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**Bašić-Jukić, Nikolina; Kes, Petar; Jurić, Ivana; Brunetta-Gavranić, Bruna**

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## **Octogenarians on hemodialysis: a prospective study**

Basic-Jukic N, Kes P, Juric I, Brunetta-Gavranic B.

Department of Dialysis, University Hospital Centre Zagreb, Zagreb, Croatia

Correspondence address:

Nikolina Basic-Jukic, M.D., Ph.D.

Departemnt of Dialysis

University Hospital Centre Zagreb

Kispaticeva 12

10000 Zagreb

CROATIA

e-mail: [nina\\_basic@net.hr](mailto:nina_basic@net.hr)

tel/Fax: ++385-1-2312-517

## **ABSTRACT**

**Background:** Octogenarian patients are the fast growing group of patients on hemodialysis. These patients were previously treated with conservative measures while they were believed to have too poor prognosis on renal replacement therapy. We prospectively investigated clinical characteristics and outcome of patients after at least 2 years of follow-up.

**Methods:** Six male and 6 female patients who were older than 80 years at the start of hemodialysis were prospectively followed up. Their clinical characteristics, comorbidities, etiology of renal disease, nutritional status, complications, vascular access, hospitalizations, compliance and outcome were recorded.

**Results:** Primary renal disease was unknown in 42.8% of patients. All patients had one or more comorbid conditions. Dialysis was initiated in an emergency situation in 64.3%. Vascular access was long-term hemodialysis catheter in 71.4% of octogenarians. Only 14.2 % received erythropoietin. There were no major bleeds with reduced doses of heparin. The most common complications were catheter-related (infections, ruptures). All patients together required 7 hospitalizations per year (0.58 per patient). Octogenarians tended to be underdialysed with the mean Kt/V 0.92. One year survival was 71.4%, and two-year survival was 50%.

**Discussion:** Octogenarian patients have good survival on hemodialysis. Most of them died from causes that were not related to the uremia. Their treatment requires a careful planning of renal service expansion while more octogenarians who need renal replacement treatment may be expected.

**Key words:** elderly, octogenarians, end-stage renal disease, hemodialysis, outcome

## **INTRODUCTION**

The elderly are the fastest growing population in developed countries. Over the future decades we can expect further expansion of this age group. Renal failure is much more common in older patients and increased age of population will result in further increase in number of patients who need renal replacement therapy (1). This problem requires a careful planning of renal service expansion even in the most developed countries in the world (2,3).

Nephrologists usually consider patients aged more than 65 years as „the elderly“ (4). However, keeping in mind the fact that the average dialysis patient is 65 years old at the start of dialysis and treatment of this age group is an everyday routine, more attention should be focused on very old patients (5). “Elderly elderly” or octogenarians are of special interest (6). This may become the fastest growing group of patients on dialysis. These patients were previously treated with conservative measures (7).

In the present study we investigated the prevalence, and prospectively followed-up clinical characteristics and outcome of patients over 80 years when they entered dialysis.

### **Patients and methods**

Octogenarian patients who started with dialysis were prospectively followed-up from the time of the first dialysis session. Their clinical characteristics, comorbidities, cause of renal failure, nutritional status and type of vascular access were recorded. Patients were followed for development of different complications, number of hospitalizations per year of treatment, number of days spent in hospital, adjustment to dialysis regimens and changes in nutritional status. Serum albumin and serum creatinine were followed-up to determine the changes in nutritional status. Patients were advised to take 1g/kg/day of proteins with at least 6.3 g of essential amino acids. Supplemental folic acid, 1,25-(OH)<sub>2</sub>-vitamin D<sub>3</sub> and pyridoxine were prescribed. Patients who developed malnutrition were treated with intravenous nutrition during the dialysis. Approach to the specific medications like erythropoietin was investigated. Compliance was determined at the basis of interdialytic weight gain. Social background and support from the families were investigated. Performance status was used as a measure of patient’s functional capacity. A number of parameters have been proposed to quantify performance status. The most commonly used system is the Karnofsky performance status

used in oncologic patients. It ranges from values of 100, signifying normal functional status, to 0, signifying death. Dialysis dose was estimated by the Online Clearance Monitoring on Fresenius 2008 S machines.

## **RESULTS**

### *Clinical characteristics*

There were 6 male and 6 female patients age at the start of dialysis ranging from 80 to 92 years. Primary renal disease was unknown in 42.8 % of patients. One patient had bilateral renal cancer, one patient suffered from nephrolithiasis, two patients developed ESRD as a consequence of hypertension and four patients had diabetes mellitus. One patient had chronic hepatitis C infection; others have negative markers of hepatitis B and hepatitis C.

All octogenarian patients had one or more comorbid conditions. Some degree of dementia was present in 3 patients, with the severe form in one of them. Cardiovascular problems including hypertension, congestive heart failure, ischemic heart disease, peripheral vascular disease, cerebrovascular problems, myocardial infarction and/or arrhythmias were present in all patients. Median Karnofsky performance status was 50 (range 40 to 90). This means that most of octogenarians required considerable assistance and frequent medical care. Two patients had Karnofsky performance status 90. They were able to carry on normal activity with minor signs or symptoms of disease.

### *Survival*

One-year survival was 71.4 %. During the first year on dialysis two patients died from malignant disease and two patients died from complications of diabetes mellitus. Two-year survival was 50%. After two years on dialysis, one patient died after operation of gastric cancer and one patient died in psychiatric clinic with severe dementia.

### *Referral to nephrologists and choice of treatment*

Old patients were referred to nephrologists less than 2 months (range 0 to 24 months) before they started with renal replacement therapy. In 64.3% of them dialysis was initiated in emergency situation with temporary endovascular catheter used for vascular access. Most of octogenarian patients (78.5%) were not informed about the possibility of peritoneal dialysis.

### *Vascular access*

Long-term hemodialysis catheters were used in 71.4% of elderly patients. Cimmino-Brescia fistula was constructed in 50 % of octogenarians, and only 42.8% were successful.

### *Nutritional status*

Serum albumin, serum creatinine and body-mass index at the beginning of dialysis treatment and after two years are presented in Table 1.

Table 1.

Female patients had lower BMI (19.3 kg/m<sup>2</sup>) than male patients (22.2 kg/m<sup>2</sup>) (p=0.094). There were no statistically significant differences between the nutritional parameters at the beginning and at the end of the study.

### *Access to erythropoietin*

Only 14.2 % of older patients received erythropoietin, thus requiring repetitive blood transfusions (range 1 to 12 per year).

### *Vaccination*

All patients received hepatitis B vaccine. Repeated vaccinations were necessary in 10 patients (83%), and 41.7% remained non-responders.

### *Heparinization*

All patients received low-molecular weight heparin (LMWH) for prevention of clotting. Heparine dose was reduced to 75% of the conventional dose for younger patients. There were neither major bleeds nor clotting. Three patients experienced minor bleeds (prolonged bleeding from the site of fistula puncture, subcutaneous hematomas).

### *Complications*

Older patients with permanent hemodialysis catheters demanded frequent catheter exchanges due to different catheter related problems. Two patients developed pneumothorax after catheter insertion, and four of them have repetitive infections of the catheter exit site. Two patients experienced sepsis that demanded extirpation of catheters. All patients were successfully treated with antibiotics. An overall number of hospitalizations were 7 per year (0.58 hospitalizations per patient). Hospitalizations lasted for 2 to 45 days (mean 22 days).

### *Compliance*

Compliance was determined according to the interdialytic weight gain. Weight gain in octogenarians with adequate mental status was within the average range (5% of their body weight). However, patients with impaired mental status gain excessive weight despite the careful families. Additional problem was poor compliance with the prescribed medications. Average octogenarian patient on dialysis had to ingest 11 pills daily.

### *Dose of dialysis*

Patients tend to be underdialysed. Dialysis sessions were frequently interrupted because of hypotension or backpain. Mean Kt/V was 0.92 (range 0.85 to 1.2).

## **DISCUSSION**

As more people survive into eighty's, a greater number of patients who need some form of renal replacement therapies may be expected (8). The elderly were previously excluded from dialysis programs while it was believed that they had poor prognosis (7,9). Croatia has no age selection for dialysis, so elderly patients have been increasingly referred to nephrologists.

Our results demonstrated that age alone should not be a barrier to renal replacement treatment. One-year survival was 71.4 %. Patients were referred late to nephrologists, most of them starting dialysis in an emergency situation. This emphasizes the problem of prevention in elderly population. Late referral was recognized as an important cause of adverse outcome in elderly dialysis patient (10).

Permanent dialysis catheters were the most common vascular access. Cimmino-Brescia fistulae were used as the first choice vascular access in 7 patients. However, attempt was successful in only 42.7 %. Permanent catheters were associated with problems that required hospitalizations. Out of 7 hospitalizations, 6 were due to different catheter-related problems. In our centre, more efforts should be invested in creating arteriovenous fistulae in octogenarians, probably by the most experienced surgeons in the institution. Garcia Cortes et al. suggested that in elderly patients a tunneled catheter should be inserted at the time an arteriovenous fistula is created, in order to avoid temporary untunneled catheters (11). Grapsa et al. compared vascular access complications and survival of the first arteriovenous fistula in different age groups. According to their results, arteriovenous fistula was the first choice of vascular access in elderly and there were no differences in vascular access complications in different age groups. Survival of the first arteriovenous fistula was independent of age (12). On the contrary, Canaud et al. suggested a permanent catheter as the vascular access of choice in elderly patients (13).

Complications were frequent, and most of the patients suffered from intradialytic hypotensions which required frequent treatment interruptions and shortenings of dialysis sessions. Dialysis disequilibrium syndrome was present in majority of patients at the start of dialysis. All patients had one or more comorbid conditions, most often different cardiovascular problems (14). In our study, an average octogenarian patient on dialysis had to take 11 medications per day what was the most common reason for lack of compliance with



the prescribed medications. It is important to prescribe the minimal number of drugs that are essential for treatment in order to avoid noncompliance.

Overall status was determined according to the Karnofsky performance status. It was developed for patients with malignancies; however, it may be useful to measure a functional capacity of dialysis patients. In our patients, median Karnofsky performance status was 50 (range 40 to 90). This means that most of the octogenarians required considerable assistance and frequent medical care. Two patients had Karnofsky performance status 90. They were able to carry on normal activity with minor signs or symptoms of disease. Both of them were older than 85 years, again proving that the physiological age is more important than chronological age. We propose use of the Karnofsky performance status scale to measure the capability of dialysis patients what will enable easier comparisons between different studies especially in the elderly population (10,15,16).

Malnutrition is a common problem in dialysis patients (17). Nutritional status in our patients was determined according to the body mass index, serum albumin and serum creatinin. Body mass index was lower in female patients. There were no significant changes in body mass index or in other nutritional parameters during the treatment while patients received parenteral nutrition when indicated.

Number of patients who were treated with erythropoietin was low due to financial limits of the hospital. Patients received blood transfusions for treatment of anemia. There were no problems associated with the use of low-molecular weight heparin. It was reported that elderly patients had an increased rate of bleeding (18). We decreased the dose of low molecular weight heparin suggested for adult patients for 25 %, thus avoiding the risk of bleeding. The anticoagulation activity was very good.

## **Conclusion**

According to our results age should not be the limiting factor for entrance on dialysis. Physiological age is much more important than chronological one, with medical, psychological and social factors playing significant role in adaptation of patients to dialysis. An increased burden of comorbidities and psychical problems including dementia demand individualized approach to each patient and increased efforts of medical staff.

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Table 1. Nutritional parameters (median, range) at the beginning of dialysis and at the end of follow-up.

<b>Parameter</b>	<b>Start of dialysis</b>	<b>End of follow-up</b>
Serum albumin (g/l)	34.7 (27.2-42.2)	34.2 (29.0-40.8)
Serum creatinine ( $\mu\text{mol/l}$ )	598 (456-890)	645 (430-1120)
Body-mass index ( $\text{kg/m}^2$ )	20.8 (16.6-27.8)	19.6 (16.4-28.9)