TURKISH JOURNAL OF INTERNAL MEDICINE

ISSN:2687-4245

Review Article

Nutrition in Internal Medicine

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ABSTRACT

Nutritional support has become a part of patient treatment. The nutritional content varies depending on the underlying disease in each patient. Malnutrition is defined as a condition that arises due to inadequate or excessive nutrition. Malnutrition is a major contributor to both morbidity and mortality, with its risk significantly heightened in hospitalized patients. Early assessment of a patient's nutritional status and timely appropriate treatment initiation can effectively reduce morbidity and mortality rates. As malnutrition is preventable, identifying at-risk patients and providing adequate nutritional support are essential components in optimizing clinical outcomes. Therefore, this review summarizes the nutritional approach to some common diseases in internal medicine practice. Our review's recommendations are based on guidelines from the European Society for Clinical Nutrition and Metabolism (ESPEN).

Turk J Int Med 2025;7(2):36-43
DOI: 10.46310/tjim.1571069

Keywords: *Malnutrition, nutritional approach, internal medicine*

INTRODUCTION

Malnutrition is a condition that leads to physical and mental impairments, with clinically observable effects on body structure and function, due to inadequate or excessive nutrition. The risk of malnutrition is elevated in hospitalized patients, with studies indicating that this risk ranges between 30% and 50% in this population.[1] The catabolic processes induced by cytokine release secondary to disease, along with accompanying conditions such as anorexia, nausea, vomiting, and immobility in patients, lead to impaired nutrition, energy, and protein loss. In patients who do not receive adequate nutritional support, the onset of malnutrition leads to increased morbidity and mortality.[2] Given the significant impact of nutritional status on clinical outcomes, assessing patients' nutritional status upon admission and promptly identifying those at risk of malnutrition to provide

Received: *October21, 2024* ***Accepted:*** *January 17, 2025* ***Published:*** *April 29, 2025*

How to cite this article: *Ozcetin M., Dizdar OS. Nutrition in Internal Medicine, Turk J Int Med 2025;7(2):36-43. DOI: 10.46310/tjim.1571069*

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appropriate nutritional support is essential. Several tools are available to evaluate nutritional risk. Commonly used malnutrition screening tests include Nutritional Risk Screening (NRS) 2002, Mini Nutritional Assessment (MNA), Simplified Nutrition Assessment Questionnaire (SNAQ), SCREEN II (Seniors in the Community: Risk Evaluation for Eating and Nutrition), Malnutrition Universal Screening Tool (MUST), and Malnutrition Screening Tool (MST). The patient population, ease of application, and ability to detect patients should be considered when selecting tests.[3] After determining the malnutrition status of the patients, the required calorie intake should be calculated based on their nutritional status. Although the gold standard for calorie estimation is the indirect calorimetry method, the Harris-Benedict formula, which is easier to apply and less expensive, is more frequently used in clinical practice.[4,5] This formula calculates the basal energy needs of the patients, and additional energy requirements are determined based on the clinical condition.

Early detection of malnutrition and timely initiation of treatment are crucial in reducing morbidity and mortality, shortening hospital stays, and lowering the frequency of readmissions. Therefore, we addressed nutritional management based on common diseases encountered in internal medicine clinics. The recommendations in our review are based on guidelines prepared by the European Society for Clinical Nutrition and Metabolism (ESPEN).[6-9]

Nutrition in hospitalized patients with polymorbidity

As life expectancy increases, the prevalence of multiple chronic diseases in individuals has also risen. The presence of at least two chronic conditions is defined as polymorbidity.[10] Research has demonstrated that nutritional support helps reduce complications and disease burden in individuals with polymorbidity.11 Therefore, nutritional support is especially critical in hospitalized patients with polymorbidity.

A basic screening should be performed to assess the risk of malnutrition in patients. For those identified as being at high risk, it is crucial to plan treatment thoroughly and initiate early nutritional support. Studies have demonstrated that patients at risk for malnutrition and receiving early nutritional intervention show significant improvements.[11,12] It has been reported that initiating nutritional support within 48 hours of hospitalization and ensuring that at least 75% of energy and protein requirements are met in patients with reduced oral intake effectively reduces mortality and the development of complications.[13]

As a result of the effects associated with inflammation, an increase in insulin resistance, lethargy, anorexia, and sarcopenia occurs.[14] Thus, the degree of acute phase response is important for nutritional screening and treatment planning. It has been shown that nutritional response is significantly reduced in patients with high inflammation.[15] Although various measurement methods are available to determine energy needs in hospitalized patients, their clinical use is challenging. Therefore, energy needs can be determined as 27 kcal/kg/day in individuals over 65 with polymorbidity and 30 kcal/kg/day in underweight patients. However, caution should be exercised regarding the refeeding syndrome, and the target should be reached gradually.

In previous studies, the daily protein requirement in patients was recommended as 1 g/kg/day. However, in hospitalized patients with polymorbidity, daily protein intake has been adjusted to 1.2-1.5 g/kg, and the results have shown reductions in mortality and complication risk as well as hospital readmissions.[13,16-17] A preliminary screening should be conducted to evaluate the risk of malnutrition in patients. Developing a comprehensive treatment plan and initiating early nutritional support is essential for those identified as high-risk. Research indicates that patients at risk for malnutrition and receiving timely nutritional intervention exhibit significant improvements.[12] Furthermore, studies have reported that starting nutritional support within 48 hours of hospitalization and ensuring that at least 75% of energy and protein needs are met in patients with reduced oral intake can reduce mortality and complication rates.[13]

In hospitalized patients who can take oral intake, vitamin and mineral supplementation should be provided based on demonstrated deficiencies or predicted decreases due to treatment (e.g., vitamin B12 deficiency with proton pump inhibitor use or thiamine deficiency with diuretic use).

If safe oral intake is feasible, personalized oral nutritional supplements should be tailored to meet the patient's energy and protein needs. When conditions such as loss of appetite, nausea, or vomiting—common complications that may impede oral intake—arise alongside the underlying diseases, enteral or parenteral nutritional support should be implemented. Enteral nutrition should be prioritized, as it helps maintain bowel function and poses a lower risk of complications than parenteral nutrition.[18,19] Gastrointestinal issues, such as diarrhea or constipation, are common during enteral

nutrition in patients. Formulas enriched with soluble and insoluble fibers are recommended to enhance bowel function in patients receiving enteral nutritional support.

Studies have shown that polypharmacy can be associated with sarcopenia and malnutrition, leading to nutrient and electrolyte deficiencies.[20-22] Due to the high number of medications used in patients with polymorbidity, drug-drug or drug-nutrient interactions should be considered.

Nutritional support should continue after discharge in patients with high malnutrition risk, insufficient nutrition, and polymorbidity. It should be noted that nutritional support can help prevent hospital re-admissions and reduce complications and mortality.

Nutrition in non-alcoholic fatty liver disease

Non-alcoholic fatty liver disease (NAFLD) is defined as hepatic steatosis (>5% hepatic steatosis) in individuals with no or minimal alcohol consumption (less than 20 g/day in women and less than 30 g/day in men), at least one risk factor for cardiometabolic dysfunction (such as obesity, dyslipidemia), and no underlying liver disease. Histological findings of hepatocellular damage recognize non-alcoholic steatohepatitis (NASH). NAFLD is one of the major causes of cirrhosis.

For screening NAFLD in obese or overweight patients with metabolic syndrome, ultrasound imaging is recommended as the initial approach. However, due to the decreased sensitivity of ultrasound in cases of increasing BMI (especially in stage 2 and 3 obese patients), abdominal computerized tomography (CT) should be performed in cases of suspicion.[23] Transaminase level measurements should not be used to exclude NAFLD. Tests such as SteatoTest, Hepatic Steatosis Index, and Fatty Liver Index can be utilized to diagnose NAFLD in patients who do not consume alcohol, have no coexisting liver disease, and present with metabolic syndrome. Patients diagnosed with NAFLD should be screened for type 2 diabetes, dyslipidemia, cardiovascular disease, obstructive sleep apnea, polycystic ovary syndrome, and osteoporosis.

Once NAFLD is detected, patients should be advised on lifestyle changes, and diet and exercise programs should be arranged. Studies have shown that a 3-5% weight loss improves hepatic steatosis, and a 7-10% weight loss improves fibrosis.[24] Patients with NAFLD are at high risk for sarcopenia, and the development of sarcopenia may lead to increased liver fibrosis.[25-28] Therefore, patients should be closely monitored for sarcopenia during weight loss.

Various formulas are used to determine patient energy needs (such as indirect calorimetry or the Harris-Benedict formula). When using these formulas is difficult, a 25 kcal/kg formula based on ideal body weight can be applied. In obese patients, using ideal body weight rather than actual body weight for calculations may underestimate energy requirements. This is because fat tissue still contributes to overall energy expenditure while consuming less energy (4.5 kcal/kg/day) than muscle tissue (13 kcal/kg/day).[29] In obese patients, approximately 10% of the excess weight is assumed to be muscle mass. The adjusted body weight formula determines energy needs in obese patients. To calculate adjusted body weight, approximately 33% of the difference between actual and ideal body weight should be added to the ideal body weight.

In obese NAFLD patients who are not losing weight, the protein requirement is recommended as 1 g/adjusted body weight/day. In contrast, in obese patients undergoing weight loss, 1.2 g/adjusted body weight/day is recommended to prevent the risk of sarcopenia.

The Mediterranean diet should be recommended to NAFLD patients due to its beneficial effects on insulin resistance, hepatic steatosis, and fibrosis, even without weight loss.[30,31] Vitamin E is an antioxidant, and studies have shown that daily use of 800 IU of vitamin E improves hepatic steatosis and fibrosis in NAFLD patients.[32,33] Therefore, daily use of 800 IU of vitamin E is recommended for non-diabetic patients with histopathologically confirmed steatosis. Omega-3 fatty acids may not affect hepatic steatosis and fibrosis, but they can improve triglyceride levels and liver enzymes and, therefore, may be recommended for NAFLD patients.[34-37]

Nutrition in acute kidney injury

Acute kidney injury (AKI) is characterized by a reduction in glomerular filtration rate (GFR) and an increase in serum creatinine levels or the onset of oliguria, occurring within 48 hours to 7 days. As kidney function declines, disturbances arise in fluid, electrolyte, and acid-base balance and in protein, lipid, and carbohydrate metabolism. Due to the underlying diseases and decreased kidney function, metabolic changes occur in patients, including increased insulin resistance, protein catabolism, pro-inflammatory system activation, antioxidant system reduction, and immune deficiency.38 Due to these metabolic changes, the risk of malnutrition increases in patients with kidney dysfunction due to inadequate nutrient intake.[39] Therefore, nutritional support should be provided to patients with kidney

dysfunction. Oral nutritional supplements should be added for patients who can safely eat orally but cannot meet their nutritional needs through diet alone. Patients who cannot meet at least 70% of their daily nutritional needs through oral intake should be evaluated for enteral or parenteral nutritional support. Enteral nutrition should be the first choice as it carries a lower risk of infectious and non-infectious complications compared to parenteral nutrition.[40]

Early nutritional support (within less than 48 hours) has positively affected sarcopenia development and patient survival. Therefore, if safe, oral nutrition should be started, and if oral intake is limited, early enteral nutritional support should be initiated. If contraindications exist for oral or enteral nutrition, parenteral nutritional support should be initiated within 3 to 7 days. Due to the risk of refeeding syndrome, nutritional support should be started at a low dose and gradually increased.

To prevent undernutrition or overnutrition in patients with kidney dysfunction, energy and protein needs should be calculated, and nutrition should be initiated accordingly. The most appropriate method is indirect calorimetry. Although its clinical use is limited, the calculation of actual body weight in patients with kidney dysfunction is challenging due to the risk of fluid retention, and other methods used to determine energy needs may lead to undernutrition or overnutrition.[41]

As a result of metabolic changes associated with kidney dysfunction, it has been shown that carbohydrate utilization decreases and lipid consumption increases in kidney patients.[42] This should be considered when balancing carbohydrate and lipid content in enteral and parenteral nutritional support.

The protein requirement in patients with acute kidney injury should be 0.8-1 g/kg/day. However, the recommended protein requirement varies for patients with chronic kidney disease or those on dialysis. While the daily protein requirement is 0.6-0.8 g/kg/day in chronic kidney disease patients, it is recommended to be 1.2 g/kg/day in dialysis patients due to increased protein losses through renal replacement therapy.[43-46] In cases of acute kidney injury superimposed on chronic kidney disease, it is appropriate to determine protein needs based on the acute condition and increase it to 0.8-1 g/kg/day.

Due to decreased insulin degradation and increased insulin resistance resulting from reduced kidney function, the risk of hypoglycemia and hyperglycemia is high.47 Therefore, serum glucose levels should be maintained between 140-180 mg/dL. In dialysis patients, increased needs and losses, especially water-soluble vitamins, necessitate close monitoring and supplementation of vitamins (such as vitamin C, thiamine, and folate). Electrolyte abnormalities are also common in kidney patients and should be closely monitored. Care should be taken concerning hyponatremia, hyperkalemia, hyperphosphatemia, and hypocalcemia.

Acute pancreatitis and nutrition

Acute pancreatitis is a common gastrointestinal emergency. Since pancreatitis is a catabolic process, nutrition plays a pivotal role in its management.48 In patients with mild to moderate pancreatitis, oral feeding typically resumes within a few days.[49] However, intestinal barrier disruption may result in bacterial translocation and necrosis in cases of severe pancreatitis.[50] Patients with anticipated severe pancreatitis should be assessed for nutritional risk.

Oral feeding should be initiated if clinically tolerated in patients with pancreatitis, regardless of lipase levels.[51] It is recommended to start oral feeding with a low-fat, soft diet. Enteral feeding should be initiated for patients who cannot tolerate oral feeding instead of parenteral nutrition. Enteral nutrition has been shown to preserve the intestinal mucosa, enhance bowel motility and splanchnic blood flow, and reduce complications and mortality rates compared to parenteral nutrition.[52-54] If oral feeding is not tolerated, enteral feeding should be started within 24-72 hours. A nasogastric tube should be preferred for enteral feeding. However, nasojejunal feeding should be considered if patients experience intolerance, such as vomiting or pain. There is no significant difference between nasogastric and nasojejunal feeding regarding their effects on complication rates and mortality.[55,56] In cases where enteral feeding is not tolerated or contraindicated (such as bowel obstruction, mesenteric ischemia, paralytic ileus), parenteral nutrition should be administered. In severe pancreatitis cases where enteral nutrition is not feasible, and parenteral nutrition is used, a daily dose of 0.20 g/kg L-glutamine supplementation can be provided. Glutamine supplementation has been shown to play a role in reducing complications and mortality.[57] Other than glutamine, immunonutrition is not recommended in severe pancreatitis. Probiotics and pancreatic enzyme replacement should not be used unless exocrine pancreatic insufficiency develops.

CONCLUSIONS AND FUTURE CONSIDERATIONS

With the rising life expectancy and the growing prevalence of chronic diseases, malnutrition is emerging

as a major health concern. The nutritional status of patients affects disease progression, morbidity, and mortality. Therefore, a nutritional risk assessment should always be performed, and nutritional support should be provided for hospitalized or outpatient follow-up patients. It is imperative to enhance the nutritional management of patients, as evidenced by the demonstrable benefits of such practices. These benefits encompass improving hospitalization, optimizing outcomes, and significant financial savings.

Hospitalized adult patients frequently experience high rates of AKI and acute pancreatitis, which can result in a multitude of nutritional deficiencies. The clinical practice points provided herein encompass the assessment of nutrition, the determination of energy requirements, and the assessment of nutrient intake in such patients, drawing upon extant literature and the insights of a multidisciplinary panel of experts. The mounting evidence highlights the pivotal role of early oral refeeding or early administration of enteral nutrition in managing patients with acute pancreatitis, underscoring their status as essential elements of a comprehensive treatment approach.

Except for certain overarching nutritional guidelines, there is an emerging consensus that there is not, in fact, one optimal diet. Utilizing personalized nutrition as a future approach to patient management, particularly in the domain of internal medicine, is a novel concept that has emerged in recent years. The concept of personalized nutrition entails the selection of foods that are optimally suited to the individual, with this selection being made based on the impact of these foods on gene expression and/or the composition of gut microbiota. The definition of food has evolved to encompass not only its role as a source of energy and macronutrients and microelements but also its significance in determining health quality. Although the relationship between nutrients/food/meals, dietary patterns, and chronic diseases has been extensively researched over the last few decades, research into nutrition's role in managing chronic diseases remains a significant challenge. Another important contribution to personalized nutrition's role in managing nutrition will be the development of artificial intelligence (AI) algorithms to create a personalized diet for patients.

Conflict of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding Sources

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Authors' Contribution

Study Conception: MO, OSD; Study Design: MO; Literature Review: MO, OSD; Critical Review: OSD; Writer: MO.

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