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N-acetylcysteine and residual kidney function among end-stage kidney failure

Seyed Seifollah Beladi Mousavi[1,2], Seyed Majid Mousavi Movahhed[2*], Leila Sabetnia[1], Fatemeh Hyati[1]

[1]Chronic Renal Failure Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
[2]Department of Internal Medicine, Baharloo Hospital, Tehran University of Medical Sciences, Tehran, Iran

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Preserving residual kidney function (RKF) is an important goal among end-stage kidney failure (ESKF) patients and it has been increasingly incriminated to be important in maintaining fluid balance, removal of middle molecular uremic toxins, nutritional condition and well-being of patients on dialysis. Therefore more attention should be focused on preserving RRF even after patients are started on dialysis

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Commentary

Dear Editor,

With great interest, we recently read the published article by Shayanpour and colleagues entitled "Evaluating the effect of N-acetylcysteine on residual renal function in chronic hemodialysis patients treated with low-flux dialysis membrane; a randomized clinical trial" in your esteemed journal (1).

In this randomized clinical trial, the author compared the effect of oral placebo and N-acetylcysteine (NAC) in a dosage of 600 mg twice a day for 1 month on residual renal function (RKF) of two groups (treatment and control group, each group 49 patients) of end-stage renal disease (ESRD) patients undergoing maintenance hemodialysis (HD) (1).

The results of the investigation showed that NAC improves RKF among ESRD patients undergoing maintenance HD (1).

Preserving RKF is an important goal among ESRD patients and it has been increasingly implicated to be important in keeping fluid balance, small solute clearance, phosphorus control, nutritional status, well-being of patients on dialysis, and removal of middle molecular uremic toxins among these patients especially among who are received peritoneal dialysis (2-7).

There is a strong relationship between RKF and the overall health and well-being of these patients. It has also been suggested that there is a significant inverse association between RRF and valvular calcification and cardiac hypertrophy among ESRD patients undergoing maintenance dialysis (8).

In addition, according to the results of numerous studies, it has also been established that the persistence of RKF conferred survival benefit among these individuals and its loss cannot simply be replaced by increasing the dose of dialysis (9-12).

As an example, the CANUSA study clearly demonstrated that RRF but not the dose of peritoneal dialysis is a strong predictor of mortality among ESRD patients undergoing peritoneal dialysis (9).

Unfortunately very few studies have examined the association between RKF and survival among HD patients, however according to the available data including the results of the study by Shemin et al in the United States as well as the result of Netherlands Cooperative Study on the Adequacy of Dialysis (NECOSAD) investigation, RKF has also a significant influence on the survival of HD individuals (10,12).

Therefore the RKF is a very valuable asset to ESRD patients and more attention should be focused on preserving RRF even after patients are started on dialysis (8-12).

The study by Shayanpour and colleagues provides some hope for better maintenance and preserving of RKF among HD patients. They have shown that NAC is an effective option for preserving RKF among HD patients

***Corresponding author**: Seyed Majid Mousavi Movahhed, Email;beladimusavi@yahoo.com

treated with low-flux dialysis membrane (1).

The mechanism of NAC in preserving RKF is not clearly understood. However, according to several experimental models, it is thought that the beneficial effect of NAC in preserving RRF is mediated, at least in part, by its ability to scavenge oxygen-derived free radicals. It has also been suggested that NAC have a vasodilatation effect on renal microcirculation by endothelium-dependent mechanism (13).

The presumed mechanism of NAC in preserving RRF is its ability to ameliorate renal ischemia reperfusion injury which also apparently promote a vasodilatory effect (13).

In addition to NAC, another reasonable approach in protecting RKF is to preferentially use modern synthetic membranes such as high-flux polysulfone membranes instead of biocompatible cellulosic membranes. This idea is supported by a number of experimental studies detecting the advantage of high-flux biocompatible membrane in HD patients (14).

It appears that avoiding use of nephrotoxic substances such as aminoglycosides, amphotericin, and non-steroidal anti-inflammatory drugs is also another potential strategy to preserve RKF among these patients (15).

If possible avoiding use of radiocontrast agents and especially high-osmolality radiocontrast agents is also important among these patients (16).

If radiocontrast study is not avoidable, a variety of preventive measures containing avoidance of volume depletion and adequate hydration, use of lower doses of contrast and avoidance of repetitive studies that are closely spaced, as well as prophylactic acetylcysteine should be considered to protecting RKF (16).

Authors' contribution

SSBM and SMMM prepared the primary draft. LS and FH edited the paper. SSBM prepared the final manuscript. All authors read and signed the final paper.

Conflicts of interest

The authors declare no conflict of interest.

Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

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