



////Title: Predicting Mortality in Kidney Disease: A New Nutritional Risk Index

////Standfirst: According to the World Health Organisation, between 5 and 10 million people die globally of kidney disease each year. There has been an important shift towards recognising chronic kidney disease (CKD) as a major public health problem that requires early management. Protein energy wasting is a maladaptive metabolic state resulting in severe malnutrition and one of the major causes of CKD-related deaths. Professor Eiichiro Kanda (*Eye-chi-ro Kan-da*) at Kawasaki (*Ka-wa-SA-ki*) Medical School and his colleagues have established a risk index that predicts the patients undergoing haemodialysis (*hee-mo-dye-AL-ah-sis*) who are at most risk for developing protein energy wasting and, potentially, death.

////Main text:

According to the World Health Organisation, between 5 and 10 million people die annually of kidney disease across the world. Kidney disease has been described as one of the most neglected chronic diseases and there has been an important shift towards recognising CKD as a major public health problem that requires early management.

The kidneys are a pair of vital organs that act as the body's filtration system. They ensure waste products are removed efficiently and maintain balance in our body's internal environment. Problems with the ability of the kidneys to function can lead to a life-threatening and long-term condition known as CKD. CKD is often detected only after the disease has moved to an advanced stage. It is a serious condition that progressively worsens, and so patients may undergo haemodialysis to replicate some of the functions of the kidneys.

Dialysis is a process that filters the body's blood externally, using complex machinery in the absence of a fully functioning healthy kidney. Dialysis helps the body remove excess water and waste products. It allows individuals with kidney disease to continue to live many years, but critically, patients undergoing dialysis can suffer from complications such as malnutrition caused by protein energy wasting. This is a form of malnutrition common in patients with CKD in which the body is unable to store protein and energy (that is, body protein and fat masses). Protein energy wasting is likely caused by the body's inflammatory response as well as poor appetite.

Protein energy wasting is associated with the development of other diseases, poor quality of life, and even death. Importantly, protein energy wasting can predict CKD progression and poor clinical outcomes for patients in some cases. Patients diagnosed with protein energy wasting can significantly benefit from an appropriate diet and treatment, but to achieve this, require constant monitoring by clinicians to ensure their nutritional status remains within a healthy range.

For patients on maintenance haemodialysis, the prevalence of protein energy wasting is between 30% to 70%. To improve the prognosis of protein energy wasting, early identification and preventative treatment are necessary. The International Society of Renal Nutrition and Metabolism has proposed specific criteria for the diagnosis of protein energy wasting consisting of a serum albumin level of less than 3.8g/dL, a serum cholesterol level of less than 100mg/dL, and a body mass index less than 23kg/m². However, these parameters are not always appropriate for Asian patients on haemodialysis as a risk index for death, or help with early identification of protein energy wasting.

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Professor Eiichiro Kanda is based at Kawasaki Medical School, Okayama, Japan. Along with colleagues, Professor Kanda conducted a nation-wide study, which included over 98,000 participants on the Japanese renal data registry of the Japanese society for dialysis therapy. They sought to identify a nutritional index for screening haemodialysis patients with a high risk of death associated with protein energy wasting. While numerous studies have investigated the risk index for death in haemodialysis patients, Professor Kanda and colleagues are the first to establish a risk index in an Asian population by conducting a large-scale study.

The nutritional risk index is a new index that uses nutritional factors to accurately identify malnourished and high-risk haemodialysis patients. As a composite index for protein energy wasting diagnosis, it involves several elements as opposed to the other single indices that exist. Critically, four important nutritional factors that are implicated in affecting the progression of malnutrition are taken into account. These include body mass index, albumin level, cholesterol level, and creatinine level. In this way, the nutritional risk index accommodates the complex and diverse nutritional conditions patients on haemodialysis are likely to possess, and is better able to predict patients at high risk of severe complications.

Previous studies have demonstrated that elderly patients are at a higher risk of developing protein energy wasting than younger patients. The serum creatinine level is an indirect way of measuring muscle mass, but this is dependent on age and sex, both of which the nutritional risk index also takes into consideration. Furthermore, the research by Professor Kanda and colleagues identified that a relationship exists between patients with low body mass index and an increased risk of death. In this study, a cut-off body mass index was given at 20.0kg/m^2 , which takes into account differences in American and Japanese populations. Additionally, very high and very low cholesterol levels in the blood were also identified as correlating with an increased risk of death. For this reason, two different cut-off levels for cholesterol were established for the nutritional risk index at each end of the healthy spectrum. Lastly, a decrease in serum albumin was associated with an increase in death, and so the cut-off for serum albumin levels was set at 3.6g/dL .

Providing early treatment is a necessity for patients diagnosed with CKD, and this is particularly the case for those who are most likely to develop protein energy wasting. Professor Kanda and colleagues have successfully identified and optimised a clinically reliable method for the early identification of haemodialysis patients at risk. The nutritional risk index will help clinicians provide the best treatment to patients, such as improving their diet, and providing oral supplements and intravenous nutrition when required.

In conclusion, the work by Professor Kanda and colleagues helps clarify our current understanding with regards to CKD complications. It will also enhance the provision of effective patient care and undoubtedly trigger further research into CKD and protein energy wasting. Findings will eventually help to reduce the number of patients who may die from the effects of the devastating disease caused by CKD and protein energy wasting.

Meet the Researcher

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