

Protein hydrolysate as a functional food for chronic kidney disease

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GUEST EDITORIAL

ARTICLE INFO

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DOI : 10.20885/JKKI.Vol10.Iss3.art1

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The progress of science and technology in the last few decades has improved the welfare and health of humanity. Invention in the fields of medicine, biochemistry, nutrition and food technology show their role in overcoming and managing various diseases through the role of functional food. The discovery of the process and manufacture of protein hydrolysate shows a pivotal role in fulfill the nutritional needs of several diseases. Because the structure of the protein will determines its function, then bioinformatics take an important role of in preparing functional food production for the future.

Protein hydrolysate, mixtures of amino acids obtained from the hydrolysis process made by separating proteins from acids, alkalis, or enzymes. Hydrolysate nutrients preparations that is produced from original ingredients in the form of amino acids that build it, are commonly used as a provider of nutrients and special dietary fluids for patients who are unable to consume ordinary food protein.¹

Its use as a protein supplement, among others, as energetic drinks, geriatric products, sports nutrition or weight control diets. While its use in the clinical field, among others, as functional food for patients with phenylketonuria (PKU), hypoallergenic infant, acute and chronic liver disease, short bowel syndrome, crohn's disease, pancreatitis and ulcerative colitis.²

In the academic literature, functional food is defined as food that is intended to be eaten as part of a daily diet and contains biologically active components that have the potential to improve health or reduce the risk of disease.³ In other words, a modified food which is provides benefits to health in addition to the benefits of it's nutritional content. Functional food is one of the mainstays in efforts to maintain public health, which has effect of reducing health costs, increasing productivity and fostering people's economy. Three important things to determine functional food through research are: bioactive compounds, biological availability and biomarkers of valid scientific evidence which states that a food has good physiological effects, which are beneficial to health.⁴

Preliminary studies indicate that protein hydrolysate is more effectively used than whole protein or amino acids. In addition, they promote a strong insulinotropic effect, which reduces protein breakdown and increases the absorption of muscle and branched-chain amino acid tissue. These effects contribute to the benefits of protein hydrolysate to increase repair of tissue damage caused by surgery, ulcers, burns, and muscle damage exercises. There is evidence that protein hydrolysate might be useful to repair tissue damage in some diseases, however additional research is needed to further examine the various roles of protein hydrolysate in this process.⁵

Most of CKD patients die from cardiovascular complications arising from high blood pressure associated with kidney damage. In the last 15 years peptide compounds with antihypertensive properties have been studied and received special attention. The main source of antihypertensive peptides comes from milk sources, but extraordinary findings have been obtained from other food sources, namely peas. Most pea peptides have demonstrated effectiveness *in vitro*, but more convincing evidence of antihypertensive effects must be based on animal experiments and clinical trials.⁶ The results of Aluko et al's study from Canada showed that pea protein hydrolysate powder can reduce hypertension and chronic kidney disease. In rats and humans with polycystic kidney disease the expenditure of urine is highly reduced, because the kidneys are unable to function as a filter for blood and fluid. In Aluko's study, rats given hydrolysate of yellow peas showed an increase in urine production by 30%, blood pressure returned to normal levels beside that there were no visible side effects from the administration of pea protein hydrolysate in rats.⁷

The natural form of peas does not have effect as good as their hydrolysate, because the therapy effect is in their bioactive form of the peptide and this peptide needs to be released from the main protein through the process of breaking peptide bonds or hydrolysis by proteases so that the free peptides activated. The focus of further study is to find specific peptides in pea protein hydrolysate that have potency to be used as a treatment and prevention of CKD.⁸

In CKD patients whose protein intake is limited, need to be given special protein, that can be used without producing waste products that are toxic to the body. It would be very excellent if the provide protein can prevent glomerular fibrosis as well. The green peas protein hydrolysate which hydrolysed by bromelain (GPPHB), with small molecular weight, has been shown to have a promising effect on improving renal function. There has been done a lot of research and findings obtained about protein hydrolysate. Study results that have been proven need to be continuing developed and investigated. Green Peas Protein hydrolysate has a promising result to be a functional food or CKD Patients in the future.

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