Protein Restriction Diet as an Essential Tool in Treating Uremia: Myth or Truth?

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Abstract: Protein restriction diet is not always accepted by every nephrologist, even though one century has been passed since such a nutritional therapy was introduced as one of the strategies against uremia. One reason might be that nutritional therapies, in contrast to drug therapies, require a longer observation period and are more difficult to use in a randomized controlled trial (RCT) to evaluate their effectiveness. At least, protein restriction has been revealed to be certainly effective in chronic renal failure except for polycystic kidney disease and diabetic nephropathy, based on the accumulated results obtained by meta-analysis, RCT and cohort studies. Another reason why some physicians hesitate to restrict protein, might be attributable to dialysis therapy; an already established procedure in the treatment of uremia, even though it is expensive and its availability is restricted. Another issue, which should be resolved in the future, is whether protein restriction diet before dialysis improves the overall prognosis of uremic patients. In any case, it is true that nutritional support, as well as drug therapies, is a mainstream treatment for uremia.

Key Words: Uremia; Chronic renal failure; Protein restriction diet; Nutritional therapy; Dialysis

Introduction

Almost one hundred years have passed since a protein restriction diet (PRD) was first applied to treat uremic symptoms. PRD certainly reduces the blood urea nitrogen level, and reduces nausea, anorexia, and itching. However, it is still controversial whether PRD has an inhibitory effect on the progression of chronic renal failure (CRF). For uremic patients, nutritional therapy, contrary to drug therapy, requires so much effort to be learned and each meal must be prepared specially everyday. For physicians, other than the difficulty in evaluat-
ing the compliance of patients, a longer period is needed to follow up the renal function of each patient, which disturbs the protocol of randomized controlled trials (RCT). These problems must be overcome to clarify the precise worth of nutritional therapy against uremia. Accordingly, we discuss the present issues, the limitations and the future of PRD.

**Which Diseases are Responsive to Protein Restriction?**

PRD has been recognized as an effective therapy for CRF, other than due to polycystic kidney disease and diabetic nephropathy, based on the results by RCTs and meta-analyses. However, from the standpoint of careful reading, each study had some problems; in selection and exclusion of background renal diseases, strictness of protein restriction, prescription of angiotensin I converting enzyme inhibitors, and evaluation of renal function. Only one report by Ihle, et al. had a satisfactory study design, in which PRD was concluded to be effective.

As mentioned above, it is difficult to investigate the efficacy of protein restriction by RCT. So we have continued the cohort study since 1987, which revealed that 102/348 cases (29.3%), observed longer than one year and except for diabetic nephropathy, were non-progressive and showed less reduction of creatinine clearance (Ccr) than that estimated by aging. The amount of proteinuria in the non-progressive group was significantly less than that in the progressive group. Surprisingly, twenty-one patients (20.6%) were non-progressive even with mild PRD of more than 0.9 g/kg body weight (BW)/day.

Animal experiments showed that PRD increased the survival rate and suppressed azotemia in polycystic kidney diseases (PCKD), but did not support the inhibitory effect of PRD on progression of renal failure. MDRD study was also suspicious about the effect of PRD among PCKD patients. We have some experience that PRD can be effective if introduced earlier (Ccr>70 ml/min) even in PCKD patients.

There is no direct evidence on the effect of PRD in diabetic nephropathy, even accumulated results obtained by animal experiments and clinical studies suggested favorable effect of PRD. It may be due to many concurrent problems, such as atherosclerosis in generalized arteries, and to renal interstitial damage caused by proteinuria.

**How Early Should PRD Begin, and How Much Should Protein be Restricted?**

The Japanese Society of Nephrology has recommended 0.6–0.7 g/kg BW/day of PRD for the patients with Ccr less than 70 ml/min, which corresponds to a half of the average protein intake among Japanese. One alternative would be to start with mild PRD; 0.9 g/kg BW/day rather than with strict PRD, initially.

Several recent reports suggested that the amount of proteinuria was well correlated with the progression of CRF. So mild PRD (0.9 g/kg BW/day) might be sufficient among slowly progressive CRF with proteinuria less than 1 g/day. Meanwhile, strict PRD; 0.4 g/kg BW/day might be required in critical CRF with Ccr less than 20 ml/min, in which supplement of calcium, vitamins (B, C, folate, and D), essential amino acids, and keto-acids should be considered.

**Availability of Protein-restricted Foods**

PRD was previously resisted by patients, because their taste was too sweet and oily, and their foods and menu were also restricted. However low protein rice, noodle, bread, side dishes and various desserts (such as jelly) were developed, which have extended the availability of PRD. Home delivery service of PRD was started by two companies in Japan. Hence
even home-bound senile patients need not be excluded from PRD treatment.

**Prognosis After Dialysis**

PRD, which can even succeed in extending the pre-dialysis period, would not be effective either for patients or medical costs, if such diets increase morbidity and mortality rate after dialysis is introduced. This is the main concern of most physicians about PRD. The quality of dialysis therapy has been kept high, and government aid for dialysis patients has been established in Japan, which are other reasons why PRD has not spread widely.

There are certainly some patients who have problems on the introduction of dialysis even at our facility. However most such cases have been related to caloric deficiency rather than PRD itself. With respect to the prognosis of protein-restricted patients after dialysis, only one report is available, in which there was no difference on the prognosis after the initiation of dialysis therapy between the CRF patients with and without PRD. It is also important to urge the patients to learn not only PRD but also to accept it with dialysis.

**Conclusion**

Dialysis is certainly the established and crucial therapy for uremia, which might weaken the enthusiasm of physicians in dealing with pre-dialysis patients. However as well as nutritional therapy, newly developed drugs, such as oral adsorbent, angiotensin I converting enzyme inhibitors, angiotensin II receptor antagonists, are now available, which may suppress the progression of CRF, decrease dialysis patients, and be consecutively anticipated to reduce the healthcare spending on CRF.

**REFERENCES**


11) Pedrini, M.T., Levey, A.S., Lau, J. et al.: The

