

Review Article

Assessing protein-energy wasting in chronic kidney disease

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ABSTRACT

Chronic kidney disease is often accompanied with a syndrome known as protein-energy wasting, which is defined by decreased protein consumption, protein loss due to metabolic disturbances, and physical consequences include sarcopenia and frailty. Due to population aging and advancements in the treatment of other chronic illnesses, this problem has drastically increased in recent years. The frequency of morbidity and death in chronic kidney disease patients may be greatly decreased with proper therapy of as protein-energy wasting. Therefore, it's crucial to prevent and manage as protein-energy wasting in chronic kidney disease patients by doing a thorough evaluation and offering each patient a customized, evidence-based treatment plan. Once protein-energy wasting is recognized, a nutritionist should be contacted to create a management strategy. A thorough diet specifically designed to fit the patient's requirements, any required nutritional supplements, and counselling about dietary changes, symptom management, and psychological support should all be part of this strategy. The risk of protein-energy wasting may be decreased with proper assessment and care. This includes changes to one's diet, resistance training or other forms of exercise, dialysis or organ transplantation when necessary, and drugs to treat any underlying disorders.

Keywords: Protein-energy wasting, Chronic kidney disease, Disease, Nutrients

INTRODUCTION

Chronic kidney disease (CKD) is often accompanied with a syndrome known as protein-energy wasting (PEW), which is defined by decreased protein consumption, protein loss due to metabolic disturbances, and physical consequences include sarcopenia and frailty.² Due to population aging and advancements in the treatment of other chronic illnesses, this problem has drastically increased in recent years. The NKF- K/DOQI clinical practice guidelines for nutrition in CKD state that between 18 and 75% of CKD patients on dialysis experience PEW.³

Numerous investigations have shown a link between PEW and a higher risk of mortality in addition to its clinical effects. Serum albumin was shown to be a significant predictor of death in haemodialysis patients in a recent ten-year cohort research that analysed many indicators, including C-reactive protein and carotid atherosclerosis, to identify mortality in these patients.^{4,5} Further evidence that

nutritional therapies, which aim to enhance nutritional status as well as prevent or correct wasting and sarcopenia, may save lives comes from the fact that patients receiving dialysis die as a result of the short-term effects of PEW.⁶

Management of PEW in CKD patients should involve adequate evaluation and intervention in addition to good diet and exercise.⁷ For the diagnosis of PEW in CKD patients, the International Society of Renal Nutrition and Metabolism has established a set of criteria that includes laboratory results, body composition, nutritional intake, and scoring.⁸ These standards aid in monitoring the course of the condition and prompting medical treatments, enhancing the quality of life for CKD patients.

Thus, the frequency of morbidity and death in CKD patients may be greatly decreased with proper therapy of PEW. Therefore, it's crucial to prevent and manage PEW in CKD patients by doing a thorough evaluation and

offering each patient a customized, evidence-based treatment plan.

CAUSES OF PROTEIN-ENERGY WASTING

In the context of patients with CKD, the probable causes of PEW syndrome may be roughly divided into two categories: modifiable variables, and non-modifiable ones.⁸ Modifiable factors can be changed, but non-modifiable factors cannot.

Anorexia (decreased appetite), incomplete dialysis, nutritional malabsorption, poor food intake, and recommended dietary restriction are some of the modifiable variables that are related with PEW in CKD patients.⁹ In individuals with chronic kidney disease, anorexia is the most prevalent risk factor because it limits the amount of protein and calories consumed. Acidosis, anemia, certain endocrine problems, and a lack of vitamin D may all have an impact on it, as might other issues. An insufficient amount of dialysis might result in the ineffective elimination of toxins from the body as well as the loss of protein.¹⁰ In patients with CKD, malnutrition may also be caused by a failure of the gut to properly absorb nutrients. Insufficient dietary intake is another factor that contributes to the development of PEW in CKD patients. This factor leads to an insufficient intake of calories and proteins from the patient's diet. Another factor that is related with PEW in CKD is dietary limitation, which may be caused by concomitant illnesses such as diabetes mellitus.¹¹ On the other hand, it is essential to take into consideration the non-modifiable risk factors linked with PEW in CKD. These causes include an increase in pro-inflammatory cytokines, oxidative and carbonyl stress, volume overload in the blood, and factors connected to the dialysis therapy itself, such as arterovenous graft and the kind of dialysis membrane that is used.^{12,13} In patients with chronic kidney disease, other illnesses, such as diabetes mellitus, cardiovascular disease, infection, aging, and so on, may potentially contribute to the development of PEW.¹⁴

In conclusion, CKD patients who have PEW have several underlying reasons, all of which must be taken into consideration throughout the treatment process. Other reasons, such as inflammation and oxidative stress, need a diverse approach to treatment in order to be managed effectively. While some of the causes, such as anorexia and low caloric intake, may be adjusted with proper interventions and dietary management, other causes, such as these, cannot. In order to devise a strategy for the treatment of PEW that is both successful and supported by evidence, it is essential to conduct an investigation into each of the factors that are at the root of the condition in CKD patients.

UNDERSTANDING PEW IN CKD PATIENTS

A well-known consequence of CKD is protein-energy waste (PEW). PEW is defined by a decline in muscle mass

and function, as well as a condition of malnutrition, and is linked to an increased risk of hospitalization as well as mortality. It is critical to comprehend the probable causes, risk factors, and clinical manifestations of PEW in CKD patients in order to properly diagnose and treat these patients' condition.

The most typical explanation for PEW is a reduction in the body's total protein and energy stores, which causes malnutrition, a loss of muscle mass, and impaired function. Inadequate dietary protein and calorie consumption, or even worse, insufficient dietary intake of vital micronutrients including vitamins and minerals, are common causes of CKD in patients.¹⁵ Although underlying renal illness may also contribute to PEW, this is less frequent and calls for further testing.

The diagnosis and treatment of PEW in CKD depend on an understanding of its different causes and risk factors. The main cause of PEW in these individuals is often poor food intake, and there are a number of potential reasons why this may be the case. It is crucial to understand that CKD may result in both physical and psychological changes, which might reduce appetite and promote unhealthy eating habits. Additionally, patients could have a variety of co-morbidities including nausea and vomiting, which might restrict their ability to eat.¹⁶ Additionally, CKD may alter hormone levels, which might affect appetite and raise the risk of malnutrition. High drug dosages as well as social and economic circumstances are likely additional contributing factors.

PEW is more likely to occur in CKD patients owing to additional variables. People who are older have a greater chance of having PEW since their nutritional intake generally declines with age, and people who have a lower BMI have a higher risk because they may already be malnourished.¹⁷ Due to increasing losses of proteins, electrolytes, and water, CKD may need different treatments including dialysis or transplantation, which might further exacerbate the risk factors indicated above. Furthermore, those with more severe renal failure may not be able to adequately absorb and use nutrients no matter how much food they consume.¹⁸

It's crucial to comprehend the PEW-related possible presentations that may occur in CKD patients. Numerous physical and psycho-social symptoms connected to the reduced intake of protein and calories may be present in patients. Weight loss, anorexia, nausea, and deterioration in physical function and/or energy are a few of the physical signs of PEW. Anemia, poor wound healing, tiredness, and mental disorientation are possible additional symptoms.¹⁹ PEW may have a substantial influence on a patient's psycho-social health in addition to their physical symptoms. Patients could feel down, anxious, irritable, or have trouble focusing.

Given that CKD patients may be affected, it is crucial to comprehend both the causes and symptoms of PEW in

order to correctly identify and treat this illness. The evaluation of the patient's medical background and present physical and psychological conditions is the first stage in this procedure. The patient's eating patterns should also be examined.²⁰ Complete blood counts and electrolyte assessments in the laboratory might also provide crucial details about the patient's PEW status.

The patient's psychological condition and any comorbidity that could be influencing the development of PEW should also be taken into account. In order to determine any possible obstacles, the patient may be encountering in acquiring appropriate nutrition, it might be useful to assess any potential socioeconomic determinants of health. Following the identification of these problems, a nutritionist should be contacted to create a strategy for controlling the PEW.²¹ A thorough diet specifically designed to fit the patient's requirements, any required nutritional supplements, and counselling about dietary changes, symptom management, and psychological support should all be part of this strategy.

Resistance training and physical activity may also be suggested as therapy for PEW in CKD patients in addition to dietary changes, however this should be reviewed with the patient's healthcare team first. Depending on the stage of the CKD, dialysis treatments or transplantation may also be advised.¹³ Any drugs used to address underlying diseases should also be examined. The goal of interventions is to meet the specific requirements of each patient, and they should be modified as necessary based on continuous evaluations of the patient's response to therapy.²²

The patient's health and quality of life may be greatly impacted by PEW, a critical CKD consequence. To correctly identify and treat PEW in CKD patients, it is critical to comprehend the probable causes and risk factors for the disorder. Once a disease has been recognized, the appropriate therapies should be put into place, including medicine to treat any underlying conditions, dietary changes and supplements, resistance training or other physical activity. The risk of PEW may be decreased and CKD patients' quality of life can be improved with the right assessment and therapy.

DIAGNOSTIC CRITERIA OF PROTEIN-ENERGY WASTING

PEW in individuals with CKD is difficult to diagnose and often necessitates a multidisciplinary strategy. This is because PEW may have a number of different origins and clinical manifestations. The definition of a PEW diagnosis and the standards that should be used to get this conclusion are hotly contested topics in the medical literature.^{12,20,22}

Body composition impairment, as shown by a drop in lean body mass or a weight loss of at least 5% over a period of 3-6 months, is the main criterion for diagnosing PEW. Even though this is thought to be the most conclusive

diagnostic criteria, a thorough evaluation should also take other relevant aspects into account.²³ These considerations include a study of the patient's eating patterns, laboratory tests such as a complete blood count and an assessment of electrolyte levels, physical examinations, and psychiatric evaluations. Depending on the patient's history and current condition, further tests could also be advised, such as assessments of the patient's nutritional and metabolic state.²⁴

New diagnostic criteria have been developed in addition to the traditional PEW diagnostic criteria. One strategy focuses on determining whether or not the amount of protein energy loss is clinically relevant and on assessing the degree of protein energy wasting. This method evaluates body composition measurements, a number of metabolic indicators, and biochemical data. In order to quantify the severity of PEW, recent research have also presented a new set of criteria that focuses on the patient's functional evaluation.²⁵ Along with the previously specified standards, this method also takes into account indicators of physical function, such as muscular strength, daily living activities, and emotional/mental health.

When diagnosing PEW, other aspects such as comorbidities, medicines, and diets should also be taken into account. It's also critical to take PEW's pace of advancement into account. In order to identify any changes or trends in the patient's health, it is often advised that PEW be evaluated and tracked for at least three months.²⁶

It is essential that the patient undergo a preliminary evaluation and examination of their medical history due to the difficulty in identifying PEW. This should include a review of the patient's eating patterns, current physical and psychological complaints, and any relevant information.²⁷ To find any possible metabolic irregularities, laboratory testing including a full blood count and electrolyte levels should also be carried out. A thorough management strategy should be created based on the findings of this evaluation in order to address any probable underlying causes of PEW and launch effective treatments.²⁸

As a result, the identification of PEW in CKD patients is challenging and requires an all-encompassing strategy. Although an evaluation of body composition is the main diagnostic criterion, other pertinent characteristics should also be taken into account.

Additionally, brand-new standards have been put forward, including the use of measurements of physical and mental health as well as metabolic and nutritional status. To provide a thorough evaluation of the patient, all of these criteria as well as other elements such as co-morbidities, medicines, and diets should be taken into account. The risk of PEW in CKD patients may be reduced and their quality of life can be enhanced with an accurate evaluation and prompt therapies.

CLINICAL IMPLICATIONS OF PROTEIN-ENERGY WASTING IN CHRONIC KIDNEY DISEASE

It is important to recognize the clinical significance of PEW in CKD. PEW is linked to a range of unfavourable outcomes, such as increased mortality and hospitalization rates. To properly diagnose and treat this ailment, it's critical to comprehend the probable causes, risk factors, and clinical manifestations of PEW.

Inadequate dietary intake of protein, calories, and in certain circumstances, vital micronutrients, is the main cause of PEW in CKD patients. Although less frequent and requiring more testing, it may also be caused by underlying renal illness. Age, BMI, co-morbidities, medicines, dialysis or transplants, and socioeconomic status are additional risk factors for PEW in addition to dietary variables.²⁹ As a result, it's crucial to examine each of these aspects while evaluating and controlling PEW.

The clinical signs and symptoms of PEW change depending on how severe the illness is. A number of medical and psychological symptoms, including anorexia, weight loss, weariness, disorientation, anemia, slow wound healing, and depression, may be present in patients. These symptoms may negatively affect a patient's quality of life and cause further problems.

An increased risk of hospitalization and death in CKD patients is one of the most important clinical effects of PEW. According to studies, PEW is linked to worse outcomes for CKD patients, and the death rate rises as PEW severity increases.³⁰ Due to their weaker immune systems, individuals with PEW also have a higher risk of infections, which may raise their mortality and hospitalization risks.

PEW may have an impact on a CKD patient's quality of life in addition to raising their risk of death and hospitalization. Patients with PEW often have malnutrition, which makes it possible that they won't be able to engage in typical everyday activities. It might be challenging to participate in social activities when a patient's motivation and energy levels are considerably reduced by PEW symptoms including exhaustion and anorexia.³¹ PEW may have severe psychological side effects, with patients often exhibiting symptoms of anxiety, sadness, and irritability.

Given the serious consequences of PEW in CKD patients, it is crucial to correctly identify and treat this illness. The patient's medical history as well as their present physical and psychological conditions are evaluated and reviewed in the first stage. The patient's eating patterns should also be examined.³² Complete blood counts and electrolyte assessments in the laboratory might also provide crucial details about the patient's PEW status. The patient's psychological condition and any co-morbidities that could

be influencing the development of PEW should also be taken into account.

Once PEW is recognized, a nutritionist should be contacted to create a management strategy. A thorough diet specifically designed to fit the patient's requirements, any required nutritional supplements, and counselling about dietary changes, symptom management, and psychological support should all be part of this strategy. Resistance training and physical activity may also be suggested as therapy for PEW in CKD patients in addition to dietary changes, however this should be reviewed with the patient's healthcare team first.³³ Depending on the stage of the CKD, dialysis treatments or transplantation may also be advised. Any drugs used to address underlying diseases should also be examined.

In conclusion, PEW in CKD patients has important clinical ramifications that shouldn't be disregarded. The risk of PEW may be decreased and CKD patients' quality of life can be improved with the right assessment and therapy. It is crucial to be aware of the possible causes of PEW and to evaluate and take into account all relevant aspects, such as nutrition, co-morbidities, and psychological condition. Once a disease has been recognized, the appropriate therapies should be put into place, including medicine to treat any underlying conditions, dietary changes and supplements, resistance training or other physical activity. A comprehensive strategy may lessen the severity of PEW and enhance the standard of living for CKD patients.

CONCLUSION

In conclusion, PEW is a well-known consequence of CKD) and is linked to a higher risk of death and hospitalization. To properly diagnose and treat this ailment, it's critical to comprehend the probable causes, risk factors, and clinical manifestations of PEW. Co-morbidities, medicines, dialysis or transplantation, age, BMI, food consumption, and socioeconomic level are a few of these.

An evaluation of body composition is the main criterion for diagnosing PEW, although other related aspects should also be taken into account. New standards have been suggested, including the use of measurements of physical and mental health as well as metabolic and nutritional status. Once PEW is recognized, a nutritionist should be contacted to create a management strategy. A thorough diet specifically designed to fit the patient's requirements, any required nutritional supplements, and counselling about dietary changes, symptom management, and psychological support should all be part of this strategy.

The risk of PEW may be decreased with proper assessment and care. This includes changes to one's diet, resistance training or other forms of exercise, dialysis or organ transplantation when necessary, and drugs to treat any underlying disorders. The ultimate goal of these treatments should be to meet the specific requirements of each patient,

and regular evaluations should be done to track the patient's reaction to therapy and adjust actions as necessary. A comprehensive strategy may lessen the severity of PEW and enhance the standard of living for CKD patients.

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