecological problems were found in patients with cervical cancer. Also greater sexual problems appeared in patients with cervical cancer. The next study assessing the quality of life in patients with cervical cancer and endometrial cancer was the work of Bradley *et al.* [12]. These authors assessed the quality of life using a different questionnaire than in our study, *i.e.*, Short Form Health Survey (SF-36), in the group of long-term survivors suffering from these two cancers. They found better social functioning in endometrial cancer patients but more depression syndromes, anger and confusion

in cervical cancer patients.

Significantly more studies assessed the quality of life in only one of the cancers we analysed, *i.e.*, separately in cervical cancer [4–8] and in endometrial cancer [9–11].

An example of such study is the work of Cianci *et al.* [4]. This author reviewed works on the quality of life of patients with cervical cancer, finding 10 publications from 2009 to 2022, including 5 prospective and 3 retrospective ones. The main conclusion of his review is that sexual dysfunction negatively affects the quality of life. According to Cianci *et al.* [4] tailored therapeutic approach may enable overcoming it. Our study examined similarities and differences in quality of life during adjuvant treatment of two common gynecological cancers. Additionally, the correlation of individual quality of life domains with selected patient characteristics was examined. The apparent difference between cervical cancer and endometrial cancer was that women with endometrial cancer after radiotherapy refused to respond to questions about sexual interest, activity and enjoyment. They also did not answer the question about sexual-vaginal problems. Those who had depression did not answer questions about sexual enjoyment and sexual-vaginal problems. According to the EORTC questionnaire, answers to the above questions were only possible if the patient has been sexually active in the last 4 weeks. It can be assumed that patients with endometrial cancer undergoing radiochemotherapy and with depression were not interested in sex. Among the similarities between the two cancers studied, similar health status and general quality of life were found, which in both cancers amounted to an average of 51.52 ± 27.05 in cervical cancer and 54.17 ± 24.17 in endometrial cancer. Torkzahrani *et al.* [5] examined the quality of life of cervical cancer patients after long-term survival (1–7 years) and found that they suffered from dyspnoea, lack of appetite, nausea and vomiting, sleep disorders, peripheral neuropathy and menopausal symptoms. This author noticed an interesting association between the quality of life and economic conditions, as well as between the quality of life and social functioning [5]. In our study, financial problems resulting from the disease were at a similar level in both groups: cervical cancer 30.30 ± 33.98 and endometrial cancer 31.67 ± 29.19. Similar relationships were found by Torkzahrani *et al.* [5]. According to these authors, financial problems resulting from cervical cancer were at a similar level of 31.33 ± 37.2 [5]. In our study, a longer time after diagnosis reduced financial problems resulting from the disease. This may indicate that women treated for cervical cancer learned to cope financially with the prolonged duration of the disease. Moreover, women who were professionally active had a better quality of life and had less fatigue compared to women who were professionally inactive. Professional inactivity was also associated with more frequent symptoms of fatigue. The time from diagnosis of the disease in our study in both groups was 14.86 ± 21.34 *vs.* 14.63 ± 20.10 months for patients with cervical cancer and endometrial cancer, respectively. The number of previous cycles of adjuvant therapy in patients treated for cervical cancer and endometrial cancer were 3.45 ± 2.28 *vs.* 3.68 ± 2.47, respectively. In our study the increased number of previous cycles of adjuvant therapy in patients treated for cervical cancer was connected with increased nausea and vomiting. Moreover, patients with cervical cancer who underwent radiochemotherapy had worse emotional functioning and had more frequent symptoms of nausea and vomiting compared to women with endometrial cancer. We realize that side effects are not simply connected with kind of treated cancer but with applied therapy.

Similarly, according to the study by Torkzahrani *et al.* [5], who found a negative impact on the quality of life on the nausea and vomiting scale among women with cervical cancer who underwent adjuvant treatment. Gradual improvement in patients with cervical cancer in the follow-up of 0–3–6 months in terms of functionality scales was found by Rahman *et al.* [6] after 6 months after treatment, it was rated the highest and amounted to 12.97 ± 3.54 in terms of physical functioning and 12.50 ± 1.90 in terms of emotional functioning. The original finding of the current study is that the use of radiochemotherapy reduced the incidence of lymphedema. Younger married women who were hospitalized more often were worried about sexuality. Frequent hospitalizations and chemotherapy worsened their body image, and the longer time since the diagnosis of the disease resulted in deterioration of sexual and vaginal functioning. It needs to be stressed that in the study of Rahman *et al.* [6] the authors found like in our report deterioration of vaginal sexual functioning after adjuvant treatment. Our special finding is that patients without comorbidities tend to have a worse body image, while patients with hypertension had a better body image. Additionally, we found that women without comorbidities perceived their bodies worse, and those who had other diseases were more used to it and learned to deal with their bodies positively. A high BMI resulted in them having fewer menopausal symptoms. In a group of 107 patients with cervical cancer, Shylasree *et al.* [7] found a decrease in sexual activity, sexual enjoyment and sexual function in most patients. Additionally, these patients more often experienced symptom of chronic lymphedema and sexual worry [7]. In our group of the patients with cervical cancer, shorter duration of disease translated into higher level of sexual worry especially in younger married women. Frequent hospitalizations were more frequent in this group. In our study, we assessed the quality of life in patients with multimodal adjuvant therapy. Stuopelyte *et al.* [8] reported the quality of life only in cervical cancer survivors treated with radiochemotherapy. The authors of this study found that these patients tend be not sexually active and rarely experience sexual enjoyment. Additionally, radiochemotherapy negatively affects their body image [8]. In our study, radiochemotherapy deteriorated emotional functioning. In Facondo *et al.* [9] study there was different approach to the use of EORTC group modules. It was especially interesting that they used 18 items from the EORTC QLQ-CX24 module intended for patients with cervical cancer in the group of patients with endometrial cancer. The authors of this study explained the use of the cervical cancer module for the analysis of patients with endometrial cancer by the lack of availability of the QLQ-EN24 module in Italy during the time of performing the study [9].

The quality of life of patients with endometrial cancer has been assessed in few contemporary studies [9–11]. The quality of life in endometrial cancer assessed in our cross-sectional study and quoted above amounted to 54.17 ± 24.17. This is in

line with the results of other authors (Kluska *et al.* [10]) who assessed in longitudinal study the quality of life and general health status in endometrial cancer on the EORTC QLQ-C30 scales at the beginning 62.25 ± 13.12 and at the end of adjuvant radiotherapy of 55.85 ± 14.68. The older the women treated for endometrial cancer were, the worse their performance in social roles and dyspnoea symptoms. The women with hypertension, diabetes and comorbidities had a worse overall quality of life. In a multi-stage study of 55 women with endometrial cancer, Facondo *et al.* [9] found a deterioration in the quality of life in terms of physical functioning and role performance only in patients with obesity. Their 5-year follow-up also showed a statistically significant tendency to aggravate the symptoms of fatigue, constipation and diarrhoea [9]. Women with endometrial cancer with a higher BMI in the study by Lajtman *et al.* [11], who were treated and survived, had worse physical, emotional and social functioning compared to patients with normal body weight. In our study, a higher BMI was only associated with less symptoms of constipation. Comorbidities in patients with endometrial cancer resulted in a higher incidence of lymphedema, poor body image, back and pelvic pain, tingling and numbness. A high body mass index caused more muscle pain. The study by Lajtman *et al.* [11] presented the results of women with a higher BMI, which was associated with greater lymphedema, dyspnoea, fatigue and pain. In our study the patients with endometrial cancer FIGO stage III and IV treated with chemotherapy, hospitalized more often and with a longer time since the diagnosis of the disease had a more frequent symptom of hair loss. Length and frequency of treatment were associated with tingling and numbness. Frequent hospitalizations intensified sexual-vaginal symptoms, and a longer duration of the disease worsened urological symptoms. Long-term observation by Facondo *et al.* [9] demonstrated no relationship between the time covered by the study and emotional functioning, social functioning and sexual worry in patients with endometrial cancer. Our study is not a longitudinal study but a cross-sectional study. This type of study was conducted in long-term survivors of cervical cancer by Shylasree *et al.* [7], and in population of gynecological cancers in Sweden [20].

Our study aimed to show differences and similarities in the quality of life in two groups of patients during adjuvant therapy using the EORTC QLQ-C30, QLQ-CX24 and QLQ-EN24 questionnaires. We intended to examine the quality of life in cancer and its correlation with selected variables. One study group included patients with cervical cancer and the other endometrial one. The first group consisted of a smaller group of surveyed women, younger, with a lower body mass index and with fewer comorbidities. For this group of patients, sexuality and body image were more important. The second, larger group of women were those suffering from endometrial cancer at more advanced age, with a higher body mass index and with more comorbidities. Long-term chemotherapy treatment in these women with advanced cancer was associated with hair loss. In older women with multimorbidities affected by negative effects of therapy, efforts should be made to minimize side effects by modifying adjuvant treatment. One of the advantages of this study is the fact that the quality of life in both cancers was assessed at the same time and in the same center during the then recommended adjuvant treatment. Polish recommendations at that time regarding adjuvant therapy, including immunotherapy, in patients with cervical cancer [14], and adjuvant therapy without immunotherapy for endometrial cancer [15], were published in 2017. In endometrial cancer immunotherapy creates the hope of better results of adjuvant therapy [21]. In the worldwide literature, the impact of adjuvant treatment with immunotherapy on oncological outcomes was assessed in patients with cervical cancer [22, 23] and endometrial cancer [21, 24–31]. However, the impact of this type of treatment on the quality of life [32, 33] was the subject of interest of only a few authors. In the current review of immunological treatment in cervical and endometrial cancer [2], the authors tried to select the most effective medication with respect to oncological outcome. It would be advisable also to evaluate these drugs in terms of patients' quality of life. Our study has practical implications for the care over patients with cervical and endometrial cancer during adjuvant therapy. Younger subjects, currently unemployed or with unstable employment form should be subject to special supervision in terms of assessing the quality of life and identifying and/or minimizing the symptoms of fatigue. Early intervention in this group may prevent the worsening of symptoms typical in oncological treatment.

Patients treated for cervical cancer should be provided with special psychological care to improve emotional functioning. Additionally, cervical cancer patients treated with radiochemotherapy should be provided with special care in the field of prevention and treatment against nausea and vomiting. Patients with endometrial cancer should be provided with special oncological rehabilitation. These patients should also be referred to oncological supporting groups that work to improve the quality of life of cancer patients.

7. Conclusions

Overall quality of life was similar in patients with cervical and endometrial cancer during adjuvant treatment. The differences were only in the worse quality of life related to sexual worry in women with cervical cancer. This deterioration increased with the duration of the disease. Cervical cancer patients who were professionally active, young and in a relationship had a better quality of life. Among women with endometrial cancer, older women and those suffering from comorbidities had a worse physical quality of life. The limitations of this study, dealing with differences and similarities of quality of life in patients with two uterus associated tumors is the fact these groups differed for example in age. Another limiting factor was the fact that a new molecular classification in endometrial cancer had recently been introduced but not used in our study.

AVAILABILITY OF DATA AND MATERIALS

The data are contained within this article (and **Supplementary material**).

AUTHOR CONTRIBUTIONS

JT, JESM, EC and BG—designed the research study. JB, AlS and AR—performed the research. SK, AM, MG—analyzed the data. JT, JESM, AnS, EB and BG—wrote the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The consent of the Director of the Registry Office (NP.072.39.2022) and the consent of the Bioethics Committee of Rzeszów Regional Medical Chamber (No. 28/2022/B) were obtained. All patients gave their informed consent to participate in the study.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.ejgo.net/files/article/1879425623704649728/attachment/Supplementary%20material.docx.

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