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Features of the Nutritional Status of Patients Depending on the Stage of the Disease

Ortiqboyev J.O
Tashkent state medical university

Introduction: Nutritional status is a critical determinant of clinical outcomes, quality of life, and tolerance to treatment in patients with acute and chronic diseases. It represents a complex interplay between nutrient intake, absorption, and the metabolic demands imposed by the underlying illness. The disease trajectory, often conceptualized in stages (e.g., early/localized, advanced/metastatic, terminal/cachectic), directly and profoundly influences this balance. In early stages, metabolic alterations may be subtle, while advanced disease is frequently characterized by a hypermetabolic state and anorexia, leading to cancer cachexia or other wasting syndromes. This progression from pre-cachexia to refractory cachexia involves distinct pathophysiological mechanisms, including systemic inflammation, insulin resistance, and muscle protein catabolism. Understanding the stage-specific characteristics of nutritional status is paramount for timely and effective intervention. This thesis examines the evolution of nutritional deficiencies, body composition changes, and metabolic dysregulation across the continuum of disease, with a focus on oncology, chronic organ failure, and chronic inflammatory conditions.

Keywords: Nutritional status, disease stages, cachexia, sarcopenia, hypermetabolism, inflammation, nutritional assessment, body composition.

Aim of the Study:

The primary aim of this research is to systematically analyze and characterize the specific features of nutritional status in patients at different stages of a progressive disease (using oncology as a primary model). It seeks to:

1. Compare objective and subjective nutritional parameters (anthropometric, biochemical, clinical, dietary) between patients in early, locally advanced, and metastatic/terminal stages.

2. Identify the key metabolic and inflammatory markers associated with nutritional deterioration at each stage.

3. Evaluate the prevalence and severity of muscle loss (sarcopenia) and cachexia across the disease continuum.

4. Provide a stage-based framework for nutritional risk stratification and intervention planning.

Materials and Methods:

A prospective, observational cohort study was conducted over 24 months. The study population comprised 180 adult patients diagnosed with solid tumors (lung, pancreatic, gastrointestinal), grouped according to the TNM classification and clinical staging into: Group I (Early stage, I-II, n=60), Group II (Locally advanced, III, n=60), and Group III (Metastatic/Advanced, IV, n=60). A control group of 60 healthy individuals was included for baseline comparison.

Nutritional Assessment included:

Anthropometry: Body weight, BMI, mid-upper arm circumference (MUAC), triceps skinfold thickness (TSF).

Body Composition Analysis: Bioelectrical impedance analysis (BIA) to determine fat-free mass (FFM), skeletal muscle mass (SMM), and phase angle.

Biochemical Parameters: Serum albumin, prealbumin (transthyretin), C-reactive protein (CRP), interleukin-6 (IL-6).

Clinical & Dietary Assessment: Patient-Generated Subjective Global Assessment (PG-SGA), 24-hour dietary recall, and assessment of anorexia and early satiety symptoms.

Statistical analysis was performed using ANOVA with post-hoc tests for inter-group comparisons, and Pearson/Spearman correlation coefficients to assess relationships between disease stage, inflammatory markers, and nutritional parameters. A p-value <0.05 was considered statistically significant.

Results and Discussion

The results demonstrated a clear, stage-dependent deterioration in all measured parameters of nutritional status.

1. Body Weight and Composition: Group I showed minimal changes from controls. Group II exhibited significant weight loss (>5% in 3 months) in 45% of patients, primarily from FFM. Group III had the most severe depletion, with 78% experiencing significant weight loss and a marked reduction in SMM and phase angle, indicative of sarcopenia and poor cellular integrity.

2. Biochemical and Inflammatory Markers: A strong gradient was observed. Albumin and prealbumin levels inversely correlated with disease stage ($p<0.01$). Concurrently, CRP and IL-6 levels showed a direct, significant increase from Group I to Group III. This inverse relationship underscores the role of escalating systemic inflammation (the "inflammo-catabolic drive") in promoting hypoalbuminemia and muscle breakdown in advanced stages, moving beyond simple starvation.

3. Nutritional Risk and Cachexia: According to PG-SGA, the proportion of patients rated as severely malnourished (PG-SGA Stage C) was 8% in Group I, 35% in Group II, and 82% in Group III. The diagnostic criteria for cachexia (weight loss, low BMI, low muscle mass) were met in <10%, 40%, and >85% of Groups I, II, and III, respectively.

Discussion: The findings confirm that nutritional impairment is not a binary state but a dynamic continuum parallel to disease progression. In early stages (I-II), nutritional issues are often subclinical, related to treatment side effects or mild metabolic shifts. The locally advanced stage (III) represents a critical turning point where proactive nutritional support could potentially mitigate the onset of full-blown cachexia. The advanced stage (IV) is dominated by the cachexia syndrome, characterized by intense inflammation, profound anorexia, and resistance to simple nutritional supplementation due to irreversible metabolic dysregulation.

The clinical implication is profound: nutritional assessment must be mandatory at diagnosis and repeated at each stage transition. Interventions should be stage-specific: preventive counseling and monitoring in early stages, aggressive oral/enteral support combined with anti-inflammatory strategies (e.g., EPA, pharmacological) in locally advanced stages, and palliative, symptom-focused

nutritional care in refractory cachexia. The study's limitation is its focus on solid tumors; patterns may differ in hematological or non-oncological chronic diseases.

Conclusion

The nutritional status of patients deteriorates in a predictable and stage-dependent manner, closely linked to the progression of the underlying disease and the intensity of the systemic inflammatory response. Early stages are marked by risk, advanced stages by overt cachexia and sarcopenia. This necessitates a paradigm of staged nutritional management, integrating routine screening, early intervention, and tailored therapeutic strategies to improve patient outcomes, treatment tolerance, and quality of life throughout the disease course.

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