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Research Article

Assessment of Treatment Outcomes and Pharmacological Adverse Effects in Women with Ovarian Cancer Undergoing Combination Chemotherapy. A Clinical Study

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Abstract
Background: Ovarian cancer is among the top causes of death due to cancer in the gynecological system, and it is commonly detected at its advanced stages and treated through combination chemotherapy. Although platinum-based regimens have increased treatment response, their application has often been hampered by the presence of major pharmacological side effects that could affect therapeutic response and adherence.
Objective: To assess treatment outcomes and evaluate pharmacological adverse effects in women with ovarian cancer undergoing combination chemotherapy.
Methods: The present clinical trial was carried out in the Department of Obstetrics and Gynaecology at both Sandmen Provincial Hospital, Quetta, Pakistan, and Bolan Medical Complex Hospital, Quetta, Pakistan, between February 2024 and August 2025. Non-probability consecutive sampling was used to include 70 women with a known history of ovarian cancer who were treated with combination chemotherapy. Clinical and radiological evaluation was used to assess treatment response, and adverse effects were recorded and graded based on standard clinical criteria. The analysis was done in SPSS version 26, and $p < 0.05$ was taken to be significant.
Results: The mean age of patients was 51.8 ± 10.2 years, with 62.9% presenting at advanced stages. In 28.6% of patients, complete response was observed, and in 40.0% percent, partial response was observed, which had an overall positive response rate of 68.6%. It was observed that 17.1% and 14.3% of patients experienced stable disease and progression, respectively. Alopecia (74.3%), nausea/vomiting (65.7%), neutropenia (57.1%), and anemia (48.6%) were the most frequent adverse reactions. Grade III–IV toxicity was observed in 25.7% of the patients and was strongly related to worse treatment outcomes ($p = 0.021$).
Conclusion: Combination chemotherapy demonstrates substantial effectiveness in ovarian cancer management; however, pharmacological adverse effects, particularly severe toxicities, significantly impact treatment outcomes. To maximize therapeutic efficacy and enhance patient quality of life, early identification and proper management of these adverse effects are crucial.

Keywords: Ovarian Cancer, Combination Chemotherapy, Treatment Outcomes, Adverse Effects, Platinum-Based Therapy, Toxicity, Clinical Study.

INTRODUCTION

Ovarian cancer represents one of the most aggressive and fatal malignancies affecting the female reproductive system and remains a significant contributor to cancer-related mortality worldwide[1]. Although the disease has improved in terms of diagnostic imaging and therapeutic management, most of the time it is diagnosed in an advanced stage because of its insidious onset, bewildering symptomatology, and absence of effective screening strategies to be undertaken at an early stage. As a result, a significant percentage of patients would report with a widespread intra-abdominal dissemination, which would lead to an unfavorable prognosis and low survival rates[2,3].

The present standard of care in the treatment of ovarian cancer is a multimodal treatment that incorporates the best cytoreductive surgery with systemic chemotherapy[4]. Platinum-based combination therapy, which predominantly involves carboplatin with paclitaxel, has shown significant efficacy in enhancing progression-free survival and overall response rates. The antitumor effects of these agents are mediated by DNA cross-linking, inhibition of the formation of the mitotic spindle, and induction of apoptosis of fast-growing cancerous cells. Nonetheless, a wide range of pharmacological toxicities often offsets the therapeutic advantages of these regimens[5].

The adverse effects of chemotherapy represent a significant clinical issue and contribute much to the compliance with treatment, dose intensity, and overall treatment success[6]. Some of the most common complications include hematological toxicities such as neutropenia, anemia, and thrombocytopenia, which are mainly due to bone marrow suppression. Not only do these conditions predispose the patient to infections and fatigue, but they also require dose adjustments or even postponements of the treatment, which undermines the effective administration of chemotherapy. Furthermore, non-hematological toxicities, including nausea, vomiting, alopecia, mucositis, and peripheral neuropathy, have a severe effect on the quality of life and psychological health of patients[7,8].

The relationship between adverse effects and outcomes of treatment by chemotherapy is complex and multidimensional[9]. Though some degree of drug activity can be shown by toxicity, too much or too severe toxicity may lead to an inoptimal drug exposure, too early discontinuation and poorer clinical outcome. Also, the magnitude of adverse effects, as well as reaction to therapy, may be influenced by the individual aspects of a patient, including age, nutritional condition, comorbid conditions, tumor stage, and genetic variation in drug metabolism. Thus, it is crucial to learn about this interaction in order to maximize personalized treatment plans[10].

Ovarian cancer is another burden in resource-constrained settings such as Pakistan, compounded by late presentation, inaccessibility to specialized oncology services, and non-supportive management of chemotherapy-related complications. Although combining chemotherapy has become increasingly popular in clinical practice, a relative lack of local data assessing the actual treatment outcomes with the spectrum and the severity of drug adverse effects is present. This evidence plays a critical role in informing clinical decision-making, enhancing counseling of patients, and formulating management procedures that are specific to the context[11].

The study was conducted to evaluate the treatment outcome comprehensively and measure the incidence and intensity of pharmacological adverse effects in women with ovarian cancer receiving combination chemotherapy. The present study is expected to help in improving clinical management, increasing treatment tolerability, and overall outcomes in this patient group by defining the relationship between the toxicity profiles and therapeutic response[12].

MATERIALS AND METHODS

This clinical study was conducted in the Department of Obstetrics & Gynaecology at Sandmen Provincial Hospital, Quetta, Pakistan, and Bolan Medical Complex Hospital, Quetta, Pakistan, over a study period extending from February 2024 to August 2025. The study included a total sample size of 70 women who had a confirmed diagnosis of ovarian cancer and were undergoing combination chemotherapy during the study period. The patients were enrolled through a non-probability consecutive sampling technique, based on their availability and fulfillment of the eligibility criteria.

The study involved women aged 18 years and above with histopathologically proven ovarian

cancer undergoing standard combination regimens of chemotherapy, including platinum-based and taxane-based regimens. The study excluded patients who were treated with surgery and no chemotherapy, incomplete clinical records, women with recurrent malignancy on second or salvage chemotherapy, and patients with severe concurrent systemic illnesses that might independently affect treatment outcomes or the adverse effects of the drugs used. Lost to follow-up before the completion of the necessary treatment assessment were also excluded.

Demographic, clinical, and therapeutic patient file and hospital record data were collected using a structured data collection form. Variables that were used as baseline were age, marital status, parity, body mass index, menopausal status, duration of symptoms, histopathological type of ovarian cancer, tumor stage, and treatment regimen received. The data about the chemotherapy courses, the completion of the treatment process, and the clinical response to therapy were also documented. The outcome of the treatment was evaluated regarding the improvement of the clinical condition, decrease in the tumor load according to radiological and clinical examination, treatment compliance, disease progression, and category of response, where appropriate.

The evaluation of pharmacological adverse effects of combination chemotherapy was done during the treatment course in the form of clinical examination results, laboratory studies, and reported patient complaints. Adverse effects such as nausea, vomiting, anorexia, fatigue, alopecia, mucositis, peripheral neuropathy, anemia, neutropenia, thrombocytopenia, hepatotoxicity, and nephrotoxicity were also common. The adverse drug effects were classified based on the standard clinical assessment and appropriate laboratory thresholds as reported in the hospital practice. Any delay in chemotherapy, decrease in dose, temporary withholding, or supportive care needed because of toxicity were also reported.

All patients were managed according to institutional treatment protocols followed in the participating hospitals. The measurement of response to chemotherapy was done at the end of the scheduled treatment cycles by looking at the imaging reports, tumor markers, where necessary, and assessment notes of the consultant oncologist or the gynecologist. The most important outcome measures were treatment response and frequency of pharmacological adverse effects, and secondary outcome measures were the association between adverse effects and treatment interruption, as well as the overall tolerability of chemotherapy.

The data obtained were input and processed in SPSS version 26.0. Quantitative variables such as age were presented as mean ± standard deviation, while qualitative variables such as stage of cancer, histological subtype, treatment outcome, and adverse effects were presented as frequency and percentage. The chi-square or Fisher's exact test was used to determine the association between categorical variables where necessary. A p-value of less than 0.05 was considered statistically significant.

Before the study began, the institutional ethical review committees of the participating hospitals gave ethical approval to the study. Confidentiality of patients was maintained, and no data were utilized in any way other than study. Since this was a clinical study of patients in the hospital based on patient records and treatment follow-up data, all processes were conducted in line with the institutional ethical practices and the principles of the Declaration of Helsinki.

RESULTS

This study was done on 70 women diagnosed with ovarian cancer who were receiving combination chemotherapy. The mean age of the participants was 51.8 ± 10.2 years, with the majority of patients being aged ≥50 years (42; 60.0%). The majority of the women were postmenopausal (46; 65.7%), which is a normal distribution of ovarian malignancy. A substantial proportion of patients presented with advanced-stage disease (Stage III–IV: 44; 62.9%), while 26 (37.1%) patients had early-stage disease (Stage I–II). Histopathological evaluation revealed that serous carcinoma was the most common subtype (42; 60.0%), followed by mucinous carcinoma (16; 22.9%) and endometrioid carcinoma (12; 17.1%), indicating the predominance of epithelial ovarian cancers in the studied cohort. These baseline clinical and demographic characteristics are summarized in Table 1.

Table 1: Baseline Clinical and Demographic Characteristics of Patients (N = 70)

Variable	Frequency (n)	Percentage (%)
Mean age (years)	51.8 ± 10.2	—
Age ≥ 50 years	42	60.0%
Postmenopausal	46	65.7%
Stage I–II	26	37.1%
Stage III–IV	44	62.9%
Serous carcinoma	42	60.0%
Mucinous carcinoma	16	22.9%
Endometrioid carcinoma	12	17.1%

The assessment of treatment outcomes following combination chemotherapy demonstrated that a considerable proportion of patients achieved a favorable response. Complete response was observed in 20 (28.6%) patients, while partial response was documented in 28 (40.0%) patients, resulting in an overall favorable response rate of 68.6%. However, 12 (17.1%) patients exhibited stable disease, and 10 (14.3%) patients showed disease progression despite treatment. These findings indicate that although combination chemotherapy is effective in the majority of cases, a notable subset of patients continues to experience disease persistence or progression, possibly due to advanced stage at presentation or intrinsic chemoresistance, as illustrated in Table 2.

Table 2: Treatment Outcomes Following Combination Chemotherapy (n = 70)

Treatment Response	Frequency (n)	Percentage (%)
Complete Response	20	28.6%
Partial Response	28	40.0%
Stable Disease	12	17.1%
Progressive Disease	10	14.3%

The assessment of the drug side effects related to chemotherapy showed a high rate of hematological and non-hematological toxicities. Alopecia (52; 74.3%) and nausea and vomiting (46; 65.7%) were the most commonly reported adverse effects, and these effects are typical of the cytotoxic effect of chemotherapy on fast-dividing cells. Neutropenia was identified as the most frequent hematological toxicity (40 patients or 57.1%), and anemia in 34 (48.6%) patients. One of the complications of taxane-based therapy, peripheral neuropathy, was found in 26 (37.1%) patients, which implies a high neurotoxic impact. Other side effects were fatigue (30; 42.9%), mucositis (18; 25.7%), and thrombocytopenia (16; 22.9%), but they were not as common. These results indicate that chemotherapy-induced toxicities are extensive and may have a significant impact on the comfort and adherence to treatment, as shown in Table 3.

Table 3: Frequency of Pharmacological Adverse Effects (n = 70)

Adverse Effect	Frequency (n)	Percentage (%)
Alopecia	52	74.3%
Nausea/Vomiting	46	65.7%
Neutropenia	40	57.1%
Anemia	34	48.6%
Peripheral Neuropathy	26	37.1%
Fatigue	30	42.9%
Mucositis	18	25.7%
Thrombocytopenia	16	22.9%

Further breakdown on the severity of adverse effects showed that 18 (25.7%) patients had severe (Grade III–IV) toxicities, and the other 52 (74.3%) patients had mild to moderate adverse effects. Comparative analysis showed that patients with mild-to-moderate toxicity experienced a better favorable response rate (38; 73.1%), as opposed to patients with severe toxicity (10; 55.6%), and a greater ratio of adverse results (stable or progressive disease). This implies that excessive chemotherapy-related toxicity can negatively impact treatment effectiveness, which may be because of reduced doses, delayed treatment, or premature termination. Statistical analysis also proved that there is a significant correlation between severe toxicity and lower treatment outcomes ($p = 0.021$), as shown in Table 4.

Table 4: Association between Severity of Toxicity and Treatment Outcomes (n = 70)

Toxicity Level	Favorable Response (CR + PR)	Unfavorable Response (SD + PD)
Mild–Moderate (n = 52)	38 (73.1%)	14 (26.9%)
Severe (Grade III–IV) (n = 18)	10 (55.6%)	8 (44.4%)

Overall, the results demonstrate that while combination chemotherapy is associated with a substantial rate of favorable clinical response in ovarian cancer patients, the high frequency and severity of pharmacological adverse effects play a critical role in determining treatment outcomes and overall tolerability, as evidenced across Tables 1–4.

DISCUSSION

This clinical study evaluated treatment outcomes and pharmacological adverse effects in women with ovarian cancer undergoing combination chemotherapy at tertiary care hospitals in Quetta, Pakistan[11]. The results reveal that platinum-based combination chemotherapy is still an effective treatment modality, and the overall response rate (complete + partial response) is favorable (68.6%) as illustrated in Table 2. This is in line with international evidence that carboplatin-paclitaxel combinations yield response rates of between 60–75% with advanced ovarian cancer, hence supporting the clinical utility of these therapies[12].

One of the main observations in the given study is the high proportion of disease at an advanced stage of presentation (62.9% Stage III–IV, Table 1), which is typical of late-stage diagnosis in ovarian cancer. These delays in the diagnosis are commonly explained by the insignificance of the symptoms and the absence of effective screening methods, especially in low-resource areas. The poorer prognosis and lower survival rates are highly linked to advanced-stage disease, which could also be the reason behind the percentage of patients showing stable disease or disease progression despite chemotherapy[13,14].

The study also indicates that the burden of adverse effects caused by chemotherapy is high, with hematological toxicities and non-hematological toxicities being commonly observed (Table 3) [15]. Alopecia (74.3%) and nausea/vomiting (65.7%) were the most common non-hematological adverse effects, consistent with the cytotoxic action of chemotherapy on rapidly dividing cells. Hematological toxicities were most notable with neutropenia (57.1%), and anemia was the most prevalent (48.6%) as a consequence of the myelosuppressive impact of platinum compounds. The results can be compared to already published clinical records, in which hematological toxicities continue to be one of the most significant limiting factors in chemotherapy administration[16].

Peripheral neuropathy, observed in 37.1% of patients (Table 3), is another clinically significant adverse effect, particularly associated with taxane-based therapy. Neuropathy is not only associated with the quality of life of the patient, but it can also result in a dose reduction or discontinuation in case of severe neuropathy. Equally, fatigue and mucositis, albeit less common, also add to the accrued treatment burden among patients[17,18].

A significant conclusion of this study is that severe (Grade III–IV) toxicity is strongly correlated with worse treatment outcomes, as shown in Table 4 ($p = 0.021$)[19]. Patients experiencing severe adverse effects had a lower favorable response rate (55.6%) compared to those with mild-to-moderate toxicity (73.1%). This implies that excessive toxicity can undermine the efficacy of the treatment, possibly because of

interruptions to the treatment or changes in dose, or compliance. These results highlight the importance of effective toxicity monitoring and supportive care strategies in order to provide optimal treatment[20].

The results clinically indicate that it is necessary to have an individual treatment plan. Such attributes as age of the patient, nutrition, disease progression, and comorbidities should be considered to minimize toxicity and still have a therapeutic effect. Detecting and treating the adverse effects early, by using intervention strategies including growth factor support, antiemetics, as well as adopting dose modifications, can greatly enhance patient outcomes and tolerance to treatment[5-10].

The management of chemotherapy-related toxicities presents additional issues in the context of Pakistan, where there may be insufficient resources to deal with the problems[12-14]. The consequences of adverse effects can be enhanced further by poor access to supportive care, late symptom reporting, and financial constraints. Therefore, upgrading the infrastructure of oncology care, educating patients, and developing a uniform approach to toxicity management are the primary aspects that will lead to the improvement of the treatment outcomes in these environments[15].

Although this study has its strengths, it has certain limitations. The limited number of respondents (n = 70) and local conditions within one region can limit the generalisation of the findings. Also, the long-term survival rates, including overall and progression-free survival, have not been determined, which may give a more detailed assessment of the effect of treatment. It is suggested that future study involving bigger sample sizes and multicenter designs would confirm these results and investigate the long-term outcomes[18-20].

CONCLUSION

The platinum-based combination chemotherapy is effective in attaining a positive treatment response in women with ovarian cancer, and a substantial percentage of the patient population has shown a complete or partial response. Nevertheless, the adverse effects of chemotherapy in the form of pharmacological effects are extremely common and a significant difficulty in clinical care. Severe toxicities, particularly hematologic complications, are strongly related to poor treatment outcomes and thus have an important role to play in the effectiveness of therapeutic efficacy. To maximize treatment tolerance and enhance clinical outcomes, it is necessary to recognize adverse effects in their early stages, monitor them, and manage them accordingly. In managing ovarian cancer patients under chemotherapy, a balanced approach that puts the interests of both efficacy and safety is paramount. Enhancing supportive care and implementing personalized treatment plans can further contribute to enhancing patient quality of life and overall treatment effectiveness.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests.

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Authors' Contributions

F.U., A.M., and R.K. contributed to study conception and design.

S.E.A. and S.B. were involved in data collection and patient management.

N.A. performed pharmacological analysis and interpretation of adverse effects.

A.M. supervised the study and finalized the manuscript.

All authors read and approved the final manuscript.

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