

Original Article

Whey Protein and its Impact on Renal and Cardiovascular Systems: A Mixed-Method Analysis

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Abstract - Healthcare and medical facilities have recently been challenged by a significant rise in renal and cardiovascular diseases, requiring a focus on more definitive treatment, dietary interventions and supplements. Whey Protein has gained popularity across the globe for its potential health benefits, particularly in the domain of muscle building and recovery. Recent studies show Whey Protein's possibility of playing a role in managing and improving cardiovascular and renal health. The research aims to analyze the effectiveness of Whey Protein intake for recovering renal and cardiovascular health. This study includes a comprehensive literature review, extractions of data from previous research work and analysis of biochemical data. Based on the research methodology, the comparisons of the findings are stated from the studies of different periods for analyzing the trends and patterns of Whey Protein consumption. Surveys among individuals aged 16-51 synthesize data on the consumption rate of whey protein supplements, preferences and awareness. Based on secondary sources, the adherence factors of the dietary patterns for recovering the renal and cardiovascular diseases in which WP consumptions are ideal have been stated. By focusing on studies, this research represents the efficiencies of whey protein intakes concerning the patients, which is suitable for quick recovery.

Keywords - Cardiovascular, Renal, Whey, Chronic, Disease.

1. Introduction

1.1. Background Information

1.1.1. Overview of Global Health Issues

In the global healthcare zones, various medical practitioners emphasize that most patients have cancer, chronic respiratory diseases, diabetes, and heart-related diseases. Due to the huge consumption of tobacco, alcohol, obesity and other consequences, it is challenging to recover from the severe treatment process. Moreover, the usage of antibiotic medicines is rising, which causes long-term health problems.

Chronic renal disease is mostly estimated among the adult group, who are mainly suffering from hypertension and diabetes. Due to the inactivity of kidneys, they tend to develop heart diseases, which progress the morbidity rates across the world. Approximately 850 million people are detected in this severe treatment process, which is vulnerable to maintaining health of well-being. In Russia, around 12,832 people are currently suffering from renal diseases, which is higher than in other countries. In the United Kingdom, about 5,167 people are affected by this chronic disease among the 100,000 population (Statista.com, 2024). While involved in the dialysis treatment process, the blood circulation level becomes high and causes anaemia.

1.1.2. Importance of Research in Addressing Kidney and Heart-Related Ailment

As per current medical histories, it seems that kidney patients become affected by heart diseases, which are challenging to cure and mostly cause death. Setting up medical research is ideal for detecting the genetic consequences of heart diseases. By gathering the genotype tissue expression data, nephrologists and other specialists can focus on the proteins and genetic objectives for implementing the treatment process. By understanding protein and heart-related ailments, they can implement blood and urine tests. By conducting research, medical practitioners can idealize the pathophysiological activities of blood proteins, which is suitable to comprehensively alter the treatment process.

1.1.3. Emergence of Whey Protein as a Potential Solution

The application of Whey Protein is an innovative solution, which is approachable to curing heart and renal diseases. Through applying the casein coagulation method, Whey Protein is prepared as the by-product of cheese-making. According to Božanić, Barulčić, Lisak Jakopović and amp Tratnik (2023), around 65 grams of WP reduces the LDL Cholesterol level within 12 weeks. Lowering bad cholesterol is suitable for maintaining blood circulation rates, which can exacerbate kidney functions. Besides this, medical practitioners estimate that Whey turns out to be an excellent



choice of protein, which is valuable towards maintaining healthy diets.

1.1.4. Research Objective

The research aims to estimate the activities of whey protein by understanding the relationship between renal and heart diseases.

Objectives:

- To evaluate the importance of WP in the health treatment of renal and heart diseases
- To understand the complexities between whey protein intake and the onset of renal and cardiovascular diseases.
- To observe the biological function of whey protein for health implications.

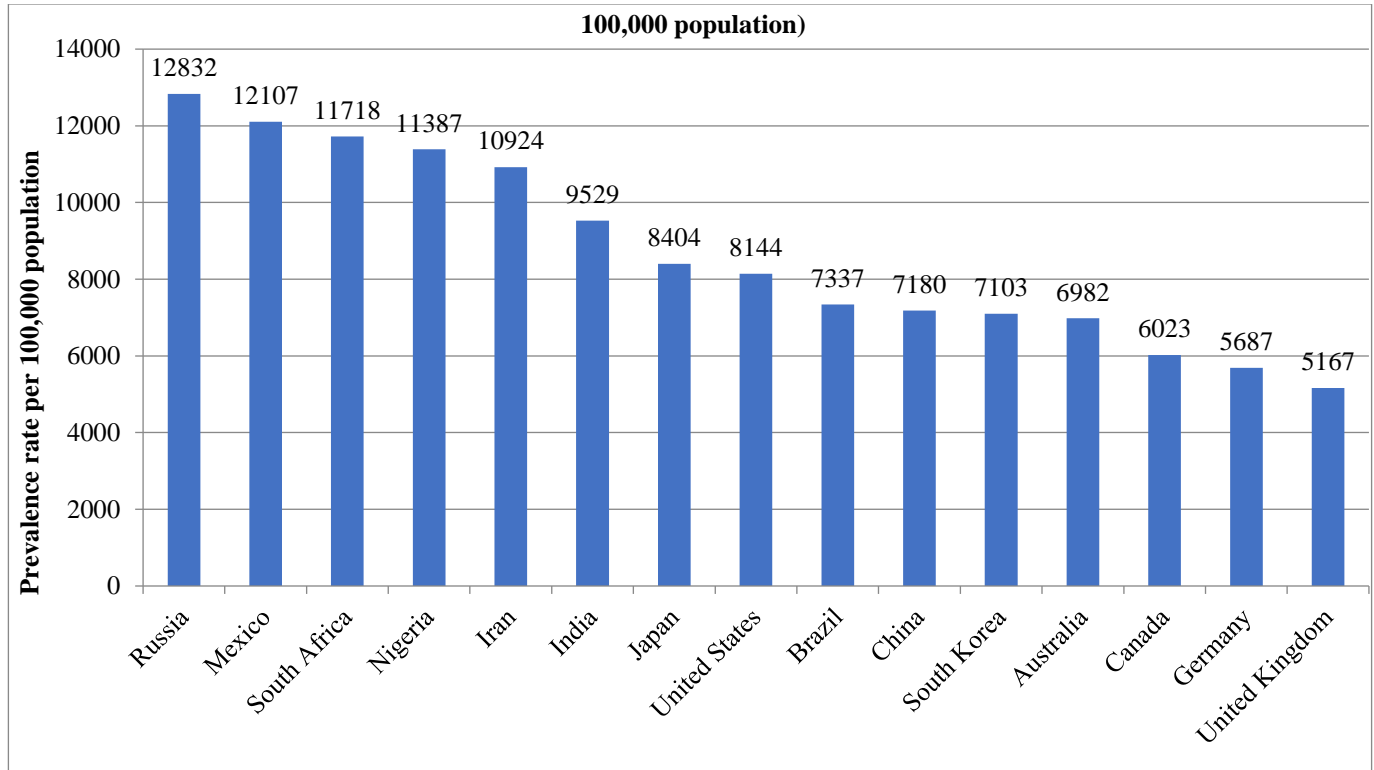


Fig. 1 Rate of patients involved in chronic renal treatment worldwide

(Source: Statista.com, 2024)

1.1.5. Research Gap and Introducing the Problem

The existing literature has focused on the significance and the role of whey protein in the present times. However, the existing literature has explored the complications amid whey protein intake and the emergency of CVD issues. It has been found that cardiovascular disease has become the leading reason for death all across the world (Who. Int, 2021). Many of the CVD cases can be effectively prevented through the effective addressing of the behavioural risk elements such as unhealthy diet, obesity and others. As per the view of Zhang et al. (2020) while the high protein intake is used for losing weight, they are also considered to increase cardiovascular risks. Therefore, people need to intake other kinds of protein that can render no harm to the CVD rates.

1.1.6. Novelty of the Work/Significance

Cardiovascular diseases have become one of the most serious reasons for death and are witnessed to have been taking the lives of almost 17.9 million every year (who. int, 2024). Therefore, individuals need to ensure that they engage

in proper diet and accurate behaviour that can leverage their well-being.

2. Literature Review

2.1. Whey Protein Composition and Properties

2.1.1. History of Whey Protein in General and How they Correlate to CVS

Whey Protein’s origins were found 8000 years ago during the inception of the process of cheese making. However, whey protein after 460 BC was utilized as a medicine, and it acted as a booster for the immune system (supplementfactoryuk.com. 2023). Moreover, the use of whey protein became frequent with the usage among many people such as athletes and others implementing it within their training schedule. As per the view of Price et al. (2022) there lies beneficial impacts of the whey protein on the blood pressure level, arterial stiffness, inflammation and others. The whey protein, along with the amino acids, can render an advantageous impact on components of the vascular function thereby contributing to the lowering of the CVD risk factors.

2.1.2. Nutritional Components and Bioactive Substances

According to Layman, Lönnerdal and amp; Fernstrom (2018), Whey fibres’ biological qualities are well-known and are being used more and more in food applications and scientific research projects by a variety of businesses. Half of the protein found in whey, which aids in the binding of minerals including calcium and zinc, is made up of β -lactoglobulin.

Moreover, it shares some sequence homology with proteins that bind retinol. In contrast, it is highly recommended that α -lactalbumin be added to meals or infant formulae to promote dietary intakes high in protein. Fatty acid chains and immunoglobulins can be bound by albumin which is a serum that helps in the production of passive immunity in consumers. According to the table above, referenced by Madureira Et. Al., “The minor constituents that come under whey protein are β -lactoglobulin, immunoglobulins, α -lactalbumin, lactoperoxidase, bovine lactoferrin and bovine serum albumin”.

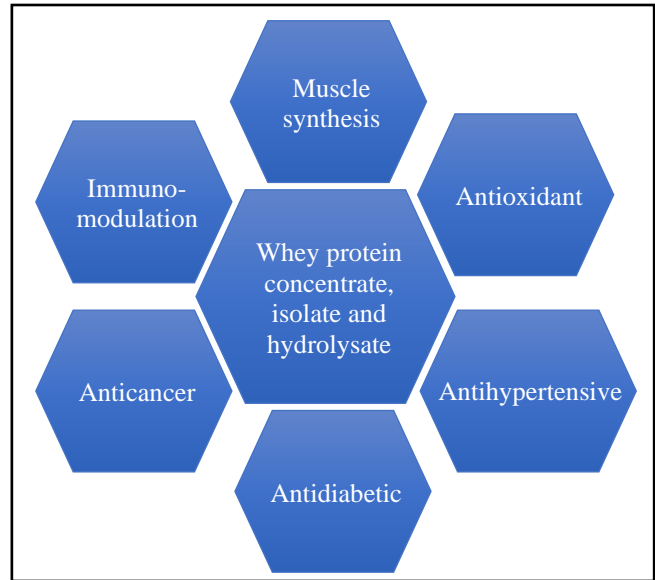


Fig. 2 Derivatives of whey protein and their biological properties

Source: Minj & Anand, 2020

Whey Protein Constituent	Concentration (g/L) ^{b,e}	Molecular Weight in kDa ^{c,d}	Number of Amino Acid Residues ^c
α -Lactalbumin	1.2	14,175	123
β -Lactoglobulin	1.3	18,277	162
Bovine serum albumin	0.4	66,267	582
Immunoglobulins (A, M, and C)	0.7	25,000 (light chain) and 50,000-70,000 (heavy chain)	-
Bovine lactoferrin	0.1	80,000	700
Glycomacropeptide	1.2	6700	64
bovine Lactoperoxidase	0.03	70,000	612

Fig. 3 Properties and profile of whey protein and the Structure

(Source: Madureira et al., 2007)

2.1.3. Potential Health Benefits and Applications

The nutritional value of Whey Protein has long been acknowledged and new developments in analytical as well as biochemical methods have contributed to the characterization of their bioactive potential. (Liu, Wang & Zhao 2014) During intestinal absorption or fermentation by proteolytic bacteria, several bioactive peptides are released through the process of proteolysis. Nutraceuticals are sports, baby food, and dietary supplements that have all found uses for commercial WP hydrolysis products and isolates.

The numerous whey-based goods and their benefits for health will be highlighted in this review. By lowering inflammation, whey protein supplements may be able to lessen symptoms associated with a variety of chronic illnesses. Conditions like arthritis, type II diabetes, IBS and heart disease are just a few of the possible health issues that are associated with persistent inflammation. It is found that almost 54% of the entire stroke cases and 47% of the coronary heart disease cases globally take place due to hypertension (Price et al., 2022). Whey Proteins engage soluble proteins that consist of the value of cow’s milk, which totals up to almost 20% of

the value in protein that is gnarly placed away from the liquid part of milk at the time of cheese making. It becomes essential to note that in the case of the overweight person, almost 65 grams of whey protein every day for 12 weeks can lower their cholesterol levels (Arnarson, 2023). It reduces blood pressure and assists in lowering type II diabetes.

2.2. Renal Diseases and Whey Protein Intake

2.2.1. Existing Studies on Whey Protein and Renal Function

Renal Function can be influenced by dietary protein intake, and research is still debating the role of protein in diet-induced renal illness. (Martin, Armstrong & Rodriguez). The main point of contention in this argument is the idea that chronically consuming more dietary protein than advised can lead to chronic kidney disease (CKD) by raising the pressure inside the kidney and increasing hyperfiltration. “Too much protein stresses the kidney” is a common conclusion found in media releases. Nevertheless, the main question is whether studies on healthy subjects validate this idea. Indeed, research indicates that hyperfiltration is a natural adaptive response to a range of physiological factors. Some researchers believe that the growth in renal action generated by a diet rich in protein

could be viewed as a simple reaction to adaptation that is not always connected with kidney disease. There is little scientific evidence that a rich diet of protein can cause ongoing kidney damage in healthy people. Special attention ought to be given more to the consumption of whey protein in people with nephrolithiasis, commonly known as kidney stones, because past studies demonstrate that a protein-rich eating diet might related to alterations in indicators that are lithogenic (such as calcium in the urine) and susceptibility directed towards the production of stones in the kidneys (Hattori et al.).

2.2.2. Mechanism and Action Potential

Another aspect to consider is the case of people taking chronic medication therapy that may impair the functioning of the kidney or liver. In a group of 50 participants undergoing Human Immunodeficiency Virus preventive therapy with daily a drug called disoproxil fumarate/emtricitabine and living in a group with a high risk of HIV, 12% of them used supplements, primarily for anabolic purposes using whey protein, creatine or steroids, and 8% (two) experiences an elevation in alanine aminotransferase and aspartate aminotransferase levels of grade 3 to 4 compared to those who do not use it (Cava et.al). The consequences of these findings are critical, emphasizing the importance of caution, keeping in mind the whey protein supplementation in diet, particularly with people with a history of kidney issues or the ones undertaking drugs chronically.

2.3. Cardiovascular Diseases and Whey Protein Intake

2.3.1. Relationship Between Whey Protein and Cardiovascular Function

“Postprandial Blood Pressure (BP)” drops to a greater extent and continues to be more prevalent amongst the elderly than in the young. (Giezenaar et. al) Protein’s impact on postprandial blood pressure in comparison to fats and carbohydrates, as well as their relationship to stomach emptying rates, has received little attention. After consuming 70g of whey protein per day, healthy older men experienced a persistent drop in blood pressure despite the rise in heart rate, but younger men experienced no change. In elderly persons at risk of anticipatory hypotension, blood pressure should be maintained after protein-packed meals.

2.3.2. Effects of Blood Pressure, Cholesterol and Inflammation

Obesity, blood pressure, and vascular stiffness have a complex relationship, with evidence firmly linking obesity and hypertension to increased arterial stiffness (Oh 17). In a comparable study (Arnberg et al., 2013), somewhat overweight teenagers ranging from age 12 to 15 years and the mean pre-test BMI is 25.1kg/m² ingesting 35g protein per day as skim milk, the World Price Index or casein exhibited a substantial rise in radial systolic blood pressure 2 ± 7.8 millimetres of mercury (standard deviation). It is possible that the average measure of blood pressure values was at normal limits ranging around 111.3 and 64.5 millimetres of mercury

(mm/Hg) for diastolic blood pressure and brachial blood pressure, respectively” with the researchers theorizing that they may only have a hypotensive impact in hypertensive patients.

2.4. Current Knowledge Gaps and Uncertainties

2.4.1. Conflicting Findings and Inconsistencies in Research

On the other hand, as per Newar (2022); 7(10): Pg.89-90, the idea that eating a diet that contains protein raises the risk of renal failure represents one of the most persistent fallacies. Nevertheless, studies of the literature conducted in 2005 and 2015 did not discover any link between kidney-related disorders and proteins.

Indeed, it was discovered that the alterations brought about by protein in the human renal system constitute a typical adaptation process and fall well inside the functional parameters of a functioning kidney.

Another protein source myth that first surfaced on internet fitness communities is that the body is only able to absorb 30g of it in a single meal. However, studies show that the body can initiate protein synthesis with just 25-35g of superior protein at each meal, so any additional protein consumed is never misused.

2.4.2. Need for Further Investigation and Clarification

As a dietary supplement, whey protein is quite popular, especially in athletes. However, with increased popularity come more expansive ideas about protein supplements in consumer and business circles. Consequently, it is crucial to have an in-depth knowledge of the protein supplement.

3. Research Methodology

3.1. Data Sources and Search Strategy

3.1.1. Selection of Peer-Reviewed Articles, Meta-Analyses, Systemic Reviews and Survey

The data collection method is the crucial method for gathering relevant resources to synthesize the major outcomes (Mazhar, Anjum, Anwar & Khan, 2021)10(1), Pg.6-10.

In this research work, the second method is followed up, which indicates the collection of evidence from the previous research work. The selection of peer-reviewed articles is ideal for getting valid information about WP via configuring its biological functions and impacts.

The collection of peer-reviewed articles is valuable to provide trust in delivering scientific communication (Alam, 2021) 16(1), Pg.1-31. By including the statistical and biological information, it is appropriate to do a meta-analysis about the activities of factors of protein. In the framework of renal and heart diseases, each secondary resource is evaluated in the systematic literature review. A survey was done containing a set of 8 questions to assess the rate of awareness and knowledge people had regarding supplements and renal function.

Survey:

- Research Aim - The survey aims to analyze the trend and awareness of people regarding protein supplementation and their guidelines, including the consequences.
- Sampling Method - The sampling method utilized was snowball sampling, as the survey form was initially shared with acquaintances, and they were encouraged to share it with their contacts for a large range of sampling.
- Sampling Size - The survey received 106 responses ranging from 16-51 years of age.
- Survey Design: The survey included 8 questions designed to assess the rate of awareness and knowledge people had regarding supplements and their potential impact on renal and cardiovascular health.

Questions:

1. How often do you consume protein powder supplements?
2. What is the typical dosage of protein powder you consume per serving?
3. Have you consulted a healthcare professional before starting protein powder supplementation?
4. What type of protein powder do you usually consume?
5. How do you typically consume protein powder supplements?
6. Are you aware of any guidelines or recommendations regarding protein powder consumption and renal health?
7. Do you monitor your renal/kidney function regularly through medical tests?
8. How much water do you typically consume per day?

3.1.2. Database Search

The collection of bioinformatics is valuable for profounding protein activities, which is reliable for selecting valuable databases. PubMed, Sciencedirect.com, Scopus, dpi.com and others are used for gathering authentic information. For evaluating the major functions of Whey Protein, it is ideal for serving suitable information by relating it to heart and kidney diseases.

3.2. Inclusion and Exclusion Criteria

The inclusion criteria emphasize the gathering of valuable data through which the research data can be gathered (Sanfilippo et al. 2020).125(5), Pg.398-399. Such well-known databases like Sciencedirect.com, PubMed, Scopes and others are suitable for finding out the research data. Those articles consist of Whey protein in other factors without having any medical-based information, which should be excluded from the collected resources (Kittelson et al.). As per the exclusion criteria, if the research articles consist of information that is not relatable to the research variables, those resources are excluded. By applying both the reliability and validity of the resources, it is ideal for mitigating such limitations regarding methodological biases. Through sampling such research articles regarding particular contexts, like 'Renal Treatment', Synthesis of Whey Proteins' and others, it is valuable to set each resource in a random sampling way. Apart from the key

findings stated in previous research articles, the major evidence can be gathered by relabelling the biological factors of the Whey Protein.

3.3. Data Extraction and Analysis

From the research datasets, it is necessary to gather biochemical information on WP activities, the presence of bimolecular elements in determining the blood circulatory functions and others related to kidney and heart diseases. By signifying the major elements regarding the impact of WP, it is suitable to summarise the empirical studies of both renal and cardiovascular health conditions.

4. Results

4.1. Summary of Literature Findings

4.1.1. Overview of Studies Investigating Whey Powder Intake and Renal Health

In the case of dietary protein impacts, the authors serve various suggestions concerning the necessity of Whey Powder intake, which is approachable for representing its function in renal activities. The enhancement of protein intake can mitigate the protein stress in the Kidney, which increases the hyperfiltration rates. The authors convey that the biochemical approaches of Whey protein impact such physiological factors, which can recover the cell damage via synthesizing new cells. In the context of dietary supplements, Whey protein is quite popular among Athletes. Due to determining high popularity in Whey protein consumption, it enhances more expansive ideas as a protein supplement regarding consumers and business circles. Moreover, it is vital for gaining in-depth knowledge about the protein supplement. Through adopting the high protein diet, various studies demonstrate the positive impacts of Whey protein. In the treatment process, the medical group includes Whey powder in the dietary chart for determining the lithogenic indicators, which is approachable for mitigating the high cholesterol rates and inflammation.

4.1.2. Summary of Studies Examining Whey Powder Intake and Cardiovascular Health

Whey protein can regulate the postprandial blood pressures in the circulatory system, which is valuable for maintaining the cell metabolism for producing carbohydrates, enzymes and others. Consumption of 70 grams of protein is suitable to regulate blood cell activities, which balances the cholesterol level. Through representing the complex relationship among obesity, inflammations and blood pressure, the authors converse about the mitigation of arterial stiffness via Whey protein. Due to the usage of cardiometabolic biomarkers, it is valuable to determine the high protein diets for maintaining blood pressure and glucose levels. Whey protein influences the high production of amino acids, which is necessary to build up the cell metabolic rates. Increasing the protein intake is suitable to maintain the presence of other necessary elements, like sulphur, nitrogen, and others, which control haemodialysis. The meta-analysis examines that the intake of Whey protein is reliable and dose-responsive, which can lower the chances of morbidity.

4.2. Identification of Trends and Patterns

4.2.1. Consistent Findings Across Multiple Studies

It is determined in the study by (Ko et al.) that the requirement of protein-rich diets for recovering renal functions maintains the hypertension of intraglomerular activities. Whey protein can maintain the de-novo synthesis of the genetic elements, which determine the high proportions of the protein in weight reduction. Moreover, it ensures glycemic constellations, which is necessary to standardize the health conditions of kidneys. In contrast, Hu et al. (2021) identified the necessity of adhering to healthy dietary patterns in which Whey protein is one of the major elements. Through conducting the chronic renal and heart insufficiencies cohort studies, medical practitioners convey the right maintenance of the nutrient factors as the major findings. Less presence of protein and nutrients causes consequences regarding cardiovascular and renal diseases, which need to be recovered. Sahathevan et al. (2018) convey that enhancing the Whey protein intake is valuable for developing the appetite scores by approximately 40%, which is valuable for determining the renal treatment goals.

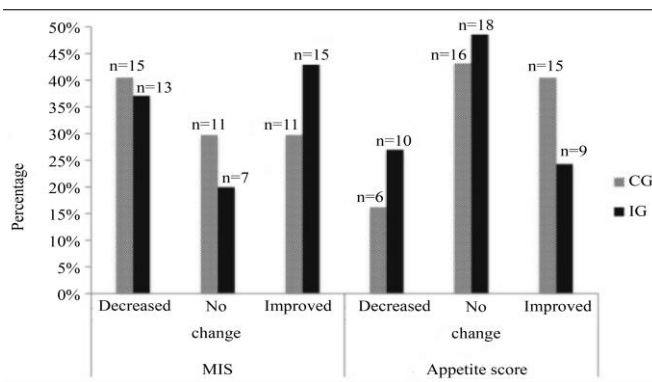


Fig. 4 Clinical efficacy of Whey protein through analyzing the appetite scores

(Source: Sahathevan et al. 2018)

4.2.2. Conflicting Evidence and Areas of Controversy

Some authors provide valuable evidence regarding the usage of Whey protein for controlling hyperphosphatemia, which is reliable in the cardiovascular treatment process. Such controversy mainly seems to be regarding the intake of Whey protein. The researchers argue about the necessity of consuming casein proteins rather than plant proteins, as it high up the rate of glutamate, anionic potassium salts, and hydrogen ions at a greater proportional level. It is stated in the study by (Ko & Kalantar-Zadeh 795) about the comparison with plant-based protein. Whey protein is ideal for maintaining the pH level of blood, for which cardiovascular patients can intake high protein diets to control renal function. The findings of this article convey that the high protein diet ensures the longevity of the renal system. Whey protein is highly applicable for serving as a dietary supplement, through which patients can consume it daily to recover from renal and cardiovascular issues. Concerning dietary supplementation,

the consumption of whey protein is popular among athletes, which enhances the trustworthy intake of whey protein.

5. Discussion

5.1. Interpretation of Findings

5.1.1. Analysis of the Relationship Between Whey Powder Intake and Renal Function

Upon examining the impact of protein powder on renal function, it is crucial to look at both the empirical findings and the implication of a broader Medication Therapy Management (MTM). Empirical findings suggest that whey protein intake does not inherently harm renal function in individuals with healthy kidneys. Studies have shown that the alterations brought about by protein in the renal system are part of a normal adaptation process and fall within the functional parameters of a healthy kidney (Newar, 2022). Moreover, it has been observed that protein intake can aid in cellular repair and recovery processes in the kidney. The empirical findings state that the application of Whey powder is valuable to hold the chronic medication therapy, which is necessary to maintain the steroid level. In association with the WP dietary supplementation, the medical practitioners would determine the postprandial blood pressures concerning the middle-aged group. (Molina et al.) argue about the impacts of low protein diets, which cause disruptions of renal activities and lower intraglomerular pressure, based on the findings. Whey protein can influence the mesangial proliferation in the GFR hyperfiltration, which is suitable for maintaining the sodium level. Via determining the interstitial proliferation, it causes proteinuria within the podocyte scales. Through activating the mesangial cells, Whey protein can increase the enzymatic activities in the lumen, which is valuable for controlling renal activities.

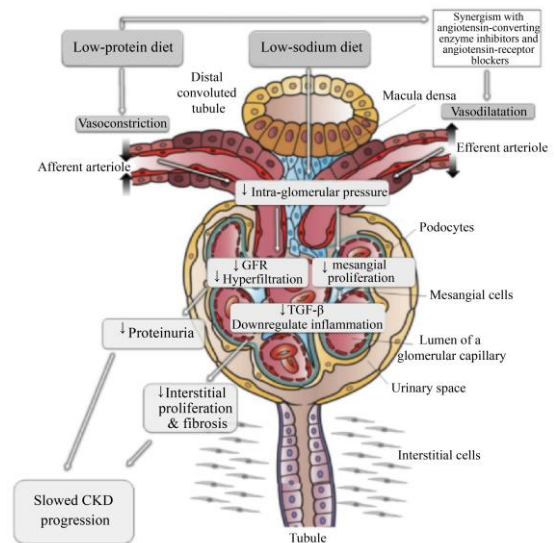


Fig. 5 Function of Whey protein in renal activity

Source: Molina et al. 2021

5.1.2. Reasons for Using Protein Powder Supplements

Currently, most people are influenced to intake Whey powder for muscle building and physical fitness, as healthcare

professionals mostly suggest the protein dosage. Around 40.6% of people would like to consume Whey protein by mixing it with water, which is suitable for maintaining the renal system. Regarding their health well beings, Whey protein is one of the most popular choices rather than other protein derivatives. Around 34.9% of respondents converse about determining protein powder consumption, which is ideal for promoting gym fitness. Approximately 27.4% would enhance the regular monitoring of renal functions, which is suitable for determining the types of protein powder; about 46.2% consider Whey protein.

5.1.3. Survey Analysis

Q1. How often do you consume protein powder supplements?

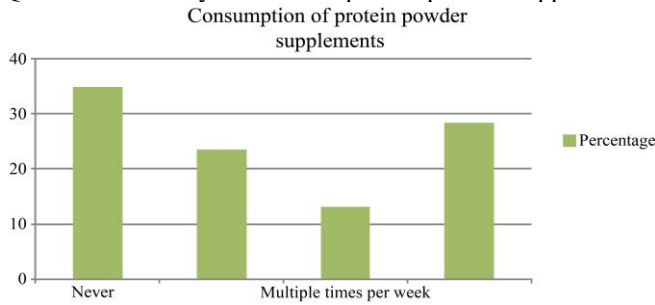


Fig. 6 Consumption of protein powder supplements

Source: Self-Generated

Analysis: From the above chart it is analyzed that the majority of people have never consumed protein powder supplements in their life.

Only 13% of people from the above survey have consumed protein supplements multiple times per week. It can be said that the majority of survey respondents were never inclined towards consuming protein powder supplements.

Q2. What is the typical dosage of protein powder you consume per serving?

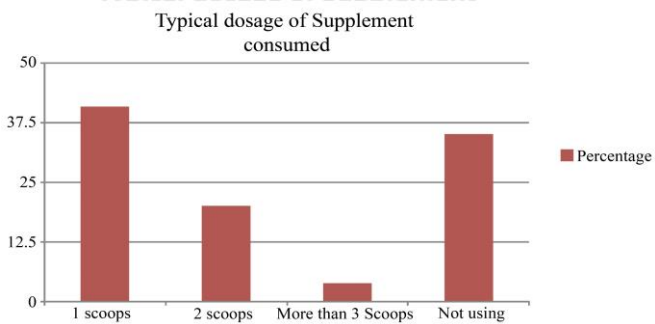


Fig. 7 Typical dosage of supplement consumed

Source: Self-Generated

Analysis: From the above chart, this is seen that the majority of people have consumed very little dosage of supplements. Only a few respondents have consumed heavy dosages, indicating the non-usage of protein powder supplements.

Q3. Have you consulted a healthcare professional before starting protein powder supplementation?

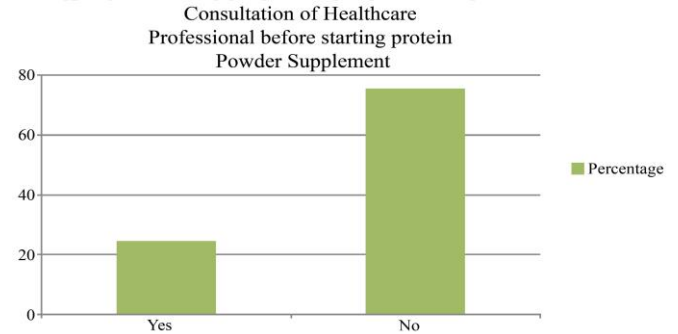


Fig. 8 Consultation of healthcare professional before starting protein powder supplement

Source: Self-Generated

Analysis: The above chart analyses that maximum respondents have never had any consultation with the Healthcare Professional before consuming the protein supplement. Minimum respondents have consulted a Healthcare Professional before consuming the supplement.

Q4. What type of protein powder do you usually consume?

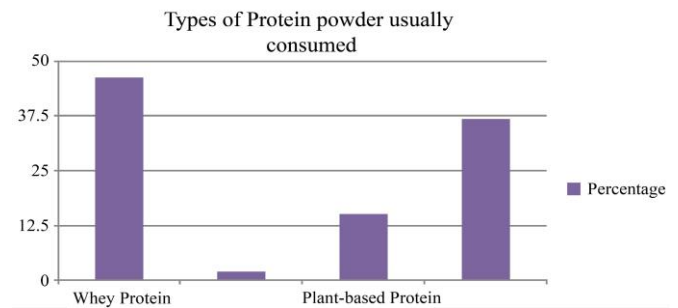


Fig. 9 Type of protein powder usually consumed

Source: Self-Generated

Analysis: From the above chart it is analyzed that the maximum respondents consume whey protein. Minimum respondents consume casein protein.

Q5. How do you typically consume protein powder supplements?

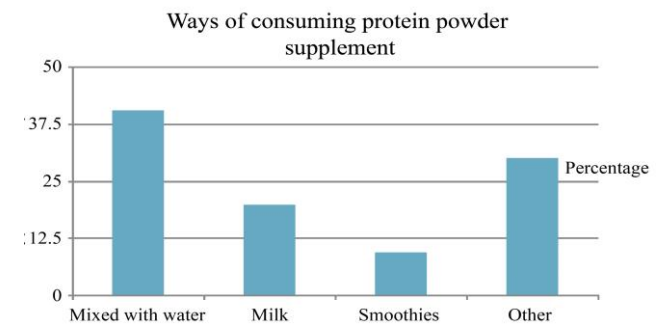


Fig. 10 Ways of consuming protein powder supplement

Source: Self-Generated

Q6. Are you aware of any guidelines or recommendations regarding protein powder consumption and renal health?

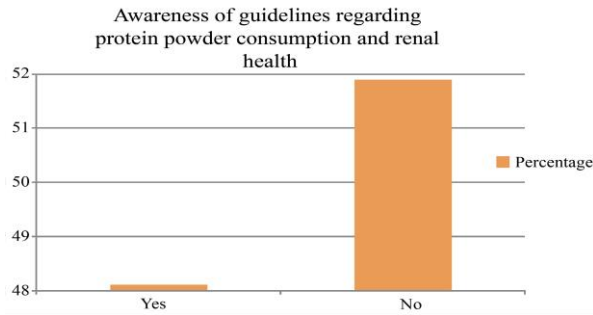


Fig. 11 Awareness of guidelines regarding protein powder consumption and renal health

Source: Self-Generated

Analysis: From the above chart it is analyzed that maximum respondents are unaware of any guidelines regarding protein powder consumption and renal health.

Minimum respondents are aware of such guidelines, indicating the rising interest of the respondents towards the consumption of protein powder for maintaining renal health.

Q7. Do you monitor your renal/kidney function regularly through medical tests?

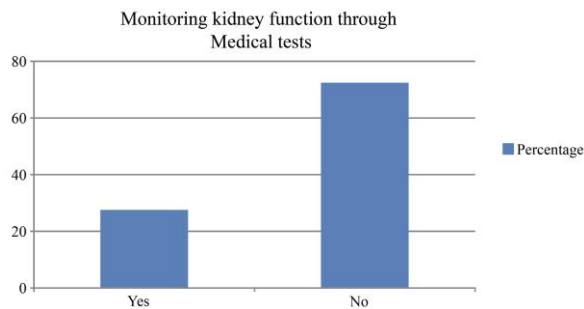


Fig. 12 Monitoring kidney function through medical tests

Source: Self-Generated

Analysis: From the above chart it is analyzed that maximum respondents do not monitor Renal/kidney function through medical tests regularly. A minimum number of respondents monitor Renal/Kidney functions through medical tests, indicating the unawareness of the survey respondents regarding the management of renal health.

Q8. How much water do you typically consume per day?

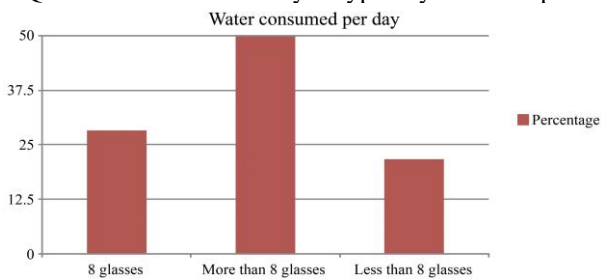


Fig. 13 Water consumed per day

Source: Self-Generated

Analysis: It is analyzed from the above chart that the maximum number of respondents consume more than 8 glasses per day. Minimum respondents intake less than 8 glasses of water per day. This indicates that the majority of the survey respondents are inclined towards drinking more water.

5.1.4. Assessment of the Impact on Cardiovascular Health

Through signifying dietary patterns in subclinical approaches, the usage of Whey powder is suitable for maintaining cardiovascular recovery. Whey protein controls the oxidative stress regarding dyslipidemia, which is suitable for increasing mitochondrial functions.

Yiğit (2023) 42(8), Pg.758-768 states in the study that whey protein can develop anti-oxygen systems, which is suitable for developing metabolic rates among the cells.

Based on the findings of the study, it can be determined that in the cardiovascular system, the protein molecules can regulate the production of peroxidase enzymes that can control the oxygen level to empower blood circulation.

Through linking with the empirical findings, Whey protein can mitigate the anticipatory hypotensions, for which the intake of protein-packed meals is necessary. Activation of oxidative stress is viable to maintain the cholesterol level, which is suitable for reducing low inflammation rates

5.2. Explanation of Dose-Response Relationships and Biological Pathways

5.2.1. Mechanisms Underlying the Response of WP on Renal and Heart Function

The figure shows the biochemical mechanisms of Whey protein, which mainly impact the muscular regions. Before reaching the circulatory system, it synthesizes into the amino acids within the adipocyte cells.

In the study by Cruzat, through determining the TG hydrolysis, it breaks down into Vitamin D, Calcium and other protein elements, which are suitable for recovering the inflammation rates, as per the findings.

In the cardiovascular system, the peptides would determine the TG hydrolysis aspects, which is suitable for promoting lipogenesis approaches in the FAS system. The formation of sulphur-containing amino acids reaches the liver cells and enhances genetic regulation, which develops glutamate, Leucine, BCAA and other elements.

It stimulates insulin production, which is necessary to determine the cell metabolism to maintain the renal system. About the major findings, Whey protein can increase intraglomerular actions, which control the filtration rates of carbohydrates and other elements.

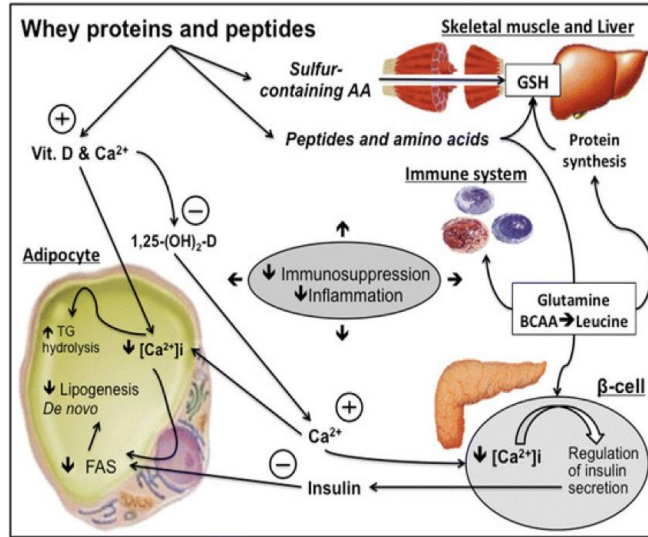


Fig. 14 Mechanisms of the Whey protein (Source: Cruzat, Krause & Newsholme, 2020)

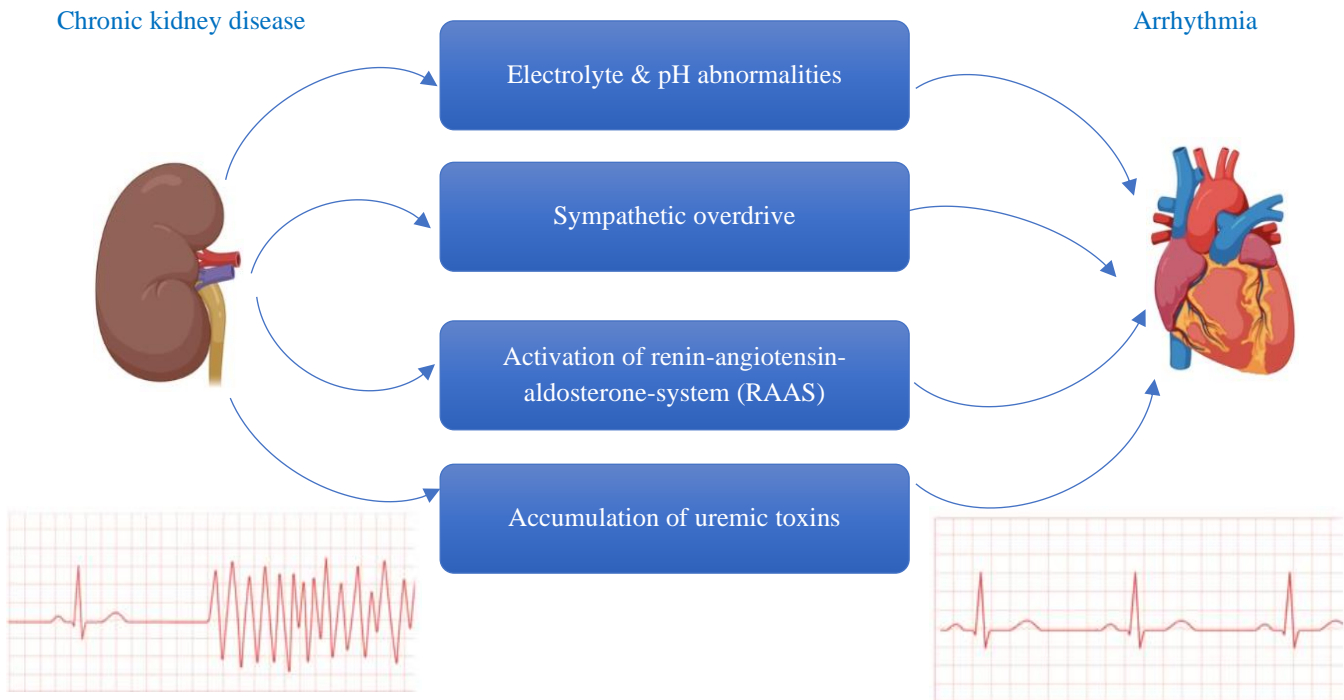


Fig. 15 Relationship between kidney diseases and the cardiovascular system (Source: Sinha, Schweda, Maier & Wagner, 2023)

5.2.2. Potential Factors Influencing the Relationship of Whey Protein in the Renal and Cardiovascular System

The inactivation of the kidneys lowers the electrolytic elements due to the disruptions of the renal systems. (Sinha et al.) argues that the uncertainty of the glomerular filtration causes the presence of damaged cells, which disbalances the blood pH level. The findings of the study show that the presence of bad cholesterol and lysosomal cells causes the accumulation of uremic toxicity, which needs to be recovered by including the protein dietary aspects. The synthesis of protein molecules determines the activation of renin-

angiotensin-aldosterone goals, which stimulate the cardiovascular systems. These factors promote fewer chances of affecting arrhythmia, in which the patient can determine the consumption of Whey proteins. In association with various supplementary proteins like creatine, De Oliveira Fonseca (2022) states that around 53.5% of patients consume Whey protein to fulfil their dietary goals. The major findings of the study convey that about 60.4% of patients reveal that this protein dose is suitable for recovering from kidney diseases, which cures them rather than before.

5.3. Implications for Public Health and Clinical Practice

5.3.1. Use of Evidence-Based Findings in Dietary Recommendations

In association with WP, it is necessary to create a dietary chart by including this milk-based protein rather than Whey protein consumption in high amounts. Cava et al. state that adult patients are capable of taking protein doses of approximately 30 grams in a regular manner, which is valuable to maintaining renal function (Cava et al.).

Based on the key findings, medical practitioners can suggest to Type-II diabetic patients to take the right meal, in which the Whey powder is suitable to consume in a particular amount. It can develop the production of BCAA, which is appropriate for determining the resistance of the hormone insulin. Right maintenance of the protein synthesis activates rapamycin, which is the mammalian target necessary to regulate the signalling of the hormone insulin. The medical group should be responsible for making the dietary chart regarding the renal patients, which includes around 55% beta-lactoglobulin, 20% alpha-lactalbumin, 7% blood serum albumin and minor proteins approximately 5% (Cava et al.)

5.3.2. Consideration of Targeted Interventions and Policy Development

The nutraceutical applications for using Whey protein are necessary to focus on the insecurity in food demands. The Governmental team should design such guidelines regarding nutrition policies, through taking such initiative concerning the value-added products. In collaboration with the dairy industries, they can determine the production of Whey powder by composing milk products approximately 20%. Pillai, Morya and Kasankala (2024) convey that through conducting various medical camps with nutritionists and medical practitioners, they take the right initiatives for delivering dietary charts. Apart from findings, it is necessary to include the high-fibre starch carbohydrates, proteins and others, which are valuable for maintaining the cholesterol level.

6. Results

6.1. Summary of Key Findings

6.1.1. Insights Gained from Secondary Research Analysis

Through linking with the first objective, the usage of Whey protein is suitable to determine the health treatment process, which is suitable for medical practitioners to control

morbidity rates. Analyzing the major functions and impacts of this protein is ideal for developing dietary charts.

The formulation of a less protein dietary chart is valuable for chronic renal treatment, in which most patients become influenced to intake Whey protein. Through determining the positive impacts of the biological process, it can be stated that the production rates of Whey powder should be increased, through which people can include it in the dietary chart. As per the research outcomes, it follows up the hypothesis considering the effectiveness of the Whey protein in recovering both Kidney and cardiovascular diseases.

6.1.2. Areas Requiring Further Investigation and Future Directions

Regarding the enhancement of Whey protein intake, it is necessary to serve alternative ways concerning the dietary chart. In future research work, it is recommended to work on a thorough and detailed analysis of protein supplementation methods, through which the practitioners can make the right initiations regarding the treatment process.

6.2. Recommendations for Future Research

6.2.1. Addressing Limitations and Research Gaps

Apart from the research outcomes, it synthesizes the advantages of whey protein in the renal treatment process, which would not convey its side effects. Moreover, such controversies are estimated regarding the consumption of Whey proteins, for which no alternative methods are discussed in this research work. Due to the settlement of secondary data collection, it does not express the benefits of Whey proteins as per the requirement of patients. Such derivatives of Whey proteins need to be discussed, which is missing in the secondary research method.

6.2.2. Conducting Prospective Studies and Clinical Trial

Based on the research limitations, medical practitioners can set up further research works to find the derivatives of Whey protein. Through conducting primary research work, it is suitable to utilize the Whey protein for clinical trials. Conducting surveys or interviews among such CDT patients is reliable for emphasizing their health-related issues and expectations for taking protein doses. It is significant for implementing the medical treatment process for determining the survival rates.

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Appendix

A. List of Included Studies and Data Extraction Tables

<i>Database source</i>	<i>Author</i>	<i>Year</i>	<i>Countries</i>	<i>Study design</i>	<i>Key Evidence of the Topic</i>
PubMed	Ko, G. J., & Kalantar-Zadeh, K.	2021	Korea	Systematic literature review	Importance of dietary management in chronic kidney disease progression
PubMed	Ko, G. J., Rhee, C. M., Kalantar-Zadeh, K., & Joshi, S.	2020	America	Observation study	Impacts of high-protein diets on kidney health and longevity
PubMed	Hu, E. A., Coresh, J., Anderson, C. A., Appel, L. J., Grams, M. E., Crews, D. C., ... & Townsend, R. R.	2021	America	Prospective cohort study	Adherence to healthy dietary patterns and risk of CKD progression
PubMed	Cava, E., Padua, E., Campaci, D., Bernardi, M., Muthanna, F. M., Caprio, M., & Lombardo, M.	2024	UK	Systematic literature Review	Estimation of Health Implications of Whey Protein Consumption
mdpi	Sinha, F., Schweda, F., Maier, L. S., & Wagner, S.	2023	UK	Secondary	Impact of Impaired Kidney Function on Arrhythmia-Promoting Cardiac Ion Channel Regulation.
U.Porto	De Oliveira Fonseca, T. M. N.	2022	Portugal	Secondary	Defining nutritional supplements as a kidney menace by focusing on Whey Protein and Creatine
Taylor and Francis	Cruzat, V. F., Krause, M., & Newsholme, P.	2020	UK	Secondary	Amino acid supplementation and impact on immune function regarding exercise
Wiley online library	Pillai, A. T., Morya, S., & Kasankala, L. M.	2024	UK	Secondary	Emerging Trends in Bioavailability and Pharmaceutical Potential of Whey Bioactives