Quality of life in ovarian cancer patients receiving chemotherapy—preliminary study

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Objective: Evaluate quality of life in ovarian cancer patients. Methods: To collect information, a diagnostic survey was carried out using the standardised survey questionnaires QLQ-C30 (quality of life questionnaire) and QLQ-OV28. The 105 women who were enrolled in the study had been diagnosed at the Diagnostic Imaging Centre and were undergoing treatment at the Chemotherapy Department of the Provincial Polyclinical Hospital in Toruń. Results: The study group consisted of women aged 35–72 years. The average age of the women was 53.2 years. Most women had secondary education—46.7%, the fewest group had vocational education—13.3%. On a scale of 1–7, most of the women rated their health status from the previous week at 4 points—31.4%, at 5 points—27.6%, and at 3 points—22.9%. Similar results were found for quality of life: 4 points—32.4%, 5 points—25.7%, and 3 points—21.9%. The women aged 45 years and younger gave the highest rating to all the sub-scales, apart from hormonal symptoms (80.45 ± 12.96) and body image (61.60 ± 28.63), which received the highest rating from the women aged >62 years. Conclusion: The quality of life in ovarian cancer patients is related to their age, education and marital status. There is a correlation between the quality of life of the respondents and their family history of ovarian and/or breast cancer.

Keywords
Quality of life; Ovarian cancer; Questionnaire QLQ-C30, QLQ-OV28

1. Introduction
Ovarian cancer is one of the most common malignancies in women in Poland, with worldwide about 240,000 new cases and 150,000 deaths every year. Currently, it is the seventh most commonly diagnosed cancer among women in the world, the sixth in Europe, and the fifth in Poland [1]. This high incidence is related to the lack of noticeable symptoms in the early stages of the disease and the lack of relevant methods for screening tests. Most ovarian cancers develop after menopause [2, 3], between 50–70 years of age. The frequency increases with age and reaches a peak in the 75–79 year old age group (incidence of 61.5 per 100,000 women).

The main treatment for ovarian cancer is surgery to confirm the diagnosis and determine the stage of the cancer. Its goal is a complete cyto-reduction or removal of as much tumour as possible in the case of advanced-stage ovarian cancer. The amount of time before a recurrence and overall survival depends on the extent of the tumour mass [4, 5]. A complete cyto-reduction prolongs the average survival time [6, 7] and—by reducing the tumour mass—increases the response to chemotherapy [6]. Ovarian cancer is considered chemosensitive, and over 75% patients respond well to a combination of surgery and systemic therapy.

The majority of patients suffering from ovarian cancer, fallopian tube cancer or peritoneal cancer, require postsurgical complementary chemotherapy, which can be omitted in patients with FIGO (International Federation of Gynecology and Obstetrics, FIGO) stage IA or IB, and G1/G2. The first-line treatment is a combination of platinum (carboplatin or cisplatin) and a taxane. Both platinums combined with taxane show similar efficacy. Better tolerance and comfort of usage (administration of paclitaxel over 24 hours and the necessity of hydration for cisplatin administration) speak for carboplatin. Since 2004, the intravenous administration of 175 mg/m² paclitaxel over 3 hours and carboplatin (AUC 5–6 acc. to Calvert) over 1 hour in 6 cycles repeated every 3 weeks is “a gold standard” in ovarian cancer treatment [8]. The objective of this study was to evaluate the influence of selected socio-demographic and medical factors on the quality of life in ovarian cancer patients receiving chemotherapy.
2. Materials and methods

105 women who had been diagnosed at the Diagnostic Imaging Centre and were undergoing treatment at the Chemotherapy Department of the Provincial Polyclinical Hospital in Toruń between August 2019 and February 2020 were enrolled in the study.

To collect information, a diagnostic survey was carried out using the standardised survey questionnaires QLQ-C30 and QLQ-OV28, collected via email through the website of the European Organization for Research and Treatment. The first questionnaire serves to evaluate quality of life. It consists of 30 questions, of which 28 have answers that range from 1 to 4 and relate to symptoms and functioning, and the other 2 questions have answers that range from 1 to 7 and relate strictly to quality of life. The other questionnaire, QLQ-OV28, contains 28 questions with a 4-point scale: 19 questions concern somatic symptoms, 5 are connected with emotional state, and 4 relate to sexual activity.

Most of the questions in QLQ-C30 and QLQ-OV28 are closed-ended, but did include personal data regarding age, education, marital status, place of residence, occupational and family status, ovarian surgical procedure, and any family history of ovarian cancer of the respondents. There were two open-ended questions related to the family situation and oncological burden of the patients.

The qualification criterion were women with ovarian cancer. All the patients were given taxanes (i.e., paclitaxel) and platinum derivatives (cisplatin or carboplatin). Paclitaxel was administered at a dose of 135 mg/m² body surface area, cisplatin at 75 mg/m² body surface area, and carboplatin at a dose calculated on the basis of the Calvert’s formula—the area under a curve (AUC), covering age, body mass, the level of creatinine, among others. Paclitaxel was then given at a higher dose—175 mg/m². According to the general rules of qualification for chemotherapy using taxanes and platinum derivatives, women with stage I ovarian cancer (according to FIGO) were enrolled in the programme.

The respondents were informed on the objective of the studies and asked to fill out the questionnaires correctly. The participants of the study were assured that the survey was anonymous. The majority of respondents filled out the questionnaire by themselves. There were only a few cases (a lack of glasses) when some help from the medical staff was necessary.

Analysis was performed by means of Statistica 10.0 using Mann–Whitney and Kruskal–Wallis tests. The level of statistical significance was taken at \( p < 0.05 \).

3. Results

The study group consisted of 105 women aged 35–72 years. The average age of the patients was 53.2 years. Most women had secondary education—46.7%, the fewest group had vocational education—13.3%. 64.8% of the women had undergone a surgical removal of the ovaries less than 6 months before (Table 1).

On a scale of 1–7 (1—poor health, and 7—very good), most women rated their health status from the last week before planned chemotherapy treatment at 4 points—31.4%, at 5 points—27.6%, and at 3 points—22.9%. Similar results were found for quality of life (where 1—poor quality of life, and 7—very good quality of life): 4 points—32.4%, 5 points—25.7%, and 3 points—21.9% (Fig. 1).

For physical functioning, the average was 77.98 points. Help with eating, getting dressed and washing as well as difficulties during short walks received the highest status—an average of 95.56 and 57.79 points, respectively (Table 1).

For chemotherapy side effects, the average was 75.09 points. The women gave the highest status to hearing loss (97.46 points), skin problems (90.17 points) and frequent urination (45.07 points) (Table 2).

The average age of the respondents was statistically significantly correlated with both physical functioning and functioning in social roles \( (p < 0.05) \). The highest quality of life was reported by the women with higher education \( (55.30 \pm 15.35) \). The lowest quality of life was reported by the women with primary education \( (37.09 \pm 19.58) \). The women aged 45 years and younger gave the highest rating to all the subscales, apart from hormonal symptoms (80.45 ± 12.96) and body image (61.60 ± 28.63), which received the highest rating from the women aged >62 years (Table 3).

The respondents with higher and secondary education experienced more fatigue compared to the women with vocational and primary education. These differences were statistically significant \( (p = 0.000) \). Pain is one of the most significant determinants of quality of life. Significant differences in pain intensity were observed in the patients with primary and vocational education, who declared a considerably better quality of life than the patients with higher and secondary education (Table 4). These differences were statistically significant \( (p = 0.000) \).

The lowest percentage of chemotherapy side effects was noted in the professionally active women, while the lowest quality of life in this area was observed in the pensioners. These differences were statistically significant \( (p < 0.05) \). Most cases of peripheral neuropathy were recorded in the group of pensioners. These differences were statistically significant \( (p < 0.05) \) (Table 5).

4. Discussion

In recent years, a growing interest in quality of life in medicine, particularly in oncology, has been observed, which speaks for a holistic attitude towards patients and their biopsychosocial problems \[9\]. Cancers occupy a high position on the list of civilisation diseases and causes of deaths, though to a varying extent they deteriorate the quality of life of patients. Cancers, particularly in their advanced stage, are often associated with both physical and mental pain, which has a negative impact on quality of life and lowers self-esteem—from body mutilation or deformity, through removal of a specific organ, lower physical attractiveness, to a
loss of female attributes (e.g., after mastectomy, limb amputation, exposed colostomy, hair loss).

For the purposes of this study, the following standardised survey questionnaires were used: QLQ-C30 to evaluate general quality of life, and QLQ-OV28 to evaluate the quality of life in ovarian cancer patients. The study group consisted of 105 women aged 35–72 years. Most women were aged 50–59 years (42.5%). Women aged above 60 years constituted 30%. Women aged 40–49 years constituted 20%. Women aged 30–39 years constituted 7.5%. The biggest number of women had secondary education—46.7%, the smallest number had vocational education—13.3%. Similar results were obtained by Połocka-Molińska et al. Our own studies showed that the biggest group constituted married women—37.1%. Divorced women constituted 24.8% and 18% of the women had never married. In the study group the majority of patients (69.5%) came from cities, and 30.5% of the respondents came from rural areas.

In studies carried out by de Walden-Galuszko, the respondents with primary and vocational education more frequently experienced a reduced ability to work or perform daily activities, which probably resulted from the fact that physical fitness associated with taking up a job had a more significant influence on the evaluation of quality of life than in the group of better educated women whose priorities seemed to be different. The women with higher education gave a lower rating to their social functioning. The discussion undertaken for the purposes of this study showed that education was in a statistically significant average correlation with the results related to physical and social functioning, functioning in social roles, and overall quality of life, and in a low correlation with the outcomes related to cognitive functioning ($p < 0.05$). The respondents with higher education gave the highest rating to quality of life and all the scales of functioning, apart from physical functioning (with secondary education). The respondents with primary education gave the lowest rating to the quality of life and all the scales of functioning, apart from cognitive functioning and functioning in social roles (with vocational education).

In the patients older than 50 years, deterioration in the quality of life was related to physical symptoms, while the younger women experienced intensification of fear, with this group requiring more special psychological and emotional support. When it comes to biological problems, most care problems were caused by dyspnea, a lack of appetite, nausea and vomiting, constipation and diarrhoea. As far as the psychological and social sphere is concerned, the main problem were the effects of chemotherapy. Studies by Majdak et al. [11] show that the younger are the ovarian cancer women receiving chemotherapy, the lower quality of life associated with this kind of treatment is observed. For this reason, caring about women’s quality of life, psychological help and recommendations of methods to cope with cancer as a traumatic stressor are necessary. The studies proved that the women suffering from breast and reproductive cancer showing the fighting spirit gave a higher rating to their quality of life, more seldom manifested helplessness, and reported fewer complaints than the women with a passive approach [12].

In a study carried out among 95 women receiving radiotherapy due to female genital cancer, Vaz et al. [13] showed that the quality of life improved with the treatment duration.
Table 1. Mean evaluation of the scales of functioning within QLQ-30.

| Position | N   | Mean  | SD   | Confidence -95.0% | Confidence +95.0% | Min.  | Max.  | Q25  | Median | Q75  |
|----------|-----|-------|------|-------------------|-------------------|-------|-------|------|--------|------|
| PF       | 105 | 57.79 | 20.82| 53.76             | 61.82             | 0.0   | 100.0 | 33.3 | 66.7   | 66.7  |
|          |     |       |      |                   |                   |       |       |      |        |      |
|          |     | 66.36 | 29.05| 60.73             | 71.98             | 0.0   | 100.0 | 66.7 | 66.7   | 66.7  |
|          |     | 88.90 | 19.96| 85.03             | 92.76             | 0.0   | 100.0 | 66.7 | 66.7   | 66.7  |
|          |     | 81.28 | 24.42| 76.55             | 86.01             | 0.0   | 100.0 | 66.7 | 66.7   | 66.7  |
|          |     | 95.56 | 13.12| 93.02             | 98.10             | 33.3  | 100.0 | 100.0| 100.0  | 100.0 |
| Total    | 105 | 77.98 | 18.93| 74.31             | 81.64             | 6.7   | 100.0 | 66.7 | 86.7   | 93.3  |
| RF       | 105 | 68.27 | 23.74| 63.67             | 72.86             | 0.0   | 100.0 | 66.7 | 66.7   | 66.7  |
|          |     | 70.17 | 24.86| 65.36             | 74.98             | 0.0   | 100.0 | 66.7 | 66.7   | 66.7  |
| Total    | 105 | 69.22 | 23.21| 64.73             | 73.71             | 0.0   | 100.0 | 66.7 | 66.7   | 83.4  |
| CF       | 105 | 93.97 | 14.45| 91.18             | 96.77             | 33.3  | 100.0 | 100.0| 100.0  | 100.0 |
|          |     | 89.85 | 17.97| 86.37             | 93.33             | 33.3  | 100.0 | 66.7 | 100.0  | 100.0 |
| Total    | 105 | 91.91 | 14.44| 89.11             | 94.71             | 50.0  | 100.0 | 83.4 | 100.0  | 100.0 |
| EF       | 105 | 80.96 | 22.00| 76.69             | 85.24             | 33.3  | 100.0 | 66.7 | 100.0  | 100.0 |
|          |     | 36.19 | 27.79| 30.81             | 41.56             | 0.0   | 100.0 | 0.0  | 33.3   | 66.7  |
|          |     | 75.56 | 25.01| 70.72             | 80.40             | 0.0   | 100.0 | 66.7 | 66.7   | 66.7  |
|          |     | 55.56 | 26.43| 50.45             | 60.68             | 0.0   | 100.0 | 33.3 | 66.7   | 66.7  |
| Total    | 105 | 62.07 | 19.99| 58.20             | 65.94             | 8.3   | 100.0 | 66.7 | 75.0   | 100.0 |
| SF       | 105 | 70.81 | 24.77| 66.01             | 75.60             | 0.0   | 100.0 | 66.7 | 66.7   | 100.0 |
|          |     | 64.14 | 23.89| 59.52             | 68.76             | 0.0   | 100.0 | 66.7 | 66.7   | 66.7  |
| Total    | 105 | 67.47 | 23.04| 63.01             | 71.93             | 0.0   | 100.0 | 66.7 | 83.4   | 83.4  |
| FA       | 105 | 69.86 | 26.77| 64.68             | 75.04             | 66.7  | 0.0   | 100.0| 66.7   | 100.0 |
|          |     | 67.63 | 27.53| 62.30             | 72.96             | 66.7  | 0.0   | 100.0| 66.7   | 100.0 |
|          |     | 64.14 | 23.44| 59.61             | 68.68             | 0.0   | 100.0| 66.7 | 66.7   | 66.7  |
| Total    | 105 | 67.21 | 24.44| 62.48             | 71.94             | 66.7  | 0.0   | 100.0| 66.7   | 88.9  |
| NV       | 105 | 70.49 | 21.34| 66.36             | 74.62             | 0.0   | 100.0| 66.7 | 66.7   | 100.0 |
|          |     | 84.45 | 21.21| 80.35             | 88.56             | 0.0   | 100.0| 66.7 | 100.0  | 100.0 |
| Total    | 105 | 77.47 | 18.77| 73.84             | 81.11             | 16.7  | 100.0| 66.7 | 83.4   | 83.4  |
| PA       | 105 | 78.74 | 22.22| 74.44             | 83.04             | 0.0   | 100.0| 66.7 | 66.7   | 100.0 |
|          |     | 78.74 | 25.37| 73.83             | 83.65             | 0.0   | 100.0| 66.7 | 100.0  | 100.0 |
| Total    | 105 | 78.74 | 22.93| 74.30             | 83.18             | 0.0   | 100.0| 66.7 | 83.4   | 100.0 |
| DY       | 105 | 93.02 | 15.11| 90.10             | 95.95             | 33.3  | 100.0| 100.0| 100.0  | 100.0 |
| SL       | 105 | 53.03 | 26.44| 47.91             | 58.14             | 0.0   | 100.0| 33.3 | 66.7   | 66.7  |
| AP       | 105 | 74.30 | 26.25| 69.22             | 79.38             | 0.0   | 100.0| 66.7 | 66.7   | 100.0 |
| CO       | 105 | 68.58 | 22.57| 64.22             | 72.95             | 0.0   | 100.0| 66.7 | 66.7   | 66.7  |
| DI       | 105 | 96.51 | 10.24| 94.53             | 98.49             | 66.7  | 0.0   | 100.0| 100.0  | 100.0 |
| FI       | 105 | 64.14 | 28.01| 58.72             | 69.56             | 0.0   | 100.0| 33.3 | 66.7   | 66.7  |

PF, physical functioning; RF, role functioning; CF, cognitive functioning; EF, emotional functioning; SF, social functioning; FA, fatigue; NV, nausea and vomiting; PA, pain; DY, dyspnea; SL, sleep problems; AP, lack of appetite; CO, constipation; DI, diarrhoea; FI, financial situation.
Table 2. Mean evaluation of the scales of functioning within QLQ-OV28.

| Position | Mean | SD  | Confidence +95.0% | Confidence +95.0% | Min. | Max. | Q25 | Median | Q75 |
|----------|------|-----|------------------|------------------|------|------|-----|--------|-----|
| GI       |      |     |                  |                  |      |      |     |        |     |
| Have you had abdominal pain? (31) | 78.11 | 73.48 | 82.74 | 0.0 | 100.0 | 66.7 | 66.7 | 100.0 |
| Have you felt bloated? (32) | 81.92 | 77.62 | 86.21 | 0.0 | 100.0 | 66.7 | 100.0 |
| Have you had an impression that your clothes are too tight? (33) | 94.90 | 73.48 | 94.90 | 0.0 | 100.0 | 66.7 | 100.0 |
| Have you noticed any change in your stool as a result of your disease or treatment? (34) | 83.97 | 74.13 | 83.97 | 0.0 | 100.0 | 66.7 | 100.0 |
| Have you had any problems with passing wind? (35) | 89.71 | 81.74 | 89.71 | 0.0 | 100.0 | 66.7 | 100.0 |
| Have you felt full? (36) | 94.12 | 88.12 | 94.12 | 0.0 | 100.0 | 66.7 | 100.0 |
| Have you had indigestion or heartburn? (37) | 88.99 | 82.37 | 88.99 | 0.0 | 100.0 | 81.0 | 90.5 |
| Have you had tingling in your arms or legs? (41) | 89.53 | 85.92 | 93.14 | 0.0 | 100.0 | 66.7 | 100.0 |
| Have you had loss of sensation in your arms or legs? (42) | 89.53 | 86.03 | 93.03 | 0.0 | 100.0 | 66.7 | 100.0 |
| Have you felt weakness in your arms or legs? (43) | 86.55 | 80.24 | 86.55 | 0.0 | 100.0 | 77.8 | 88.9 |
| CH Hair loss (38) | 45.07 | 37.48 | 52.66 | 0.0 | 100.0 | 33.3 | 66.7 |
| Worrying about hair loss (39) | 45.27 | 37.69 | 52.85 | 0.0 | 100.0 | 33.3 | 66.7 |
| Taste change (40) | 79.38 | 75.55 | 83.21 | 0.0 | 100.0 | 66.7 | 66.7 |
| Pain in muscles and joints (44) | 74.72 | 67.54 | 74.72 | 0.0 | 100.0 | 66.7 | 66.7 |
| Hearing problems (45) | 99.18 | 95.74 | 99.18 | 0.0 | 100.0 | 66.7 | 100.0 |
| Frequent urination (46) | 90.40 | 83.59 | 90.40 | 0.0 | 100.0 | 66.7 | 100.0 |
| Skin problems (47) | 93.38 | 86.95 | 93.38 | 0.0 | 100.0 | 66.7 | 100.0 |
| HM Hot flushes (48) | 86.78 | 79.60 | 86.78 | 0.0 | 100.0 | 66.7 | 100.0 |
| Night sweats (49) | 82.22 | 74.64 | 82.22 | 0.0 | 100.0 | 66.7 | 100.0 |
| BI Feeling less attractive due to disease or treatment (50) | 83.45 | 78.17 | 83.45 | 0.0 | 100.0 | 66.7 | 83.4 |
| Dissatisfaction with your body (51) | 68.40 | 57.32 | 68.40 | 0.0 | 100.0 | 33.3 | 66.7 |
| Total | 80.81 | 79.60 | 80.81 | 0.0 | 100.0 | 66.7 | 83.4 |
| AT Extent of disease burden (52) | 50.96 | 27.02 | 50.96 | 0.0 | 100.0 | 33.3 | 66.7 |
| Extent of treatment burden (53) | 57.44 | 26.107 | 57.44 | 0.0 | 100.0 | 33.3 | 66.7 |
| Worrying about your future health (54) | 28.10 | 17.61 | 28.10 | 0.0 | 100.0 | 0.0 | 33.3 |
| Total | 65.40 | 60.41 | 65.40 | 0.0 | 100.0 | 66.7 | 83.4 |
| SE Interest in sex (55) | 48.29 | 48.29 | 48.29 | 0.0 | 100.0 | 88.9 | 55.6 |
| Sexual activity (56) | 11.22 | 4.01 | 11.22 | 0.0 | 100.0 | 0.0 | 0.0 |
| Sexual satisfaction (57) | 61.50 | 27.38 | 61.50 | 0.0 | 100.0 | 33.3 | 33.3 |
| Total | 6.65 | 4.87 | 6.65 | 0.0 | 100.0 | 0.0 | 0.0 |

GI, gastrointestinal symptoms; PN, peripheral neuropathy; CH, chemotherapy side effects; HM, hormonal symptoms; BI, body image; AT, attitude to disease/treatment; SE, sexuality.
Table 3. QLQ-30, socio-demographic and medical data of the patients.

| Parameters                      | Physical functioning | Functioning in social roles | Cognitive functioning | Emotional functioning | Social functioning | Overall quality of life |
|---------------------------------|----------------------|-----------------------------|-----------------------|-----------------------|-------------------|------------------------|
|                                 | Mean ± SD            | Mean ± SD                   | Mean ± SD             | Mean ± SD             | Mean ± SD         | Mean ± SD              |
| Age                             |                      |                             |                       |                       |                   |                        |
| Up to 45 years (n = 20)         | 85.52 ± 15.39        | 78.27 ± 19.74              | 96.38 ± 8.63          | 71.74 ± 20.38         | 73.93 ± 21.22     | 49.64 ± 18.89          |
| 46–50 years (n = 14)            | 85.25 ± 7.33         | 75.02 ± 14.69              | 94.05 ± 12.18         | 59.53 ± 16.00         | 70.26 ± 17.19     | 52.68 ± 13.64          |
| 51–62 years (n = 49)            | 83.82 ± 13.14        | 73.82 ± 21.00              | 94.65 ± 12.04         | 67.27 ± 16.81         | 72.04 ± 20.32     | 54.18 ± 18.63          |
| >62 years (n = 22)              | 57.18 ± 20.93        | 50.01 ± 25.84              | 82.70 ± 19.13         | 50.64 ± 21.34         | 53.85 ± 28.03     | 32.37 ± 21.64          |
| p                               | 0.000                | 0.000                       | 0.004                 | 0.006                 | 0.005             |                        |
| Education                       |                      |                             |                       |                       |                   |                        |
| Primary (n = 20)                | 67.34 ± 18.72        | 56.67 ± 24.44              | 88.34 ± 17.17         | 55.84 ± 19.52         | 55.85 ± 20.45     | 37.09 ± 19.58          |
| Vocational (n = 14)             | 63.34 ± 23.94        | 58.34 ± 25.96              | 84.53 ± 19.01         | 56.55 ± 22.69         | 61.91 ± 28.07     | 38.09 ± 23.28          |
| Secondary (n = 49)              | 83.95 ± 15.87        | 73.82 ± 22.57              | 93.20 ± 13.57         | 64.46 ± 20.19         | 70.08 ± 21.52     | 50.68 ± 19.09          |
| Higher (n = 22)                 | 83.64 ± 12.64        | 77.30 ± 14.11              | 96.97 ± 6.57          | 65.92 ± 17.24         | 75.77 ± 21.66     | 55.30 ± 15.35          |
| p                               | 0.000                | 0.001                       | 0.032                 | 0.073                 | 0.002             | 0.001                  |
| Marital status                  |                      |                             |                       |                       |                   |                        |
| Married (n = 39)                | 79.15 ± 21.59        | 72.23 ± 26.86              | 91.46 ± 14.23         | 66.25 ± 20.68         | 68.39 ± 24.13     | 49.36 ± 20.36          |
| Single (n = 19)                 | 70.18 ± 21.25        | 62.29 ± 27.14              | 87.72 ± 19.12         | 50.88 ± 19.83         | 57.03 ± 27.41     | 40.79 ± 23.06          |
| Divorced (n = 26)               | 85.14 ± 10.55        | 76.95 ± 13.38              | 96.80 ± 6.69          | 65.71 ± 15.70         | 75.02 ± 17.15     | 52.57 ± 14.51          |
| Widowed (n = 21)                | 73.98 ± 16.99        | 60.33 ± 17.88              | 90.48 ± 16.30         | 59.93 ± 20.69         | 65.89 ± 20.74     | 43.26 ± 21.67          |
| p                               | 0.014                | 0.021                       | 0.412                 | 0.057                 | 0.123             | 0.234                  |
| Time since surgery              |                      |                             |                       |                       |                   |                        |
| Up to 6 months (n = 68)         | 86.28 ± 11.28        | 78.45 ± 17.04              | 95.35 ± 10.71         | 67.78 ± 17.98         | 73.30 ± 19.77     | 54.66 ± 15.94          |
| More than 6 months (n = 37)     | 62.71 ± 20.70        | 52.26 ± 23.64              | 85.59 ± 18.06         | 51.58 ± 19.43         | 56.76 ± 25.00     | 34.01 ± 20.26          |
| p                               | 0.000                | 0.000                       | 0.014                 | 0.000                 | 0.002             | 0.000                  |
| Family history of ovarian and/or breast cancer | | | | | | |
| Yes (n = 22)                    | 84.55 ± 21.31        | 78.80 ± 21.32              | 92.43 ± 14.29         | 68.95 ± 17.85         | 75.01 ± 21.05     | 57.20 ± 17.32          |
| No (n = 83)                     | 76.23 ± 19.68        | 66.68 ± 23.14              | 91.77 ± 14.57         | 60.25 ± 20.22         | 65.45 ± 23.26     | 44.78 ± 20.07          |
| p                               | 0.042                | 0.887                       | 0.048                 | 0.100                 | 0.194             | 0.016                  |

Mean, arithmetic mean; SD, standard deviation; p, statistical significance.
| Parameters                              | Fatigue     | Nausea and vomiting | Pain         | Dyspnea      | Sleep disorders | Lack of appetite | Constipation | Diarrhoea | Financial situation |
|----------------------------------------|-------------|---------------------|--------------|--------------|----------------|-----------------|--------------|------------|---------------------|
| Age                                    |             |                     |              |              |                |                 |              |            |                     |
| Up to 45 years                         | 77.79 ± 22.22 | 81.90 ± 15.82       | 86.96 ± 18.77 | 98.55 ± 6.94 | 65.24 ± 21.27  | 82.62 ± 19.76  | 79.73 ± 19.43 | 97.10 ± 9.59 | 75.38 ± 20.64 |
| 46–50 years                            | 73.83 ± 13.59 | 78.59 ± 13.49       | 83.94 ± 16.01 | 97.62 ± 8.73 | 58.35 ± 14.73  | 82.16 ± 19.20  | 75.03 ± 14.68 | 97.62 ± 8.73 | 58.35 ± 32.24 |
| 51–62 years                            | 73.82 ± 21.00 | 82.75 ± 16.65       | 84.53 ± 20.25 | 96.43 ± 10.49| 61.91 ± 25.21  | 77.39 ± 24.10  | 69.06 ± 22.10 | 97.62 ± 8.73 | 71.44 ± 28.28 |
| >62 years                              | 43.59 ± 24.35 | 66.68 ± 24.05       | 59.63 ± 25.47 | 79.50 ± 21.24| 26.92 ± 31.20  | 55.14 ± 23.56  | 51.28 ± 13.38 | 93.60 ± 8.73 | 52.57 ± 23.45 |
| *p*                                    | 0.000       | 0.080               | 0.000        | 0.000        | 0.000          | 0.000          | 0.000        | 0.238      | 0.018               |
| Education                              |             |                     |              |              |                |                 |              |            |                     |
| Primary                                | 51.68 ± 23.18 | 64.18 ± 15.57       | 65.01 ± 20.18 | 85.01 ± 20.15| 40.00 ± 27.80  | 61.68 ± 27.10  | 61.68 ± 22.38 | 96.67 ± 10.25 | 40.01 ± 27.80 |
| Vocational                             | 50.80 ± 24.56 | 75.01 ± 25.95       | 69.06 ± 26.04 | 88.11 ± 16.56| 38.10 ± 28.83  | 69.06 ± 27.63  | 57.14 ± 24.23 | 92.86 ± 14.18 | 50.01 ± 21.71 |
| Secondary                              | 73.49 ± 23.22 | 79.27 ± 16.85       | 84.36 ± 22.15 | 95.24 ± 13.60| 57.84 ± 24.33  | 78.92 ± 26.08  | 72.81 ± 21.16 | 97.28 ± 9.21  | 66.00 ± 20.97 |
| Higher                                 | 77.80 ± 15.70 | 87.13 ± 13.54       | 84.86 ± 18.47 | 98.49 ± 7.10 | 63.65 ± 20.35  | 78.80 ± 21.93  | 72.74 ± 22.15 | 96.97 ± 9.80  | 90.91 ± 21.04 |
| *p*                                    | 0.000       | 0.000               | 0.000        | 0.000        | 0.018          | 0.019          | 0.546        | 0.000      |                     |
| Marital status                         |             |                     |              |              |                |                 |              |            |                     |
| Married                                | 70.95 ± 26.57 | 76.51 ± 20.85       | 81.21 ± 23.31 | 92.31 ± 16.15| 55.57 ± 27.94  | 76.93 ± 27.73  | 73.52 ± 21.87 | 95.73 ± 11.28 | 70.95 ± 23.18 |
| Single                                 | 56.15 ± 26.59 | 72.82 ± 23.05       | 65.80 ± 25.14 | 91.23 ± 18.73| 47.38 ± 30.07  | 66.68 ± 29.40  | 61.42 ± 25.50 | 94.74 ± 12.48 | 43.86 ± 38.58 |
| Divorced                               | 76.52 ± 15.17 | 81.43 ± 14.39       | 87.19 ± 17.82 | 98.72 ± 6.53 | 61.55 ± 18.14  | 80.78 ± 23.43  | 73.09 ± 21.12 | 100.00 ± 0.00 | 76.94 ± 20.59 |
| Widowed                                | 58.74 ± 22.56 | 78.59 ± 15.03       | 75.41 ± 22.13 | 88.90 ± 16.09| 42.85 ± 26.14  | 68.27 ± 22.31  | 60.33 ± 20.07 | 95.24 ± 11.94 | 53.98 ± 19.68 |
| *p*                                    | 0.011       | 0.690               | 0.014        | 0.089        | 0.058          | 0.128          | 0.061        | 0.248      | 0.001               |
| Time since surgery                     |             |                     |              |              |                |                 |              |            |                     |
| Up to 6 months                         | 77.96 ± 17.43 | 82.12 ± 14.76       | 87.26 ± 17.06 | 99.02 ± 5.67 | 65.22 ± 18.61  | 84.82 ± 18.59  | 76.98 ± 17.51 | 98.04 ± 7.89  | 70.60 ± 28.52 |
| More than 6 months                     | 47.45 ± 23.25 | 68.93 ± 22.29       | 63.07 ± 24.27 | 81.99 ± 20.17| 30.62 ± 24.07  | 54.96 ± 27.48  | 53.15 ± 22.87 | 93.70 ± 13.22 | 52.26 ± 22.98 |
| *p*                                    | 0.000       | 0.000               | 0.000        | 0.000        | 0.000          | 0.000          | 0.000        | 0.273      | 0.001               |
| Family history of ovarian and/or breast cancer |             |                     |              |              |                |                 |              |            |                     |
| No                                     | 64.67 ± 25.10 | 75.11 ± 19.89       | 76.12 ± 23.74 | 92.37 ± 15.89| 51.01 ± 26.73  | 70.29 ± 27.06  | 66.68 ± 22.70 | 96.79 ± 9.89  | 60.25 ± 28.27 |
| Yes                                    | 76.78 ± 19.37 | 86.38 ± 9.80        | 88.65 ± 16.57 | 95.46 ± 11.70| 60.62 ± 24.44  | 89.40 ± 15.88  | 75.77 ± 21.03 | 95.46 ± 11.70 | 78.80 ± 21.93 |
| *p*                                    | 0.029       | 0.021               | 0.033        | 0.608        | 0.194          | 0.003          | 0.139        | 0.775      | 0.009               |

Mean, arithmetic mean; SD, standard deviation; *p*, statistical significance.
Table 5. QLQ-OV-28, socio-demographic and medical data of the patients.

| Parameters | Abdominal symptoms | Peripheral neuropathy | Effects of chemotherapy | Hormonal symptoms | Body image | Attitude to disease and treatment | Sexuality |
|------------|--------------------|-----------------------|-------------------------|-------------------|------------|----------------------------------|-----------|
|            | Mean ± SD          | Mean ± SD             | Mean ± SD               | Mean ± SD         | Mean ± SD  | Mean ± SD                        | Mean ± SD |
| Age        |                    |                       |                         |                   |            |                                  |           |
| Up to 45 years | 92.76 ± 12.99     | 90.83 ± 9.26          | 77.95 ± 13.92           | 80.45 ± 12.96     | 61.60 ± 28.63 | 58.47 ± 19.31                     | 28.26 ± 29.06 |
| 46-50 years   | 91.33 ± 9.07       | 89.29 ± 13.00         | 76.11 ± 11.65           | 75.02 ± 10.64     | 67.27 ± 29.92 | 40.08 ± 18.74                     | 7.14 ± 16.62  |
| 51-62 years   | 89.81 ± 11.92      | 86.12 ± 12.69         | 73.19 ± 10.17           | 80.97 ± 16.80     | 64.29 ± 21.15 | 46.43 ± 22.85                     | 2.08 ± 7.73  |
| >62 years     | 68.87 ± 20.75      | 67.53 ± 17.76         | 73.51 ± 12.35           | 87.19 ± 10.86     | 67.96 ± 24.01 | 32.05 ± 24.22                     | 0.00 ± 0.00  |
| p            | 0.000              | 0.000                 | 0.356                   | 0.016             | 0.656      | 0.001                            | 0.000      |
| Education    |                    |                       |                         |                   |            |                                  |           |
| Primary      | 76.44 ± 17.10      | 77.24 ± 17.47         | 77.95 ± 10.24           | 80.85 ± 13.54     | 75.84 ± 21.95 | 37.78 ± 19.89                     | 2.08 ± 3.70  |
| Vocational   | 77.22 ± 19.34      | 74.61 ± 21.10         | 76.88 ± 14.00           | 85.73 ± 11.04     | 79.77 ± 24.62 | 35.72 ± 23.15                     | 0.59 ± 2.22  |
| Secondary    | 89.90 ± 15.27      | 87.99 ± 13.76         | 72.65 ± 9.86            | 77.23 ± 13.48     | 56.13 ± 25.40 | 44.00 ± 23.79                     | 12.58 ± 22.06 |
| Higher       | 90.05 ± 15.12      | 84.36 ± 13.99         | 76.81 ± 15.64           | 85.62 ± 13.88     | 67.44 ± 23.84 | 54.05 ± 21.78                     | 10.98 ± 25.25 |
| p            | 0.000              | 0.038                 | 0.246                   | 0.661             | 0.076      | 0.009                            | 0.540      |
| Marital status|                  |                       |                         |                   |            |                                  |           |
| Married      | 86.70 ± 17.21      | 84.34 ± 19.20         | 75.38 ± 12.41           | 81.64 ± 15.67     | 63.25 ± 26.83 | 48.44 ± 24.79                     | 17.95 ± 26.11 |
| Single       | 79.96 ± 19.99      | 83.63 ± 17.12         | 81.13 ± 13.30           | 71.95 ± 9.71      | 69.31 ± 26.80 | 34.50 ± 23.69                     | 2.63 ± 3.98  |
| Divorced     | 90.48 ± 14.19      | 82.92 ± 13.77         | 70.89 ± 11.59           | 82.07 ± 13.26     | 61.55 ± 23.00 | 47.02 ± 20.46                     | 6.09 ± 17.57 |
| Widowed      | 83.00 ± 16.60      | 82.03 ± 13.36         | 74.31 ± 8.23            | 85.73 ± 9.55      | 70.64 ± 26.83 | 39.68 ± 20.67                     | 0.00 ± 0.00  |
| p            | 0.107              | 0.572                 | 0.065                   | 0.003             | 0.561      | 0.079                            | 0.003      |
| Time since surgery |            |                       |                         |                   |            |                                  |           |
| Up to 6 months | 92.51 ± 10.12    | 89.55 ± 11.33         | 76.09 ± 12.46           | 77.96 ± 14.52     | 65.69 ± 26.07 | 50.17 ± 21.52                     | 13.36 ± 23.00 |
| More than 6 months | 73.11 ± 20.09  | 72.09 ± 18.08         | 73.26 ± 10.96           | 86.05 ± 10.02     | 64.87 ± 25.70 | 32.13 ± 21.58                     | 0.00 ± 0.00  |
| p            | 0.000              | 0.000                 | 0.647                   | 0.011             | 0.854      | 0.000                            | 0.003      |

Mean, arithmetic mean; SD, standard deviation; p, statistical significance.
It should be strongly emphasised, however, that the factor responsible for diminishing the quality of life in the physical, mental and social areas was pain. A lot of authors write about the meaning of pain in the course of the tumour process. They pay attention not only to the physical dimension of pain, but also to the mental aspect that blurs the difference between physical and mental suffering in cancer patients, to become total suffering [14–16]. In our studies, quality of life and other scales of functioning were rated higher by the respondents who had undergone surgical removal of the ovaries less than 6 months before, which is probably associated with a small number of the respondents and a short time of observation.

It should be strongly emphasised that ovarian cancer women encounter specific problems that affect their quality of life. Diagnosis and treatment are an extremely emotional burden connected with a huge adaptation challenge [17], particularly in terms of perceiving the body and person as a woman, sexual functioning and infertility [18].

Besides, the importance of specified symptoms is highlighted in this group of patients, such as abdominal pain, feeling bloated, eating disorders, indigestion and vomiting [19]. The problems of weight gain or loss were also pointed out.

Infertility can be another serious problem among ovarian cancer women—postponing pregnancy or, in case of a clinically advanced stage of the disease, treatment that makes them unable to become pregnant, considerably influences the quality evaluation. In addition, in younger patients, anticancer treatment causes premature menopausal symptoms—hot flushes, vaginal dryness, changes in hair and skin, and mood swings [20].

Women receiving chemotherapy often experience a loss of libido, dyspareunia, loss of genital sensation, and decreased or no ability to reach orgasm, which significantly reduce their quality of life [21, 22]. This has been confirmed in our studies—the younger the woman, the worse the functioning and lower sexual satisfaction.

The frequency of sexual dysfunction in reproductive cancer women is estimated at between 40–100% compared to 9–50% in healthy women [23, 24]. Undoubtedly, cancer can result in profound changes related to perceiving the body, especially in cases of premature infertility or deformations after surgery, which is associated with decreased sexual functions and increased discomfort during intercourse [25]. All major cancer therapies (surgery, radiotherapy, chemotherapy and hormone therapy) are connected with significant impairment of sexual function.

Mütsch et al. [26] showed a considerable decline in sexual satisfaction, changes in sexuality, and an increased need for sexual support among cancer teenagers and young women. Similar findings were observed in a study by Geue et al. [27], and therefore the greatest number of women possible should receive advice on sexology and infertility in case of cancer treatment [28]. In recent years, several guidelines and clinical recommendations on fertility preservation techniques have been developed. They strongly recommend informing patients about possible fertility preservation techniques prior to anti-cancer treatment [29, 30].

In a study by Stewart et al. [31], 57% of women recorded a deterioration in sexual functioning within 2 years following the ovarian cancer treatment. Younger and married women paid more attention to intensified negative symptoms of menopause at the premenopausal age, reduced production of oestrogens and androgens causing vaginal atrophy, less flexible vagina and increased vaginal dryness, which would lead to pain and discomfort during intercourse.

Studies by Harter et al. [32] clearly show disturbances in cancer women’s sexual functioning yet, interestingly, the authors did not observe the influence of sexual disorders on the quality of life, explaining that this is due to the women’s change of priorities related to the concern for their lives and fear of recurrence. In addition, women who underwent a surgical treatment can experience a disturbed sense of womanhood and themselves, but first and foremost the inability to have a child [20].

Aside from a surgical procedure, ovarian cancer treatment also includes chemotherapy, evoking nausea and vomiting that for many patients are serious chemotherapy side effects disturbing their mental and family functioning, as well as their ability to perform everyday activities [33].

Other side effects of chemotherapy are peripheral neuropathies characterised by numbness, prickling and warmth in the hands. Nevertheless, patients should be aware that as chemotherapy progresses, tremors, weak muscles and loss of sensation, e.g., in the arm, may appear, which definitely influences the quality of life. This has been confirmed in our studies—these symptoms were present in the women regardless of age or education. The younger the patient, the more intensified the symptoms of peripheral neuropathy.

One serious chemotherapy side effect is the reduced number of blood cells and bone marrow suppression, which have a negative influence on the patient quality of life by increased fatigue, dizziness, shortness of breath and cognitive impairment. Studies prove that even mild anaemia can reduce quality of life (thrombocytopenia can lead to bruising and bleeding, while neutropenia can cause infections requiring an intravenous antibiotic treatment and longer hospitalisation).

The analysis of the respondents’ health status from the previous week showed that on a scale of 1–7, most women rated their health status at 4 points—31.4%, at 5 points—27.6%, and at 3 points—22.9%. Similar results were found for quality of life: 4 points—32.4%, 5 points—25.7% and 3 points—21.9%. Among 40 patients of the Wielkopolskie Oncology Centre in Poznań, 22.5% rated their health status as 1 point, 17.5% as 2 points, 32.5% as 3 points, and 25% as 4 points. 2.5% of the respondents rated their health status as 5 points [10].

Treatment of ovarian cancer patients is lengthy and exhausting. Essential needs give way to more basic needs, which is why an evaluation of patient quality of life should
be an indispensable element in the evaluation of therapeutic effectiveness in ovarian cancer patients. Identification of the factors responsible for diminishing the quality of life in ovarian cancer patients can help maintain focus on those areas of life that are particularly disturbed. They can also be worthwhile suggestions in developing more effective therapeutic methods during treatment.

5. Conclusions

(1) Demographic variables such as age, education and marital status have a significant influence on the evaluation of the quality of life.

(2) Quality of life and all the scales of functioning were rated higher by those respondents with a family history of ovarian and/or breast cancer.

(3) A great emphasis should be placed on further studies among a larger group of ovarian cancer patients to determine effective methods for improving their quality of life.

Our results need to be interpreted with regard to several limitations. Our trial was homogenous and relatively small, where the patients were treated in one medical centre and using one method, i.e., multiple drug chemotherapy. Despite these limitations, a great emphasis should be placed on further studies among a larger group of ovarian cancer patients to determine effective methods for improving their quality of life.

Author contributions

MR, KPR, GJB, WT and PM designed the manuscript. MR, KPR, GJB, WT and PM wrote the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of the University of Medical Sciences in Poznan (approval number: 199/09).

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Conflict of interest

The authors declare no conflict of interest.

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