



SUPPLEMENT ABSTRACTS

Conference Proceedings

**21st Symposium on Nutri Indonesia held in conjunction
with the 13th International Nutrition Symposium**



25–26 July 2026



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Table of Content

Page

Volume 10, Issue S1, October 2026 | page 1 – 28, | eISSN: 2580-7013

Abstracts Speakers

Yeh Y C	From microcirculation to the gut: rethinking nutrition timing in septic shock [1]	2
Pudjiadi C J	Clinical application of HMB & beta glucan to regain muscle, strength & immunity for faster recovery [2]	2-3
Triana R	Omega profile [3]	3
Sunardi D	Advancing gut health through nutritional interventions the importance of complete and optimal nutrition in early life [4]	4-5
Widodo A D	The importance of gut health in shaping early life [5]	5
Varon J	Precision protein: AI, chronobiology, and the future of personalized clinical nutrition [6]	6-7
Wong T	Protein in paediatric health and disease [7]	7
Fard S G	DHA bioavailability in early life: Does delivery format matter? [8]	7
Hussaini N	Protein beyond the hype: Why more is not better? [9]	7-8
Hardy G	Invitation to provide an Indonesian perspective for two international surveys on home care and clinical nutrition as a human right? [10]	8
Varon J	Protein as a resuscitation drug: From ICU survival to human resilience [11]	8-9
Puspitasari H A	Sodium and its impact on children's health [12]	10
Rosemiarti T	Safe drinking water: Its critical role in children's growth and development [13]	10
Mohamed H J J	The interlink between protein, linear growth and stunting in children [14]	11

Agdeppa I A	Limiting amino acid in rice-eating countries: Implications on growth and development [15]	11-12
Nakayama N	Cancer metabolism-hidden cause of sarcopenia [16]	12
Chandra D N Prafiantini E	Rethinking protein requirements in Southeast Asia: Bridging policy gaps and local nutritional contexts in an aging society [17]	12-13

Abstracts Oral Presentation Participants

Siswati T Hayati A W Paramashanti B A	Beyond calories: Protein as a missing link in the global stunting crisis [18]	13-14
Nathanian M	Body composition and adiposity changes following a workplace nutrition intervention in obese Indonesian office employees: A pilot study [19]	14
Surya S Adinhya P A Rini Surya F	High calories nutrition diet on Tetanus Ablett II-III : A case report [20]	15
Adisty M T Izzah N	Food acceptance of balanced meals based on the “isi piringku” guideline among Indonesian children: A plate waste observation [21]	16
Illona E Wiraputri A A W	Differential effects of glutamine supplementation in critically ill adult patients: A systematic review with subgroup analysis of burn and non-burn populations [22]	16-17
Walter B C Lestari W Sonia S	From muscle mass to functional recovery: the correlation between preoperative appendicular skeletal muscle index and post operative hand grip strength following elective laparotomy [23]	17-18
Nugraheni R Ariyati D Fajrin R	Effects of maternal balanced energy–protein supplementation during pregnancy and lactation on infant gut microbiome and early growth: A systematic review and meta-analysis of randomized controlled trials [24]	18
Fadhlan M M Kurniati A M Husin S Purnamasari S Liberty I A	Fat intake profile among third trimester pregnant women in Kertapati district [25]	19
Letissia A N Kurniawan M A Umar T P	The role of body composition on clinical outcomes of hemodialysis-dependent chronic kidney disease: A systematic review [26]	19-20

Luthfiya R I Maulidina A R Purnama S D Assifah N Gunawan V A Salsabila F Danastri H C Dewi O K Habibie I Y Nastania H I	A comparative study of household dietary diversity in double burden of malnutrition and non-double burden of malnutrition households in the city of Malang. [27]	20
Hakiki N Sihanto F N Nabila T Hudiyanto P S	Metabolically unhealthy normal weight versus metabolically healthy obesity: A systematic review of Asian cohort studies [28]	21
Sandra R A Fatmaningrum W	Nutritional status and sarcopenia in peripheral artery disease: prognostic and clinical implications A systematic review [29]	21-22
Kristanto A Primariayu M	Effect of vitamin d supplementation on maternal outcomes in pregnant women with obesity: A systematic review [30]	22
Latifa A Wiramihardja S Fatimah S N Suwarman Miranda M Nugraha G I	Decoding ICU malnutrition: A 2023 perspective using glim criteria in Bandung, Indonesia [31]	23
Amanda O Humairah N Famela A	Association of iron deficiency anaemia with cognitive and psychomotor development in children under five years: A systematic review [32]	23-24
Wiraputri A A W Ilona E Dewi I A I P	Indicators of protein adequacy in critical illness: A systematic review of their association across outcome domains [33]	24
Vointa A Fabiani H Sutanto L B	Correlation of nutritional status with vital lung capacity employee's at the university of Jakarta in 2025 [34]	25
Welan R Mardiah A	Nutritional management in a patient with severe malnutrition, stage V chronic kidney disease, and grade III sacral pressure ulcer: A case report [35]	25-26
Ramadhani Q Chandra N D Mirtha L T Khouw I T Sekartini R	Macronutrient intake and serum triglyceride status among Indonesian school-aged children: Findings from the SEANUTS II study [36]	26

MY M L Mardiah A	Balancing hypercatabolism and renal dysfunction: Nutritional therapy in active systemic lupus erythematosus with acute kidney injury [37]	27
Prasita R E Sitompul K A	High versus low protein intake in critically ill patients: A systematic review of mortality and length of stay [38]	27-28
Wijaya A R Saraswati P D Lianto A N Sumartini N K	Efficacy of Time-Restricted Eating (TRE) on cancer- related fatigue, quality of life, and treatment toxicity in adult cancer patients: A systematic review and meta-analysis [39]	28



SUPPLEMENT ABSTRACT

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21st Symposium on Nutri Indonesia, held in conjunction with the 13th International Nutrition Symposium: Abstract Supplement

EDITORIAL

It is our pleasure to present this special abstract supplement of the World Nutrition Journal (WNJ), featuring the scientific contributions presented at the 21st Symposium on Nutri Indonesia, held in conjunction with the 13th International Nutrition Symposium, on July 25–26, 2026, in Jakarta, Indonesia.

Under the theme “Beyond Calories: Protein for Growth, Strength, Recovery & Survival,” Nutri 2026 brought together national and international experts, researchers, and healthcare professionals to share advances in nutrition science and clinical practice.

This supplement brings together abstracts from invited speakers and 22 oral presentations, encompassing original research, systematic reviews, meta-analyses, and clinical case reports. The scientific contributions cover a broad spectrum of topics, including precision protein nutrition, nutritional management in critical illness, muscle preservation and recovery, maternal and child nutrition, gut health, stunting, metabolic disorders, and nutrition interventions across the lifespan.

Together, these abstracts highlight the evolving role of nutrition beyond meeting energy and protein requirements, emphasizing individualized, evidence-based approaches to improving clinical outcomes and overall health.

Through this supplement, the World Nutrition Journal aims to extend the dissemination of scientific knowledge presented at Nutri 2026, encourage further research, and foster collaboration among healthcare professionals and researchers worldwide.

We sincerely thank all invited speakers, researchers, oral presenters, scientific reviewers, and organizing committee members for their valuable contributions. We hope this collection of abstracts will serve as a meaningful scientific resource and inspire continued progress in nutrition science and clinical practice.

Dr. dr. Luciana B. Sutanto, MS, SpGK(K)

Editor-in-Chief



01 | From microcirculation to the gut: rethinking nutrition timing in septic shock

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Abstract

Nutrition in the icu is not a single therapeutic target but a context-sensitive intervention shaped by shock biology, gut perfusion, prognosis, and patient goals.

In septic shock, restoration of mean arterial pressure does not ensure recovery of microcirculatory or splanchnic perfusion. Capillary heterogeneity, endothelial injury, vasoconstriction, microthrombosis, barrier failure, dysbiosis, and nonocclusive mesenteric ischemia make the gut vulnerable during the acute phase of shock. Landmark evidence suggests that early full enteral feeding in ventilated shock patients does not improve survival and may increase bowel ischemia and gastrointestinal complications. A safer approach is to individualize nutrition according to shock trajectory, vasopressor dose, perfusion markers, feeding tolerance, lactate kinetics, abdominal signs, and clinical suspicion of mesenteric hypoperfusion. In early unstable shock, trophic feeding or temporary withholding may better respect gut biology than pursuing predicted caloric targets. At the end of life, the clinical question changes from nutritional adequacy to comfort, meaning, and proportionality. Artificial nutrition and hydration are medical treatments that require indication, benefit, consent, and alignment with patient values. Evidence shows limited survival or comfort benefit near death, while harms include aspiration, fluid overload, secretions, edema, agitation, and refeeding complications. In Asian ICUs, food often represents filial duty and continued care, making culturally sensitive communication essential. Clinicians should separate symbolic feeding from biological feeding, offer comfort feeding and meticulous mouth care, consider time-limited trials when uncertain, and de-escalate artificial nutrition when burdens outweigh benefits during shared, compassionate bedside decision- making.

Keywords: septic shock, microcirculation, enteral nutrition, endoflife care, artificial nutrition hydration

02 | Clinical application of HMB & beta glucan to regain muscle, strength & immunity for faster recovery

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Abstract

Nutrition in the icu is not a single therapeutic target but a context-sensitive intervention shaped by shock biology, gut perfusion, prognosis, and patient goals.

Loss of skeletal muscle mass and strength is a common consequence of aging, acute illness, hospitalization, surgery, and chronic inflammation. Sarcopenia and malnutrition are associated with impaired physical performance, delayed recovery, increased susceptibility to infection, prolonged hospitalization, and higher mortality. Skeletal muscle contributes to immune regulation through the production of myokines and amino acid substrates, nutritional interventions that support both muscle anabolism and immune function may provide important clinical benefits. A growing body of clinical evidence supports the use of oral nutritional supplementation (ONS) containing β -hydroxy- β -methylbutyrate (HMB), high-quality protein, and yeast derived beta-glucan (YBG) in individuals at risk of sarcopenia, malnutrition, and impaired immunity. Studies involving HMB-containing ONS have demonstrated improvements in body weight, mid-upper arm circumference, calf circumference, and physical performance among older adults and malnourished patients. In hospitalized and postoperative populations, supplementation has been associated with improved nutritional status, increased serum albumin concentrations, enhanced recovery, and reductions in complications, readmissions, and mortality. HMB is known to promote muscle protein synthesis and to reduce muscle protein degradation. YBG has demonstrated immunomodulatory effects, particularly on innate immune responses. Clinical studies have reported enhanced salivary immunoglobulin A recovery following exercise stress, increased circulating monocyte and T-cell concentrations. In conclusion, the combination of HMB, high-



quality protein, and YBG in ONS represents a promising nutritional strategy for supporting muscle recovery, improving nutritional status, and enhancing immune function, thereby contributing to faster recovery and improved clinical outcomes.

Keywords: HMB, beta-glucan, oral nutritional supplement, sarcopenia, muscle strength, immunity, malnutrition, recovery

03 | Omega profile

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Abstract

Dietary fats, primarily in the form of triglycerides, are essential macromolecules classified by their carbon chain length and degree of saturation (SFA, MUFA, PUFA).

Polyunsaturated fatty acids (PUFAs), specifically linoleic acid (LA) and alpha-linolenic acid (ALA), are nutritionally essential as the human body lacks the enzymes to synthesize them. These fats serve as primary energy sources, structural components of cell membranes (notably in the brain and retina), and precursors for bioactive signaling molecules. Genetic Regulation: The endogenous synthesis of long-chain PUFAs, such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), is regulated by the FADS1 and FADS2 gene cluster. These genes encode rate-limiting desaturase enzymes that determine the efficiency of fatty acid conversion. Genetic variants, such as the rs174547 SNP, significantly influence circulating levels of EPA and arachidonic acid (ARA), thereby modifying individual susceptibility to Type 2 Diabetes, cardiometabolic diseases, and systemic inflammation. Global Status and Monitoring: The Omega-3 Index (O3I)—measuring the percentage of EPA and DHA in red blood cell membranes—is a validated biomarker for cardiovascular risk and mortality. The 2024 Global World Map update reveals that status in most countries remains low to very low ($\leq 4\%$), with "desirable" levels ($> 8\%$) found primarily in Japan, South Korea, and Nordic nations. Recent advancements in Dried Blood Spot (DBS) analysis and Gas Chromatography-Mass Spectrometry (GC-MS) have enabled large- scale, cost-effective monitoring of these profiles across diverse populations. Health Impacts Across the Lifespan: Pregnancy and Development: Maternal PUFA metabolism is a critical factor in neonatal outcomes. DHA is indispensable for fetal neurodevelopment and visual acuity. Disruptions in these pathways are linked to preeclampsia, fetal growth restriction, and preterm birth. Cardiovascular and Metabolic Health: In adults, the heart relies on fatty acid oxidation (FAO) for approximately 80% of its ATP production. Maintaining a balanced n-6:n-3 ratio is vital to prevent arterial stiffness and metabolic syndrome. Musculoskeletal Health in the Elderly: Omega-3 supplementation (> 2 g/day) is a promising strategy to combat sarcopenia. Mechanisms include augmenting the mTORC1 pathway for protein synthesis, reducing protein breakdown through the ubiquitin-proteasome system, and enhancing mitochondrial biogenesis.

Conclusions: Systematic evidence across the sources underscores that dietary fat quality and genetic background are primary determinants of long-term health. Given the global deficiency in omega-3 levels and the significant impact of FADS genotypes, personalized nutritional interventions and direct supplementation of EPA and DHA are recommended to bypass metabolic bottlenecks and reduce the global burden of non-communicable diseases.

Keywords: Fatty Acid, Omega 3 Index, EPA, DHA, ALA, FADS, Non- communicable diseases



04 | Advancing gut health through nutritional interventions the importance of complete and optimal nutrition in early life

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Abstract

Nutrition during the first 1,000 days of life—from conception to two years of age—is the foundation for healthy growth, neurodevelopment, immune competence, and metabolic function.

Nutrition during this critical period influences metabolic programming, with implications to the growth and the risk of chronic diseases later in life. Gut health, marked by a healthy intestinal microbiome, is an important mediator of the relationship between nutrition and child growth. Beyond supporting digestion, the gut microbiome contributes to immune maturation, maintenance of the intestinal barrier, and protection against pathogenic microorganisms. Many of these benefits are mediated through the production of short-chain fatty acids (SCFAs), which provide energy for colonocytes, strengthen epithelial barrier integrity, regulate immune responses, and help maintain communication along the gut–brain axis. Evidence also suggests that selected probiotic strains may enhance the production of insulin-like growth factor-1 (IGF-1), a key mediator of linear growth. Because these effects depend on the specific microbial strain and an adequate intake of viable organisms, probiotic benefits cannot be generalized across all products. In Indonesia, the Food and Drug Authority regulates health claims for probiotic-containing processed foods to ensure that approved products meet established standards for safety, quality, and demonstrated efficacy in supporting digestive health. Optimal gut health also depends on an adequate supply of essential micronutrients. Zinc plays a central role in maintaining intestinal barrier integrity and reducing the risk of diarrheal illness, while vitamin A supports the integrity of the gastrointestinal epithelium. Vitamin D contributes to immune regulation and may further promote intestinal homeostasis. However, evidence from the SEANUTS II study indicates that many Indonesian children continue to face substantial nutritional challenges. Indonesia is experiencing a triple burden of malnutrition, characterized by persistent stunting, widespread micronutrient deficiencies, and a growing prevalence of childhood obesity. More than 99% of children aged 6 months to 12 years consume less dietary fiber than the Recommended Nutrient Intake (RNI), and over half fail to achieve the recommended intakes of energy, calcium, iron, zinc, and vitamins A and D. These dietary inadequacies are often accompanied by frequent consumption of energy-dense fried foods and insufficient intake of fruits and vegetables. Suboptimal complementary feeding practices further contribute to poor nutritional status. Complementary foods are frequently introduced too early and often lack dietary diversity, with meals dominated by staple foods such as rice or pasta, while animal-source proteins are introduced relatively late. In addition, picky eating behaviors may further limit dietary quality, as children often favor nutrient-poor snack foods over fruits, vegetables, and protein-rich foods. Addressing these challenges requires coordinated nutrition interventions during early childhood. Strengthening nutrition education for parents and caregivers can improve understanding of balanced diets and reinforce the importance of the first 1,000 days of life. At the same time, promoting dietary diversification and increasing the consumption of locally available foods that contain prebiotics and probiotics may help support gut health, improve nutrient intake, and contribute to optimal growth among Indonesian children.

Keywords: Fatty Acid, Omega 3 Index, EPA, DHA, ALA, FADS, Non-communicable diseases

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05 | The importance of gut health in shaping early life

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Abstract

The first 1,000 days of life, spanning from conception to a child's second birthday, represent a critical window for establishing lifelong health.

During this period, the gastrointestinal tract undergoes rapid structural and functional maturation while becoming home to a developing gut microbiome that plays an essential role in growth, immune development, metabolism, and overall well-being. Optimal gut development is fundamental for efficient nutrient digestion and absorption, ensuring adequate energy and micronutrient availability to support healthy growth and neurodevelopment. Disruptions to gut health during early life may have immediate and longterm consequences. Common gastrointestinal conditions in Indonesian children, including acute diarrhea and constipation, remain important causes of morbidity and may negatively affect nutritional status, quality of life, and child development. Understanding the factors that influence gut health is therefore essential for healthcare professionals involved in maternal and child care. Among these factors, nutrition is a key modifiable determinant. Appropriate infant feeding practices, including breastfeeding and ageappropriate complementary feeding, provide the foundation for healthy gut development. Increasing evidence also supports the role of selected prebiotics and probiotics in promoting a balanced gut microbiota and supporting gastrointestinal health when used appropriately. This session will review the development of the gastrointestinal tract during the first 1,000 days, discuss the relationship between gut health and child growth, examine common gut-related problems encountered in Indonesian children, and summarize the current evidence regarding nutritional strategies to support gut health. Practical indicators of a healthy gut and simple parameters for monitoring gastrointestinal health in everyday clinical practice will also be presented, enabling healthcare professionals to identify early warning signs and provide timely interventions that support healthier outcomes throughout childhood.

Keywords: Fatty Acid, Omega 3 Index, EPA, DHA, ALA, FADS, Non- communicable diseases



06 | Precision protein: AI, chronobiology, and the future of personalized clinical nutrition

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Abstract

Recent research demonstrates that protein metabolism is influenced by factors such as age, sex, body composition, genetics, activity, disease physical states, microbiome composition, gut and circadian rhythms. As a result, identical protein intake can produce significantly different physiological responses among individuals. Precision nutrition seeks to advance beyond generalized recommendations by developing personalized strategies that maximize metabolic efficiency and improve clinical outcomes.

Artificial intelligence is a powerful tool in this transformation. By integrating large datasets encompassing dietary intake, laboratory wearable device biomarkers, measurements, genetic information, and lifestyle patterns, AI algorithms can identify nutritional needs with high accuracy. Machine learning models are capable of predicting protein requirements, estimating muscle protein synthesis rates, identifying risks for sarcopenia, and recommending individualized dietary interventions. These approaches are particularly valuable for hospitalized patients, older adults, athletes, and individuals with chronic diseases.

Chronobiology, the study of biological rhythms and their effects on physiological processes, is an equally important yet often overlooked factor. Human metabolism follows circadian patterns that influence nutrient absorption, hormonal secretion, insulin sensitivity, and protein synthesis. Recent evidence indicates that the timing of protein consumption may be nearly as important as the total amount consumed. Muscle protein synthesis fluctuates throughout the day, and disruptions in circadian rhythms can impair anabolic responses and contribute to metabolic dysfunction.

The interaction between protein intake and circadian biology has significant clinical implications. Strategic distribution of protein across meals can enhance muscle maintenance, improve glycemic control, and support recovery from illness. For instance, adequate protein intake earlier in the day may better align with natural metabolic rhythms, whereas prolonged fasting or irregular meal timing may negatively affect muscle preservation in vulnerable populations. These findings underscore the importance of considering both the content and timing of dietary intake.

Precision Protein approaches may be especially beneficial in aging populations. Sarcopenia, frailty, and loss of functional independence represent growing global health challenges. AI-driven assessments, nutritional combined with chronobiological insights, may enable clinicians to identify individuals at risk before significant muscle loss occurs. Personalized protein prescriptions could then be implemented to preserve lean body mass, improve physical performance, and enhance quality of life.

In critical illness and chronic disease, individualized protein strategies can improve clinical outcomes. Patients with cancer, diabetes, obesity, cardiovascular disease, and inflammatory disorders often exhibit altered protein metabolism. Precision nutrition platforms assist clinicians in adjusting protein intake according to metabolic demands, inflammatory status, and treatment objectives. These interventions support recovery, reduce complications, and optimize long-term health.

The integration of artificial intelligence, wearable technologies, biomarker analysis, and chronobiology constitutes a significant paradigm shift in clinical nutrition. Instead of relying on generalized dietary recommendations, healthcare professionals will increasingly use dynamic, data-driven approaches that continuously adapt nutritional prescriptions to each patient's evolving needs.

As medicine advances toward greater personalization, Precision Protein is positioned to become a cornerstone of future nutritional practice. Integrating technological innovation with a comprehensive understanding of human biological rhythms will enable clinicians to deliver more effective, individualized, and sustainable nutritional interventions.

Keywords: precision nutrition, protein, artificial intelligence, chronobiology, circadian rhythm, personalized medicine, sarcopenia, clinical nutrition

07 | Protein in paediatric health and disease

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08 | DHA bioavailability in early life: Does delivery format matter?

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Abstract

This Indonesia– collaborative study Australia investigated omega-3 status and the effectiveness of DHA-fortified formulas in Indonesian toddlers aged 2–3 years. Following dietary screening of 400 toddlers in East Jakarta, 120 children with low habitual omega-3 intake were enrolled in an 8-week double blind randomized controlled trial and assigned to receive a formula fortified with microencapsulated DHA, conventional fish oil, or an unfortified control formula. Whole-blood fatty acids, the Omega-3 Index, and fecal fatty acid excretion were assessed to evaluate DHA status and bioavailability. At baseline, Indonesian toddlers exhibited very low omega-3 status, with mean whole-blood DHA and Omega-3 Index values of 1.6% and 2.4%, respectively.

These values were substantially lower than those reported in Malaysian toddlers (DHA 3.3%, Omega-3 Index 6.5%) and Australian children (Omega-3 Index approximately 5.0%). Both DHA-fortified formulas improved blood DHA status; however, only the microencapsulated DHA formula achieved significant improvements versus the control group, including higher blood DHA levels and a greater Omega-3 Index response. The microencapsulated formula also demonstrated higher adherence, greater blood DHA incremental area under the curve, and higher apparent DHA digestibility than the conventional fish-oil formula. Despite these improvements, the average Omega-3 Index remained below the proposed optimal target, suggesting that higher DHA doses or longer intervention periods may be required. These findings highlight a significant omega-3 nutritional gap among Indonesian toddlers and demonstrate that DHA delivery format influences the effectiveness of fortified foods, providing important insights for future child nutrition strategies in Indonesia.

Keywords: protein, critical care, resuscitation, resilience, sarcopenia, muscle preservation, precision nutrition, recovery, aging, clinical nutrition

09 | Protein beyond the hype: Why more is not better?

Najia Hussaini^{1,2}

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2. Independent Medical Alliance

Abstract

While adequate protein intake is essential for maintaining muscle mass, tissue repair, and normal physiological function, the growing popularity of high-protein diets has also led to widespread misconceptions that greater protein consumption is universally beneficial. This narrative review examines current evidence regarding protein requirements, protein metabolism, and the physiological roles of insulin like growth factor-1 (IGF-1) and mammalian target of rapamycin (mTOR) signaling. It also discusses the benefits and limitations of increased protein intake across



different populations, including healthy adults, athletes, older adults, and individuals with selected medical conditions such as chronic kidney disease and acromegaly.

In addition, the review addresses common misconceptions regarding dietary protein and cancer risk, emphasizing the distinction between physiological protein management. Current requirements and disease-specific nutritional evidence supports individualized protein recommendations based on age, physical activity, health status, and underlying medical conditions rather than a one-size-fits-all approach. Although higher protein intake may be appropriate in selected clinical situations, excessive consumption has not consistently demonstrated additional health benefits once nutritional requirements are met. Overall, this review highlights the importance of evidence-based nutritional guidance and reinforces that optimal protein intake should be tailored to the individual rather than driven by popular dietary trends.

Keywords: Fatty Acid, Omega 3 Index, EPA, DHA, ALA, FADS, Non-communicable diseases

10 | Invitation to provide an Indonesian perspective for two international surveys on home care and clinical nutrition as a human right?

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Abstract

The digestive process normally secretes proteins and amino acids into the gastrointestinal tract via digestive enzymes. Following major gastrointestinal surgery, metabolism deviates from homeostasis. Hypercatabolism, inflammation and underlying diseases can lead to intestinal failure (IF) with increased degradation of endogenous proteins in response to stress hormones. The compromised gut in IF cannot absorb enough nutrients, leading to severe malabsorption with the loss of bile salts and amino acids (AA) via diarrhea, ostomy output or fistulas. A reduced absorptive surface area severely impairs protein uptake and absorption of endogenous proteins, resulting in a vicious cycle of protein depletion, impaired synthesis of intestinal mucosa and digestive enzymes, which because of their rapid turnover, are extremely vulnerable to protein deficiency.

Tryptophan, threonine, and branched-chain amino acids losses lead to sarcopenia. As the primary fuel for enterocytes, glutamine losses may require supplementation. Arginine is involved in the urea cycle and nitric oxide production and may be immunoenhancing, but plasma concentrations are low during critical illness and are strongly related to the severity of inflammation. Because Citrulline is primarily synthesized by small bowel enterocytes it may act as a biomarker to evaluate residual small bowel mass.

Traditionally, PN or EN containing 1.5-2.0 g/kg.bw AA is prescribed to build muscle, promote intestinal adaptation and limit gut permeability but chyme reinfusion therapy (CRT) can now combat bile and AA losses and encourage the remaining bowel to increase its natural absorption capabilities to eventually achieve enteral autonomy.

Keywords: amino acids, bile, intestinal failure, chyme reinfusion

11 | Protein as a resuscitation drug: From ICU survival to human resilience

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Abstract

Recent evidence, however, indicates that protein may also serve as a therapeutic intervention capable of influencing clinical outcomes across diverse disease states. In critically ill patients, sufficient protein administration



is now recognized as a cornerstone of contemporary nutritional therapy, prompting clinicians to view protein not only as a nutrient but also as a form of metabolic resuscitation. This evolving perspective extends beyond the intensive care unit (ICU), providing valuable insights into the promotion of long-term health, recovery, and human resilience. Critical illness is marked by significant metabolic disturbances, such as hypercatabolism, systemic inflammation, hormonal dysregulation, and accelerated skeletal muscle breakdown.

During severe infections, trauma, burns, and major surgical procedures, patients may lose considerable lean body mass within days. This rapid protein depletion leads to weakness, compromised immune function, delayed recovery, prolonged hospitalization, and increased mortality. In this context, protein administration assumes a role similar to other resuscitative therapies by preserving essential physiological functions and supporting recovery. Skeletal muscle is the body's largest reservoir of amino acids and is essential for maintaining metabolic homeostasis. During physiological stress, muscle protein breakdown supplies substrates required for immune responses, wound healing, and organ function. Excessive muscle loss can hinder recovery and contribute to long-term disability.

Early and sufficient protein delivery is associated with improved nitrogen balance, preservation of lean body mass, and better functional outcomes in critically ill patients. In addition to its structural functions, protein influences a range of biological processes vital for survival. Amino acids act as precursors for neurotransmitters, hormones, enzymes, antibodies, and antioxidant systems. Protein availability directly impacts immune competence, tissue regeneration, mitochondrial function, and cellular signaling pathways involved in stress adaptation.

The concept of resilience has received growing attention in the medical field. Resilience is defined as the capacity to withstand, adapt to, and recover from physical or psychological stressors. Although traditionally examined from behavioral and psychological perspectives, biological resilience is equally significant. Sufficient protein intake supports muscle preservation, immune function, cognitive performance, and metabolic flexibility, all of which contribute to recovery from illness and the maintenance of independence.

The increasing prevalence of aging populations underscores the importance of protein in maintaining resilience. Sarcopenia, frailty, and loss of functional capacity are significant contributors to healthcare morbidity utilization and globally. Evidence indicates that optimized protein intake, in conjunction with physical activity, may slow the progression of age-related muscle loss and improve quality of life. These benefits extend beyond longevity and may enhance healthspan by preserving both physical and cognitive function. Recent developments in precision nutrition offer new opportunities to individualize protein therapy. Factors such as age, body composition, disease burden, physical activity, genetics, and metabolic status all influence protein requirements.

Emerging technologies, including artificial intelligence, wearable devices, and biomarker-guided assessments, may enable clinicians to tailor protein interventions more effectively and identify patients who would benefit from targeted nutritional support.

The future of nutritional medicine may involve considering protein as a dynamic therapeutic agent rather than a static dietary recommendation. Similar to the careful titration of fluids, vasopressors, and medications during critical illness, protein administration may become increasingly personalized based on physiological needs and clinical objectives. This approach has the potential to improve outcomes not only in the ICU but also across the broader continuum of health and disease.

Protein serves as more than a source of calories; it is a fundamental determinant of recovery, adaptation, and survival. Recognizing protein as a resuscitation drug and a key driver of human resilience may enable healthcare professionals to improve patient outcomes, preserve functional capacity, and promote healthier aging across diverse populations.

Keywords: protein, critical care, resuscitation, resilience, sarcopenia, muscle preservation, precision nutrition, recovery, aging, clinical nutrition



12 | Natrium and its impact on children's health

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Abstract

Disorders of sodium, including hyponatremia and hypernatremia, remain among the commonest electrolyte abnormalities in pediatric practice which may result in serious neurological complications. In addition, increasing consumption of ultra-processed foods has led many children to exceed the recommended daily sodium intake, contributing to an increased risk of hypertension, chronic kidney disease (CKD), and future cardiovascular disease.

Total body water constitutes approximately 75–80% of body weight in neonates and gradually decreases to about 60% in older children. Sodium concentration is tightly regulated by the kidneys through the coordinated actions of antidiuretic hormone, the renin–angiotensin aldosterone system, and natriuretic peptides.

Hyponatremia is commonly caused by excess free water retention or sodium loss, whereas hypernatremia primarily results from free water deficit. Beyond acute disorders, ultra-processed foods account for the majority of dietary sodium intake in children. Although drinking water contributes only a small proportion of total sodium intake, the sodium content of bottled mineral water varies considerably. For infants and children with CKD, hypertension, or other conditions requiring sodium restriction, selecting low-sodium mineral water may help minimize unnecessary sodium exposure.

Maintaining sodium homeostasis is fundamental to children's health. In addition to the prompt recognition and management of dysnatremia, healthcare professionals should promote dietary sodium reduction, encourage healthy food choices, and recommend low-sodium drinking water as part of comprehensive strategies to support kidney and cardiovascular health in children.

Keywords: sodium, hyponatremia, hypernatremia, children

13 | Safe drinking water: Its critical role in children's growth and development

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Abstract

Recent evidence demonstrates that microbiological contamination of drinking water, especially by *Escherichia coli* and other fecal pathogens, significantly increases the risk of diarrheal diseases, recurrent infections, and environmental enteric dysfunction, which adversely affect nutrient absorption and overall child health. Contaminated drinking water is a leading contributor to childhood diarrhea, a condition associated with dehydration, malnutrition, increased morbidity, and mortality among children under five years of age and have a significantly higher likelihood of experiencing stunting and underweight status compared with children consuming safe water.^{1,2}

Furthermore, a recent systematic review reported consistent associations between unsafe drinking water and reduced height-for-age scores, increased risk of stunting, and potential adverse effects on cognitive development during early childhood. Access to improved water sources and integrated water, sanitation, hygiene (WASH), and nutrition interventions have been associated with better growth outcomes and lower stunting prevalence.

^{2,3} In conclusion, unsafe drinking water negatively impacts children's growth and development through increased exposure to infectious diseases, particularly diarrhea, which contributes to malnutrition and stunting. Ensuring access to safe drinking water, together with effective WASH and nutrition programs, is essential to prevent disease, support healthy growth, and improve long-term developmental outcomes among children. ^{1,3,4}

Keywords: Unsafe drinking water, child growth, child development, diarrhea, contamination, stunting



14 | The interlink between protein, linear growth and stunting in children

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Abstract

Stunting remains a major public health problem among children. Stunting occurs when a child does not grow to the expected height for their age due to long-term undernutrition and other health-related factors. Children who are stunted are at greater risk of poor health, delayed cognitive development, lower academic performance, and reduced productivity later in life. Protein is an essential nutrient for normal growth and development. It provides the amino acids needed for building body tissues, supporting bone growth, and producing growth-related hormones such as insulin-like growth factor-1. During the first 1,000 days of life, from conception to a child's second birthday, adequate protein intake is particularly important for healthy linear growth. Insufficient protein intake may slow growth and increase the risk of stunting. Studies have shown that both the amount and quality of protein consumed can influence growth outcomes. Animal-source proteins, such as milk, eggs, fish, and meat, generally contain higher-quality protein and may have a stronger positive effect on growth compared with some plant-based sources. However, stunting is a complex condition that is not caused by protein deficiency alone. Other contributing factors include repeated infections, poor maternal nutrition, inadequate dietary diversity, micronutrient deficiencies, poor sanitation, and socioeconomic challenges. Therefore, addressing stunting requires a comprehensive approach that goes beyond improving protein intake. This review discusses the relationship between protein intake, linear growth, and stunting in children and highlights the importance of adequate protein nutrition as part of broader strategies to support healthy growth and reduce the burden of stunting worldwide.

Keywords: Stunting, children, protein

15 | Limiting amino acid in rice-eating countries: Implications on growth and development

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Abstract

Background: Lysine is an essential amino acid, one of the building blocks of proteins important for growth and development. Lysine is classified as essential because the body can't produce it. That means people must obtain it from their diets. In Southeast Asia, rice is the staple food, where lysine is the limiting amino acid. This raises concern about protein quality and risk such as stunting. In the Philippines, a study was conducted to assess lysine intake among selected populations and identify groups at risk of inadequacy by locale and wealth quintile.

Methods: The data is obtained from the 2013 National Nutrition Survey with about 8,592 sample households (response rate: 87.7%) and 35,884 individuals used in the current analysis: 6-11 months old (n=355), 1-3 years old (n=1,450), 4-10 yo (n=6,909), 11-14 yo (n=4,060), 15-18 yo (n=3,204), and 19- 49 yo (n=19,906).

Food intake was collected on 2 non-consecutive days. The first food recall was collected from all household members. The second day recall was only from a random sub-sample of 50% of those members with a first day recall. Energy and nutrient content of foods were processed using an electronic Individual Dietary Evaluation System containing the updated Philippines Food Composition Table. Mean and usual lysine intake was estimated using the PC Software for Intake Distribution Estimation version 1.02.

Results: The prevalence of lysine inadequacy was highest among 6 to 11 months old children (54%). For other agegroups, prevalence were 14% among 1-3 yo, about 2% among 4-10 yo; 8% among 11-14 yo; 13% among 15-18 yo, and 15% among 19-49 yo. Lysine inadequacy was also most common among females, the poorest sectors, and in the rural areas. Lysine intake of stunted children is lower than normal children.



Conclusion: These findings highlight the need to address lysine inadequacy through complementation from other food sources like beans, nuts, and animal and fish sources of proteins particularly among infants, to support optimal growth and development.

Keywords: Lysine, infants, food complementation

16 | Cancer metabolism-hidden cause of sarcopenia

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Abstract

In recent years, a variety of molecular targeted therapies have been introduced into clinical practice; however, these advances have not led to substantial improvements in survival rates for patients with solid tumors.

Meanwhile, muscle wasting in cancer patients has been recognized as a significant prognostic factor associated with poor outcomes, highlighting the need for the development of novel therapeutics targeting muscle loss to improve prognosis. Cancer cachexia and cancer-associated sarcopenia have been considered major contributors to muscle wasting in cancer patients, and their underlying mechanism is generally attributed to chronic inflammation. However, it remains unclear whether cachexia and sarcopenia are true drivers of muscle loss, or merely consequences induced by more fundamental processes. In this presentation, we propose a novel hypothesis that metabolic reprogramming in cancer cells itself acts as a primary driver of muscle wasting, while cachexia and sarcopenia may represent secondary phenomena resulting from this process. Although cancer cells proliferate uncontrollably beyond normal regulatory mechanisms, the surrounding tumor microenvironment is not always favorable for their growth. To maintain a growth advantage under such conditions, cancer cells undergo metabolic reprogramming. However, the precise mechanisms underlying this process remain incompletely understood. In our research team, we have identified that NAC1, an oncogene frequently amplified in several solid tumors including ovarian cancer, induces metabolic reprogramming in cancer cells. Furthermore, we have demonstrated that this reprogramming enhances glutamine uptake in cancer cells. In this lecture, I will talk about the basic knowledge about nutrient metabolism in cancer cells first. Then, I will introduce the specific features of cancer-associated metabolic reprogramming, and the molecular mechanisms by which NAC1 regulates these processes, supported by our experimental evidence.

Targeting cancer metabolism may not only suppress tumor growth but also ameliorate muscle wasting, suggesting a dual therapeutic effect. Such an approach has the potential to significantly improve survival outcomes in cancer patients.

Keywords: Cancer metabolism, gluconeogenesis, sarcopenia

17 | Rethinking protein requirements in Southeast Asia: Bridging policy gaps and local nutritional contexts in an aging society

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Abstract

The co-occurrence of frailty, sarcopenia, and malnutrition in elderly was associated with higher risk of all-cause mortality.^{1,2} Emerging evidence demonstrates that current general recommended dietary intake of protein may be insufficient for older adults due to anabolic resistance, reduced muscle protein synthesis, and changes in digestion and metabolism. Higher protein intake particularly high-quality protein rich in leucine distributed evenly across meals



can improve muscle mass, strength, and metabolic resilience. Studies highlight the role of leucine thresholds, protein distribution, and protein-nutrient interactions in optimizing muscle protein synthesis.³

Furthermore, a systematic review revealed a high risk of malnutrition alongside inadequate intakes of macronutrients, especially protein and key micronutrients (including calcium, folate, and vitamins D, B12, and E) among Southeast Asian elderly populations.^{4,5} Furthermore, combining protein with synergistic nutrients (e.g. omega-3 fatty acids, vitamin D, collagen, creatine), culturally tailored dietary strategies, and physical exercise is critical for preserving functional health in aging populations. Despite these findings, public health policies across ASEAN countries often lack updated, context-specific guidelines.⁶

This special group will discuss recent evidence, identify methodological gaps, and propose research priorities on optimal intake, timing, quality of protein, and public health strategies to support healthy aging.

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18 | Beyond calories: Protein as a missing link in the global stunting crisis

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Abstract

Background: Childhood stunting affects approximately 148 million children under five worldwide and remains highly prevalent in low- and middle-income countries. Diets in many stunting-endemic settings are dominated by staple cereals that provide adequate energy but limited high-quality protein and essential amino acids necessary for skeletal growth. Evidence linking protein intake to linear growth across diverse contexts, however, remains fragmented.

Objective: To synthesize recent evidence on the relationship between dietary protein intake, protein quality, and linear growth in children. This special group will discuss recent evidence, identify methodological gaps, and propose research priorities on optimal intake, timing, quality of protein, and public health strategies to support healthy aging.

Methods: A literature review was conducted in accordance with the PRISMA guidelines. Electronic databases (PubMed, Scopus, Web of Science) were searched for studies published between 2018 and 2025 examining protein intake, animal-source food consumption, or amino acid adequacy in relation to child growth outcomes. After



screening and eligibility assessment, approximately 12 key studies were included for qualitative synthesis, encompassing observational studies and intervention trials.

Results: Across included studies, higher intake of animal-source foods and high-quality protein was consistently associated with improved height-for-age Z-scores and reduced risk of stunting. Diets dominated by cereal-based staples were frequently linked to inadequate essential amino acid intake. Several studies reported that consumption of eggs, dairy products, and fish was positively associated with linear growth indicators. Mechanistic evidence suggested that insufficient amino acid availability may impair anabolic pathways, including IGF-1 signaling, thereby constraining growth even when caloric intake is adequate. Infection burden and poor environmental conditions were identified as factors that further increase protein requirements and reduce nutrient utilization.

Conclusions: In stunting-endemic settings, inadequate intake of high-quality protein may represent a critical barrier to optimal child growth despite sufficient energy consumption. Nutrition strategies that prioritize dietary quality, particularly access to affordable animal-source proteins, may enhance the effectiveness of stunting reduction strategies.

Keywords: Protein Intake; Animal Source Foods; Stunting; Linear Growth; Child Nutrition; Systematic Review

19 | Body composition and adiposity changes following a workplace nutrition intervention in obese Indonesian office employees: A pilot study

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Abstract

Background: Obesity and cardiometabolic disease continue to increase in Indonesia, particularly among sedentary office workers. Despite the growing burden of obesity in occupational settings, data on workplace nutrition interventions in Indonesia remain limited, particularly clinical nutrition specialist-led intervention

Objective: To evaluate changes in anthropometric and body composition parameters among obese Indonesian office employees participating in an 11-week workplace nutrition intervention led by a clinical nutrition specialist.

Methods: This pilot observational pre-post study included 14 obese office employees (mean age 31.8 ± 5.5 years; 71.4% female; baseline BMI 27.9 ± 2.6 kg/m²). Weekly anthropometric and body composition assessments were performed using bioelectrical impedance analysis (Omron HBF-375) under standardized conditions. The intervention consisted of individualized medical nutrition therapy delivered by a clinical nutrition specialist, including individualized calorie and macronutrient prescriptions, physical activity recommendations, and online group evaluation sessions at months 1 and 2, without pharmacotherapy use. Paired statistical analyses were performed according to data distribution.

Results: Participants received individualized hypocaloric, relatively high-protein meal plans with a mean prescribed caloric deficit of 288 ± 53 kcal/day. Body weight decreased from 72.6 ± 7.7 kg to 69.6 ± 9.0 kg ($p=0.006$), waist circumference from 91.9 ± 7.6 cm to 84.3 ± 7.7 cm ($p<0.001$), and visceral fat from 10.3 ± 3.0 to 8.8 ± 3.1 ($p<0.001$). Fat mass significantly decreased ($p<0.001$), while skeletal muscle mass remained relatively preserved ($p=0.753$). Clinically significant weight loss ($\geq 5\%$) was achieved in 35.7% of participants, while 92.9% demonstrated fat mass reduction. Weekly measurements demonstrated progressive downward trajectories in adiposity-related parameters.

Conclusions: An 11-week workplace nutrition intervention led by a clinical nutrition specialist was associated with improved adiposity and central obesity while relatively preserving skeletal muscle mass among obese Indonesian office employee.

Keywords: obesity, adiposity, body composition, nutrition therapy, workplace wellness programs, occupational health



20 | High calories nutrition diet on Tetanus Ablett II-III : A case report

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Abstract

Background: Tetanus is a vaccine-preventable disease caused by *Clostridium tetani*. Data from Sanglah General Hospital (January 2018 to October 2019) indicated that the majority of tetanus patients were classified under moderate Ablett scores (18 patients, 54.5%), followed by severe (9 patients, 27.3%), very severe (5 patients, 15.2%), and mild (1 patient, 3.0%)

Objective: This case study discusses the administration of nutritional therapy in a patient with tetanus.

Case: A 60-year-old male presented with a primary complaint of dysphagia (difficulty swallowing) occurring since the morning of admission. The patient's history revealed a head injury from falling bricks at a temple on October 12, 2024. Although the wound was cleaned and X-rays showed no abnormalities, tetanus immunoglobulin (tetanus antitoxin) was not administered at that time. Anthropometric examination showed a height of 166 cm, weight of 70 kg, and a BMI of 25.40 kg/m². There was no evidence of muscle wasting or loss of subcutaneous fat. Clinical findings included an NG tube with no residual volume, normal bowel sounds, and a flat, non-distended abdomen. The patient was diagnosed with tetanus (Ablett score II-III).

Results: Participants received individualized hypocaloric, relatively high-protein meal plans with a mean prescribed caloric deficit of 288 ± 53 kcal/day. Body weight decreased from 72.6 ± 7.7 kg to 69.6 ± 9.0 kg ($p=0.006$), waist circumference from 91.9 ± 7.6 cm to 84.3 ± 7.7 cm ($p<0.001$), and visceral fat from 10.3 ± 3.0 to 8.8 ± 3.1 ($p<0.001$). Fat mass significantly decreased ($p<0.001$), while skeletal muscle mass remained relatively preserved ($p=0.753$). Clinically significant weight loss ($\geq 5\%$) was achieved in 35.7% of participants, while 92.9% demonstrated fat mass reduction. Weekly measurements demonstrated progressive downward trajectories in adiposity-related parameters.

Nutritional therapy was provided over 16 days. The patient initially received Oral Nutritional Supplements (ONS) high in HMB, which were later transitioned to high-choline and BCAA-enriched ONS. Parenteral therapy was also administered, including high-lipid PN, high-glucose with electrolytes, and parenteral electrolytes. It took two days to achieve 100% of the total energy and protein targets. Notably, the patient's handgrip strength improved from a score of 0 to 3 points.

Conclusions: Tetanus patients require high-energy nutrition and, in some cases, a ketogenic diet to prevent recurrent seizures. A combination of enteral and parenteral therapies during hospitalization is essential to reduce the incidence of malnutrition during treatment.

Keywords: tetanus, high calories, ketogenic diet



21 | Food acceptance of balanced meals based on the “isi piringku” guideline among Indonesian children: A plate waste observation

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Abstract

Background: Indonesia's national dietary guideline, Isi Piringku, mandates that half of each meal consist of vegetables and fruit but provides limited guidance on food preparation, presentation, or strategies to improve children's dietary acceptance—factors influencing actual intake. In practice, whether guideline-compliant meals achieve adequate consumption, particularly for components recommended in the largest proportions, remains inadequately examined. Meanwhile, snacks contribute substantially to children's intake and are often more readily accepted, but are not explicitly addressed within the guideline.

Objective: To assess food acceptance of balanced meals formulated according to the Isi Piringku guideline among Indonesian children aged 1–16 years over a four-month period, using plate waste as the primary outcome, and to compare acceptance across meal components and meal types (main course and snack).

Methods: A longitudinal observational plate waste study was conducted from January to April 2026 among 72 children in a structured meal program in Bandung, West Java. Meals were formulated based on the Isi Piringku guideline and individual estimated energy requirements (EER). A registered nutritionist recorded daily plate waste as the percentage of each component left uneaten, across five categories: staple foods, protein dishes, vegetables, fruits, and snacks. A total of 1,660 meal records were analyzed descriptively by component, meal timing, and age group.

Results: Across 1,021 main course observations, vegetables had the highest waste (20.6%), followed by fruit (17.9%), staple foods (13.0%), and protein dishes (9.0%). In contrast, snacks showed markedly lower waste (4.2%) across 676 observations. Waste was highest in vegetables at main course (26.1%) and among children aged 4–6 and 10–12 years (23.8% and 27.6%). Only 50.7% of meals achieved $\geq 80\%$ consumption across all components of main course.

Conclusions: Despite adherence to Isi Piringku, vegetable and fruit intake remained suboptimal, while snacks showed higher acceptance. across four months. These findings indicate that nutritional guideline compliance alone is insufficient to ensure adequate intake in children. The Isi Piringku guideline and broader Pedoman Gizi Seimbang would benefit from integrating practical execution guidance that incorporates culinary science — including food presentation, texture modification, and age-appropriate palatability strategies — alongside nutritional standards.

Keywords: plate waste, dietary guidelines, child nutrition, food acceptance, meal programs, culinary nutrition

22 | Differential effects of glutamine supplementation in critically ill adult patients: A systematic review with subgroup analysis of burn and non-burn populations

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Abstract

Background: Glutamine supplementation has been widely used in critically ill patients to improve clinical outcomes. However, evidence regarding its effectiveness remains inconsistent, particularly following large randomized trials and updated clinical guidelines. Burn patients represent a distinct subgroup with altered metabolism and increased glutamine demand, suggesting that the effects of supplementation may differ compared with non-burn critically ill populations.



Objective: To evaluate the effects of glutamine supplementation on mortality and ICU length of stay in critically ill adult patients, and to compare these effects between burn patients (TBSA >20%) and non-burn critically ill populations.

Methods: A systematic review of randomized controlled trials (RCTs) was conducted in accordance with a predefined protocol. Studies published from 2010 onwards were identified from 3 major databases. Eligible studies included adult critically ill patients admitted to the ICU, comparing glutamine supplementation (enteral, parenteral, or combined) with standard care or placebo. The primary outcomes were mortality and ICU length of stay (ICU LOS). A narrative synthesis was performed, with a pre-specified subgroup analysis comparing burn patients (TBSA >20%) and non-burn critically ill patients.

Results: A total of 11 RCTs involving approximately 3,200 patients were included. In non-burn populations, glutamine supplementation did not reduce mortality, and some large trials suggested a potential increase in mortality risk. No consistent reduction in ICU LOS was observed in this subgroup. In contrast, in burn patients, glutamine supplementation was associated with a reduction in ICU LOS in several studies, although no significant effect on mortality was observed. Overall, findings across studies were heterogeneous in terms of population characteristics, dosing, and duration of intervention.

Conclusions: Glutamine supplementation in critically ill adult patients does not confer a consistent benefit on mortality or ICU length of stay, particularly in non-burn populations. In burn patients, glutamine may reduce ICU LOS but does not appear to improve survival. These findings support current guideline recommendations against the routine use of glutamine in general ICU populations, while suggesting a potential role in selected subgroups such as burn patients. Further well-designed trials are needed to clarify its role in specific patient populations.

Keywords: Critical Illness, Intensive Care Units, Glutamine, Burns, Mortality, Length of Stay

23 | From muscle mass to functional recovery: the correlation between preoperative appendicular skeletal muscle index and post operative hand grip strength following elective laparotomy

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Abstract

Background: Laparotomy is a major surgical procedure that may lead to a decline in skeletal muscle mass and functional capacity, including handgrip strength (HGS). Various studies have shown that reduced postoperative HGS is associated with adverse clinical outcomes, while HGS is closely related to appendicular skeletal muscle index (ASMI). However, scientific evidence regarding the correlation between preoperative ASMI and postoperative HGS remains limited. Therefore, this study aimed to evaluate the correlation between preoperative ASMI and postoperative HGS in patients undergoing elective laparotomy.

Objective: To investigate the correlation between preoperative ASMI and postoperative HGS, a marker of functional recovery, among patients undergoing elective laparotomy.

Methods: This prospective observational study included adults aged 18-65 years old who underwent elective laparotomy at Dr. Cipto Mangunkusumo National Hospital, Jakarta, a tertiary teaching hospital, between March and June 2023. Preoperative ASMI was assessed using multifrequency bioimpedance analysis (BIA) in seca® mBCA 525 and postoperative HGS of both hands was measured on postoperative day 6 (POD-6) using a CAMRY® spring-type hand dynamometer. Bivariate and multivariate analyses were performed to evaluate the correlation between preoperative ASMI and postoperative HGS and to identify potential confounding factors.

Results: Among 85 participants, 98.8% had low preoperative ASMI. Preoperative ASMI showed a significant moderate positive correlation with postoperative HGS in both the right hand ($r=0.444$, $p<0.001$) and left hand



($r=0.423$, $p<0.001$). Reduced postoperative HGS was observed in 72.9% and 80.0% of participants for the right and left hands, respectively.

Conclusions: A significant positive correlation was observed between preoperative ASMI and postoperative HGS in patients undergoing elective laparotomy. Assessment of preoperative skeletal muscle mass may provide useful information regarding postoperative functional status. Further studies with larger populations are needed to validate these findings and explore their implications for perioperative nutritional management.

Keywords: appendicular skeletal muscle index, skeletal muscle mass, handgrip strength, elective laparotomy

24 | Effects of maternal balanced energy–protein supplementation during pregnancy and lactation on infant gut microbiome and early growth: A systematic review and meta-analysis of randomized controlled trials

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Abstract

Background: Balanced energy-protein (BEP) supplementation during pregnancy and lactation may improve maternal and child growth outcomes, although the underlying mechanisms remain unclear. Emerging evidence suggests that the gut microbiome may mediate the relationship between early-life nutrition and growth.

Objective: To systematically synthesize evidence from randomized controlled trials evaluating the effects of maternal BEP supplementation on infant gut microbiome composition and early growth outcomes.

Methods: Randomized controlled trials were identified through PubMed, Europe PMC, and OpenAlex. Eligible studies assessed BEP supplementation during pregnancy and/or lactation and reported postpartum infant growth and/or gut microbiome outcomes. Three reviewers independently performed screening and data extraction. Meta-analysis was conducted using Comprehensive Meta-Analysis V4.

Results: Seven studies met the inclusion criteria. Four studies reported LAZ outcomes at birth, two at 6 months, and two at ≥ 12 months. In the neonatal subgroup, BEP supplementation did not significantly improve LAZ (SMD = 0.560, 95% CI: -1.670 to 2.791; $p = 0.622$). Similarly, no significant effects were observed at 6 months (SMD = 0.014, 95% CI: -0.068 to 0.096; $p = 0.736$) or ≥ 12 months (SMD = 0.051, 95% CI: -0.034 to 0.136; $p = 0.241$). However, qualitative findings suggested that BEP supplementation may alter maternal and infant gut microbiome composition by increasing maternal microbial diversity, enhancing infant carbohydrate metabolism pathways, and modulating specific microbial taxa associated with infant growth. Further studies are needed to better determine whether these microbial changes contribute significantly to infant growth outcomes. Overall, the evidence remained limited by the small number of studies and substantial heterogeneity.

Conclusions: Maternal BEP supplementation did not significantly improve pooled infant linear growth outcomes, but qualitative evidence suggests a potential microbiome-mediated role in early growth and development. Future standardized longitudinal studies incorporating multi-omics approaches are needed to clarify the microbiome-growth axis and optimize targeted nutritional interventions for vulnerable populations

Keywords: Balanced Energy-Protein Supplementation; Gastrointestinal Microbiome; Infant Growth.



25 | Fat intake profile among third trimester pregnant women in Kertapati district

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Abstract

Background: Essential fatty acids (omega-3 and omega-6) play an important role in supporting pregnancy, benefiting both the mother and the fetus. Previous studies have reported that essential fatty acid intake among pregnant women in Indonesia tends to be low. This study aims to determine the fat intake profile of third-trimester pregnant women in Kertapati District.

Objective: This study aims to determine the fat intake profile of third-trimester pregnant women in Kertapati District.

Methods: This research was a quantitative descriptive study with a cross-sectional design involving third-trimester pregnant women in Kertapati District who visited midwives for antenatal care (ANC). Data were collected through interviews using a validated SQ-FFQ instrument adapted to the study location. The interview results were processed using Nutrisurvey and subsequently analyzed using univariate methods in SPSS.

Results: Based on this study, the majority of respondents were aged 19–29 years (58%), had completed senior high school or its equivalent (60%), were unemployed (88%), and had a normal pre-pregnancy nutritional status (40%). The average daily fat intake was 97.59 grams, with most respondents exceeding the recommended dietary allowance (74%). The average percentage of daily fat intake compared to the recommended daily caloric intake was 35.04%. The average omega-3 intake was 0.83 grams, with most respondents falling below the recommended level (84%). The average omega-6 intake was 6.15 grams, also mostly below recommendations (94%). The average omega-3/omega-6 ratio was 0.14 or equivalent to 1:7.

Conclusions: This study shows that although third-trimester pregnant women in Kertapati District have a high total daily fat intake, their intake of essential fatty acids remains inadequate.

Keywords: Fat intake, omega-3, omega-6, omega-3/omega-6 ratio, third-trimester pregnant

26 | The role of body composition on clinical outcomes of hemodialysis-dependent chronic kidney disease: A systematic review

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Abstract

Background: Body composition (BC) is recognized as an important determinant of clinical outcomes across various diseases, including hemodialysis-dependent chronic kidney disease (HD-CKD) patients. These patients are vulnerable to BC alterations, closely associated with malnutrition which is often driven by chronic inflammation and dietary intake. Despite growing evidence, BC assessment in HD-CKD patients remains limited.

Objective: To evaluate the association between body composition parameters and clinical outcomes in HD-CKD patients.

Methods: A systematic literature search was conducted based on the PRISMA 2020 guidelines utilizing three databases: PubMed, Scopus, and Google Scholar. Relevant keywords related to body composition, hemodialysis, and clinical outcomes were used to identify studies published between 2021 and 2025. The primary outcomes of interest were clinical outcomes, including mortality, composite events, and cardiovascular events, in HD-CKD patients.

Results: Nineteen observational studies were included, predominantly using bioelectrical impedance-derived parameters. Adiposity showed heterogeneous effects, with higher total body fat percentage associated with increased mortality in normal BMI patients (HR 2.35; 95% CI 1.31–4.22); meanwhile, fat tissue index demonstrated inconsistent associations. In contrast, muscle-related parameters showed consistent capability, as reduced lean tissue



index and skeletal muscle mass were strongly associated with adverse outcomes (HR up to 3.40; $p < 0.001$). Fluid-related parameters, despite methodological heterogeneities and ratios, showed consistent negative associations with composite outcomes such as cardiovascular events. Fluid overload markedly increased mortality risk (HR up to 6.83), while longitudinal assessments further revealed that variability and cumulative exposure further strengthened its prognostic value. Despite limited evidence, nutritional interventions focusing on maintaining optimal body composition were consistently emphasized.

Conclusions: Body composition parameters, particularly fluid status and muscle mass, are consistently associated with clinical outcomes of HD-CKD patients. Dynamic BC monitoring should be considered to improve prognostic accuracy and enable appropriate nutritional intervention strategies.

Keywords: Body Composition, Hemodialysis-dependent, Chronic Kidney Disease Conflict of Interest: none declared

27 | A comparative study of household dietary diversity in double burden of malnutrition and non-double burden of malnutrition households in the city of Malang.

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Abstract

Background: Malnutrition in children, including stunting, underweight, and wasting, remains a major global nutrition problem caused by inadequate dietary intake. In Indonesia, this issue is increasingly accompanied by the Double Burden of Malnutrition (DBM), where undernourished children under five and overweight or obese mothers coexist within the same household. Malang, as a rapidly developing urban city, still faces relatively high rates of both conditions. Although low dietary diversity is considered one of the factors contributing to DBM, studies exploring this issue in Malang remain limited.

Objective: This study aimed to identify differences in dietary diversity between DBM and non DBM households in Malang City and to examine the correlation between dietary diversity, household food security, and socioeconomic characteristics.

Methods: This study is an observational analytic design with a case-control approach and analyzed pairs of 158 mother-child age 24-59 months. The case group consisted of 79 pairs of undernourished children and overweight or obese mothers, while the control group consisted of 79 children with normal nutritional status. Data were collected using a structured questionnaire, the Household Dietary Diversity Score (HDDS) questionnaire and anthropometric measurements (body weight and height). Nutritional status is calculated using z-score for children and BMI for mothers. Statistical analysis included Fisher's Exact and Spearman's rank correlation tests..

Results: Results showed that 99.4% of households had high dietary diversity (>9 food groups), while over 70% were food secure. ($p=0.266$). Furthermore, no significant association was found between dietary diversity and household food security ($p=0.266$) within the case group. Spearman's test also showed no significant correlation between HDDS scores and socioeconomic characteristics.

Conclusions: The existence of double burden malnutrition in the case group despite high HDDS may indicate unequal intra-household food distribution, where available foods are more oriented toward adult preferences and energy-dense consumption patterns rather than meeting children's nutritional needs. Therefore, emphasizing balanced portion distribution remains essential to ensure nutritionally adequate intake and prevent DBM.

Keywords: Double Burden Malnutrition, Dietary Diversity, HDDS, Stunting, Socioeconomic, Children Under Five.



28 | Metabolically unhealthy normal weight versus metabolically healthy obesity: A systematic review of Asian cohort studies

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Abstract

Background: Body mass index (BMI) does not fully reflect cardiometabolic risk. Two discordant phenotypes, metabolically unhealthy normal weight (MUNW) and metabolically healthy obesity (MHO), challenge the assumption that risk is determined primarily by adiposity. This distinction is particularly relevant in Asian populations, where metabolic abnormalities often occur at lower BMI levels.

Objective: This review aimed to compare the prognostic implications of MUNW and MHO in Asian populations.

Methods: This systematic review followed PRISMA 2020 guidelines. Longitudinal cohort studies involving Asian adults with MUNW and MHO phenotypes were identified through searches of PubMed, Europe PMC, and Semantic Scholar (May 2021–May 2025). Eligible studies reported adjusted risk estimates for all-cause mortality, cardiovascular disease (CVD), type 2 diabetes, or other major clinical outcomes. Risk of bias was assessed using the Newcastle–Ottawa Scale. Owing to study heterogeneity, findings were synthesized narratively.

Results: Eleven cohort studies involving more than 1.4 million adults from China, South Korea, Taiwan, and Japan were included. Compared with metabolically healthy normal-weight individuals, MUNW was consistently associated with increased cardiovascular risk and higher all-cause and cardiovascular mortality (HR 1.54, 95% CI 1.49–1.60; CVD HR 1.35, 1.13–1.66). MHO was associated with modestly elevated CVD risk but generally neutral or lower all-cause mortality. Across most studies, MUNW conferred risks comparable to or greater than MHO for cardiovascular and fatal outcomes. Furthermore, approximately 40% of individuals with MHO transitioned to a metabolically unhealthy state within 8–10 years.

Conclusions: MUNW is associated with a risk profile comparable to, and often greater than, MHO. These findings highlight the importance of assessing metabolic health beyond BMI alone. Although MHO generally carries lower risk than MUNW, it remains associated with cardiometabolic risk and metabolic instability. Further prospective studies are needed to clarify the long-term consequences of these phenotypes.

Keywords: metabolically healthy obesity; metabolically unhealthy normal weight; metabolic phenotype; body mass index; Asian population

29 | Nutritional status and sarcopenia in peripheral artery disease: prognostic and clinical implications A systematic review

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Abstract

Background: Body patients with peripheral artery disease (PAD) undergoing lower limb revascularization are at risk for adverse postoperative outcomes. Poor nutritional status and sarcopenia are recognized as prognostic factors, yet their role in PAD remains underexplored. The high prevalence of diabetes in PAD may worsen malnutrition and muscle loss, highlighting the need for integrated nutritional assessment.

Methods: A systematic review was conducted following PRISMA guidelines. PubMed and Scopus were searched from inception to March 2026. Studies involving adult PAD patients undergoing lower limb revascularization and reporting nutritional status or sarcopenia and clinical outcomes were included. Methodological quality was assessed using the Newcastle–Ottawa Scale (NOS). AI assisted in search strategy generation and manuscript drafting, while all included studies were manually reviewed and critically assessed by the authors.



Results: Six studies met the inclusion criteria, with sample sizes ranging from 57 to 1,166,848 patients. All included studies demonstrated low risk of bias with NOS scores ranging from 7 to 9. Three studies reported significant associations between reduced skeletal muscle mass or sarcopenia and adverse outcomes, including higher mortality and amputation rates. The remaining three studies found no statistically significant association. Malnutrition, assessed via the CONUT score and GNRI, was identified as an independent predictor of major adverse cardiovascular and limb events in two studies.

Conclusions: Nutritional status may be a more consistent prognostic factor than sarcopenia alone in PAD patients undergoing revascularization. Preoperative nutritional screening and early intervention should be integrated into perioperative vascular surgery care. Standardized prospective studies are warranted.

Keywords: peripheral artery disease (PAD), sarcopenia, nutritional status

30 | Effect of vitamin d supplementation on maternal outcomes in pregnant women with obesity: A systematic review

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Abstract

Background: Obesity in pregnancy is associated with increased risk of gestational diabetes mellitus (GDM), preeclampsia, and fetal growth disorders. Pregnant women with obesity exhibit higher prevalence of vitamin D deficiency due to adipose tissue sequestration, impaired placental vitamin D receptor expression, and heightened systemic inflammation, yet the therapeutic implications of this deficiency on maternal outcomes remain insufficiently characterized.

Objective: To evaluate the effectiveness of vitamin D supplementation on maternal 25-hydroxyvitamin D [25(OH)D] status, GDM incidence, and cardiometabolic markers in pregnant women with obesity.

Methods: A systematic review was conducted following PRISMA 2020 guidelines, searching major databases for studies published from January 2015 to January 2026. Five studies met the inclusion criteria, comprising three randomized controlled trials and two secondary analyses of RCTs, enrolling 841 participants.

Results: Studies administered oral cholecalciferol at doses ranging from 400 to 7,000 IU/day, initiated between 10 and 28 weeks of gestation, with mean baseline BMI ranging from 27.8 to 34.2 kg/m². All studies reported significant improvements in maternal 25(OH)D concentrations following supplementation. One study additionally demonstrated a significant positive association between maternal 25(OH)D and placental weight. Adverse effects were minimal, occurring in 0.1% of the 841 enrolled participants. Among the three studies reporting GDM incidence, none demonstrated a significant between-group difference. No significant effects on hypertensive disorders of pregnancy were observed across any reporting study. Lipid parameters were unaffected in studies evaluating this outcome.

Conclusions: Vitamin D supplementation consistently improved maternal vitamin D status in pregnant women with obesity, with no significant effects on GDM incidence, hypertensive disorders, or lipid profile. Evidence on clinical metabolic outcomes, however, remains inconclusive. Well-powered trials with first-trimester initiation are needed to establish definitive recommendations.

Keywords: Vitamin D; Pregnancy; Obesity; Maternal Outcome; 25-Hydroxyvitamin D



31 | Decoding ICU malnutrition: A 2023 perspective using glim criteria in Bandung, Indonesia

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Abstract

Background: Malnutrition in the Intensive Care Unit (ICU) patients is associated with increased morbidity, mortality, and healthcare costs. The Global Leadership Initiative on Malnutrition (GLIM) provides a standardized framework for diagnosis, yet its application in specific regional settings remains to be fully explored.

Objective: This study aimed to evaluate the prevalence and phenotypic-etiological characteristics of malnutrition using GLIM criteria among critically ill patients at secondary referral hospital in Bandung-Indonesia, in 2023.

Methods: An observational crosssectional study was conducted on 271 adult ICU patients in the accessible population of secondary referral hospitals in Bandung, Sartika Asih Hospital. Nutritional status was assessed using the GLIM criteria framework, requiring at least one phenotypic criterion (body mass index–BMI, weight loss, or muscle mass) and one etiologic criterion (reduced intake/assimilation or inflammation). Initial screening was performed using the Subjective Global Assessment (SGA).

Results: A total of 271 patients were analyzed, predominantly males (45– 65 years) with circulatory-related admissions. A nutritional paradox was identified: while the majority of the subjects (71.2%) presented with a non-underweight BMI category, the GLIM criteria-based assessment revealed a high malnutrition prevalence of 51.7% (29.9% moderate; 21.8% severe). This clinical masking was characterized by significant phenotypic findings, specifically non-volitional weight loss and muscle wasting (39.1% each). Regarding etiologic criteria, 66.4% is reduced on nutrient assimilation, while 100% presented with systemic inflammation associated with acute critical illness.

Conclusions: Application of the GLIM criteria reveals a nutritional paradox in the ICU. Over the half of patients were malnourished in nonunderweight BMI patients, dominantly characterized by muscle wasting, reduced nutrient assimilation in acute critical illness.

Keywords: GLIM criteria, ICU malnutrition, nutritional paradox, critical illness

32 | Association of iron deficiency anaemia with cognitive and psychomotor development in children under five years: A systematic review

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Abstract

Background: Iron deficiency anaemia (IDA) remains one of the most common nutritional deficiencies among children under five, affecting nearly 40% of preschool-aged children worldwide. Iron is essential for myelination, neurotransmitter synthesis, and hippocampal development. Iron deficiency during early life may impair neurodevelopment. However, evidence regarding its effects on cognitive and psychomotor development remains inconsistent, indicating the need for a systematic review.

Objective: To evaluate the association between iron deficiency anaemia and cognitive and psychomotor development in children under five.

Methods: A systematic review was conducted using PubMed, Scopus, Cochrane Library, Europe PMC, and ScienceDirect (last search: March 15, 2026). Observational studies involving children aged 0–59 months assessing



IDA or iron status using haemoglobin and relevant iron biomarkers and measuring cognitive and/or psychomotor outcomes were included. Three reviewers performed study selection, data extraction, and risk of bias assessment using the Newcastle–Ottawa Scale and AXIS tool. Findings were synthesized narratively.

Results: Twelve studies met the eligibility criteria. Most studies showed significant or partial associations between iron deficiency and impaired cognition. Psychomotor findings were more heterogeneous, with only one study reporting no significant association. Longitudinal studies suggested persistent neurodevelopmental effects of early-life iron deficiency.

Conclusions: Current evidence suggests iron deficiency and IDA are associated with poorer cognitive development, whereas evidence for psychomotor development is less consistent because of heterogeneity in study design, exposure definitions, and assessment methods. Early detection and prevention of iron deficiency remain important for optimal child neurodevelopment.

Keywords: Iron Deficiency Anaemia; Cognitive Development; Psychomotor Development; Infant; Child, Preschool

33 | Indicators of protein adequacy in critical illness: A systematic review of their association across outcome domains

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Abstract

Background: Protein provision is a fundamental component of nutritional therapy in critically ill adults admitted to the intensive care unit (ICU). However, its optimal role remains controversial, particularly regarding its impact on metabolic responses and clinical endpoints.

Objective: This systematic review aimed to evaluate the association between protein adequacy and biochemical, body composition, functional, nitrogen balance, and clinical outcomes in critically ill adults.

Methods: This systematic review was conducted according to PRISMA guidelines. PubMed, Cochrane Library, and ScienceDirect were searched using predefined keywords related to critical illness and protein intake. Eligible studies included randomized controlled trials and observational studies involving adult ICU patients that reported protein-related outcomes. Data were extracted using a standardized extraction table and qualitative synthesis was performed across predefined outcome domains due to heterogeneity.

Results: Twenty-three studies were included. Protein adequacy was commonly assessed as protein intake in g/kg/day, percentage of prescribed target achieved, cumulative protein deficit, or nitrogen balance. Higher protein provision generally improved nitrogen balance; protein-fortified feeding at approximately 1.8 g/kg/day improved nitrogen balance by about +5.22 g at day 3, while early high protein intake of 1.5 g/kg/day improved nutritional and nitrogen balance parameters. However, body composition outcomes were inconsistent, with early quadriceps or rectus femoris reductions of approximately 5–27% reported despite nutritional support. Subgroup findings suggested potential benefit in selected patients with favorable baseline muscle characteristics, whereas high protein delivery of approximately 2.0 g/kg/day did not improve mortality and was associated with worse health-related quality of life and greater gastrointestinal intolerance. Improvements in metabolic indicators do not necessarily translate into clinically meaningful benefits, likely due to anabolic resistance, inflammation, and impaired protein utilization. These effects may depend on protein dose, timing, illness phase, and baseline muscle mass.

Conclusions: Individualized protein provision in critical illness may be preferred over a universal high-protein strategy. Future research should focus on precision nutrition strategies integrating metabolic, functional, and structural patient characteristics.

Keywords: critical illness; protein intake; nitrogen balance; muscle mass; intensive care unit



34 | Correlation of nutritional status with vital lung capacity employee's at the university of Jakarta in 2025

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Abstract

Background: Nutritional status plays a crucial role in shaping overall health, including lung function, which can be influenced by variations in body composition and daily physical activity among employees. Excess adiposity, particularly central obesity, has been associated with altered respiratory mechanics, while malnutrition can impair lung development and capacity; however, evidence in the working population is still lacking on this topic. This study aimed to determine the correlation between nutritional status, as assessed using body mass index (BMI), waist circumference (WC), and waist-to-hip ratio (WHR), and vital lung capacity among employees at the University of Jakarta.

Methods: This study used a descriptive analytical, cross-sectional design and purposive sampling. We analyzed 91 subjects after they met the inclusion and exclusion criteria. Inclusion criteria included security guards, cleaning staff, and administrative staff. Exclusion criteria included those who reported respiratory problems. Nutritional status indicators and anthropometric measurements were obtained using standard procedures, while vital capacity was measured using a calibrated spirometer. We categorized vital lung capacity as normal or abnormal based on the subjects' age, sex, and height. Data were analyzed using Pearson correlation to evaluate the relationship between nutritional indicators and lung capacity.

Results: The study showed no statistically significant correlation between BMI and vital lung capacity ($r = 0.047$; $p = 0.658$), WC and vital lung capacity ($r = 0.170$; $p = 0.108$), or WHR and vital lung capacity ($r = 0.082$; $p = 0.438$).

Conclusions: Nutritional status is not significantly associated with lung vital capacity among employees. Lung function can be influenced by various factors, including age, smoking history, physical activity, and occupational exposure. Further studies using multivariate analysis and direct body composition measurements are recommended. In addition, population-based studies are needed to establish reference values for lung vital capacity among Indonesian adults by sex.

Keywords: Vital Capacity; Nutritional Status; Body Mass Index; Waist circumference; Waist-to-Hip ratio; Spirometry

35 | Nutritional management in a patient with severe malnutrition, stage V chronic kidney disease, and grade III sacral pressure ulcer: A case report

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Abstract

Background: Protein-energy wasting (PEW) is common in advanced chronic kidney disease (CKD). PEW is linked to reduced intake, chronic inflammation, and poor outcomes. In patients with pressure ulcers, this condition is important because wound healing needs adequate nutritional support.

Objectives: To describe the nutritional assessment, planning, and management of a patient with severe malnutrition, stage V CKD undergoing routine hemodialysis, and a grade III pressure ulcer in the sacral region, and to evaluate the clinical rationale for an individualized, multidisciplinary nutritional intervention.

Methods: This case report covers a 65-year-old woman admitted to Edelweis Geriatric Ward in February 2026. Her nutritional status was assessed using MST, MNA, and GLIM criteria. Data on anthropometric, biochemical, clinical, and nutritional analyses were collected systematically. An individualized nutritional plan was developed and monitored during hospitalization.



Results: The patient presented with an MST score of 5 and an MNA score of 13, fulfilling the GLIM criteria for severe malnutrition based on significant unintentional weight loss of 27.5% over 8 months, from 80 kg to 58 kg, reduced muscle mass, decreased energy intake, and chronic inflammation due to CKD and the pressure ulcer. Nutritional management targeted a total energy requirement of 1,600 kcal/day with 64 g of protein, equivalent to 1.2 g/kgBW/day, through a combination of oral protein nutrition and parenteral administration of a BCAA amino acid formula. Laboratory values were monitored throughout the intervention. The patient received nutritional therapy for nine days, and the pressure ulcer wound had begun to improve by the time of discharge.

Conclusions: Individualized high-protein and high-calorie nutritional support is essential in patients with stage V CKD undergoing hemodialysis complicated by severe malnutrition and pressure ulcers. A multidisciplinary approach incorporating targeted micronutrient supplementation and continuous electrolyte monitoring is crucial for counteracting PEW, supporting wound healing, and improving long-term clinical outcomes.

Keywords: Malnutrition; Renal Insufficiency, Chronic; Renal Dialysis; Pressure Ulcer; Protein-Energy Wasting

36 | Macronutrient intake and serum triglyceride status among Indonesian school-aged children: Findings from the SEANUTS II study

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Abstract

Background: Nutritional transition among children has increased the risk of early cardiometabolic disorders. However, evidence on macronutrient adequacy and serum triglyceride status among Indonesian school-aged children remains limited.

Objectives: To describe the macronutrient intake adequacy and compare it across the serum triglyceride categories.

Methods: This cross-sectional study used secondary data from the SEANUTS II dataset involving 162 Indonesian children aged 7–12 years. Dietary intake was assessed using a single 24-hour recall. Macronutrient adequacy was classified as inadequate (<80% RDA), adequate (80–110% RDA), or excessive (>110% RDA). Triglycerides were categorized using age-specific NHLBI cutoffs (<75, 75–99, and ≥100 mg/dL for ages 7–9 years; <90, 90–129, and ≥130 mg/dL for ages 10–12 years). Differences in dietary intake across triglyceride categories were analyzed using the Kruskal–Wallis test.

Results: Participants were predominantly aged 7–9 years (53.1%), boys (51.9%), and moderately active (56.8%). Median energy, fat, carbohydrate, and protein intakes were 1264.2 kcal/day, 48.0 g/day, 163.0 g/day, and 39.8 g/day, respectively. Inadequate carbohydrate, energy, and protein intake occurred in 76.6%, 62.3%, and 43.2% of children, while 30.9% had excessive fat intake. Borderline and high triglyceride levels were found in 25.3% and 20.4% of participants. No significant differences in energy or macronutrient intake were observed across triglyceride categories (all $p > 0.05$).

Conclusions: Macronutrient inadequacy and elevated triglyceride levels were common, but macronutrient intake did not differ across triglyceride categories.

Keywords: children; macronutrient adequacy; triglycerides; cardiometabolic risk.



37 | Balancing hypercatabolism and renal dysfunction: Nutritional therapy in active systemic lupus erythematosus with acute kidney injury

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Abstract

Background: Active systemic lupus erythematosus (SLE) with renal involvement may induce a hypercatabolic inflammatory state associated with reduced oral intake and metabolic disturbances. Nutritional management is challenging because increased energy and protein requirements must be balanced against impaired renal function. **Objectives:** To describe individualized nutritional therapy in a patient with active SLE complicated by acute kidney injury (AKI), proteinuria, and reduced oral intake.

Methods: A 29-year-old female was hospitalized in Dr. M. Djamil Central General Hospital, Padang, Indonesia, from March 25 to April 3, 2026 with active SLE, AKI, proteinuria, severe mucocutaneous lesions, and reduced nutritional intake. Nutritional assessment included Malnutrition Screening Tool (MST), Global Leadership Initiative on Malnutrition (GLIM) criteria, anthropometry, dietary assessment, biochemical evaluation, and clinical monitoring. Nutritional therapy was progressively initiated based on renal and metabolic tolerance.

Results: The patient had high nutritional risk (MST score 4), 23% unintentional weight loss within 2 months, severe hypoalbuminemia (1.9 g/dL), and azotemia (urea 244 mg/dL; creatinine 4.5 mg/dL). Painful oral lesions markedly reduced oral intake. Nutritional therapy was initiated at approximately 80% basal energy expenditure. Oral nutritional supplements with renal-adjusted electrolyte content and antioxidant micronutrients (vitamins C and E, selenium) were utilized to support nutritional intake while minimizing renal solute burden. During hospitalization, oral intake tolerance and mucosal lesions improved progressively. Serum albumin increased from 1.9 g/dL to 2.4 g/dL with concurrent improvement in azotemia and overall clinical condition. At discharge, the patient tolerated soft porridge and renal-specific oral nutritional supplements adequately.

Conclusions: Individualized progressive nutritional therapy using renal-specific oral nutritional supplements may support nutritional rehabilitation and metabolic tolerance in hypercatabolic patients with active SLE and AKI.

Keywords: Systemic Lupus Erythematosus; Acute Kidney Injury; Nutritional Support; Diet Therapy; Malnutrition.

38 | High versus low protein intake in critically ill patients: A systematic review of mortality and length of stay

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Abstract

Background: Protein is known to support immune function and promote recovery, leading to increasing use of high-protein nutritional strategies in critically ill patients. However, uncertainty remains regarding its impact on clinical outcomes.

Objectives: To evaluate the impact of high-protein intake on clinical outcomes in critically ill patients.

Methods: A systematic search of major databases for studies published between January 2016 and January 2026 was conducted following PRISMA 2020 guidelines. Studies included were RCTs and relevant secondary analyses



that compared high protein intake ($>1.3\text{g/kg/day}$) to low protein intake ($\leq 1.3\text{g/kg/day}$), administered by any route, in adult patients admitted to the ICU. Reported clinical outcomes assessed were mortality and LOS.

Results: A total of 502 studies were identified and 12 were included ($N = 5921$). Most studies found no significant difference in mortality between high and low-protein groups. A study suggested that protein doses of $\geq 2.0\text{g/kg/day}$ increase 60-day mortality in patients with Acute Kidney Injury (RR 1.4, 95% CI 1.1-1.8; $p=0.02$), and 48% potential harm in a Bayesian analysis. Another Bayesian analysis suggested 72% potential harm in $\geq 2.2\text{g/kg/day}$ protein group. Findings on LOS were heterogeneous, with 3 studies reporting shorter ICU stays with high protein, while another reported longer time to discharge alive ($p=0.001$). A Bayesian analysis found that high protein has 92% potential of increasing time to discharge alive from hospital. In addition, 2 studies showed delayed discharge or even faster recovery in the low-protein group.

Conclusions: High protein intake does not consistently improve mortality or LOS and may be harmful in specific clinical contexts. These findings support an individualized, phase-based approach to protein delivery in critically ill patients, highlighting the need for further high-quality research.

Keywords: Dietary proteins, Critical Illness, Intensive Care Units, Nutrition therapy, Mortality, Length of Stay

39 | Efficacy of Time-Restricted Eating (TRE) on cancer-related fatigue, quality of life, and treatment toxicity in adult cancer patients: A systematic review and meta-analysis

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Abstract

Background: Cancer-related fatigue (CRF) is among the most distressing and debilitating symptoms in cancer patients undergoing chemotherapy. Time-Restricted Eating (TRE) and other intermittent fasting approaches have been proposed as adjunctive dietary strategies to improve quality of life (QoL), reduce treatment-related toxicity, and support metabolic outcomes.

Objectives: This systematic review and meta-analysis evaluated the efficacy of TRE on CRF, QoL, and treatment toxicity in adult cancer patients.

Methods: A systematic literature search was conducted across PubMed, Cochrane Library, Scopus, Web of Science, EMBASE, and CINAHL for randomized controlled trials (RCTs) published between January 2014 and December 2024. Eligible studies included adults with cancer undergoing active treatment and investigated TRE interventions, including short-term fasting (nSTF), fasting-mimicking diets (FMD), or fasting during chemotherapy. Effects were pooled using random-effects models and reported as mean difference (MD) for continuous outcomes and odds ratio (OR) for dichotomous outcomes. Risk of bias was assessed using the Cochrane Risk of Bias 2 (RoB 2) tool.

Results: Six studies involving adult oncology patients were included. TRE did not significantly improve CRF (MD = 3.17; 95% CI: -0.99 to 7.34; $p = 0.13$). QoL findings were inconsistent across studies. However, TRE significantly reduced severe grade 3–4 treatment-related toxicities (OR = 0.36; 95% CI: 0.19–0.69; $p = 0.002$), particularly leukopenia (MD = -1.87; 95% CI: -2.47 to -1.27; $p < 0.0001$), and fasting blood glucose levels (MD = -4.37 mg/dL; 95% CI: -7.08 to -1.65; $p = 0.002$). No significant effects were observed for lean body mass (MD = 0.0 kg; 95% CI: -0.19 to 0.20; $p = 0.75$).

Conclusions: TRE appears to be a safe and feasible nutritional intervention for adult cancer patients undergoing active treatment. While evidence for improving CRF and QoL remains inconclusive, TRE may reduce severe treatment-related toxicities and improve metabolic outcomes without compromising lean body mass. Larger, high-quality RCTs are needed to confirm these findings.

Keywords: time-restricted eating; intermittent fasting; cancer-related fatigue; quality of life; chemotherapy toxicity; cancer



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