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Exploring the Impact of a Plant-Based Diet on Quality of Life and Treatment Needs in Chronic Kidney Disease (CKD)

Exploración del impacto de una dieta basada en plantas en la calidad
de vida y la necesidad de tratamiento en la enfermedad renal crónica
(ERC)

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“Courage. Kindness. Friendship. Character. These are the qualities that define us as human beings, and propel us, on occasion, to greatness.”

—R.J. Palacio

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LIST OF ABBREVIATIONS

CKD	Chronic Kidney Disease
PBD	Plant based diet
DM	Diabetes Mellitus
WFPBD	Whole-food plant-based diet
eGFR	Estimated glomerular filtration rate
uACR	Urine albumin-creatinine ratio
SANRA	Scale for the Assessment of Narrative Review Articles
ADMA ratio	L-arginine/asymmetric dimethylarginine
PLAFOND	Plant-Focused Low-Protein Nutrition for CKD in Diabetes
hPDI	Healthful plant-based diet index
HTN	Hypertension
BP	Blood pressure
SZC	Sodium zirconium cyclosilicate
DPI	Dietary protein intake
KDIGO	The Kidney Disease: Improving Global Outcomes
ISRNM	International Society of Renal Nutrition and Metabolism
MNT	Medical nutrition therapy
RCT'S	Randomized controlled trials
KDOQI	Kidney disease outcome quality initiative
PLADO	Plant-Dominant Low-Protein Diet
VD	Vegetarian diet
DKD	Diabetic kidney disease
NDKD	Non-diabetic kidney disease
QOL	Quality of life
HRQOL	Health related quality of life

ABSTRACT

Introduction

Chronic kidney disease (CKD) is multifactorial condition that poses a progressive global health issue and economic burden. It is strongly associated with metabolic comorbidities such as diabetes mellitus, obesity, and cardiovascular disease. Despite its high prevalence, there is a lack of consensus surrounding its treatment and management. Dietary interventions, especially whole food plant-based diets (WFPBDs), have emerged as promising methods for both prevention and management. WFPBDs act as a scientifically supported approach to enhance the body's intrinsic healing ability.

Objective

To critically analyse whether a WFPBDs could be used as a potential therapeutic treatment strategy or to slow the progression of CKD.

Materials and Methods

A systematic review was conducted using the databases PubMed, EBSCO and Scopus. Studies were selected based on predetermined inclusion and exclusion criteria in conjunction with a PICO framework. Narrative review articles were evaluated using the SANRA tool, case report were assessed using the Joanna Briggs Institute (JBI) checklist and the clinical trials were appraised using the UCSF evidence-based medicine scale scale. Findings were tabulated to identify emerging themes.

Results

Twenty-three studies demonstrated that a WFPBD has favourable outcomes in improving cardiovascular and metabolic markers, reducing common CKD comorbidities (e.g., diabetes, obesity, hypertension, dyslipidaemia), and improving quality of life. Their naturally high fibre content helps modulate the gut microbiota and contributes to reduced uremic toxin build-up. Potassium restriction does not appear to be necessary while following a WFPBD.

Conclusion

WFPBDs offer therapeutic potential in both the prevention and management of CKD. They may reduce the need for dialysis and pharmacological treatments while aligning with global health and sustainability goals.

Keywords

Whole food plant based diet, chronic kidney disease, treatment, quality of life

RESUMEN

Introducción

La enfermedad renal crónica (ERC) es una afección multifactorial que plantea un problema de salud mundial progresiva y una carga económica. Está fuertemente asociada a comorbilidades metabólicas como la diabetes mellitus, la obesidad y las enfermedades cardiovasculares. A pesar de su elevada prevalencia, no hay consenso sobre su tratamiento y gestión. Las intervenciones dietéticas, especialmente las dietas integrales a base de plantas, se han revelado como métodos prometedores tanto para la prevención como para el tratamiento. Las dietas integrales a base de plantas actúan como un enfoque científicamente respaldado para potenciar la capacidad curativa intrínseca del organismo.

Objetivo

Analizar críticamente si una DMAP podría utilizarse como estrategia terapéutica potencial o para ralentizar la progresión de la ERC.

Materiales y métodos

Se realizó una revisión sistemática utilizando las bases de datos PubMed, EBSCO y Scopus. Los estudios se seleccionaron basándose en criterios de inclusión y exclusión predeterminados junto con un marco PICO. Los artículos de revisión narrativa se evaluaron mediante la herramienta SANRA, los informes de casos se evaluaron mediante la lista de comprobación del Instituto Joanna Briggs (JBI) y los ensayos clínicos se valoraron mediante la escala de medicina basada en la evidencia de la UCSF. Los resultados se tabularon para identificar los temas emergentes.

Resultados

Veintitrés estudios demostraron que una DMAP tiene resultados favorables en la mejora de los marcadores cardiovasculares y metabólicos, la reducción de las comorbilidades comunes de la ERC (por ejemplo, diabetes, obesidad, hipertensión, dislipidemia) y la mejora de la calidad de vida. Su alto contenido natural en fibra ayuda a modular la microbiota intestinal y contribuye a reducir la acumulación de toxinas urémicas. La restricción de potasio no parece ser necesaria cuando se sigue una DMAP.

Conclusión

Los DMAP ofrecen un potencial terapéutico tanto en la prevención como en el tratamiento de la ERC. Pueden reducir la necesidad de diálisis y de tratamientos farmacológicos, al tiempo que se alinean con los objetivos globales de salud y sostenibilidad.

Palabras clave

Dieta integral a base de plantas, enfermedad renal crónica, tratamiento, calidad de vida

1 INTRODUCTION

1.1 Definition

Chronic kidney disease (CKD) is a progressive condition. It is defined by kidney damage or diminished renal function lasting a minimum of three months. During which the glomerular filtration rate of the kidneys gradually struggle to perform essential physiological functions. The kidneys are responsible for erythropoietin production, fluid and waste filtration from the body, blood pressure regulation, and maintaining bone health (NKF Patient Education Team, 2024).

Furthermore, the assortment of complications that CKD produces can significantly impair an individual's quality of life (QOL) likewise its effects can be felt at a greater societal level. According to Hussien et al. (2020) regardless of the stage of CKD the patients QOL will be fundamentally impaired. CKD gives rise to various factors which can contribute to this, depression, anxiety, social isolation, fragility. Additionally across a larger societal context, the healthcare demands and decreased workforce productivity and lack of social support would influence health related quality of life (HRQOL). Currently there is no global standard in which to measure HRQOL. (Hussien et al., 2020)

1.2 Chronic Kidney Disease in the Context of Metabolic Comorbidities

CKD frequently coexists with metabolic conditions, hypertension, dyslipidemia, obesity and particularly diabetes mellitus (DM). DM is one of the most significant risk factors for the onset and progression of CKD (Anders et al., 2018). According to the CDC (2024), approximately one in three adults with diabetes also has CKD, one in five adults with hypertension have CKD and those with heart failure are at an elevated risk of developing CKD. According to Abdellah et al. (2023) chronic hyperglycemia, is a characteristic feature of diabetes, puts the kidneys under constant strain. Over time, this results in both structural and functional renal deterioration (Kumar et al., 2023). Anders et al. (2018) stated that a number of urgent unmet needs have arisen due to lack of the differentiation between the causes of CKD. Acknowledging that DM may or may not be the root cause and treating the patient accordingly, would lead to more effective CKD prevention and control. According to Abdellah et al. (2023) serum IgG is a simple test that can be used as a predictive biomarker for early renal affection in type-2 diabetic patients. DKD, NDKD, or a combination of both may coexist with CKD, and distinguishing between the two conditions often through a kidney biopsy is essential for precise diagnosis, treatment planning, and research (Esposito et al., 2023).

Recent clinical trials have identified shared mechanistic pathways contributing to renal damage in DKD and NDKD. In particular, hyper filtration driven by sodium–glucose cotransporter 2 (SGLT2) activity and the activation of the renin–angiotensin system play principal roles in disease progression (Anders et al., 2018). Contrastingly this promotes the idea that similar therapeutic targets could be successful regardless of the origin.

Preventative strategies are paramount for individuals with both diabetic and non-diabetic kidney disease (DKD and NDKD), respectively (Anders et al., 2018). Strict blood pressure, blood glucose, and body weight monitoring all form part of effective preventative techniques. Additionally, it is critical to limit the use of nephrotoxic drugs in standard practice and prevent iatrogenic kidney injury (Anders et al., 2018).

In addition to its metabolic comorbidities, CKD has been strongly associated with premature cardiovascular morbidity and mortality. The clinical ramifications surrounding this aren't fully understood to date. An evidence based link has been drawn between metabolic syndrome (MS) and the risk of developing CKD, therefore MS serves as a commanding awareness tool before MS progresses to CKD (Raimundo & Lopes, 2011). Patients with CKD face a substantially elevated risk of developing cardiovascular conditions, including coronary artery disease, heart failure, arrhythmias, and stroke (Sumida et al., 2023; Jankowski et al., 2021). This emphasises how CKD and its related disorders require an integrated, multidisciplinary management approach. According to Raimundo and Lopes (2011) obesity has emerged as a global epidemic in recent decades. Currently one in three American adults are classed as obese. Tackling this should be treated as a public health priority due to the likely burden it will impose on the health care system including dialysis facilities.

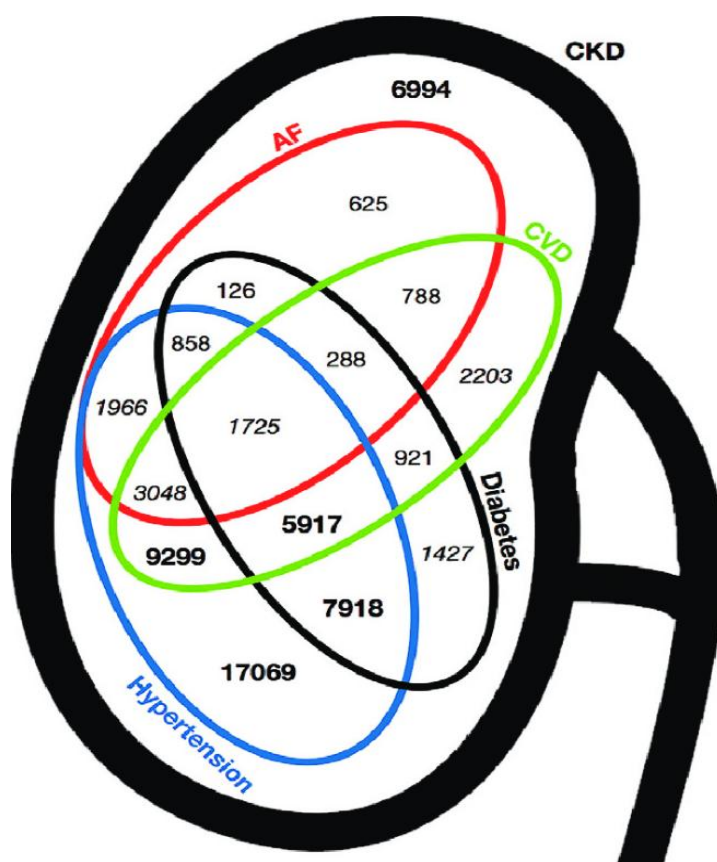


Figure 1. Venn diagram illustrating the overlap between chronic kidney disease (CKD) and its major comorbid conditions: diabetes, cardiovascular disease (CVD), atrial fibrillation (AF), and hypertension. The high prevalence of multimorbidity highlights the complexity of CKD management. Radford et al. (2019)

1.3 Global Burden and Epidemiology of Chronic Kidney Disease

By 2040, CKD is projected to become the fifth leading cause of mortality globally, underscoring its status as a rapidly escalating public health crisis (Foreman et al., 2018). Despite this trajectory, there remains a notable lack of comprehensive epidemiological data on CKD, especially in low- and middle-income countries. Recent reports indicate that governments globally are struggling to find accurate and sufficient data on the exact mortality and morbidity rates associated with the disease (International Society of Nephrology, 2023). In fact, many countries face a complete lack of epidemiological data on CKD (*Global, Regional, and National Burden of Chronic Kidney Disease, 1990-2017*: Hailemariam et al., (2020)

Its prevalence poses a substantial financial burden on healthcare systems worldwide. CKD affects an estimated 850 million people around the world. This is more than double the number of

individuals living with diabetes and approximately 20 times the number of people diagnosed with cancer (National Kidney Foundation, 2023). The global economic impact of CKD is considerable, healthcare expenditures escalate dramatically as the disease progresses depending on treatment approach and dialysis type. According to Darbà and Marsà (2020) specialised care is effective in lowering the necessary length of inpatient hospitalisation. Cardiovascular risks were found to be the most pivotal hospital mortality marker. To mitigate the burden of CKD, cost-effective therapies that focus on primary prevention and progression of the disease are key (Jha et al., 2023). For instance, in Germany, the average annual cost of managing a single CKD patient is approximately €56,623 (International Society of Nephrology, 2023). Given these staggering statistics, there has been an urgent need to explore innovative approaches to managing CKD.

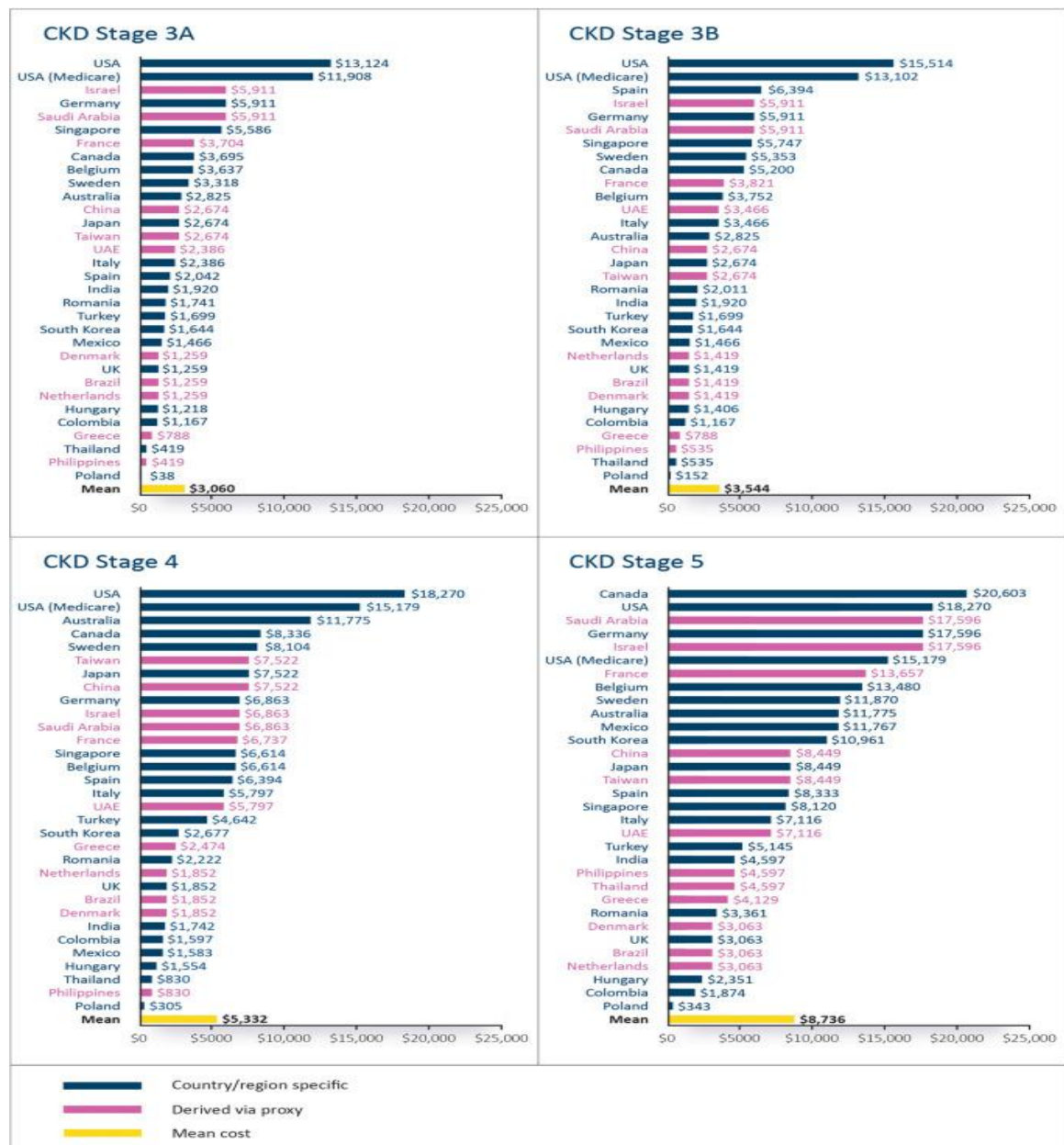


Figure 2. Country- and region-specific annual per-patient costs for chronic kidney disease (CKD) management by KDIGO GFR stage, adjusted for purchasing power parity. The data illustrate significant variation in cost burden by disease severity and geography, emphasizing the rising economic toll of CKD globally. (Jha et al., 2023)

Costs vary greatly among countries, from under \$500 in Poland to over \$20,000 per patient annually in Canada at stage 5 of CKD. This emphasises the inequity and complexity of managing

CKD globally. The need for cost-effective therapies that are adapted to national healthcare capacities is highlighted by these disparities.

1.4 Disease Progression and Dietary Intervention

The severity of CKD is classified into five stages, guided by key biomarkers such as estimated glomerular filtration rate (eGFR) and urine albumin-creatinine ratio (uACR). These measures enable healthcare professionals to assess kidney function and determine appropriate treatment strategies (NKF Patient Education Team, 2024). CKD typically advances gradually, with symptoms becoming more pronounced in the later stages therefore, research into the determinants of this progression and the possibility of slowing it further or even stopping it are essential (NKF Patient Education Team, 2024). New strategies must be investigated to improve the life quality of the CKD population and reducing its strain on the economy has become an urgent objective.

In addition to, conventional treatments, dietary, and lifestyle modifications have emerged as promising strategies to mitigate disease progression and improve patients' quality of life (Avesani et al., 2024). Among these, the whole-food plant-based diet (WFPBD) diet has garnered increasing attention for its potential benefits in CKD management (Nhan et al., 2023). There is a growing body of evidence which indicates that plant-based diets WFPBD can have protective effects against CKD, as well as slowing progression of the disease, ultimately causing an overall reduction in mortality risk (Avesani et al., 2024).

This literature review examines the evidence surrounding the role of a WFPB diet in treating and managing CKD. It investigates the role of dietary pattern analysis in the treatment of disease as well as slowing its progression. It will compile and examine research which looks at the possibility of tailoring a diet to improve clinical outcomes for patients with CKD.

1.5 Definition and Relevance of Plant-Based Diets in CKD

A whole food plant based diet is a form of eating which centers around consuming minimally processed fruits and vegetables, whole grains, legumes, nuts and seeds, herbs, and spices. All animal products, including red meat, poultry, fish, eggs, and dairy products are removed from the diet. In contrast to vegan or vegetarian diets that traditionally focus on the exclusion of meat, poultry and dairy, plant based diets are generally defined by their nutritional composition instead of a rigid exclusion criteria (Ivanova et al. 2021).

The emphasis is placed on whole, minimally processed plant foods, contributing to improved nutrient density, fiber intake, and reduced consumption of saturated fats and dietary cholesterol (Massera et al. 2016). These diets are associated with several health benefits, such as reduced risk of diabetes and lower body weight (Kubala, 2018).

A WFPB diet is often favoured for its nutritional quality. Locally sourced food, where possible are consumed. Adopting a diet that mainly consists of organic foods promotes both environmental sustainability and food safety. This dietary framework aligns the fundamental principles of holistic lifestyle medicine. Its principal goals are disease prevention, longevity and environmental stewardship (Levine et al., 2018).

	Principal Food Sources	Meat, Poultry & Animal Product Consumption	Protein Sources	Saturated Fat Level	Dietary Fiber Level	Phosphorus & Acid Load	Potassium Content	Uremic Toxin Precursors	Cardiovascular Implications	Environmental Impact
Whole Food Plant-Based Diet	Vegetables, fruits, whole grains, legumes, nuts, seeds	Minimal or zero consumption	Legumes, soya (tempeh, tofu, edamame), quinoa, seeds	Low	High	Lower phosphorus level, lower dietary acid load	High (monitoring recommended in late-stage CKD)	Lower due to absence of red meat and animal protein	Reduced risk	Lower
Omnivorous Diet	Mix of plant and animal products, including red/processed meats	Regular to high consumption	Meat, poultry, eggs, dairy products	Higher (especially from red meat and dairy)	Often low	Higher phosphorus (especially inorganic), higher dietary acid load	Variable	Higher due to red meat and animal protein metabolism	Increased risk	Higher

Table 1. A comparison of a whole food plant-based diet and a typical omnivorous diet in the context of CKD. Original creation. Nutrient characteristics are based on current literature regarding renal nutrition and dietary patterns relevant to chronic kidney disease management.

1.6 People Planet And Sustainability- Objective 3 Of SDG: Good Health And Well-Being

The United Nations Sustainable development's third objective is to ensure, "healthy lives and promote well-being for all ages" (United Nations, 2015). Considering poor diets are among the leading causes of non-communicable diseases such as diabetes, cancer, and chronic kidney disease. Nutrition is crucial to achieving this objective. Encouraging everyone to adopt sustainable eating habits, such as plant-based diets and whole foods, not only improves individual health but also supports broader public health economic objectives. These dietary approaches may provide governments with an affordable means of lowering chronic kidney disease (CKD), especially in nations with limited access to pharmaceutical and dialysis services. Thus, research into dietary lead prevention and treatment methods for CKD directly contributes to the achievement of the third SDG. This connects personal nutrition to health equity and global sustainability (United Nations, 2015).



Figure 3. The 2030 Agenda for Sustainable Development Goals.. The 2030 Agenda is a 15-year global framework centred on an ambitious set of 17 Sustainable Development Goals (SDGs) (Canada, 2015)

2.1 Hypothesis

A well-designed, nutrient-dense, whole-food plant-based diet (WFPBD) may contribute to slowing the progression of, or preventing the onset of, chronic kidney disease (CKD).

2.2 Main Objective

To critically examine the current scientific literature to determine whether a whole food plant based diet (WFPBD) can be employed to prevent and treat CKD.

2.3 Specific objectives

- H0: Adherence to a whole food plant-based diet (WFPBD) by patients with CKD does not influence disease progression and the need for pharmacological treatment and dialysis.
- H1: Adherence to a whole food plant-based diet (WFPBD) by patients with CKD decreases disease progression and the need for pharmacological treatment and dialysis.
- OP: To study the principal pathophysiological characteristics, causes and stages of chronic kidney disease (CKD) in adult patients.
- SO1: To review current dietary recommendations for adult renal patients according to national and international guidelines.
- SO2: To analyse the available scientific evidence on the effects of a whole food plant-based diet (WFPBD) in renal patients.
- SO3: To compare clinical outcomes of patients with CKD following a whole food plant-based diet (WFPBD) versus an omnivorous diet.
- SO4: To determine whether current literature includes specific guidance or evidence regarding the use of whole food plant-based diet (WFPBD) in pediatric CKD populations.

3 MATERIALS AND METHODS

3.1 Design

A systematic review was selected as the most appropriate methodological strategy to address the study's objectives and hypothesis. The design facilitate evidence-based critical appraisal of dietary implications on disease progression. The review was conducted in line with PRISMA 2020 guidelines to allow for transparency, methodological rigour and reproducibility.

This bibliographical review was conducted between October 2024 and May 2025. Systematic searches of three well-established biological databases Scopus, PubMed, and EBSCO were chosen for the review. These databases were employed for their extensive coverage of biomedical and clinical research. In addition, the metasearch engines Google Scholar and Crai were also used to supplement results and identify gaps in the literature.

The search strategy was guided by the Patient-Intervention-Comparison-Outcome (PICO) framework:

“Can a whole foods plant-based diet WFPBD improve quality of life and reduce the need for pharmacological and dialysis treatment in patients with CKD?” (Table 1).

MeSH terms and Boolean operators were used to refine database results. The search strategy and word combinations used in each database are presented in Tables 3-5. Key terms incorporated were, “chronic kidney disease”, “chronic renal disease”, “whole foods plant-based diet”, “vegetarian diet”, “CKD”. The Boolean operators “AND” and “OR” were incorporated to combine and narrow the search terms. See tables 3-5.

Comparison	Omnivorous diet / Standard renal diet
Intervention	Whole Food Plant-based diet (WFPBD)
Outcome	Improved quality of life and reduced need for medical treatments (dialysis and pharmacological treatments)
Patients/ Population	Adults with chronic kidney disease (CKD)

Table: 2 PICO question. Original creation.

3.2 Subject of study

This systematic review focused exclusively on adult patients (over 18 years old) diagnosed with CKD. No restrictions were applied based on the disease stage. The population was included irrespective of which treatment plan they were following. Patients undergoing dialysis, pharmacological treatment or dietary intervention were all considered. Pediatric populations were excluded due to insufficient available literature in this subgroup.

3.3 Tables of Database search

DATA BASE	SCOPUS
FILTERS	• Language: English or Spanish • Publishing date: between the years 2022-2024 • Document availability: complete document and completely free • Article type: review article, research article
SEARCH TERMS	("chronic kidney disease" / "CKD") AND ("Plant-based diet" OR "Whole foods plant based diets" OR "Vegan") AND ("treatment" OR "remedy" OR "Dialysis alternative") AND ("adult")
RESULTS	4 articles

TABLE 3. Database search results for Scopus. Original creation.

DATA BASE	PUBMED
FILTERS	• Language: English or Spanish • Publishing date: between the years 2022-2024 • Document availability: Full free text • Species: Humans • Article type: Review
SEARCH TERMS	((("Chronic Kidney Disease"[Mesh] OR "chronic renal disease"[All Fields] OR "CKD"[All Fields]) AND ((("Diet, Vegetarian"[Mesh] OR "plant-based diet"[All Fields] OR ("plant"[All Fields] AND "based"[All Fields] AND "diet"[All Fields]) OR "vegetarian diet"[All Fields]))
RESULTS	13 articles

TABLE 4. Database search results for PUBMED. Original creation.

DATA BASE	EBSCO
FILTERS	• Language: English or Spanish • Publishing date: between the years 2022-2024 • Document availability: complete document and completely free • Article type: review articles, research articles
SEARCH TERMS	("chronic kidney disease" OR "CKD" OR "kidney disease") AND ("plant-based diet" OR "vegan diet" OR "whole foods plant based") AND ("treatment" OR "remedy" OR "Treatment Outcome")
RESULTS	6 articles

TABLE 5. Database search results for EBSCO. Original creation.

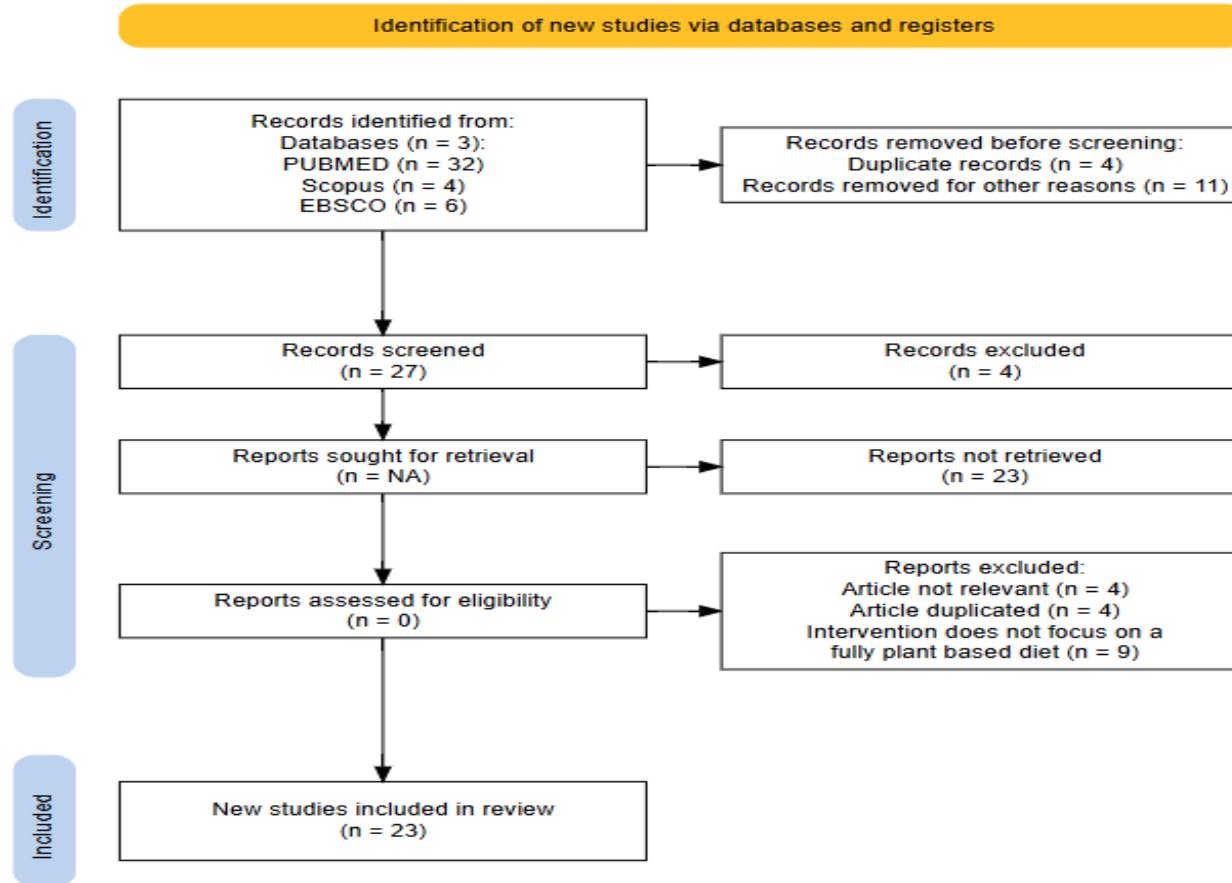


Figure 4: Prisma Diagram. This review followed the PRISMA 2020 guidelines to ensure transparency and reproducibility. Original Creation

3.4 Inclusion criteria:

The review's inclusion criteria encompassed studies that investigated the role of whole food plant-based diets in the management or progression of chronic kidney disease in adult populations. Pediatric studies were excluded due to limited documented investigation available.

Only peer-reviewed studies published between 2022 and 2024 were included. Eligible studies were composed in either Spanish or English and available in full text (open access or accessible through university databases). Furthermore, quantitative, qualitative and mixed-methods studies, including research articles and systematic reviews were permitted.

Studies that did not explicitly address dietary or nutritional interventions or those involving alternative or unrelated treatment strategies were excluded.

Criteria Type	Included	Excluded
Population	Adults with CKD	Pediatric populations
Publication Date	2022–2024	Published before 2022
Language	English and Spanish	Other languages
Study Type	Peer-reviewed research articles, systematic reviews, qualitative and quantitative studies	Non-peer-reviewed articles, editorials, commentaries, opinion pieces
Focus Area	Studies addressing plant-based diets to treat or slow CKD progression	Studies not involving dietary/food intake interventions or focusing on alternative treatments
Access	Full-text articles (open access or accessible via university library)	Abstracts only or inaccessible articles

Table 6. Inclusion versus exclusion criteria. Original Creation

3.5 Data extraction and evaluation of methodological quality:

Data were independently extracted by the author (N.C.) in several phases. An initial exploratory search was conducted, followed by the removal of duplicate articles. The remaining studies were analysed and narrowed down based on the inclusion and exclusion criteria. These articles were then critically examined for sample size, relevance, methodology, and risk of bias.

Three validated quality appraisal tools were employed to evaluate the methodological rigour and applicability of the included literature:

- **SANRA (Scale for the Assessment of Narrative Review Articles):** It applies to non-systematic reviews; this tool has a scoring system out of 12. Structure, scientific reasoning, and reference quality are evaluated (Baethge et al., 2019).

- **The JBI Critical Appraisal Checklist for Case Reports:** Used to assess case reports in the interim. It is a scoring system with 8 criteria including clarity, reliability, ethical transparency and clinical relevance. (Peters et al., 2020).
- **UCSF Clinical Trial Feasibility Checklist:** A 19-item checklist designed to assess the practical feasibility of clinical trials. It assesses elements such as logistical demands, staffing requirements, adverse event management, participant recruitment, and integration into standard clinical care..

In combination, these resources allowed for a rigorous and transparent evaluation of studies. The methodological quality was checked across a range of research types. Their evidence-based criteria for article inclusion created a uniform reliable base to interpret the review findings.

3.6 Data Analysis and Presentation

To facilitate a systematic comparison, extracted data was compiled and tabulated into summary tables. This approach follows the guidelines of (Bethel et al. 2021), who encourages the use of tables data in systematic reviews for clarity and efficiency.

A thematic analysis was also performed due to the heterogeneity of study designs and outcome measures. This method enabled the identification of recurring patterns, challenges and conclusions across the included literature. The thematic approach facilitated meaningful synthesis despite methodological variability, especially in relation to the application of WFPBD'S in clinical CKD care.

4 RESULTS

4.1 Characteristics of the studies

As shown in the PRISMA flow diagram (Figure 3), 20 of the 24 initially selected publications were ultimately included in the final analysis. The chosen studies were made up of a range of methodologies: case reports (n = 2), expert consensus reviews (n = 2), scoping reviews (n = 1), narrative reviews (n = 12), feasibility studies (n = 3), and systematic reviews (n = 1).

Geographically, the studies were greatly dispersed; research was conducted in nations like Spain, the United States, Brazil, Romania, Mexico, Canada, and Poland. A significant portion of the studies originated in the United States, which may have influenced the global applicability of certain findings. However, this international representation offers a broader cultural context and insights into the implantation of WFPBD's in distinct healthcare systems.

The UCSF Clinical Trial Feasibility Checklist was used to evaluate the practicality of relevant research. The checklist's 19 elements cover hiring, staffing, risk management, logistics, and integration into therapeutic care. The complete checklist can be found in Annex 1.

4.2 Quality and evidence of the studies

Author(s)	Study Type	Outcome Variables	Conclusion	JBI	SANRA	UCSF
Thompson et al. (2024)	Prospective cohort	All-cause mortality, HPDI/uPDI adherence	HPDI lowered risk 23%, uPDI increased 49%. Effects stronger in early CKD. Supports quality-based PBDs in CKD.	–	–	17/19
Narasaki et al.	Narrative Review	Nutritional strategies pre-dialysis to dialysis	Personalized PBDs can delay CKD progression.	–	12/12	17/19
Avesani et al. (2024)	Feasibility Clinical Trial	Potassium levels, dietary quality, QoL	Plant-based diet with BZC was safe, improved diet quality, maintained normokalemia.	–	–	16/19
Nhan, Sgambati & Moudgil (2023)	Educational Review (Pediatrics)	Feasibility & implications of PBD in children with CKD	PBDs can be safe in pediatric CKD with careful planning and nutrient monitoring.	–	11/12	17/19
Visinescu et al. (2024)	Educational Review	Cystatin C vs. creatinine in diabetes	Cystatin C may offer more accurate GFR in diabetic CKD than creatinine.	–	10/12	15/19
Bruehl et al. (2024)	Narrative Review	Cultural adaptation of dietary patterns for CKD	Dieta de la Milpa is culturally appropriate for Latine patients; more evidence in CKD needed.	–	10/12	16/19
Valim et al. (2022)	Scoping Review	eGFR/creatinine clearance in vegetarian CKD diets	One study positive (ketoanalogues); others mixed. More research needed.	–	11/12	16/19
Moldovan et al. (2024)	Narrative Review	Diet and vascular calcification	PBDs may prevent vascular calcification via gut microbiota, inflammation, mineral balance.	–	10/12	15/19
Kalantar-Zadeh et al. (2022)	Expert Consensus Review	PLADO for diabetic CKD	PLADO (plant-based, low-protein) is promising but needs more trials.	–	11/12	17/19
Świątek et al. (2023)	Systematic Review	eGFR in vegetarians vs. omnivores in CKD	Vegetarian diets may improve eGFR; further studies needed.	–	–	16/19
Narasaki et al. (2024)	Narrative Review	Safety and role of vegetarian diets in CKD	Plant-based diets may slow CKD progression; monitor for hyperkalemia, adequacy.	–	–	14/19
Babich, Kalantar-Zadeh, Joshi (2022)	Review	Serum potassium & plant food intake in CKD	Plant foods don't significantly raise potassium if chosen well.	–	9/12	14/19
Sumida et al. (2023)	Review	Potassium intake and	Less restriction of potassium-rich plants may be appropriate.	–	11/12	16/19

		hyperkalemia				
Rhee et al. (2023)	Expert Consensus Review	Plant-based low-protein diets in conservative care	The utilization of low-protein diets as an intervention to reduce CKD progression and mortality risk Guidelines recommend low-protein diets to reduce the progression of CKD.	–	11/12	17/19
Lambert et al. (2024)	Narrative Review	Gut microbiota modulation in CKD	Various factors contribute to gut dysbiosis in CKD, such as restrictive diets, polypharmacy, urea influx from the circulation. PBDs may improve gut microbiota; personalization important.	–	11/12	17/19
Avesani et al. (2023)	Narrative Review	Environmental & health impact of PBDs in CKD	PBDs benefit CKD and the planet; avoid ultra-processed foods.	–	–	15/19
Etaee et al. (2022)	Narrative Review	Skin autofluorescence as CKD/CVD marker	Vegetarian diets may reduce SAF and CV risk in CKD patients.	–	–	15/19
Montgomery et al. (2024)	Case Report	Cardiorenal syndrome, clinical symptoms	Defined PBD improved eGFR and symptoms in CRS patient.	7/8	–	–
Seed & Gilbertson (2022)	Case Report	Pregnancy outcomes in CKD	Plant-based diet with dialysis helped achieve safe pregnancy.	7/8	–	–
Jung & Lee (2024)	Narrative Review	Diet in pediatric CKD	PBDs and carb-restricted diets may help; ketogenic diet promising but needs study.	–	11/12	16/19
Joshi, McMacken, Kalantar-Zadeh, Rhee	Narrative Review	Clinician attitudes toward PBDs	PBDs underused due to unfamiliarity; more referrals and training needed.	–	9/12	15/19
Kalantar-Zadeh et al. (2022)	Narrative Review	Comparison of dietary patterns in CKD	Whole-food PBDs recommended; each approach has pros and cons.	–	10/12	16/19

TABLE 7. Results of the methodological evaluation and evidence of the articles found within the group of reviews.

Article / Study	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Total Yes
Avesani et al. (2022)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Thompson et al. (2024)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	18
Łukasz Świątek et al. (2023)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Montgomery et al. (2024)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Unclear	No	Yes	No	Yes	Yes	Yes	15
Seed & Gilbertson (2022)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	18
Narasaki et al.	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Nhan et al. (2023)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Visinescu et al. (2024)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Bruehl et al. (2024)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Valim et al. (2022)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Moldovan et al. (2024)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Kalantar-Zadeh et al. (2022)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Narasaki et al. (2024)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Babich et al. (2022)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Sumida et al. (2023)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Rhee et al. (2023)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Lambert et al. (2024)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Avesani et al. (2023)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Etaee et al. (2022)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Jung & Lee (2024)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Joshi et al.	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17
Kalantar-Zadeh et al. (2022)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17

Table 8, UCSF Clinical Trial Feasibility Checklist, Original creation.

JBI Criteria	Montgomery et al., 2024	Seed & Gilbertson, 2022
1. Were patient's demographic characteristics clearly described?	Yes	Yes
2. Was the patient's history clearly described and presented as a timeline?	Yes	Yes
3. Was the current clinical condition of the patient on presentation clearly described?	Yes	Yes
4. Were diagnostic tests or assessment methods and the results clearly described?	Yes	Yes
5. Was the intervention(s) or treatment procedure(s) clearly described?	Yes	Yes
6. Was the post-intervention clinical condition clearly described?	Yes	Yes
7. Were adverse events (harms) or unanticipated events identified and described?	No	No
8. Does the case report provide takeaway lessons?	Yes	Yes
Total "Yes" criteria	7/8	7/8

Table 9. JBI Critical Appraisal Checklist for Case Reports. Original Creation

Author(s)	1. Justification of Article's Importance	2. Statement of Concrete Aims/Questions	3. Literature Search Described	4. Referencing	5. Scientific Reasoning	6. Appropriate Presentation of Data	Total (/12)
Narasaki et al. (2024)	2	2	2	2	2	2	12/12
Nhan, Sgambati & Moudgil (2023)	2	2	1	2	2	2	11/12
Visinescu et al. (2024)	2	2	1	2	1	2	10/12
Bruehl et al. (2024)	2	2	1	2	1	2	10/12
Valim et al. (2022)	2	2	2	2	2	1	11/12
Moldovan et al. (2024)	2	2	1	2	1	2	10/12
Kalantar-Zadeh et al. (2022) (PLADO)	2	2	1	2	2	2	11/12
Babich et al. (2022)	2	1	1	2	1	2	9/12
Sumida et al. (2023)	2	2	1	2	2	2	11/12
Rhee et al. (2023)	2	2	1	2	2	2	11/12

Lambert et al. (2024)	2	2	1	2	2	2	11/12
Jung & Lee (2024)	2	2	1	2	2	2	11/12
Joshi et al.	2	1	1	2	1	2	9/12
Kalantar-Zadeh et al. (2022) (<i>Dietary Patterns</i>)	2	2	1	2	1	2	10/12

Table 10. SANRA Criteria Scoring. Original Creation

5 DISCUSSION

5.1 Key findings and themes

This literature review supports the hypothesis that a whole-food plant-based diet (WFPBD) can positively influence the progression and management of chronic kidney disease (CKD). Evidence across multiple studies suggests a consistent trend that patients primarily adhering to WFPBDs show slower disease progression, improved cardiovascular, metabolic parameters, and potential delays in the initiation of dialysis or renal replacement therapy (Vallianou et al., 2019). Twelve thematic findings emerged from the analysis. These included: (1) the therapeutic role of plant-based protein in managing CKD progression; (2) the importance of dietary fiber in improving gut health and uremic toxin clearance; (3) the potential application of WFPBDs in pregnancy among CKD patients; (4) concerns around hyperkalemia and nutritional adequacy in plant-rich diets; (5) phosphorus management and vascular benefits linked to WFPBDs; (6) improvements in metabolic and cardiovascular markers; (7) the lack of consistent clinical recommendations in existing guidelines; (8) the greater proactivity of dietitians compared to physicians in CKD dietary counselling; (9) the effectiveness of culturally adapted dietary models such as the Dieta de la Milpa; (10) the connection between plant-based nutrition, sustainability, and planetary health; (11) the modulation of gut microbiota through WFPBDs; and (12) issues related to dietary safety and practical implementation in diverse patient populations.

5.2 Plant-Based Protein

Investigation into the management of CKD and the function of dietary protein is still ongoing. According to the National Kidney Foundation of Michigan (2025), persons with CKD stages 3–5 who are metabolically stable and under therapeutic supervision may benefit from protein restriction, frequently with keto acid analogues. This is especially true for those without diabetes. Additionally, there is growing evidence that a WFPBD may improve quality of life, lower mortality rates, and lessen the risk of developing end-stage kidney disease (ESKD) (Carla Maria Avesani et al., 2024).

The hormonal and metabolic impact of plant-based proteins is one conceivable mechanism behind their protective effect. Jung and Lee (2024) argued that plant-based proteins reduce the progression of CKD due to their distinct hormonal responses compared to animal based protein sources. For instance, Kontessis et al. found that plant sources of protein may blunt the glucagon response, which in turn could reduce glomerular hyperfiltration. Glomerular hyperfiltration is a key contributor to renal stress and long-term kidney damage. This is linked to modifications in membrane permeability in intraglomerular pressure, mechanisms that may delay or mitigate the onset of CKD.

Additionally, higher consumption of plant-based protein compared to nondairy animal protein has been associated with a lower risk of GFR decline (Narasaki et al., 2024). The therapeutic value of whole food plant-based diets in the treatment of chronic kidney disease has also been demonstrated by clinical research. For instance, one Italian study (Babich et al., 2022) found that patient's serum potassium levels were not significantly raised when following a structured WFPDBD. When Moorthi et al. fed participants a 70% plant protein diet, only one subject with pre-existing type IV renal tubular acidosis suffered minor hyperkalemia (serum potassium at 5.8 mEq/L). This demonstrated that plant protein can be a safe substitute with proper monitoring. Kalantar-Zadeh et al. (2020) proposed the PLAFOND model, which recommends 0.6–0.8 g/kg/day of protein at least 50% from unprocessed plant sources. This model has been shown to improve glycaemic control and decrease glomerular pressure. Valim et al. (2022) further demonstrated improved endothelial function and phosphorus handling in transplant recipients consuming soy-rich diets.

These results are further supported by a long-term prospective cohort study involving nearly 1,600 women from the Nurses' Health Study. Over an 11-year period, higher consumption of plant-based protein was associated with a slower decline in eGFR. In contrast, higher intakes of total protein and nondairy animal protein were linked to a faster decline in kidney function, with each 10 g/day increase in those protein types associated with a steeper drop in eGFR (Narasaki et al., 2024). These results are consistent with the hormonal theories put forth by Jung and Lee (2024), who stated that the endocrine effects of plant-based proteins differ from those of animal proteins. In particular, without producing the same vasodilatory and proteinuric effects as meat eating, vegetable proteins may cause renal alterations comparable to those attained by lowering total protein intake (Kontessis et al., as cited in Jung & Lee, 2024). It is believed that enhanced renal prostaglandin synthesis and decreased glucagon secretion are the mechanisms underlying these positive benefits. Given its potential to offer both renal protection and greater dietary flexibility, a protein-modified diet instead of one that is completely protein-restricted may prove beneficial in the long-term management of chronic renal failure.

Finally, existing clinical trial data have shown that partial substitution of animal protein with plant-based protein leads to reductions in albuminuria (Moorthi et al., 2023; Babich et al., 2022). A recent systematic review further concluded that vegetarian diets may improve renal filtration function in CKD patients, reinforcing the therapeutic potential of dietary interventions focused on plant-based proteins.

5.3 The Role of Dietary Fiber

Dietary fiber is crucial, yet frequently underappreciated, component of renal nutrition. WFPBDs are inherently rich in fiber. As a result WFPBDs provide many therapeutic benefits to individuals with CKD.

Lambert et al. (2023) emphasize that fiber plays a multifaceted role in maintaining gut health, reducing systemic inflammation, and enhancing the elimination of uremic toxins. Fiber undergoes a process of fermentation in the colon. This produces short-chain fatty acids (SCFAs), which have anti-inflammatory effects that have been documented to improve kidney function. These findings align with earlier research from (Moldovan et al., 2024), who showed that higher fiber intake is linked to greater glycemic control, lower serum cholesterol, and better regulation of blood pressure. These are all critical factors in CKD management.

According to (Baschich et al., 2022) fibre slows gastrointestinal absorption and promotes more balanced serum potassium levels when handled properly. This makes WFPBDs more practical and safer options for CKD patients. Additionally, there is evidence that fibre may help reduce the risk of hyperkalemia because of the high potassium concentration in a lot of plant-based meals.

Narasaki, Siu, et al. (2024) provides further mechanistic insight about fibers' role in CKD prevention through an experimental CKD omnivorous dietary model. Dietary fiber was supplemented and this resulted in reduced levels of the uremic toxin p-cresol sulfate. It also improved SCFAs production, which is associated with better systemic blood pressure regulation, glucose and lipid metabolism, and cardiovascular health, improving patient outcomes in general.

Furthermore, fibre encourages more regular bowel movements, which lessens the systemic burden of nitrogenous waste, according to Carla Maria Avesani et al. (2024b). By naturally reducing calorie intake and portion size, its satiating qualities may also help avoid obesity, a significant risk factor for the advancement of CKD.

Collectively, these results indicate dietary fibre as an active factor in better renal outcomes. Its incorporation into a plant-based diet offers a practical and multifactorial tool for CKD management.

5.4 Gestation and CKD

According to Seed and Gilbertson (2023), pregnant women with CKD are typically classified as high-risk due to the potential complications for both mother and fetus. Nonetheless, new research suggests that nutritional approaches including WFPBDs could be employed to support safer outcomes during and the postpartum period.

Seed and Gilbertson (2023), stated that the increase in recent years of the occurrence of CKD in pregnant women is thought to be associated to advancing maternal age and higher prevalence of diabetes and obesity. Within their study, Seed and Gilbertson (2023) presented a case of a pregnant woman with stage 4 CKD who began dialysis at 11 weeks and also adopted a WFPBD, this allowed her to cease dialysis by 31 weeks as well as delivering a healthy infant at full term. The authors attributed this outcome to improved metabolic control, enhanced nitrogen management, and decreased uremic toxin production. These effects were likely mediated by the high fiber content and low acid load of the diet.

Although there is limited data specifically on CKD in pregnancy, early results appear to show that the implementation of WFPBD yields positive results in populations with chronic kidney disease. In one study, by Rhee et al. (2023) and Kalantar-Zadeh et al. (2020) that plant-based diets were shown to enhance glycaemic management, decrease systemic inflammation, and lower dietary acid load. All of which are pivotal for controlling CKD during pregnancy. According to these similarities, the prescription of WFPBDs could serve as an effective and safe addition to multidisciplinary treatment for patients with pregnant CKD.

5.5 Concerns about hyperkalemia and nutritional adequacy

A common concern regarding the use of WFPBDs in the treatment of CKD is the likelihood of developing hyperkalemia. This stems primarily from the high potassium content in fruits, vegetables, legumes, and whole grains. Previously this led to blanket dietary potassium restrictions for CKD patients. Resulting in a limiting patients access to otherwise nutrient-dense plant foods. However, recent evidence suggests that this cautious approach may be unnecessary and could inadvertently deprive patients of the broader metabolic benefits associated with plant-based eating.

Babich et al. (2022) critically investigated the connection between plant-based food intake and serum potassium levels in individuals with CKD. The authors highlighted that the bioavailability of potassium from plant sources is lower than that of animal-based or processed foods due to fiber-rich plant cell walls that reduce absorption. Moreover, dietary potassium intake alone is not a strong predictor of serum potassium levels. Potassium homeostasis is influenced by factors such as metabolic acidosis, aldosterone levels, insulin activity, and gastrointestinal excretion. Plant-rich diets tend to be alkalinizing, meaning whole foods create intracellular potassium shifts, decreasing serum levels and reducing overall hyperkalemia risk.

Building on this, a feasibility trial conducted by Avesani et al. (2024) specifically explored the safety and acceptability of a plant-based diet in hyperkalemic CKD patients receiving sodium

zirconium cyclosilicate (SZC), a potassium binder. The six-week intervention involved 26 adults with stage 4–5 CKD and baseline hyperkalemia who were prescribed a potassium-rich plant-based diet alongside SZC. Over the six weeks, the majority of participants maintained normal serum potassium levels (3.5–5.0 mEq/L) despite the high dietary potassium content. Importantly, the diet was also associated with increased dietary fiber intake, improved overall diet quality, and enhanced quality of life. No serious adverse effects were mentioned

These findings suggest that hyperkalemia risks associated with plant-based diets in CKD can be effectively managed through individualized care, clinical oversight, and where appropriate, pharmacological support. Rather than enforcing blanket potassium restrictions. A more nuanced approach was used where the source and context of potassium, as well as the patient's overall dietary pattern and treatment plan—may be more appropriate. This evolving perspective is crucial for removing unnecessary dietary limitations and improving patient outcomes through more inclusive, plant-rich nutritional strategies.

5.6 Phosphorus Management and Vascular Benefits of Plant-Based Diets in CKD

Beyond potassium management, WFPBDs offer significant benefits in the regulation of phosphorus and the protection of vascular health for individuals with CKD. Phosphorus retention is a common issue in later CKD stages. It contributes to vascular calcification, a conditions that accelerate both kidney and cardiovascular deterioration

As previously mentioned WFPBDs are inherently lower in phosphorus and provide it in less bioavailable forms. In plant foods, phosphorus is typically bound to phytates, these do not absorb effectively in the human digestive tract. This characteristic leads to lower serum phosphorus levels and a reduced risk of complications such as vascular calcification. Valim et al. (2022) gave evidence that even a one-week vegetarian diet had a marked impact on reduced serum phosphorus levels and fibroblast growth factor 23 (FGF-23) levels. This is a hormone responsible for the mineral metabolism and cardiovascular risk. Similarly, Biruete et al. (2024) reinforced the role of diet in managing phosphorus balance and preserving cardiovascular integrity

.The kidneys play a central role in phosphorus regulation, and dysfunction in this process contributes to vascular calcification. Vascular calcification is a condition in which phosphorus build up and binds with calcium, forming deposits in the vasculature. According to both Valim et al. (2022) and Biruete et al. (2024), WFPBDs help mitigate this risk by reducing dietary phosphorus load.

Supporting these findings, Rhee et al. (2023) observed that WFPBDs contributed to the preservation of GFR and delayed the need for dialysis by reducing dietary acid load and uremic toxin generation. Despite the PLAFOND model acknowledging hyperkalemia as a potential risk of plant-based eating in CKD, the reduction in serum phosphorus and proven benefits reported across multiple studies highlight the strategic role of WFPBDs in non-pharmacological CKD care.

5.7 Improvement in metabolic and cardiovascular parameters

In a study cited by Valim et al. (2022), renal transplant recipients participated in a five-week intervention involving a soy protein-rich plant-based diet. At the end of the intervention, participants demonstrated notable improvements in endothelial function, attributed to an increased L-arginine/asymmetric dimethylarginine (ADMA) ratio—a marker associated with enhanced nitric oxide production and vascular health. The researchers concluded that a plant-based diet may foster a favorable biochemical environment that supports healthy blood flow. These findings were especially noteworthy given the absence of changes in isoflavone levels, oxidative stress markers, or lipid profiles. This aligns with the research of Etaee et al. (2022), who found that a vegetarian diet was associated with lower skin autofluorescence (SAF) levels, whereas malnutrition was correlated with higher SAF levels and increased mortality.

Joshi et al. (2023) proposed that a plant-based diet may help prevent lifestyle-related conditions such as insulin resistance, metabolic syndrome, and primary hypertension—all of which are recognized risk factors for the onset and progression of chronic kidney disease (CKD). Their findings suggest that the lower bioavailability of protein in plant-based sources may reduce the uremic burden, potentially delaying the initiation of dialysis and improving quality of life for individuals with CKD.

The association between plant-based diets and improved metabolic outcomes was further supported by Thompson et al. (2024), who conducted a prospective cohort study of 4,807 CKD patients from the UK Biobank. Their analysis revealed that diets high in unhealthy plant-based foods were associated with a 49% increase in mortality, while greater adherence to a healthful plant-based diet index (hPDI) was linked to a 33% reduction in mortality risk. The researchers attributed these outcomes to enhanced insulin sensitivity, reduced systemic inflammation, and improved blood pressure regulation—factors critical to managing the metabolic burden in CKD.

A further compelling example of plant-based dietary intervention comes from Montgomery et al. (2024), who reported on a patient with type 5 cardiorenal syndrome and decompensated heart failure-related cardiogenic shock (HF-CS). The patient, with severe renal impairment (eGFR 14 mL/min/1.73 m²), was treated using a defined plant-based diet (DPBD) in combination with

aggressive intravenous hydration and a substantial reduction in prescription medications. Over the course of hospitalization, the patient's eGFR rose by 236%, and creatinine levels fell from 12.1 to 1.8 mg/dL, alongside resolution of symptoms such as chest pain and fatigue. The intervention also resulted in an 82% reduction in medications, suggesting a powerful role for dietary therapy in reversing metabolic strain and improving both renal and cardiovascular function. The authors emphasized that these improvements were likely due to reduced oxidative stress, decreased acid load, and improved endothelial function facilitated by the plant-based diet. This case reinforces the growing body of evidence that well-structured plant-based nutrition can support recovery and reduce the burden of pharmacological intervention in complex CKD-cardiac patients.

Collectively, these findings reinforce the absence of uniform, evidence-based dietary guidelines for WFPBDs in CKD undermines clinical confidence and contributes to inconsistent care. To close the gap between emerging research and practice, high-quality, contemporary trials are urgently needed. Particularly those which evaluate WFPBDs across diverse patient groups, including pediatric and non-dialysis populations. The integration of such evidence into a coherent, internationally endorsed guideline will be essential to standardize care and empower clinicians and patients to make informed dietary decisions in CKD management.

5.8 Lack of consistent clinical recommendation

A persistent challenge in the dietary management of chronic kidney disease (CKD) is the lack of consistent clinical recommendations across professional guidelines and clinical practice (Narasaki, Kalantar-Zadeh et al., 2024). Although a growing body of evidence supports the use of whole food plant-based diets (WFPBDs) to improve outcomes in CKD particularly in populations with diabetes, obesity, and cardiovascular comorbidities existing guidelines remain fragmented and often contradictory (Ivanova et al., 2021).

The Kidney Disease: Improving Global Outcomes (KDIGO) guidelines state that there is not enough data to support a stricter restriction and suggest a moderate intake of 0.8 g/kg/day for individuals with diabetic CKD. The International Society of Renal Nutrition and Metabolism (ISRNM) and the Kidney Disease Outcomes Quality Initiative (KDOQI), on the other hand, recommend a lower consumption of 0.6–<0.8 g/kg/day, with a focus on plant-based protein sources. According to Kalantar-Zadeh et al. (2022), these recommendations are frequently based on expert consensus rather than extensive randomised controlled trials, which causes ambiguity in clinical implementation, particularly when building customised treatment plans.

This inconsistency translates into variability in practice, as highlighted by Rhee et al. (2023). While the updated KDOQI guidelines are grounded in clinical trials, they do not fully consider real-world implementation data, which may better represent diverse patient populations. Additionally, many foundational studies on low-protein diets in CKD are outdated, lack robust follow-up, or underrepresent diabetic subgroups—the patients most likely to benefit from dietary intervention. There remains a significant evidence gap, particularly regarding modern plant-based models such as PLADO and PLAFOND, which are largely absent from current large-scale clinical trials.

In pediatric nephrology, the lack of consensus is even more pronounced. Nhan, Sgambat, and Moudgil (2023) report that although plant-based diets are gaining popularity for their health and environmental benefits, no clinical trial data exist assessing their safety, efficacy, or long-term outcomes in children with CKD. Francis et al. (2024) note that while updated pediatric renal guidelines cautiously allow greater inclusion of high-potassium plant foods—acknowledging the lower bioavailability of potassium and phosphorus from plant sources—there remains no formal endorsement of plant-based dietary patterns. In practice, this forces clinicians to rely on adult data or adopt a conservative approach, leading to wide variations in pediatric dietary care.

Compounding the problem, the definition of WFPBDs itself is inconsistent across the literature. Some studies include minimally processed plant foods only, while others allow for limited inclusion of oils or refined products, making standardization and guideline development more difficult.

Jung and Lee (2024) further emphasize the uncertainty in dietary guidance by comparing multiple nutritional strategies including ketogenic, low-carbohydrate, and plant-based diets effectiveness and feasibility. While they cite potential benefits such as improved cardiovascular biomarkers, reduced glomerular hyperfiltration, lowering obesity rates and lower CKD risk, they also highlight the lack of clarity around practical implementation.

Although high quantities fruit and vegetables are often discouraged in clinical practice due to hyperkalemia concerns, the KDOQI guidelines do not explicitly restrict them. In fact, they recognize their benefit in phosphorus management, citing their low bioavailability due to the absence of the enzyme phytase in humans.

In conclusion, the lack of consistent dietary recommendations hampers the implementation of potentially beneficial interventions and contributes to practice variability. To move forward, there is a pressing need for high-quality, contemporary trials that evaluate WFPBDs across diverse patient populations and clinical settings. Integrating these findings into a coherent, globally

endorsed dietary guideline will be essential in standardizing care and empowering both patients and providers to make informed, effective dietary decisions in CKD

5.9 Dietitians Are More Proactive Than Physicians in CKD Dietary Management

Evidence consistently shows that registered dietitians play a more proactive and patient-centred role than physicians in the dietary management of CKD (Łukasz Świątek et al., 2023). Dietitians are better equipped to translate evolving evidence into practical, culturally sensitive dietary advice and are more likely to address specific concerns such as phosphorus bioavailability, protein sources, and potassium management (Kalantar-Zadeh et al., 2022; Avesani et al., 2023). While critical in medical management, physicians often have limited time or training to deliver comprehensive nutrition counselling. Studies have shown that dietitian-led interventions improve dietary adherence and better clinical outcomes, including slower CKD progression and reduced uremic symptoms (Birute et al., 2024; Rhee et al., 2023). Integrating dietitians earlier and more routinely into CKD care pathways would enhance non-pharmacological management strategies and improve patient outcomes.

5.10 Role of Culturally Adapted Dietary Models

Culturally adapted dietary patterns may increase adherence and effectiveness of nutrition interventions in CKD management, especially in ethnically diverse populations. According to Birute et al. (2024), the Dieta de la Milpa is a plant-forward, culturally concordant diet based on traditional Mesoamerican foods such as sweetcorn, beans, squash, and chillies. It aligns with renal dietary principles like low phosphorus bioavailability and reduced sodium, while being socially and culturally acceptable for Hispanic/Latine individuals with CKD (Birute et al., 2024). The diet promotes nutrient-dense plant-based meals that may support better acid-base balance, gut microbiota diversity, and phosphorus control. Lack of culturally sensitive options may lead to anxiety and poor adherence among minority patients (Lambert et al., 2023; Łukasz Świątek et al., 2023). Emphasising culturally rooted diets that share features with the DASH or Mediterranean patterns could support equitable and effective CKD dietary strategies (Kalantar-Zadeh et al., 2021)

5.11 Focus on Sustainability and Planetary Health

The intersection of planetary health and CKD dietary management has become increasingly relevant. Unhealthy, animal-heavy, ultra-processed diets contribute to poor renal outcomes and

environmental degradation through greenhouse gas emissions, biodiversity loss, and excessive water use (Avesani et al., 2022). Conversely, plant-based diets—especially those with low ultra-processed food content—offer a "win-win" by improving CKD-related outcomes and reducing environmental harm (Avesani et al., 2022). Plant-based diets have lowered the risk of CKD incidence and progression while reducing inflammation, acidosis, and uremic toxin generation (Betz et al., 2021). The concept of "food as medicine" merges clinical nutrition with planetary responsibility, suggesting that sustainable eating can become a cornerstone of personal and global health (Kalantar-Zadeh et al., 2021).

5.12 Limitations and future research Gaps

This review is limited by its focus on recent publications (2022–2024) and adult-only CKD populations, excluding pediatric or transplant-specific contexts. Rigorous filtering was a prerequisite during this review due to the volume of scientific literature available regarding CKD and dietary interventions. Additionally, dependence on full-text availability may affect the reproducibility of this type of research making the retrieval process vulnerable to change especially as access to data evolves and the volume of new research continues to grow.

A further investigation should prioritise pediatric CKD populations who are currently understudied.. In contrary to adult populations, children with CKD often have distinct disease etiologies and are less likely to present with comorbidities such as diabetes or cardiovascular disease. CKD treatment strategies should be trialed to ascertain whether this can be treated with a whole food plant based diet.

6 CONCLUSIONS

The objective of this systematic review was to ascertain whether a whole food plant-based, diets (WFPBD) could prevent or slow the progression of chronic kidney disease (CKD). Based on a structured literature search using the PRISMA 2020 guidelines, twenty-three suitable peer-reviewed studies were chosen and analysed.

The research revealed the therapeutic potential of WFPBDs in regulating CKD progression. Across varied study designs, consistent evidence pointed to advantages including delayed dialysis initiation, reduced need for pharmacological interventions, and improvements in blood pressure, proteinuria, and metabolic acidosis. These results support the alternative hypothesis (H1), demonstrating that WFPBDs used as a dietary intervention may a beneficial influence disease progression.

Furthermore, whole food plant-based diets can be tailored to comply with current renal dietary guidelines as long as key elements like protein, potassium, and phosphorus are properly monitored. Additionally, a number of comparison studies showed that WFPBDs produced superior outcomes than omnivorous diets, especially when it came to cardiovascular and inflammatory indicators.

However, pediatric CKD populations remain notably under-represented in the literature.. Despite findings in this subgroup being promisingly encouraging, further dedicated research is essential to validate the safety and efficacy of WFPBDs in children.

In conclusion, the current body of evidence reinforces that integration of WFPBDs for both managing and preventing CKD. Nevertheless, more extensive, high quality long-term research is required to prove these benefits and to inform future kidney friendly dietary guidelines with more confidence.

This review contributes to the expanding body of research supporting and advocating for nutritional interventions in nephrology. It identifies and highlights areas for further research.

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APPENDICES

Item No.	Feasibility Evaluation Criterion
1	Are the objectives of the study clearly defined?
2	Is the study population clearly defined?
3	Is the study design appropriate to meet the objectives?
4	Are the eligibility criteria appropriate and not overly restrictive?
5	Is there a sufficient potential participant pool available at the site?
6	Is the projected enrollment timeline realistic?
7	Is the intervention clearly described and feasible to implement at the site?
8	Are the protocol procedures (labs, imaging, assessments) available at the site?
9	Are the clinical staff adequately trained or easily trainable to conduct the study?
10	Is there adequate infrastructure and resources to support study activities?
11	Are the regulatory and IRB requirements manageable within the projected timeframe?
12	Are the study risks and adverse events well defined and manageable?
13	Are there clear criteria for monitoring and managing safety events?
14	Is there a data management plan in place (e.g., CRFs, database access)?
15	Is there funding to support site-specific costs (e.g., staff, labs, tests)?
16	Are there competing studies that may limit recruitment?
17	Is participant compensation appropriate and ethical?
18	Are the patient burden and visit schedule reasonable?
19	Can the study be integrated into the standard workflow of clinical care?

Appendices1. Ucsf clinical trial feasibility checklist – 19 evaluation criteria (original creation based on ucsf clinical research planning tools