

# MALNUTRITION IN PATIENTS ON DIALYSIS TREATMENT

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Many factors contribute to morbidity and mortality in patients with end-stage renal disease, one of these being malnutrition. Eating disorders are inevitable in patients with uremia. A common associated factor is inflammation with hypoalbuminemia and decrease in serum proteins. In the present study, data on 33 (38.37%) female and 53 (61.63%) male patients were assessed with standard statistical analysis including the R-test for normality. The assessment method used was the Malnutrition Inflammation Score (MIS) composed of 10 components. The mean patient age was  $67.28 \pm 12$ , range 32-86 years. The mean duration of hemodialysis (HD) was  $48.94 \pm 47.57$ , range 3-224 months. The MIS has three categories: (A) well nourished; (B) mild malnutrition; and (C) severe malnutrition. At the beginning of the study, results were as follows: (A) 6.98%; (B) 51.16%; and (C) 41.86%. The respective figures recorded after 6 months were as follows: (A) 10.47%; (B) 25.58%; and (C) 63.95%. During the study, 53.49% of patients had a MIS of 7 or more, 6.97% of patients passed away, and 3.49% underwent transplantation. The mean MIS was  $20.3 \pm 1.63$  in the deceased,  $3 \pm 2.6$  in the transplanted, and  $7.98 \pm 5.7$  in the rest of patients. Patients having undergone HD for at least 3 months and aged at least 18 years were included in the analysis. The objective of the study was to determine the rate of malnutrition among HD patients and to compare the results recorded in our center with other HD centers around the world. Furthermore, our aim was to compare MIS with mortality rate. We repeated MIS after 6 and 12 months to find out whether there would be a decrease in the rate of malnutrition among patients, since additional nutritional support was introduced after detection of the state. According to our study results, there is strong correlation of malnutrition, hospitalization and mortality.

**Key words:** malnutrition, dialysis, morbidity, mortality

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## INTRODUCTION

It is well known that chronic disease causes loss of appetite and body weight, as well as malnutrition. Uremia is a common state that accompanies malnutrition. In the state of uremia, there is a restriction of protein intake due to the lack of appetite on the one hand and loss of protein through preserved diuresis on the other. Hemodialysis (HD) induces protein catabolism, eliminates nutrients and has a proinflammatory effect. Peritoneal dialysis causes protein leakage through the peritoneal membrane. However, inadequate dose of dialysis contributes to malnutrition considering the proinflammatory and toxic effects of retained uremic metabolites.<sup>(1-8)</sup> We conducted a cross analysis in our dialysis center among patients having undergone treatment for at least 3

months and aged at least 18 years. Our aim was to assess the rate of malnutrition, compare our results with those of other dialysis centers around the world, and determine the impact of the study score on mortality. We repeated the test after 6 and 12 months to find out whether there would be a decrease in malnutrition among patients, since additional nutritional support was introduced after detection of the state, and patients, their families and personnel realized the importance of nutrition and physical activity.

## SUBJECTS AND METHODS

Eighty-six patients (33 female and 53 male) were assessed using standard statistical analysis. The Malnutrition Inflammation Score (MIS) composed of 10 compo-

nents was used as the method of assessment<sup>(9)</sup>. The MIS is divided into four categories (nutritional history, physical examination, body mass index (BMI) and laboratory parameters). Patients were distributed according to their nutritional status, i.e. MIS, into three categories: (A) well nourished (0, 1, 2); (B) mild malnutrition (3, 4, 5); and (C) severe malnutrition ( $\geq 6$ ). The Karnofsky scale was used to evaluate performance status<sup>(10)</sup>.

## RESULTS

There were 38.37% of female and 61.63% of male patients, mean age  $67.28 \pm 12$  (range, 32-86) years and mean HD duration  $48.94 \pm 47.57$  (range, 3-224) months. Results are shown in Table 1.

The mean Karnofsky score was  $71.16 \pm 18.75$ , range 30-100.

Table 1  
*Results of Malnutrition Inflammation Score (MIS) in study patients*

	MIS (%)		
	A	B	C
Baseline	6.98	51.16	41.86
After 6 months	10.47	25.58	63.95
After 12 months	9.52	30.16	60.38

MIS score: (A) well nourished (0, 1, 2); (B) mild malnutrition (3, 4, 5); (C) severe malnutrition (6 or more)

During the study period, 6.97% of patients died, whilst 3.49% underwent kidney transplantation. The mean MIS was  $20.3 \pm 1.63$  in the deceased,  $3 \pm 2.6$  in the transplanted and  $7.98 \pm 5.7$  in the rest of patients. The mean Karnofsky score was 62.32, range 20-100.

After the 12-month period, 63 out of 86 patients remained in the study, five (5.81%) had been transplanted and 18 (20.93%) passed away. The mean MIS was  $6.48 \pm 3.78$  and the mean Karnofsky score was  $71.11 \pm 12.96$ , range 30-90 (Table 2).

Table 2  
*Correlation between albumin levels and Malnutrition Inflammation Score (MIS)*

Start	0.61657465
After 6 months	0.72847086
After 1 year	0.61543457

## DISCUSSION

Analysis of data obtained in the study revealed rather poor results in terms of increase in the rate of malnutrition among patients during the first 6 months. However, this increase in malnutrition was primarily due to comorbidities, malignant disease and old age. Great difference in MIS between the deceased and transplanted patients was expected and confirmed by analysis. The mean MIS was  $20.3 \pm 1.63$  in the deceased,  $3 \pm 2.6$  in the transplanted and  $7.98 \pm 5.7$  in the rest of patients. According to some authors, the preva-

lence of malnutrition among dialysis patients can be 70% or more<sup>(5,6,9)</sup>.

After 12 months, malnutrition was still a major problem among our patients, even though we detected the state, attempted to correct anemia, and started substitution therapy via parenteral re-feeding with proteins and other nutrients. These results are understandable considering that new patients were not added to the study, while the subjects assessed were aging and acquired new comorbidities during the study. However, it is significant to note that nutrition and performance status did not deteriorate in study patients.

Malnutrition is a common complication of chronic disease, either because of restriction of nutrient intake, or due to other factors such as catabolism or protein leakage via proteinuria, or a combination of these. Uremia is frequently accompanied by anorexia. Anorexia is defined as the lack of appetite and is common among patients with high degree renal disease and patients undergoing HD treatment. There are many causes, being either of physical or psychological nature. The most common causes of poor nutrient intake are changes in the mucous membranes of the mouth and olfactory region causing deterioration of taste and smell, changes of salivary glands causing xerostomia and hypopyalism that disrupt fragmenting and swallowing of food, gastroparesis (dyspepsia, vomiting) and intestinal motility disorders (constipation, diarrhea)<sup>(11, 12)</sup>.

Hypoalbuminemia frequently accompanies chronic disease, and is a relevant predicting factor of cardiovascular events and poor outcome. Duration of dialysis reduces muscle mass, physical activity, lowers quality of life and is associated with depression. Inadequate dialysis treatment contributes to malnutrition, and dialysis per se contributes to nutrient loss, whatever

the dialysis method. Extracorporeal circulation in HD is proinflammatory due to bioincompatible filters, nonsterile dialysis fluid and plastic dialysis bloodlines. All these lead to higher catabolism and lower anabolism of proteins. The elderly predominate in the dialysis treatment population, involving the process of aging. Serum level of albumin is a strict laboratory predictor of mortality, and hypoalbuminemia is a frequent sign of inflammation and poor nutritional status among individuals<sup>(11,12)</sup>. C-reactive protein (CRP) levels are determined in our patients on a monthly basis, and more frequently if needed, whereas albumin, ferritin, iron, UIBC and transferrin are assessed every three months. Iron parameters significantly correlate with nutritional status and inflammatory state among end-stage renal disease (ESRD) patients. At the beginning of our study, the mean albumin level was 40.22 g/L and mean CRP 13.31 mg/L. At the end of the study, the mean albumin level was 42.1 g/L. There was a strong correlation between albumin and CRP levels ( $r=-0.55$ )<sup>(2)</sup> and correlation between albumin levels and MIS.

During treatment modalities such as peritoneal dialysis (PD), loss of protein can be 5-15 grams per day, or even more during peritonitis. PD frequently increases body weight due to storage of fat derived from resorbed glucose and water retention due to decreased ultrafiltration, but with loss of muscle mass. A lack of appetite can arise because of glucose and fluid resorption from glucose solutions as well. Depression often accompanies patients with chronic kidney disease (CKD)/ESRD due to a decrease in the quality of life caused by HD treatment. Sometimes, the symptoms of uremia mimic depression (fatigue, slackness, lack of strength, appetite loss, loss of body weight, pruritus, etc.). Sometimes, CKD/ESRD patients acquire depression during their illness. Interestingly enough, recent research has shown a connection between proinflammatory cytokines and depression, which explains the high incidence of depression among ESRD patients due to CKD and impact of treatment methods.

## CONCLUSION

The goal of dialysis treatment is to lower inflammation, prevent further loss of serum proteins including albumins and body weight loss, restore nutrients and correct acidosis. Re-feeding with special nutrient preparations after verification of the degree of malnutrition has become standard in our dialysis center. According to tests conducted in our center, we have learned that there is high association of malnutrition, hospitalization and mortality among patients with ESRD. Their physical performance is tightly linked to their nutritional status, and physical therapy should be conducted to preserve remaining muscle mass and slow down additional sarco-

penia. It seems that dialysis duration is a powerful and independent morbidity factor, and the longer dialysis treatment lasts, the higher is MIS, as well as physical deterioration.

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## SAŽETAK

### POTHRANJENOST BOLESNIKA NA DIJALIZI

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*Opća bolnica Zadar, Odjel za dijalizu i 1 Odjel za psihijatriju, Zadar, Hrvatska*

Poznato je da teške bolesti uzrokuju gubitak apetita, tjelesne težine i malnutriciju. Uremija je teška bolest i čest pratilac pothranjenosti. Uzroci tome su višestruki: ograničen unos bjelančevina, gubitak bjelančevina uz još očuvanu diurezu. Sama hemodijaliza potiče katabolizam proteina i eliminira neke hranjive tvari te djeluje proupalno. U Centru za kroničnu hemodijalizu svih ispitanika liječenih najmanje 3 mjeseca i starijih od 18 godina napravili smo presječnu analizu. Željeli smo vidjeti kolika je zastupljenost pothranjenosti i u kojoj je korelaciji sa svjetskim podacima te koliki je utjecaj visine ispitivanog zbira na smrtnost. Ponavljanjem testa nakon 6 i 12 mjeseci očekivali smo smanjenje stupnja pothranjenosti s obzirom na nutricionističku potporu nakon otkrivanja stanja, a na osnovi kojeg se podizala svijest o tom problemu kod bolesnika, obitelji i osoblja, naročito iz područja prehrane i tjelesne aktivnosti. U analiziranim podacima na prvi pogled došli smo do poražavajućih rezultata u smislu porasta pothranjenosti u prvih 6 mjeseci. Daljnja analiza je pokazala da je pothranjenost bila uglavnom uzrokovana komorbiditetom povezanim s malignitetom te visokom dobi. Logično je da je uočena velika razlika u Malnutrition Inflammation Score (MIS) između umrlih i transplantiranih bolesnika. Kod umrlih bolesnika zbir MIS je bio  $20,3 \pm 1,63$ , kod transplantiranih  $3 \pm 2,6$ , a kod svih ostalih  $7,98 \pm 5,7$ . Ne smijemo zaboraviti da se prema nekim autorima u literaturi navodi učestalost pothranjenosti kod bolesnika na dijalizi od 70% i više.

*Ključne riječi:* pothranjenost, dijaliza, pobol, smrtnost