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Nutritional Care in Cancer Chemotherapy

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Abstract

Aim: *To evaluate the impact of structured nutritional care on the nutritional status, treatment tolerance, and clinical outcomes of cancer patients undergoing chemotherapy.*

Materials and methods: *This was a prospective, randomized controlled trial conducted at a tertiary oncology centre. Adults (≥18 years) with solid tumors starting cytotoxic chemotherapy, ECOG 0–2, and treatment duration ≥8 weeks were eligible. Patients with concurrent tube/parenteral nutrition, uncontrolled endocrine disease, refractory nausea/vomiting, pregnancy/lactation, or inability to consent were excluded. One hundred participants were randomized 1:1 to Intensive Nutritional Care (INC) or Usual Care (UC) using computer-generated blocks, stratified by tumor site (GI vs non-GI) and baseline nutritional risk (PG-SGA A vs B/C). Ethical approval and written informed consent were obtained.*

Results: *In this study of 100 cancer patients undergoing chemotherapy (INC = 50, UC = 50), baseline characteristics were comparable between groups, with 60% classified as malnourished by PG-SGA. At the end of treatment, the intervention group (INC) showed better outcomes, including lower PG-SGA scores (5.8 vs. 9.2), stable body weight compared to loss in UC, higher serum albumin levels (3.74 vs. 3.48 g/dL), and greater achievement of energy targets (88% vs. 54%). Additionally, chemotherapy dose reductions were less frequent in INC (14%) than UC (32%), indicating that structured nutritional care improved nutritional status, energy intake, and treatment tolerance.*

Conclusion: *Early and structured nutritional care during chemotherapy improves nutritional status, treatment tolerance, and overall outcomes in cancer patients.*

Keywords: *malnutrition, nutrition, chemotherapy*

INTRODUCTION

The management of cancer patients has shifted in recent years toward a more patient-centered approach, with emphasis on quality of life and long-term treatment outcomes. The introduction of targeted therapies and immune modulators has extended survival but also increased treatment complexity, costs, and side effects. In this setting, nutrition plays a central role, as malnutrition affects nearly half of all cancer patients and is associated with complications such as muscle wasting, poor treatment tolerance, prolonged hospital stays, and reduced survival. Despite the availability of effective screening tools, a significant proportion of malnourished patients remain undetected or inadequately managed, highlighting the need for early and systematic nutritional assessment.[1,2,3]

Early detection of malnutrition is crucial because weight loss, sarcopenia, and poor dietary intake negatively influence treatment outcomes. Screening should be initiated at diagnosis and repeated throughout the treatment pathway, using validated tools such as MUST, NRS-2002, MNA, or PG-SGA. The European and global guidelines emphasize simple but effective measures like tracking weight loss while also recommending more advanced body composition assessments when feasible. However, in real-world practice, only a minority of patients undergo structured screening and intervention, and even fewer receive specialist nutritional care, despite evidence linking nutritional status with tolerance and response to therapy.[4,5]

During chemotherapy, unintentional weight loss and muscle depletion are common and contribute to toxicities such as fatigue, mucositis, dysgeusia, hematologic complications, and poor overall tolerance. Nutritional interventions aim to maintain energy intake (25–30 kcal/kg/day) and protein supply (1.2–1.5 g/kg/day), with dietary counseling, oral nutritional supplements, and escalation to enteral or parenteral support when required. Physical activity and pharmacological approaches, including appetite stimulants or specific supplements, may further support lean body mass and functional capacity. Timely reassessment, ideally every month, is necessary to adjust interventions and prevent deterioration during ongoing chemotherapy.[6,7,8]

Evidence shows that proactive nutritional care not only improves dietary intake, body weight, and treatment adherence but also reduces hospitalizations and enhances quality of life. Although survival benefits are less consistently demonstrated, maintaining nutritional status helps patients complete chemotherapy, thus preserving the chance of long-term disease control or cure. Multidisciplinary collaboration between oncologists, dietitians, and nurses, along with patient engagement tools such as apps or educational materials, is essential to integrate nutrition into standard cancer care. Ultimately, structured nutritional care during chemotherapy represents a cost-effective and patient-centered strategy to optimize both treatment tolerance and overall outcomes.[9,10]

MATERIALS AND METHODS

This was a prospective, randomized controlled trial conducted at a tertiary oncology centre. Adults (≥18 years) with solid tumors starting cytotoxic chemotherapy, ECOG 0–2, and treatment duration ≥8 weeks were eligible. Patients with concurrent tube/parenteral nutrition, uncontrolled endocrine disease, refractory nausea/vomiting, pregnancy/lactation, or inability to consent were excluded. One hundred participants were randomized 1:1 to Intensive Nutritional Care (INC) or Usual Care (UC) using computer-generated blocks, stratified by tumor site (GI vs non-GI) and baseline nutritional risk (PG-SGA A vs B/C). Ethical approval and written informed consent were obtained.

The INC group received a structured, dietitian-led program with individualized calorie/protein targets, symptom-based counseling, oral supplements as needed, weekly follow-ups, and escalation to enteral support if intake was inadequate. The UC group received routine ward counseling and printed diet sheets without structured follow-up. Outcomes were measured at baseline, mid-treatment, end of chemotherapy, and 30-day follow-up. The primary outcome was change in PG-SGA score; secondary outcomes included anthropometry, biochemical markers, dietary intake, chemotherapy tolerance, hospitalizations, and quality of life.

Data analysis was carried out on an intention-to-treat basis. Continuous variables were summarized as mean with standard deviation or median with interquartile range and compared between groups using t-tests or Mann–Whitney U tests as appropriate. Categorical variables were analyzed using chi-square or Fisher's exact tests, while the primary outcome was evaluated with ANCOVA adjusted for baseline PG-SGA, tumor site, and stratification factors, with statistical significance set at $p<0.05$.

RESULTS

Table 1: Baseline characteristics of study participants (N=100)

Variable	INC (n=50)	UC (n=50)	Overall (N=100)
Age (years, mean ± SD)	53.6 ± 11.0	54.8 ± 10.6	54.2 ± 10.8
Female, n (%)	24 (48%)	24 (48%)	48 (48%)
Weight (kg, mean ± SD)	67.8 ± 11.6	69.2 ± 12.3	68.5 ± 12.0

BMI (kg/m², mean ± SD)	24.9 ± 4.1	25.3 ± 3.7	25.1 ± 3.9
PG-SGA malnourished (B/C), n (%)	30 (60%)	30 (60%)	60 (60%)

Table 2: Key outcomes at end of chemotherapy (Week 8–12)

Outcome	INC (n=50)	UC (n=50)	Overall (N=100
PG-SGA score (mean ± SD)	5.8 ± 3.1	9.2 ± 4.8	7.5 ± 4.4
Weight change (kg, mean ± SD) |	0.1 ± 1.2 |	3.2 ± 2.1 |	1.6 ± 2.0
Albumin (g/dL, mean ± SD)	3.74 ± 0.42	3.48 ± 0.53	3.61 ± 0.48
Energy target achieved, n (%)	44 (88%)	27 (54%)	71 (71%
Chemo dose reduction, n (%)	7 (14%)	16 (32%)	23 (23%)

DISCUSSION

Nutritional care has become an integral component of cancer management, particularly during chemotherapy, where the combined effects of the disease and cytotoxic treatments often lead to weight loss, muscle wasting, and reduced functional capacity. Malnutrition is highly prevalent among cancer patients and is strongly associated with poorer tolerance to therapy, increased complications, diminished quality of life, and reduced survival. Early identification of nutritional risk and timely intervention not only help patients maintain strength and body composition but also improve treatment adherence and outcomes, making nutrition a cornerstone of supportive care in oncology.[11,12]

Our study enrolled 100 participants, equally divided between the intervention group (INC, n=50) and the usual care group (UC, n=50). The mean age of the cohort was 54.2 ± 10.8 years, with similar distributions across groups (53.6 ± 11.0 in INC and 54.8 ± 10.6 in UC). Women accounted for 48% of participants in both groups. The mean body weight was 67.8 ± 11.6 kg in the INC group and 69.2 ± 12.3 kg in the UC group, resulting in an overall average of 68.5 ± 12.0 kg. Mean BMI was comparable across groups, with 24.9 ± 4.1 in INC, 25.3 ± 3.7 in UC, and an overall mean of 25.1 ± 3.9. According to the Patient-Generated Subjective Global Assessment (PG-SGA), 60% of participants in both groups were classified as malnourished (categories B/C), indicating that malnutrition was prevalent at baseline.

At the end of chemotherapy (week 8–12), notable differences emerged between groups. The mean PG-SGA score was lower in the INC group (5.8 ± 3.1) compared to the UC group (9.2 ± 4.8), reflecting better nutritional status in the intervention arm. Weight change also differed significantly, with the INC group showing near stability (0.1 ± 1.2 kg) versus a gain of 3.2 ± 2.1 kg in the UC group, for an overall mean change of 1.6 ± 2.0 kg. Serum albumin levels were slightly higher in INC (3.74 ± 0.42 g/dL) compared to UC (3.48 ± 0.53 g/dL), with an overall mean of 3.61 ± 0.48 g/dL. Importantly, 88% of INC patients achieved their prescribed energy target, compared with only 54% in UC, yielding an overall rate of 71%. Chemotherapy dose reductions were less frequent in the intervention group (14%) than in the usual care group (32%), resulting in an overall reduction rate of 23%.

In the study by Álvaro Sanz E et al., patients with cancer frequently experienced malnutrition, which was associated with higher rates of morbidity and mortality. Of the 234 patients included, 84 (36%) required individualized nutritional care: 27 (32.1%) had high nutritional risk, 12 had a Nutriscore ≥5, and 45 experienced weight loss during chemotherapy. At study entry, mean weight loss compared to normal weight was −3.6% ± 8.2, whereas by the end of chemotherapy, the mean change was 0% ± 7.3 ($p < 0.001$), with 71% of patients maintaining or gaining weight relative to baseline. The findings showed that more than one-third of patients starting chemotherapy were candidates for early nutritional intervention,

emphasizing the importance of timely identification of those at risk to enhance the effectiveness of nutritional management across all disease stages.[13]

Lee Ho et al. reported a case study describing the nutritional diagnosis and intervention of a malnourished patient undergoing chemotherapy for colorectal cancer, later complicated by liver metastasis. The patient had lost 17% of body weight over three months due to chemotherapy-induced stomatitis, nausea, and vomiting. Using the nutrition care process across two screening rounds, oral intake improved from 28% to 62% of recommended needs, with continued monitoring required after discharge. The authors suggested that earlier patient education and dietary management following the first chemotherapy cycle might have prevented severe weight loss, emphasizing the importance of proactive nutritional guidance and continuous monitoring to reduce malnutrition in patients receiving chemotherapy.[14]

Maschke J et al. conducted a survey in Germany to evaluate the status of nutritional care among cancer patients, with 1,335 participants completing an online questionnaire. While 69% had received some form of nutrition-related information, this was mostly from print media (68.5%) or self-help groups (58.7%) rather than healthcare professionals, and over half (57%) reported unresolved nutrition-related questions or eating difficulties. Key topics of interest included healthy diet, weakness/fatigue, dietary supplements, and taste changes, with dietitians (38.7%) and physicians (9.8%) being the main professional sources of advice. Women were nearly twice as likely as men to receive hospital-based nutrition counseling, and 24.1% of patients reported using dietary supplements, a trend significantly higher among those who had received nutritional information. The study concluded that although nutrition is a vital component of cancer care, many patients still lack access to high-quality nutrition therapy during and after treatment.[15]

The evidence from our study, supported by findings from previous clinical and observational research, underscores that nutritional care plays a decisive role in optimizing cancer treatment outcomes. Patients receiving structured, individualized nutritional support not only demonstrated better maintenance of weight, nutritional markers, and treatment adherence but also experienced fewer therapy interruptions compared to those given usual care. Published studies consistently highlight the high prevalence of malnutrition in cancer, its adverse impact on prognosis, and the clear benefits of early, proactive intervention. Collectively, these findings emphasize the need to integrate dietitian-led, patient-centered nutritional care into routine oncology practice, ensuring that it is recognized as a core element of comprehensive cancer management rather than an optional adjunct.

CONCLUSION

Early and structured nutritional care during chemotherapy improves nutritional status, treatment tolerance, and overall outcomes in cancer patients.

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