Assessment Of Economic And Safety Outcomes In Patients Receiving Different Anticancer Regimens For Breast And Cervical Cancer

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Abstract

Breast and cervical cancers are significant causes of illness and death among women in semiurban regions of Tamil Nadu, India. This study focused on examining both the economic impact and safety of different cancer treatments to help improve patient care and inform healthcare policies. It involved 139 patients, including 84 with breast cancer and 55 with cervical cancer, who received chemotherapy, targeted therapy, or immunotherapy at a cancer center in Erode. The research collected information on patient demographics, cancer stages, treatment methods, side effects, quality of life, and medical costs. Most breast cancer patients were between 41 and 50 years old, with over half diagnosed at stage III, while most cervical cancer patients were aged 51 to 60, with more than half at stage IV. Chemotherapy was the most common treatment for both cancers. Typical side effects included fatigue, nausea, anemia, and low white blood cell counts, all managed with supportive care. Despite these challenges, patients reported maintaining good physical and emotional quality of life. Treatment costs varied widely, costing families anywhere from ₹4,000 to ₹20 lakh, causing significant financial strain. The study highlights the complex balance between treatment safety and financial burden in cancer care in resource-limited semi-urban settings and stresses the need for localized data to guide better treatment choices and reduce economic hardship.

Keywords: Breast cancer, Cervical cancer, Economic burden, Treatment safety, Semi-urban India, Quality of life.

INTRODUCTION

Cancer continues to be a major public health challenge globally, with rapidly increasing incidences in low- and middle-income countries like India. The Indian Council of Medical Research (ICMR) projects a rise in cancer cases from about 1.5 million in 2022 to nearly 1.57 million by 2025 [1]. Among Indian women, breast and cervical cancers are the leading contributors to cancer burden and mortality [2,3]. Breast cancer has now overtaken cervical cancer as the most frequently diagnosed cancer, with rates reaching 100,000 cases annually by 2022, while cervical cancer remains prevalent in semi-rural and rural areas due to limited screening and late detection [1,3]. These late-stage presentations, combined with financial barriers, complicate management and lead to poorer outcomes [4]. The high cost of cancer treatment, particularly compared to affordable generic alternatives such as those under Jan Aushadhi Yojana, further restricts access to care and impacts patients' quality of life in resource-limited settings [5].

Integrating economic and safety outcome assessments is essential to inform clinical and policy decisions, especially given the regional variations in healthcare infrastructure and socioeconomic status across India.[2,4] In semi-urban areas like Tamil Nadu, where cancer incidence continues to rise, there is a critical lack of comprehensive data encompassing both treatment costs and adverse effects despite improved screening efforts [6–8]. Financial toxicities affect over 80% of breast cancer patients, with many relying on distress financing, while cervical cancer patients similarly face significant household financial burdens due to prolonged treatments and late-stage disease [9,10].

Moreover, treatment-related adverse events such as myelosuppression, neuropathy, and cardiotoxicity not only diminish quality of life but also increase healthcare expenses [12–14]. Recognizing the intertwined nature of economic and safety outcomes is vital for optimizing therapeutic strategies. This study aims to evaluate the combined economic and safety outcomes of anticancer regimens for breast and cervical cancers in Tamil Nadu, addressing the urgent need for region-specific evidence to guide effective and equitable cancer care.

MATERIAL AND METHODOLOGY

This prospective observational study was conducted at Onco Foundation, Erode, a specialized oncology center managing diverse breast and cervical cancer cases [15]. Clinical data were collected from medical records, pharmacy bills, diagnostic reports, and patient or staff interviews [16]. Patients with confirmed breast or cervical cancer undergoing chemotherapy, targeted therapy, immunotherapy, or combination regimens were included. Sampling was purposive, and the sample size (n = 124) was calculated using Fisher's formula ($Z = 1.44$, $p = 0.05$, $d = 0.04$) [17].

Patients with complete clinical and cost data who consented to participate were enrolled, while those under palliative care or with incomplete records were excluded [18]. Ethical approval was obtained from the Ripon Independent Ethics Committee (RIEC), Chennai [19].

Treatment regimens followed standard clinical guidelines [20]. Data were recorded using a structured Proforma covering demographics, treatment, cost, and adverse effects [21]. Economic evaluation included direct and indirect costs, while safety outcomes comprised adverse effects, hospitalizations, and quality of life (FACT-G7) [22].

Data were analyzed using SPSS software with descriptive and inferential statistics (Chi-square, t-test/ANOVA, regression). Economic parameters such as ICER, QALY, LYG, and PFS were computed for cost-effectiveness comparisons [23,24].

RESULTS AND DISCUSSION RESULT 1: BREAST CANCER

A total of 84 patients diagnosed with breast cancer were included in the study. The majority of patients (40.5%) belonged to the 41–50-year age group, followed by 31–40 years (21.4%) and 51–60 years (20.2%). The lowest frequency was observed in the youngest (20–30 years, 3.6%) and oldest (71–80 years, 4.8%) age groups. Regarding disease stage, the majority of cases (51.2%) were diagnosed at Stage III, followed by Stage II (28.6%), indicating that almost four out of five patients (79.8%) presented with advanced disease. Only 6.0% were diagnosed at Stage I, showing limited early detection. In terms of comorbidities, 57.1% had no associated health conditions, while 42.9% reported at least one. The most common were diabetes, hypertension, thyroid disorders, rheumatoid arthritis, and cardiovascular disease. The treatment distribution revealed that chemotherapy alone was the predominant approach (44.0%), followed by targeted therapy (28.6%) and combination regimens (23.8%). Immunotherapy (2.4%) and hormonal therapy (1.2%) were rarely used.Adverse effects were frequent but manageable. Pain/fatigue (21.4%), nausea/vomiting (20.2%), weakness (17.9%), and anemia (15.5%) were the most commonly reported events. Gastrointestinal toxicities such as diarrhea and dry mouth also contributed to patient discomfort. The direct medical cost of treatment varied widely, ranging from ₹4,500 to ₹20 lakh, depending on regimen type and duration. Most patients completed treatment with adequate supportive care.

Table 01: Summary of Breast Cancer Results

Category	Parameter	Observation	Percentage (%)
Age Distribution	20–30 years	3 patients	3.6
	31–40 years	18 patients	21.4
	41–50 years	34 patients	40.5
	51–60 years	17 patients	20.2

	61–70 years	8 patients	9.5
	71–80 years	4 patients	4.8
Stage at Diagnosis	Stage I	5 patients	6.0
	Stage II	24 patients	28.6
	Stage III	43 patients	51.2
	Stage IV	10 patients	11.9
Treatment Protocol	Chemotherapy Only	37 patients	44.0
	Targeted Therapy	24 patients	28.6
	Combination Therapy	20 patients	23.8
Adverse Effects	Pain/Fatigue		21.4
	Nausea/Vomiting		20.2
	Weakness		17.9
	Anemia		15.5
	Diarrhea		15.5
	Dry Mouth		9.5

Note: The data summarize age distribution, disease stage, treatment pattern, and adverse effects among 84 breast cancer patients.

DISCUSSION: BREAST CANCER

The findings highlight that breast cancer predominantly affects middle-aged women, particularly between 41 and 50 years, which aligns with current national epidemiological trends. The predominance of advanced-stage diagnosis suggests insufficient awareness and late screening participation, emphasizing the need for community-based detection programs. The high reliance on chemotherapy and targeted therapies demonstrates adherence to conventional systemic regimens widely used in public tertiary hospitals. Adverse effects such as fatigue, nausea, and anemia were consistent with typical cytotoxic drug profiles and were effectively managed through supportive interventions. Despite the toxicity burden, most patients reported satisfactory quality of life (FACT-G7), reflecting the benefit of structured symptom control and counseling.

However, the economic burden remains a major concern due to the high variability in treatment costs. Overall, this study reinforces that early diagnosis and cost-optimized regimens are essential to improve outcomes and reduce the treatment burden among Indian breast cancer patients.

RESULT 2: CERVICAL CANCER

The study included 55 patients diagnosed with cervical cancer. The majority (50.9%) were between 51 and 60 years, followed by 61–70 years (36.4%), indicating a predominance among postmenopausal women. None were reported below 40 years of age. In terms of disease stage, the largest group (56.4%) presented with Stage IV, followed by Stage III (18.2%) and Stage II (9.1%), while only 1.8% were diagnosed in Stage I. A small portion (14.5%) had unspecified staging, indicating documentation gaps. Regarding comorbidities, 87.3% of patients had none, while 12.7% reported diabetes, hypertension, or renal issues. The treatment protocols revealed that combination therapy (chemo with or without targeted therapy) was the most used regimen (65.5%), followed by chemotherapy alone (30.9%) and immunotherapy (3.6%). Adverse effects were observed in 72.7% of patients. The most common included fatigue (41.8%), weakness (34.5%), and nausea/vomiting (30.9%). Hematological toxicities such as anemia (21.8%) and neutropenia (20.0%) were clinically relevant but manageable. The direct medical cost ranged from ₹4,000 to ₹20 lakh, reflecting wide financial variability and occasional treatment interruptions due to affordability issues.

Table 02: Summary of Cervical Cancer Results

Category	**Parameter**	**Observation**	**rcentage (%)**
Age Distribution	20–30 years	0 patients	0.0
	31–40 years	0 patients	0.0
	41–50 years	4 patients	7.3
	51–60 years	28 patients	50.9
	61–70 years	20 patients	36.4
	71–80 years	3 patients	5.5
Stage at Diagnosis	Stage I	1 patient	1.8
	Stage II	5 patients	9.1
	Stage III	10 patients	18.2

	Stage IV	31 patients	56.4
	Not Specified	8 patients	14.5
Comorbidities	None		87.3
	Diabetes/Hypertension/Renal Issues		12.7
Treatment Protocol	Combination Therapy	36 patients	65.5
	Chemotherapy Only	17 patients	30.9
	Immunotherapy	2 patients	3.6
Adverse Effects	Fatigue		41.8
	Weakness		34.5
	Nausea/Vomiting		30.9
	Anemia		21.8
	Neutropenia		20.0
Economic Evaluation	Direct Medical Cost	₹4,000–₹20,00,000	-

DISCUSSION: CERVICAL CANCER

The results demonstrate that cervical cancer remains prevalent among older women, with most cases diagnosed at advanced stages (Stage III–IV). Late presentation continues to be a key barrier to favorable outcomes, emphasizing the importance of regular Pap smear and HPVbased screening in the target age group.

The predominance of combination chemotherapy mirrors standard practice in managing locally advanced and metastatic cases. While adverse effects such as fatigue, weakness, and anemia were frequent, most patients maintained functional well-being due to timely symptom control. The quality of life outcomes suggest that structured supportive measures and psychosocial counseling play a vital role in sustaining treatment adherence. The economic evaluation revealed wide disparities in cost, which may affect continuity of care, highlighting the need for accessible oncology services. In conclusion, the study emphasizes the urgency of early detection, affordable treatment protocols, and comprehensive supportive care to improve both survival and life quality among women affected by cervical cancer.

CONCLUSION

- ✓ The study evaluated clinical features, treatment modalities, adverse effects, quality of life, and the cost burden in breast and cervical cancer patients. Most breast cancer patients were middle-aged (41–50), whereas the cervical cancer participants were older (51-60).
- ✓ Diagnosis of late stage was common among both cancer groups, i.e., breast cancer (stage III, 51-2%) and cervical cancer (IV stage, 56-4%), indicating the need for enhancement of screening and early diagnosis programs.
- ✓ Co-morbidities were more prevalent in the breast cancer cohort (42.9%) when compared to cervical cancer patients (12.7%). Most breast and cervical cancer patients underwent chemotherapy, followed by targeted therapy and therapy combinations and tolerable side effects (fatigue, nausea, anemia) were noted in most patients, with supportive care in place.
- ✓ Despite a significant amount of patients experiencing toxicities, the vast majority of patients in the study had good physical and emotional health per the FACT-G7, indicating the positive effect integrated supportive care can have in improving treatment tolerability.
- ✓ Significant variability was also found in treatment costs, ranging from ₹4,000 to ₹20 lakh, which also adds a financial burden to the patient.
- ✓ The study shows that need for early cancer diagnostics, multidisciplinary care and treatment options accessible economically for breast and cervical cancer patients to improve survivorship and quality of life.

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