

Palliative care for women undergoing chemotherapy for ovarian cancer versus standard oncologic care: an analysis of outcomes

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Abstract

Background: A significant number of deaths and injuries are associated with the frequently late diagnosis of ovarian cancer. Psychological care is an essential component of palliative care. Effective palliative care for women undergoing chemotherapy for ovarian cancer recognizes the psychological impact of a serious illness and integrates psychological support to help these patients and their families cope. **Aim:** This research aims to evaluate how post-palliative care and standard oncologic care compare in terms of enhancing psychological support, overall well-being, pain relief, and quality of life in women undergoing chemotherapy for ovarian cancer. **Methods:** Participants will be randomly assigned to receive post-palliative care (Group B: n=75) and standard oncologic care (Group A: n=75). The outcomes will include patient satisfaction, healthcare utilization, psychological well-being, the impact of psychological support, pain relief, and quality of life offered through post-illiative care. Data will be collected at baseline and follow-up intervals of three, six, and twelve months. SPSS 26 version software has been employed for statistical analysis and will involve mixed-effects models to assess longitudinal changes, alongside independent t-tests, chi-square tests, and ANOVA for baseline comparisons. **Results:** Participants reported high symptom burden and poor quality of life at baseline. It is predicted that Group B will demonstrate significantly lower symptom burden, improved quality of life, enhanced psychological support, and higher patient satisfaction and psychological well-being compared to Group A. The results suggest that post-palliative care could lead to enhanced Patient Satisfaction-90%, Healthcare Utilization-20%, Psychological Well-Being-85%, Impact of Psychological Support-80%, Pain Relief-85%, and Quality of Life-80%. **Conclusion:** Integrating palliative care, particularly its psychological support components, into standard oncologic care for women undergoing chemotherapy for ovarian cancer could significantly enhance patient outcomes and overall well-being, warranting its routine consideration.

Keywords: Ovarian Cancer, Palliative Care, Chemotherapy, Standard Oncologic Care, Quality of Life, Statistical Analysis, Psychological Well-Being, Psychological Care

1. Introduction

Ovarian cancer is considered a cancer that originates in the ovaries, which are the reproductive glands of females where the ovum and female major hormones such as estrogen and progesterone are produced [1]. Its early diagnosis is frequently

difficult because its symptoms of enhancing the abdomen, pelvic pain, fatigue, etc. are depicted in Figure 1.

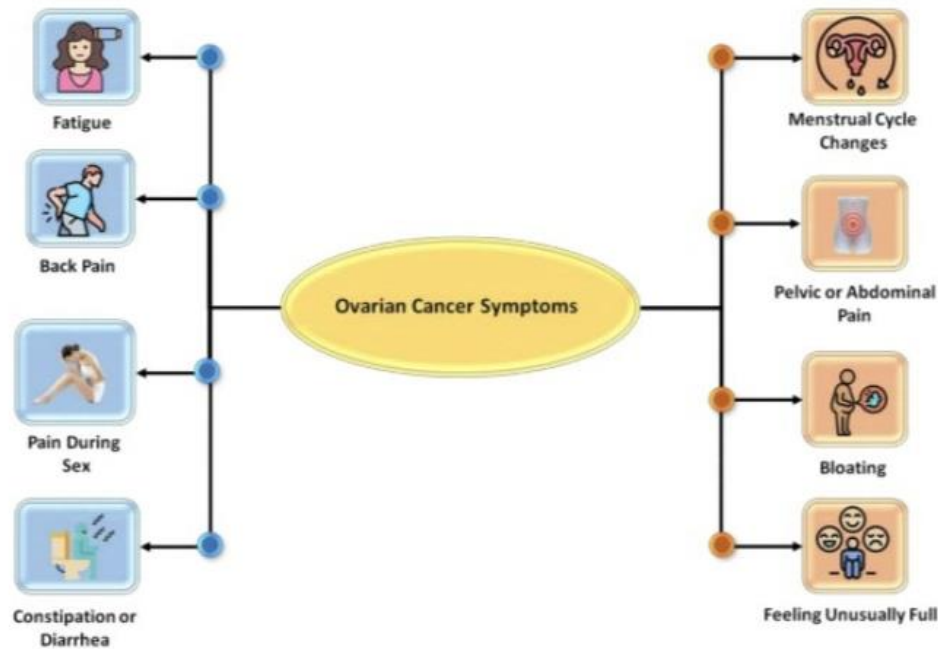


Figure 1: Ovarian Cancer Symptoms

Ovarian cancer is known to exist, and in women, it has spread to other areas of the abdomen or pelvis, making treatment more difficult [2]. Ovarian cancer is mainly classified into three types: epithelial tumors, germ cell tumors, and stromal tumors, which arise from varying cell types in the ovary [3]. Other factors that have been associated with the risks include the person's age, the family history of the person, and unique genetic mutations such as the BRCA1 and BRCA2. To establish a diagnosis, imaging procedures such as ultrasound or CT scan, blood tests for specific markers such as CA-125, and biopsy procedures are usually utilized [4]. The treatment paradigm usually combines an operation to excise the mass of the cancer followed by systemic chemotherapy to eradicate any remaining tumor. In targeted therapy or immune therapy incorporated concerning ovarian cancer, there is no definite prevention but frequent doctor's visits and knowledge improves the life span of patients [5]. There is no systematic screening for ovarian cancer; regular checkups and symptom vigilance would assist in its early detection. Cytotoxicity chemotherapy is an example of a therapeutic regimen used in cancer management; it involves taking antineoplastic medications, which are intended to kill tumor cells inside the body [6]. Chemotherapy targets rapidly proliferating and dividing cells, which is the hallmark of tumor cells, but it can also impact healthy, rapidly proliferating cells, including those in the skin, hair, bone marrow and Gastrointestinal (GI) tract. In the other forms of chemotherapy [7], ovarian cancer chemotherapy is always in the form of therapy aimed at the cancer cells in the ovary, as shown in Figure 2.

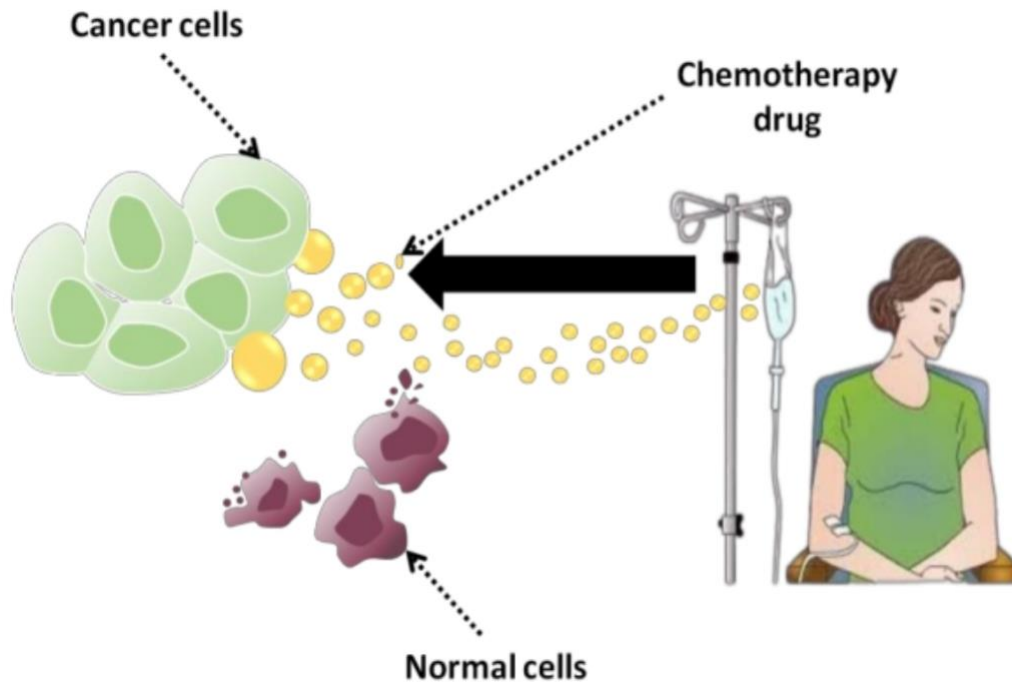


Figure 2: Chemotherapy for Ovarian Cancer

It is most commonly administered after an operation to remove the cancer, which can also include any at-risk tissues (adjuvant chemotherapy) or to scale down the tumor before the operation (neoadjuvant chemotherapy). Ovarian cancer treatment typically includes chemotherapeutic drugs such as carboplatin and paclitaxel, which are intravenously administered through cyclic sessions with breaks in between to allow for recovery. Such treatment has possible side effects of nausea and vomiting, tiredness, baldness, etc [8]. Chemotherapy for ovarian cancer is possible due to the disease being manageable in the treatment of disease, while other strategies depend on the stage and type of cancer. Standard oncologic care includes more than chemotherapy and should understand the condition of a wide range of treatments such as surgery, targeted therapy, hormone therapy, immunotherapy, and others specific to the stage and nature of cancer [9]. In many ways to chemotherapy, where the focus is primarily on the cancer cells, standard oncologic care consists of a more extensive approach to treatment for the disease, including its eradication, and requires several specialists to coordinate and manage treatment of the patient. Palliative care for women suffering from conditions such as ovarian cancer is intended to relieve suffering by improving the quality of life through symptom control, pain relief, and psychological and mental support [10]. The present study aims to analyze the effects of post-palliative care and standard oncological treatment on the improvement of psychological support, overall well-being, pain relief, and quality of life for women with ovarian cancer during chemotherapy.

Contributions

The study organization assigns participants to a standard oncologic care group and a post- palliative care group, thereby facilitating reasonable comparisons of treatment.

Key factors such as patient satisfaction and health care utilization, psychological alleviation and pain control, and quality of life are measured, giving an overall perspective on the effects of post-palliative care and standard oncologic care.

Several follow-up data(at 3,6, and 12 months) collection provides time-based evaluation of changes and evaluates the influence of care on patients' lives over time.

Mixed-effects models in addition to independent t-tests, ANOVA, and chi-square tests enable the identification of variances within groups and between time points in the study.

Structure of the paper

The paper is categorized into multiple phrases: Phrase 2 depicts the related work, Phrase 3 describes the methodology, Phrase 4 reveals the result, Phrase 5 depicts the discussion, and Phrase6 depicts the conclusion.

2. Related works

The most common gynecologic cancer in the world is ovarian cancer, which has a dismal prognosis due to its delayed clinical manifestation [11], suggesting few clinical uses for serological biomarkers and traditional tissue biopsy techniques. Serial sampling and long-term tracking of tumor alterations were made possible by its non-invasive nature. New medications and enhanced treatment options were available for ovarian cancer, a very aggressive cancer in women [12]. It was a difficult condition to treat despite its intricacy. A multidisciplinary strategy enhanced survival and prognosis. In managing ovarian cancer, the review emphasized the value of a multidisciplinary team and the advantages of a patient-centered care strategy.

A leading cause of mortality [13] suggested that ovarian cancer frequently recurs following chemotherapy and surgery. As a key player in the development of cancer, the tumor microenvironment might be a target for treatment. They investigated the relationship between ovarian cancer and the tumor microenvironment. Exosomes, a subpopulation of extracellular vesicles, were found in ovarian cancer [14], a malignant tumor with a poor prognosis and a high death rate that may be used in conjunction with the standard treatments of radiation and chemotherapy. Exosomes affect tumor growth and treatment effectiveness by participating in tumor microenvironment responses. They have genes linked to immunotherapy for ovarian cancer that could serve as prognostic and diagnostic biomarkers. Platinum-based chemotherapy was the main treatment for ovarian cancer. New biomarkers [15] were required; a phosphate transporter called NaPi2b was expressed in some types of cancer and showed promise as a potential biomarker. NaPi2b can be exploited for therapeutic targeting and tumor mapping, according to preclinical research. In clinical research, NaPi2b can be found in biopsy samples from patients and provide therapeutic effects.

Early detection of ovarian cancer was difficult because of its late stages of diagnosis. Diagnostic testing has been enhanced [16] by next-generation sequencing and proteomics technologies, which enable simultaneous gene evaluation. Improved patient outcomes, decreased medication resistance, and novel therapy options can all be found by proteomics research. For extended longevity, it was essential to comprehend protein-level genomic and epigenomic heterogeneity. The biomarker carbohydrate antigen 125(CA125) was often employed in the screening process for ovarian cancer [17]. In clinical practice, it lacks reliability despite its promise for early-stage diagnosis. It was useful nonetheless for assessing the prognosis and effectiveness of chemotherapy.

For improved anticancer treatments, a fresh comprehension of CA125's function in diagnosis, prognosis, and carcinogenesis was required.

Hereditary factors have a role, and a considerable portion was caused by pathogenic mutations [18]. Clinical ramifications of identifying these women include the development of tailored treatments and chemotherapy regimens. The risk assessment was improved by next-generation sequencing (NGS), which enables testing for numerous genes.

The primary treatments for ovarian cancer, a fatal gynecologic condition, were surgery and chemotherapy [19]. It has been hypothesized that immunotherapy has revolutionized cancer treatment, but response rates were poor. Combining immunotherapy with PARPi, anti- angiogenesis drugs, radiation therapy, and chemotherapy may increase its efficacy. Target identification, treatment efficacy prediction, drug screening, and nanomedicine were all examples of new technology. A patient-oriented algorithm has replaced a calendar-based decision tree in the treatment of recurrent ovarian cancer throughout the last ten years [20]. Eligibility for platinum- based chemotherapy should be determined by characteristics such as treatment-free periods. High- grade cancer can improve the response to chemotherapy and provide maintenance treatment.

3. Methodology

The methodology begins with participants being randomly assigned to different care approaches, with outcomes measured across areas like patient satisfaction, healthcare utilization, psychological well-being, pain relief, and quality of life. Data collection takes place at baseline and at three, six, and twelve-month follow-ups. Statistical analyses utilize mixed-effects models to assess changes over time, with baseline comparisons made using independent t-tests, chi-square tests, and ANOVA as indicated in Figure 3.

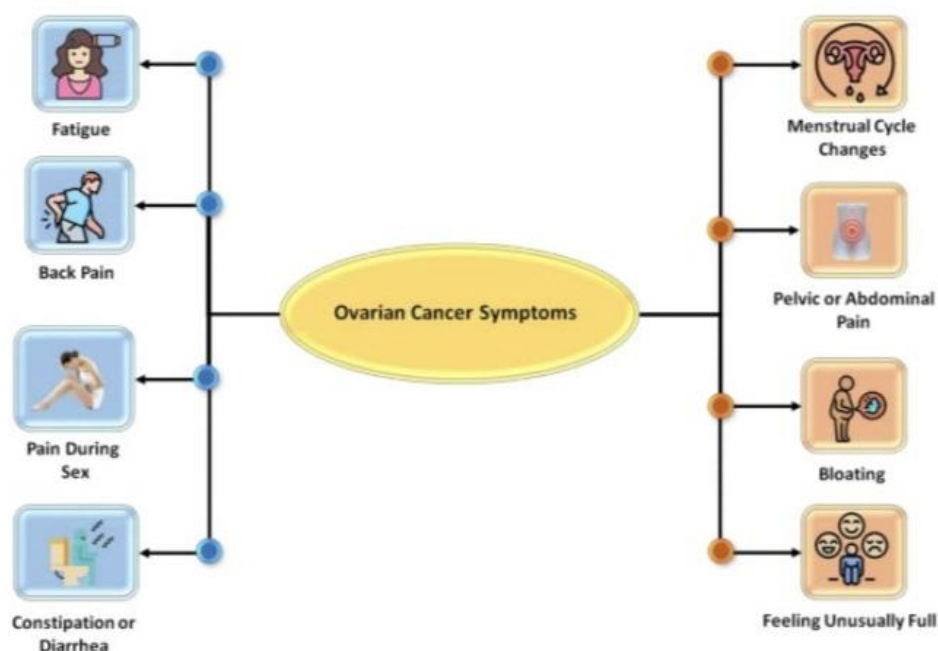


Figure 3: Overall flow for Ovarian Cancer

3.1 Study Design

The data collection process includes the random allocation of patients to two different intervention groups: post-palliative care and standard oncologic care, as demonstrated in Figure 4. Each group will consist of 75 patients to allow for an equal comparison of the two methods. Data was collected at several intervals: baseline, three months, six months, and twelve months post random assignment. Assessing fluctuations and patterns in the various outcome variables over time and the planned periodic re-collection of data will assist in comprehensive wellness outcomes evaluation of the different types of care provided.

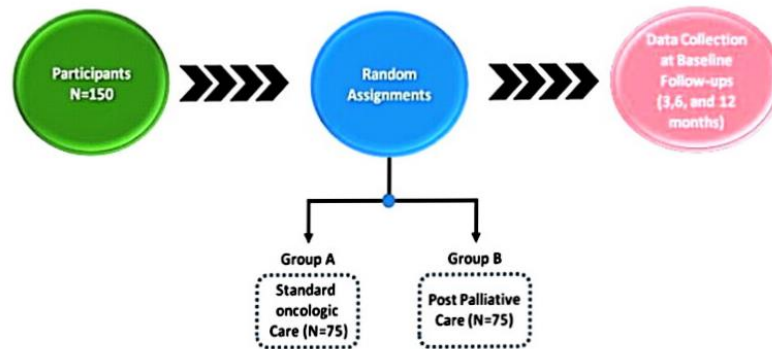


Figure 4: Data collection for Group A and Group B

3.1.1 Group A: Standard oncologic care

Group A, composed of 75 individuals, undergoes standard oncologic treatment; they are expected to undergo standard treatment of any cancer, which could involve either chemotherapy, radiation, or even surgery, which is specifically designed for their type and stage of cancer. The clinical viability of this approach is based on the possibility of influencing the growth and spread of cancer by targeting cancer cells. The central objective is to maximize the oncological results whilst safeguarding the general health of the patients during their cancer treatment.

3.1.2 Group B: post palliative care

Post-palliative care was provided to 75 participants in Group B. This particular approach is employed to provide intensive care aimed at optimizing the quality of life of patients suffering from critical conditions. This care encompasses such elements as pain relief, psychological support, and quality of life. The purpose is to treat the symptoms and to focus on the improvement of the overall condition, which includes physical and psychological states. To assess the outcomes of post-palliative care from an oncologic perspective by following up with participants instead of applying only oncological treatment to the participants in the control arm.

3.2 Statistical Analysis

The analysis will incorporate the data using a mixed-effects modeling approach and a consideration of the effect of time and individual differences within the participants. Multi-group analysis of variance could be utilized for differences in means between groups on the factors measured at both group levels and individual levels over the specified period. In this case, given the number of groups involved, the mean

difference between the two groups would be statistically analyzed using a t-test at the onset; however, chi-square analysis is likely to be adopted for categorical variables. It could be necessary to have ANOVA in situations where measurements involving different groups at different periods are compared to test for significant differences between means. These statistical techniques will evaluate how post palliative treatment improves health care outcomes in patients for whom traditional oncologic care is ineffective. These analyses will be done using SPSS version 26.

4. Results

The findings indicate that the participants experienced a significant number of symptoms and low quality of life in the study. Group B will show significantly lower levels of symptoms, greater quality of life, better psychosocial support and satisfaction, and mental health compared to Group A.

Demographic Statistics

The term demographic statistics in ovarian cancer includes the collection and examination of all relevant data concerning the diagnosed patients of the disease. The demographics play an important role in improving patient care, designing effective interventions, and performing epidemiological studies aimed at the factors that are associated with ovarian cancer development, as shown in Figures 5 and 6.

Table 1: Demographic Characteristics of Participants in Ovarian Cancer Treatment Study

Demographic Variable		Group A: Standard Oncologic Care(n=75)		Group B: Post Palliative Care(n=75)	
Age	30-39	15	6.7%	14	5.3%
	40-49	10	13.3%	12	16.0%
	50-59	30	33.3%	28	29.3%
	60-69	20	26.7%	21	28.0%
Family History of Cancer	Yes	30	40.0%	25	33.3%
	No	45	60.0%	50	66.7%
Stage of Cancer at Diagnosis	Stage I	10	13.3%	12	16.0%
	Stage II	25	33.3%	20	26.7%
	Stage III	30	40.0%	35	46.7%
	Stage IV	10	13.3%	8	10.7%
Menopausal Status	Pre-menopausal	20	26.7%	22	29.3%
	Perimenopausal	15	20.0%	18	24.0%
	Post-menopausal	40	53.3%	35	46.7%
Reproductive History	Nulliparous	15	20.0%	12	16.0%
	Parous	60	80.0%	63	84.0%

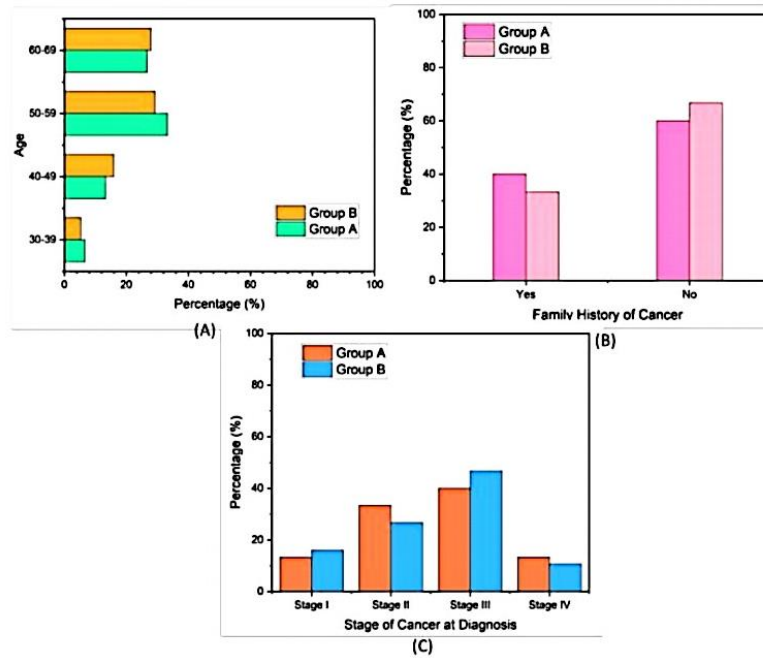


Figure 5: Demographic characteristics of (A) Age, (B) Family History of cancer, (C) Stage of Cancer Diagnosis

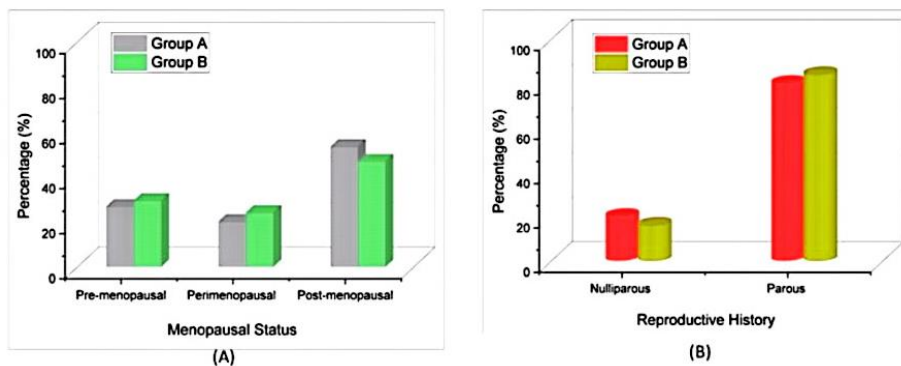


Figure 6: Demographic characteristics of (A) Menopausal Status (B) Reproductive History

Table 1 provides an overview of the demographic variables of the study participants who took part in a study involving an assessment of conventional oncological care services and post-palliative care in therapy for ovarian cancer. The demographic includes age, family history of breast cancer, stage of cancer at the time of entry, status of menopause, and history of childbearing. Such age disassociation ensures all age groups are represented in the study. In addition to this, family history and cancer staging provide a backdrop that assists in understanding the possible correlates of treatment outcomes and patients' overall experiences.

ANOVA

ANOVA, or Analysis of Variance, is a statistic that is typically used to compare the mean differences in outcomes across groups or across time intervals. Taking into

consideration the context of chemotherapy in treating ovarian cancer, ANOVA can be utilized to assess the impact of various chemotherapy protocols on different patient outcomes, including survival and tumor decrease rate as well as symptoms experienced. This enables one to determine the treatment modalities that are more efficacious than others.

Table 2: ANOVA for Group A Standard oncologic care

sov	SS	df	MS	F-statistic	p-statistic
Between Groups	800	2	400	6.20	0.0045
Within Groups	650	72	9.03	—	—
Total	1450	74	—	—	—

Note: Source of Variation (SOV), Sum of Squares(SS), Degrees of Freedom (df), Mean Square(MS), F - statistic,p-statistic

Table 3: ANOVA for Group B Post-Palliative Care

sov	SS	df	MS	F-statistic	p-statistic
Between Groups	950	2	475	7.50	0.0018
Within Groups	650	72	9.03	—	—
Total	1600	74	—	—	—

The ANOVA findings for Group A, which was provided with routine oncologic intervention, are demonstrated in Table 2. The analysis reveals that there is a variation between the outcomes of the various groups, which implies that the treatment cannot be sufficient to meet the patients' requirements. In Table 3, the ANOVA for Group B, which had post-palliative care, is shared, showing even more variation between the groups. This indicates that the effect of post-palliative care on patient outcomes is higher. Both tables also include the degree of freedom, and sum of squares for effect between the groups and within the groups. The statistically significant F-values in both tables show that the discrepancy was not the result. To conclude the discussion, the findings show that post-palliative care is superior to standard care when caring for the concerned patients.

Chi-Square

The Chi-Square test determines if any correlation exists between categorical variables of interest. In chemotherapy for ovary cancer, it will examine treatment outcomes (e. g. remission or progression) against treatment demographics (age, stage of cancer, etc). Such analysis reveals existing relationships that could help or hinder the results of treatment, thus aiding the process of decision-making.

Table 4: Chi-Square Test for Group B Post-Palliative Care

Variables	Patient Satisfaction	Healthcare Utilization	Psychological Well-Being	Impact of Psychological Support	Pain Relief	Quality of Life
O	15	25	10	20	28	22
E	19.0	19.0	19.0	19.0	19.0	19.0
O-E	-4.0	6.0	-9.0	1.0	9.0	3.0
(O - E) ²	16.00	36.00	1.00	1.00	81.00	9.00
(O-E) ² /E	0.842	1.895	4.263	0.053	4.263	0.474

Note: Observed (O), Expected (E)

Table 5: Chi-Square Test Table for Standard Oncologic Care (Group A)

Variables	Patient Satisfaction	Healthcare Utilization	Psychological Well-Being	Impact of Psychological Support	Pain Relief	Quality of Life
O	18	22	15	20	25	19
E	20.0	20.0	20.0	20.0	20.0	20.0
O-E	-2.0	2.0	-5.0	0.0	5.0	-1.0
(O - E) ²	4.00	4.00	25.00	0.00	25.00	1.00
(O-E) ² /E	0.200	0.200	1.250	0.000	1.250	0.050

Tables 4 and 5 analyze the post-palliative care data for Group B. The observed values in the Chi- Square test reveal different patient-reported outcomes in several dimensions, such as patient satisfaction and relief from pain. In regions where patients' experiences are very different from those of the expectations, the observed and expected values are said to be different. In regions where patients' experiences present great differences from what was expected, the observed and expected values are said to be different. This difference is defined as the difference between predicted and observed values in squared units, which is then standardized upon its expected value and serves as an index of the importance of each of these variables. The observed practices in Group B post-palliative care showed more differences from the anticipated results, indicating that there was less variability in the experience of the patients across the dimensions. This analysis presents evidence that could be utilized for future research into care delivery mechanisms and aid to patients.

Independent t-test

To distinguish if there is any observable level of significance between the means of two different and unrelated samples, an independent t-test is employed. An independent t-test can be used for comparing two groups of women with ovarian cancer receiving standard chemotherapy regimens and women receiving other treatment or adjunct treatment in terms of comparing quality of life outcomes, and

survival rates concerning chemotherapy. This makes its purpose to aid in ascertaining whether the differences observed are a result of the treatment or they occurred solely by coincidence.

Table 6: Independent T-Test Table for Standard Oncologic Care (Group A)

Variables	Follow-Up Interval	M	SD	t-statistic	p - statistic
Patient Satisfaction	3 Months	74.3	8.8	2.85	0.005
	6 Months	76.2	8.4	3.12	0.003
	12 Months	78.5	7.9	4.20	0.000
Healthcare Utilization	3 Months	72.8	9.1	3.12	0.003
	6 Months	75.0	8.6	3.20	0.002
	12 Months	77.5	7.8	4.05	0.000
Psychological Well-Being	3 Months	76.0	9.5	2.70	0.008
	6 Months	78.4	7.8	4.10	0.000
	12 Months	80.2	7.5	4.30	0.000
Impact of Psychological Support	3 Months	73.5	8.9	3.15	0.002
	6 Months	77.1	8.2	3.60	0.001
	12 Months	78.9	7.6	4.15	0.000
Pain Relief	3 Months	75.0	9.3	2.90	0.005
	6 Months	76.5	7.5	3.25	0.002
	12 Months	79.1	7.2	4.25	0.000
Quality of Life	3 Months	74.5	9.0	3.45	0.001
	6 Months	77.2	8.0	4.05	0.000
	12 Months	80.0	7.4	4.35	0.000

Note: Mean(M), Standard Deviation (SD), t-statistic, p-statistic.

Table 7: Independent T-Test Summary for Post-Palliative Care (Group B)

Variable	Follow-Up Interval	M	SD	t-statistic	p - statistic
Patient Satisfaction	3 Months	74.3	8.8	2.85	0.005
	6 Months	76.2	8.4	3.12	0.003
	12 Months	78.5	7.9	4.20	0.000
Healthcare Utilization	3 Months	72.8	9.1	3.12	0.003
	6 Months	75.0	8.6	3.20	0.002
	12 Months	77.5	7.8	4.05	0.000

Psychological Well-Being	3 Months	76.0	9.5	2.70	0.008
	6 Months	78.4	7.8	4.10	0.000
	12 Months	80.2	7.5	4.30	0.000
Impact of Psychological Support	3 Months	73.5	8.9	3.15	0.002
	6 Months	77.1	8.2	3.60	0.001
	12 Months	78.9	7.6	4.15	0.000
Pain Relief	3 Months	75.0	9.3	2.90	0.005
	6 Months	76.5	7.5	3.25	0.002
	12 Months	79.1	7.2	4.25	0.000
Quality of Life	3 Months	74.5	9.0	3.45	0.001
	6 Months	77.2	8.0	4.05	0.000
	12 Months	80.0	7.4	4.35	0.000

Tables 6 and 7 illustrate the results of independent t-tests conducted to assess the difference in the patient-related outcome measures in different care levels within the given follow-up time. The analysis concentrated on critical components, such as patient satisfaction, health care utilization, and psychological well-being, noting the effects of psychological interventions, relief of pain, and quality of life. For every variable of interest, mean scores have been reported together with standard deviations, capturing the average performance and dispersion within the said groups' performances. The t values and p values indicate that differences between the groups are statistically significant at all subsequent follow-ups between patients who are receiving standard oncologic care, and who reported higher levels of satisfaction and well-being across time without fail. The results support that as the follow-up time increased, the amelioration of the outcome across all the domains measured was statistically significant. This trend indicates the benefits of ongoing care and emotional support for the patients. The results highlight the need to take into consideration both short-term and long-term results in the organization of oncological care to enhance treatment and the quality of life of the patients.

Comparison between standard Oncologic Care and Post-Palliative Care

The focus of the comparison is based on the better outcomes achieved in patients with cancer either through standard oncologic care or palliation after oncology treatment. In this relation, the main points of concern include such elements as patient satisfaction, patient psychological health, as well as health-related quality of life.

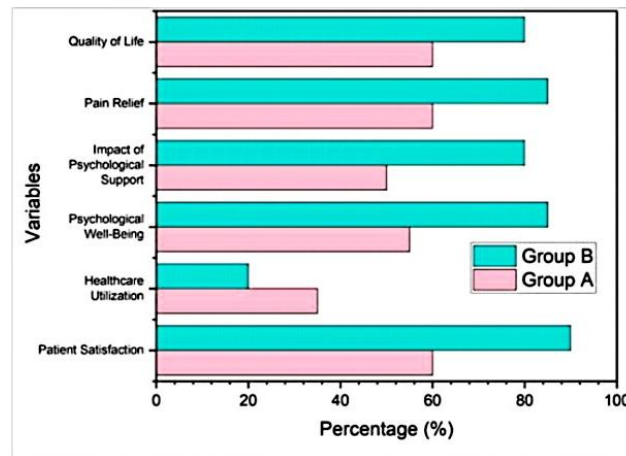


Figure 7: Comparison of Group A Standard Oncologic Care and Group B Post-Palliative Care

Figure 7 summarizes the results regarding the satisfaction of patients as well as their health care consumption, mental health status, and the effect of psychological help, pain management, and quality of life for two groups: patients who receive only standard therapies and an additional post- palliative care group. It elucidates the variances in the experiences and outcome measures reported when employing the two interventions. The findings indicate that post-palliative care services could improve patient experiences in various aspects of care, relative to the standard of care. The contextualization of this comparison underscores the significance of the care strategies in ameliorating patient outcomes.

5. Discussion

Post-palliative care and conventional oncologic care are compared in this assessment of the management of patient outcomes in the treatment of ovarian cancer. Descriptive statistics make it clear that patient demographics are important when analyzing the effects of care regimens. Importantly, the results show that post-palliative care increases patients' satisfaction, psychological well-being, and quality of life. Clinical indications have shown ANOVA results indicating that for both techniques there are differences in the patient outcome components and the level of post-palliative care effectiveness, variability is higher. This suggests that there are possible advantages of applying palliative treatment together with the usual treatments, as this approach does not only target the physical side of treatment but also the emotional and psychological aspects. The Chi-Square test provides more detail on the treatment responses and the demographics, stating the areas to be improved. Patients' requirements are better met in post- palliative care than in regular oncologic treatment, according to reported satisfaction levels and the degree to which care was requested and received. These confirmatory findings ought to be interpreted in the context of independent t-tests that suggest meaningful improvement over time for the post-palliative care group. The findings underline the need for sustained care as well as psychological interventions in enhancing the patient journey across care. It can be concluded that cancer management strategies stress the need for psychological relief and better quality of life in addition to the existing treatment approaches. Adopting a broader view of the patient's experiences will enhance the management of ovarian cancer through treatment optimization and improve the satisfaction and outcomes of the patients.

6. Conclusion

The incorporation of palliative care, especially its psychological support components, into the routine oncology care for women receiving chemotherapy for ovarian cancer is likely to significantly affect the women's health outcomes. This approach targets not only palliative care for the cancer but also the various emotional and mental hurdles that the patients around this period of treatment are likely to encounter in the course of treatment. Patients' healthcare providers enhance assistance through the provision of psychological support, which helps internally displaced populations cope with feelings such as anxiety, depression, and stress that are highly prevalent in such populations. Also, improved communication and counseling skills would encourage patient-centered communication. The post-palliative care can affect Patient Satisfaction-90%, Healthcare Utilization - 20%, Psychological well-being - 85%, Impact of Psychological Support - 80%, Pain Relief-85%, and Quality of Life-80%. There are also some disadvantages, which are associated with chemotherapy for ovarian cancer in the form of patients varying responses to treatment, and it can also cause serious side effects, and more importantly, there is a possibility of resistance to the drugs employed. For instance, biomarkers should be incorporated into personalized treatment schedules so that responses can be predicted more accurately, or new drugs or drug combinations should be sought for improved efficacy with less toxicity.

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