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OPTIMIZING INTRADIALYTIC NUTRITIONAL INTAKE: A SYSTEMATIC REVIEW OF SAFETY AND CLINICAL EFFECTS DURING HEMODIALYSIS

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ABSTRAK

Abstract:
Hemodialysis is an essential therapy for patients with end-stage kidney disease; however, it is often accompanied by the risk of malnutrition, which contributes to reduced quality of life and increased mortality. Intradialytic eating (IDE) has the potential to offer clinical benefits for hemodialysis patients, but its practice remains controversial, particularly regarding safety and possible clinical outcomes. This study aims to evaluate the safety and clinical impact of IDE through a systematic review of the available scientific evidence. A comprehensive literature search was conducted using PubMed, Cochrane CENTRAL, ScienceDirect, EBSCO, and Scopus databases. Studies were selected based on relevance to the PICO framework. A total of 9,142 articles were identified, and after data screening and extraction, eight studies met the inclusion criteria. The findings suggest that intradialytic eating (IDE) has the potential to improve nutritional status and quality of life in hemodialysis patients at risk of malnutrition, although it still carries the risk of hypotension and blood pressure instability. Intradialytic eating (IDE), defined as providing meals or oral supplements during dialysis, may improve nutritional status in hemodialysis patients. Its safe application requires careful patient selection, appropriate meal composition, mid-to-late session timing, and close monitoring. Multidisciplinary support and institutional policies are key to long-term succes.

***Abstrak*:**
Hemodialisis merupakan terapi esensial bagi pasien penyakit ginjal, namun sering disertai risiko malnutrisi yang berkontribusi terhadap penurunan kualitas hidup dan peningkatan mortalitas. *Intradialytic eating* (IDE) berpotensi memberikan manfaat bagi pasien hemodialisis, namun praktik ini masih menjadi sumber kontroversi, terutama terkait aspek keamanan dan dampak klinis yang mungkin ditimbulkan. Studi ini bertujuan untuk mengkaji keamanan dan dampak klinis intradialytic eating (IDE) melalui tinjauan sistematik terhadap bukti ilmiah yang tersedia. Pencarian dilakukan menggunakan database PubMed, Cochrane CENTRAL, ScienceDirect, EBSCO, dan Scopus. Studi diseleksi berdasarkan relevansi terhadap pertanyaan PICO. Sebanyak 9.142 artikel diidentifikasi, dan setelah proses ekstraksi data, diperoleh delapan studi yang memenuhi kriteria inklusi. Tinjauan ini menunjukkan bahwa IDE berpotensi meningkatkan status gizi dan kualitas hidup pasien hemodialisis berisiko malnutrisi, walaupun tetap berisiko hipotensi dan tekanan darah tidak stabil. Makan selama dialisis (Intradialytic Eating/IDE), yang didefinisikan sebagai pemberian makanan atau suplemen oral selama sesi hemodialisis, berpotensi meningkatkan status gizi pada pasien hemodialisis. Penerapan yang aman memerlukan seleksi pasien yang cermat, komposisi makanan yang sesuai, waktu pemberian pada fase pertengahan hingga akhir sesi, serta pemantauan yang ketat. Dukungan multidisiplin dan kebijakan institusional menjadi kunci keberhasilan jangka panjang.

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INTRODUCTION

Hemodialysis is a renal replacement therapy that significantly impacts various clinical outcomes, including patients' nutritional status, physical function, and quality of life. During the dialysis process, patients often experience nutritional loss due to multiple contributing factors, such as procedure-induced inflammation, prolonged and frequent therapy sessions, reduced appetite, and limited physical activity. The combination of these factors frequently leads to malnutrition, which has been shown to increase the risk of complications, infections, and mortality, while significantly decreasing quality of life [1]. Strict dietary restrictions and prohibitions against eating during dialysis sessions may further compromise patients' energy and protein intake, ultimately worsening their clinical condition [2]. One promising approach to address this issue is intradialytic eating (IDE)—the practice of allowing food intake during dialysis sessions [1].

Although intradialytic eating (IDE) has the potential to offer benefits for hemodialysis patients, the practice remains controversial, particularly concerning its safety and possible clinical implications. Physiologically, food intake during dialysis sessions can lead to a redistribution of blood flow to the gastrointestinal tract, which may trigger intradialytic hypotension [3]. This hypotension not only has the potential to compromise dialysis adequacy but may also increase the risk of cardiovascular complications.

Nevertheless, several studies have demonstrated that IDE can improve nutritional status and enhance patients' quality of life without a significant increase in hypotensive episodes [4]. Existing scientific evidence regarding the effectiveness and safety of IDE remains limited. It often presents conflicting findings, leading to uncertainty in clinical practice and posing a dilemma for healthcare professionals in decision-making.

Scientific findings regarding the safety and effectiveness of intradialytic eating (IDE) have influenced the perceptions of stakeholders involved in the care of hemodialysis patients. For many patients, eating during dialysis is perceived as a physiological necessity to maintain comfort and physical endurance [5]. In contrast, healthcare professionals hold varying views on this practice [6]. Some support the implementation of IDE as a strategy to improve nutritional intake [7][8], while others express concerns about potential complications, particularly those related to intradialytic hypotension and dialysis adequacy [9][10][11]. Moreover, there is ongoing debate regarding the most appropriate types of food and the optimal timing of meals during hemodialysis sessions [12][10]. These disagreements highlight the urgent need for evidence-based guidelines to define safe IDE practices, including appropriate meal timing, nutrient-controlled intake, and hemodynamic monitoring.

Most previous studies have primarily focused on the impact of intradialytic eating (IDE) on specific clinical parameters. However, to date, there has been no systematic review that provides a comprehensive overview of the implementation strategies of IDE. This study aims to address this gap by conducting a systematic review of the available published evidence. The findings of this review are expected to contribute to the advancement of evidence-based nursing practice, particularly in optimizing the application of IDE.

RESEARCH METHOD

Research Question

Among adult patients receiving maintenance hemodialysis, what are the effects and safe implementation strategies of intradialytic eating, compared to abstaining from food intake during dialysis sessions, on hemodynamic stability, dialysis adequacy, nutritional status, and quality of life?

Search Strategy and Databases

The literature search was conducted systematically across several databases, including PubMed, Cochrane CENTRAL, ScienceDirect, EBSCO, and Scopus, covering publications from 2015 to 2024. The search utilised a combination of keywords structured using Boolean operators as follows: ("Intradialytic eating" OR "feeding during hemodialysis" OR "intradialytic oral nutrition") AND ("hemodynamic" OR "adequacy" OR "nutritional status" OR "blood pressure").

Selection Criteria

The inclusion criteria encompassed quantitative studies with experimental, quasi-experimental, or cohort designs involving adult patients (aged ≥18 years) undergoing routine hemodialysis. Eligible studies evaluated interventions related to eating during hemodialysis procedures, including the consumption of food or beverages. Primary outcomes analyzed included hemodynamic stability (e.g., blood pressure, heart rate), dialysis adequacy (e.g., Kt/V or URR), nutritional status, and patient quality of life. Studies must have been conducted in hemodialysis facilities, published in either English or Indonesian, and released between 2015 and 2025.

Exclusion criteria included descriptive studies, cross-sectional or observational studies without a clear comparator or intervention group; studies involving pediatric populations (<18 years) or patients undergoing acute hemodialysis; and articles that did not specifically examine eating during hemodialysis or lacked reports on relevant clinical parameters.

Quality Assessment

The critical appraisal for quality assessment in this systematic review was conducted using the JBI Critical Appraisal Checklist for Quasi-Experimental Studies 2023, which consists of 9 items, and the JBI Critical Appraisal Checklist for Randomized Controlled Trials 2023, which comprises 13 assessment items.

Data Extraction

The data extraction process in this systematic review began with a comprehensive screening and assessment of article titles to evaluate their relevance to the review topic and alignment with the predetermined inclusion criteria. The primary researcher conducted the initial evaluation independently to maintain objectivity during the early selection phase. Subsequently, the abstracts were reviewed by examining the research problem, study objectives, design, and key findings to determine the articles' relevance to the focus of the review. Keyword analysis was also conducted to identify thematic connections between the articles and the reviewed issue. To enhance validity and minimise the risk of subjective bias, the selection and data extraction processes involved two additional research team members. Each selected article was then thoroughly examined through collaborative discussions to reach a consensus on its eligibility for inclusion and the accuracy of the extracted data. Articles that were agreed upon during this process were subsequently included in the final synthesis stage.

Data Synthesis

The synthesis results in this literature review are presented in the form of a synthesis matrix table. The purpose of data synthesis is to compile and classify various phenomena or findings from the reviewed articles and to integrate those findings to derive a general conclusion from all the articles in a narrative form (Ramdhani et al., 2014).

RESULT

A total of 9.142 articles were initially identified through the literature search. Of these, 8.539 articles were excluded through automatic filtering provided by the journal databases. An additional 51 articles were removed due to duplication. Further screening based on title assessment eliminated 516 articles, while 21 articles were excluded after abstract review for not meeting the inclusión criteria. Seven articles were excluded following a full-text analysis due to non-compliance with the predefined inclusion criteria. Consequently, eight articles met the eligibility criteria and were included in this systematic review (Figure 1). Among the eight included studies, five were single-center studies, and the remaining three were randomized controlled trials.

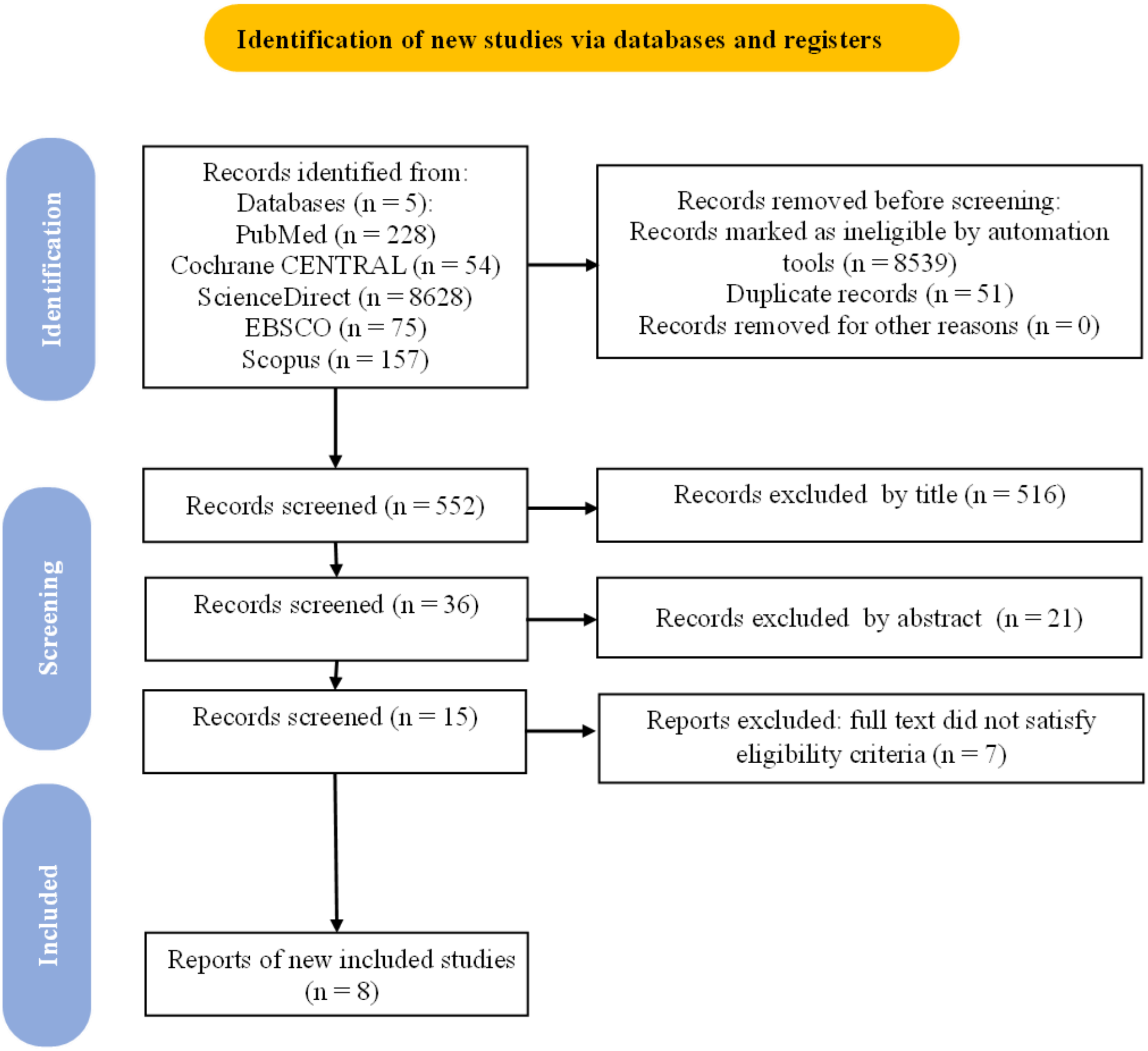

Figure 1. PRISMA flow diagram. Adapted from Haddaway et al. (2022)

Characteristics of Included Studies

Overall, the eight included studies evaluated the impact of oral nutritional supplementation administered either before or during hemodialysis sessions on patients' nutritional status, blood pressure, dialysis adequacy, and quality of life. Several studies examined the effects of high-protein meals consumed during dialysis [12][13][14][15], while others focused on general oral nutritional intake [16][17][18]. The studies by Fotiadou et al. [12], Rao et al. [17], and Goyal et al. [10] specifically investigated intradialytic blood pressure and dialysis adequacy. Meanwhile, Rhee et al. [13], Caetano et al. [14], Li et al. [15], and Ayala [16] assessed parameters related to nutritional status, particularly serum albumin levels.

Several studies also analyzed the effects of the intervention on quality of life [16][18]gastrointestinal symptoms [17], and food tolerance [18]. Most interventions were conducted during dialysis sessions [10][12] [13][14][15][16][18], whereas Rao et al. [17] compared the effectiveness of nutritional supplementation during the predialysis and intradialytic phases.

The studies included in this review were published over the past decade (2014–2024) and were conducted across a range of countries, including Chile [16], India [17][10], Mexico [18], Portugal [14], the United States—specifically Southern California [13], China [15], and Greece [12]. The geographic and methodological diversity of these studies offers valuable insights into intradialytic nutritional practices among hemodialysis patients and their implications for various clinical parameters.

Measurement Tools Used

Two studies employed the Kidney Disease Quality of Life Short Form (KDQoL-SF) to assess the quality of life among hemodialysis patients [16][18]. One study additionally utilized the Appetite and Diet Assessment Tool (ADAT), Malnutrition Inflammation Score (MIS), and bioimpedance analysis (BIA) to evaluate nutritional status[18]. Another study used a Body Composition Monitor (BCM) to measure body composition [15]. Four studies evaluated dialysis adequacy using Kt/V or Urea Reduction Ratio (URR) and monitored blood pressure periodically during hemodialysis sessions to assess hemodynamic stability [10][12][17][18]. Two studies assessed biochemical parameters, including serum albumin and phosphorus levels, through routine blood examinations [13] [14]. Additionally, two studies measured serum albumin levels before and after the intervention [13][15]. One study also included blood urea measurements to evaluate dialysis efficiency [17].

Quality Assessment

The quality assessment of all articles included in this review was conducted using the JBI Critical Appraisal Checklist 2023, tailored to the specific design of each study. Five articles evaluated using the JBI Critical Appraisal Checklist for quasi-experimental studies achieved a perfect score of 9 out of 9 (100%), indicating excellent methodological quality and minimal risk of bias. Meanwhile, three articles employing a Randomized Controlled Trial (RCT) design obtained an average score of 9 out of 13 (±69%), reflecting moderate methodological quality, with potential risks of bias particularly in the areas of randomization, blinding, and control of confounding variables. Overall, of the eight studies reviewed, 62.5% (5 out of 8) were categorized as high quality (≥80%), and all articles were deemed methodologically sound and suitable for inclusion in the narrative synthesis.

Table 1.
Studies Included in The Systematic Review

Study	Intervention				Control	Outcome		
	Described	Time	Duration	Frequency		List of outcomes	tools	Frequency of measurement
Rhee, et al., (201(	High-protein meals during hemodialysis: 50-55 g protein, 850 kcal,	1 hour after the start of the dialysis session	2 months	thrice weekly	a low phosphorus protein ratio of <10 mg/g, yielding 400–450 mg of natural phosphorus.	Increase in serum albumin ≥0.2 g/dL while maintaining phosphorus levels between 3.5-<5.5 mg/dL.	Biochemical measurements with a blood test	Baseline serum albumin and phosphorus levels were measured within 5 days before randomization and intervention. Then every month thereafter
Caetano (2017)	Intradialytic meal composition was 160 mL of a drink rich in high biological value protein (65% e pasteurized egg albumin, milk proteins and whey proteins e strawberry or vanilla flavor) and an egg sandwich	one and a half hour after the start of the dialysis session	3 month	thrice weekly	The patients themselves served as their controls. In the first session patients eat the snack that they usually brought from home	Improvement in nutritional and body composition parameters.	Nutritional parameters and body composition analysis	Not specifically mentioned
Li, et al. (2020)	nutritional counseling plus a low-cost, intradialytic, protein-rich meal consisting of 200 mL milk and two egg whites	one and a half hour after the start of the dialysis session	3 month	thrice weekly	The patients themselves served as their controls. In a controll session patient just gave the nutritional counseling alone	Improvement in serum albumin levels after 3 months of intervention; effect not sustained after follow-up.	body composition monitor (BCM; Fresenius Medical Care Deutschland GmbH, Bad Homburg, Germany,	Baseline, after 3 months of intervention, and after 3-month follow-up period
Rao, et al. (2021	ONS contained 450 kcal energy, 20 g protein (in the form of milk and whey protein concentrates), phosphorus 170 mg, potassium 250 mg, and 180 mL water	2 hour after the start of the dialysis sessio	2 weeks	twice weekly	The patients themselves served as their controls. One hour prior to the start of the session	Differences observed in intradialytic BP, dialysis adequacy, and urea removal between pre-dialytic and intra-dialytic nutrition.	BP monitoring, Kt/V, and urea level analysis	pre-dialysis, every 30 minutes in hemodialysis session, and post-dialysis

Ayala (2021	intradialytic oral nutritional supplementation 200 ml of Fresubin 2 kcal Drink (400 kcal, 20 g protein, 15.6 g lipids, 45 g carbohydrates, 3 g fiber, phosphorus:protein ratio 12 mg/g)	1 hour after the start of the dialysis session	3 months	thrice-weekly	each patient serves as her own control	improves the components of physical and mental quality of life and nutritional status in older patients receiving hemodialysis diagnosed with loss of protein energy	Quality of life score, burden of kidney disease, mental and physical health status using KDQoL-SF 1.3	Taken at baseline and after 3 months
Fotiadou et al. (2022)	A high-protein meal (1.5 g/kg body weight)	1 hour after the start of the dialysis session	3 dialysis sessions	thrice-weekly	low-protein meal (0.7 g/kg body weight)	Increased intradialytic BP variability, reduced dialysis adequacy.	BP monitoring, dialysis adequacy (Kt/V) measurements	pre-dialysis, every 15 minutes in hemodialysis session, and post-dialysis
Goyal, e al. (2024	the consumption of either a small meal (200g Upma, 270 calories, 4g protein) or a large meal (400g Upma, 540 calories, 8g protein) during the hemodialysis session	1 hour after the start of the dialysis session	3 dialysis sessions	twice-trice weekly	The patients themselves served as their controls. no meal consumption	Food intake during dialysis affects dialysis adequacy and BP.	BP monitoring, dialysis adequacy measurements (URR and spKt/V	pre-dialysis, every 30 minutes in hemodialysis session, and post-dialysis
López, e al. (2024	oral nutritional supplement (liquid or solid) 234 ml included 432 kcal and 19.2 g of protein	117 ml 60 min. after starting HD and 117, 45 min. before the end	six weeks	thrice weekly	standard care (without supplementation)	Improvement in quality of life components, appetite rated as good to very good, systolic BP increased slightly but remained safe.	KDQOL-SF36, ADAT self-administered, Malnutrition Inflammation Score (MIS), anthropometric measurements bioimpedance analysis (BIA), and systolic BP monitoring	Baseline, after 18 sessions, after 36 sessions

Table 1.
Critical *Appraisal* Results of RCT Studies

Author (Year)	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Total "Yes"	Quality
Rhee, et al (2017)	Y	Y	Y	N	Y	Y	U	Y	Y	N	N	Y	Y	9/13	moderate
Fotiadou et al. (2022)	Y	N	Y	N	N	Y	U	Y	Y	Y	N	Y	Y	9/13	moderate
López-(2024)	Y	Y	U	N	N	Y	U	Y	Y	Y	Y	Y	Y	9/13	moderate

Tabel 2.
Hasil *Critical Appraisal* Studi Quasi-Eksperimental

Author (Year)	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Total "Yes"	Quality
Caetano (2017)	Y	Y	Y	Y	Y	Y	Y	Y	Y	9/9	high
Li et al (2019)	Y	Y	Y	Y	Y	Y	Y	Y	Y	9/9	high
Rao et al. (2021)	Y	Y	Y	Y	Y	Y	Y	Y	Y	9/9	high
Goyal et al. (2024)	Y	Y	Y	Y	Y	Y	Y	Y	Y	9/9	high
Ayala, (2021)	Y	Y	Y	Y	Y	Y	Y	Y	Y	9/9	high

Intervention Description

The interventions analyzed in the included studies focused on improving nutritional intake and clinical outcomes in hemodialysis patients. These interventions were classified based on their type, timing, duration, and frequency of implementation. Nutritional counselling combined with high-protein intradialytic meals was applied in studies by Li et al. [15] and Caetano et al. [14], in which the provided menus included milk, egg whites, and high-protein beverages. Oral nutritional supplements (ONS) were utilized in studies by López et al. [18] and Rao et al. [17], with precisely determined caloric and protein content. A comparison between high-protein and low-protein meals was conducted in studies by Fotiadou et al. [12] and Goyal et al. [10] aimed to evaluate the impact of varying protein levels and portion sizes on patient outcomes.

The timing of the interventions varied across studies; some, such as Fotiadou et al. [12] and Goyal et al. [10] implemented the intervention during the early phase of the dialysis session (within the first hour). In contrast, others, including Li et al. [15] and Rao et al. [17]It was applied it during the mid-to-late phase of the session. The duration of the interventions ranged from short-term (two weeks in Rao et al., [17]), medium-term (six weeks in López et al., [18]), to long-term interventions lasting three months (Li et al., [15]; Caetano et al., [14]). Most studies applied the intervention three times per week, except for the study by Rao et al. [17], which used a twice-weekly schedule, and Goyal et al. [14], which varied the frequency between two and three times per week.

The results of the interventions demonstrated improvements in nutritional status and body composition [14][15], enhanced quality of life and appetite [18], as well as increased dialysis adequacy in line with higher protein intake [12][17]. However, several studies also reported increased blood pressure variability associated with the consumption of high-protein meals [12]. Comparative analyses revealed that larger meal portions, as investigated by Goyal et al. [10], offered greater nutritional benefits but required careful consideration of patient tolerance. These findings underscore the importance of individualized nutritional interventions in hemodialysis patients to optimize effectiveness while maintaining safety.

DISCUSSION

This systematic review integrates current evidence regarding the effectiveness and safety of intradialytic eating (IDE) among hemodialysis patients. The findings suggest that, in general, IDE has a positive impact on nutritional status, quality of life and may improve adherence to therapy. However, this practice also carries potential risks to hemodynamic stability, thereby necessitating a selective and evidence-based clinical approach to its implementation.

Effectiveness of Intradialytic Nutrition on Nutritional Status

Most of the studies included in this review reported that the provision of food or oral supplementation during dialysis sessions can improve nutritional parameters, particularly serum albumin levels, which are a key indicator of nutritional status and a predictor of mortality in hemodialysis patients. Studies by Rhee et al. [13] and Li et al. [15] demonstrated significant post-intervention increases in serum albumin levels. Other studies, such as those by Caetano [14] and Ayala [16], supported these findings by showing improvements in body composition, including increased fat tissue index and stable muscle mass. However, these effects appear to be temporary and require ongoing intervention. Li et al. [15] noted that albumin levels declined again after the intervention was discontinued. It is important to note that most of these studies employed non-experimental designs or had small sample sizes, which limits the generalizability of the findings.

Blood Pressure Variability and Intradialytic Hypotension

The safety aspect of intradialytic eating (IDE) remains a major concern, particularly regarding the risk of intradialytic hypotension (IDH). Studies by Fotiadou et al. [12] and Goyal et al. [10] reported an increase in systolic blood pressure variability and the incidence of IDH, especially when large meals or protein-rich foods were consumed. This can be explained by the increased splanchnic blood flow (splanchnic vasodilation), which reduces systemic perfusion during ultrafiltration. However, not all studies demonstrated similar findings. Research by Rao et al. [17] and López-Cisneros et al. [18] found no significant increase in IDH associated with IDE. These discrepancies are likely due to variations in study protocols, patients' clinical stability, the type of food consumed, and the timing of food intake. These findings suggest that a generalized implementation of IDE without individualized consideration may increase the risk of iatrogenic complications.

Dialysis Adequacy and Biochemical Parameters

This review found that intradialytic eating (IDE) does not significantly affect the efficiency of the dialysis process. Several studies [10], [17] reported that parameters such as single-pool Kt/V and urea reduction ratio (URR) remained within adequate ranges. In fact, Rao et al. found that nutrient intake before the dialysis session resulted in better urea clearance efficiency compared to intake during dialysis, although both were well tolerated. Regarding biochemical parameters, most studies did not report significant changes in serum phosphorus, potassium, or C-reactive protein (CRP) levels. This may be attributed to the fact that meals used in the interventions were typically tailored to patients' needs and combined with phosphate binders according to clinical protocols.

Impact on Quality of Life and Psychosocial Aspects

Quality of life is a crucial component in the care of hemodialysis patients. A study by Ayala [16] and López-Cisneros [18] indicated that intradialytic eating (IDE) may enhance several quality-of-life domains, including social functioning, energy levels, sleep, and general health perception. This practice is also perceived as a means of creating a more "normal" experience during dialysis and alleviating the psychological burden associated with strict dietary restrictions. However, this dimension remains underexplored in high-quality quantitative studies, highlighting the need for further research employing standardized measures of patients' psychosocial aspects.

Clinical Implications and Implementation Strategies

The implementation of safe and effective intradialytic eating (IDE) strategies must be grounded in robust scientific evidence and well-considered clinical judgment. Based on the findings of this systematic review, the first critical step is proper patient selection. IDE should be offered only to patients with stable hemodynamic status, without a history of severe intradialytic hypotension (IDH), and with clear clinical indications such as protein-energy malnutrition or low serum albumin levels. Findings from studies by Fotiadou et al. [12] and Goyal et al. [10] emphasize that IDE in patients with blood pressure instability may increase the risk of blood pressure variability and IDH, whereas studies by Ayala and Rao demonstrate good tolerability in carefully selected patients.

The selection of food type and composition is another essential component. Meals provided during hemodialysis should be high in protein, yet low in phosphorus, potassium, and sodium, and should be easy to digest. When foods high in phosphorus—such as animal-based products—are included, they should be combined with phosphate binders to maintain metabolic balance. A study by Rhee et al. [13] reported the successful combination of high-protein meals and lanthanum carbonate supplementation in improving serum albumin levels without triggering hyperphosphatemia.

Small to moderate-sized meals are recommended to avoid excessive gastrointestinal load, which may exacerbate hemodynamic intolerance. Recent studies have supported the implementation of intradialytic eating (IDE) as a strategy to address protein-energy malnutrition in hemodialysis patients. A study by Gharib et al. [19] demonstrated that oral nutritional supplementation during hemodialysis significantly improved body weight, serum albumin, and prealbumin levels, while reducing hs-CRP concentrations within three months among malnourished patients. The consensus from the International Society of Renal Nutrition and Metabolism (ISRNM) also recommends that for patients with malnutrition, providing meals during dialysis is an essential approach to enhance energy and protein intake—particularly in Asia and Europe, where this practice is more culturally accepted.

The timing of meal provision also warrants careful consideration. Several studies have indicated that consuming food during the early phase of a hemodialysis session is associated with an increased risk of intradialytic hypotension (IDH), due to the coincidence with the period of intensive ultrafiltration. As reported by Fotiadou, food intake during the initial 1–2 hours of dialysis induces blood volume redistribution to the splanchnic circulation, leading to blood pressure drops and heightened hemodynamic variability. Therefore, the mid to late phases of dialysis (between the second and fourth hours) are considered safer periods for meal administration, as the ultrafiltration rate has typically decreased and patients are more hemodynamically stable. This strategy also allows for nutritional support without compromising dialysis efficiency.

The practice of intradialytic eating (IDE) should be accompanied by strict clinical monitoring. Patients' blood pressure should be monitored every 15–30 minutes during dialysis sessions, and clinical symptoms such as dizziness, nausea, or fatigue must be promptly documented and addressed [20]. Although the use of automatic blood pressure monitoring devices is standard in dialysis units, continuous monitoring using finger cuff technology is inaccurate and frequently fails in hemodialysis patients, and therefore is not recommended [21].

Regular evaluation of laboratory parameters such as serum albumin, dry body weight, and dialysis adequacy indicators (Kt/V or URR) is also necessary to assess the long-term effectiveness and safety of this intervention. Monitoring becomes particularly crucial when the meals provided contain significant fluid volumes or are administered to patients at high cardiovascular risk [22].

The successful implementation of IDE is highly dependent on the collaboration of a multidisciplinary team consisting of nephrologists, nurses, dietitians, and the patients themselves. IDE requires comprehensive planning, including patient education, the development of standard operating procedures (SOPs), and clinical policy support from dialysis service units. According to Elkeraie [8], SOPs and clinical guidelines should be tailored to the patient's condition, taking into account hemodynamic stability and individual nutritional needs. Studies by Ayala [16] and López [18] emphasize that active involvement of the care team is essential to ensure the continuity and safety of this intervention.

Strengths and Limitations of the Review

This review possesses several strengths, particularly in the use of a systematic selection process and quality assessment guided by the JBI Critical Appraisal Checklist. Five out of eight studies (62.5%) demonstrated high methodological quality (score of 9/9), while the three randomized controlled trials (RCTs) had an average score of 9 out of 13, with potential biases mainly related to blinding and randomization. The wide scope of topics—ranging from nutritional status, blood pressure, and dialysis adequacy to quality of life—and the diversity in geographic contexts and study designs enrich the overall findings. However, heterogeneity among the included studies, especially in terms of intervention types, timing of food administration, and population carácteristics, limits generalizability and precludes quantitative synthesis. The heterogeneity of interventions, small sample sizes, and risk of bias in some studies limit the generalizability of findings. In addition, the exclusion of non-English and non-Indonesian studies introduces potential language and publication bias. Therefore, the findings should be interpreted with caution and confirmed through large-scale randomized clinical trials to more comprehensively determine the effectiveness and safety of intradialytic eating practices.

CONCLUSION

This systematic review identifies that intradialytic nutritional intake (intradialytic eating/IDE) demonstrates significant potential in improving nutritional status, biochemical parameters, and quality of life among hemodialysis patients, particularly in populations at risk of protein-energy malnutrition. The accumulated evidence suggests that providing food during dialysis—especially high-protein meals that are appropriately formulated—can enhance serum albumin levels, maintain body composition, and improve quality of life scores without substantially compromising dialysis adequacy or metabolic homeostasis.

Nevertheless, the potential risks associated with IDE such as increased blood pressure variability, intradialytic hypotension, gastrointestinal discomfort, aspiration, and reduced dialysis efficiency remain critical concerns in clinical settings. These findings underscore the necessity for individualized implementation strategies, including careful patient selection based on hemodynamic stability, appropriate meal type and timing, and vigilant clinical monitoring. Multidisciplinary collaboration and supportive institutional policies are also essential to optimize the safety and sustainability of this practice.

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