

IMPACT OF DELIVERED DIALYSIS DOSE ON 1 YEAR MORTALITY OF NONDIABETIC MAINTENANCE HEMODIALYSIS PATIENTS

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Objectives:

The optimal delivered dialysis dose has been of a great interest for the last 3 decades, though a clear cut point has not been reached yet. The aim of this study was to find the impact of delivered single pool Kt/V (spKt/V) on 1 year mortality in non-diabetic maintenance hemodialysis (MHD) patients.

Methods:

A total of 80 patients on MHD were included in this single-center prospective observational study. We studied only non-diabetic and anuric (< 100 ml/day) patients to minimize the confounding effects of diabetes mellitus and residual renal function on patient survival. Patients with a history of hospitalization, major surgery, obvious infections, inflammatory disease within the preceding 3 months, end stage liver disease, metastatic malignancies and malabsorption syndromes were excluded from the study. Demographic and biochemical data, dialysis adequacy and nutritional-inflammation indices including spKt/V, dry weight, body mass index (BMI), relative interdialytic weight gain (RIDWG), serum albumin and high sensitive c-reactive protein (hs-CRP) levels were obtained from all patients. Patients were classified into 2 groups according to spKt/V levels; group 1 (n= 20): spKt/V ≤ 1.4, group 2 (n= 60): spKt/V > 1.4. Study population was followed up as a 1 year prospective cohort to evaluate mortality as the primary outcome.

Table 1. Characteristics of all patients and groups.

	All patients (n= 80)	Group 1 (n= 20)	Group 2 (n= 60)	P
Demographics				
Age (y)	49.5 (29)	52.5 (26)	46.5 (30)	0.107
Sex (male/female)	41/39	13/7	28/32	0.200
Duration on HD (months)	60 (94)	64 (113)	60 (82)	0.846
Dry weight (kg)	56.7 (18)	64.2 (27)	55.5 (15)	0.003
Body mass index (kg/m ²)	22.6 (6)	24.1 (8)	21.7 (5)	0.012
Systolic BP (mm Hg)	110 (20)	110 (28)	112.5 (30)	0.469
Diastolic BP (mm Hg)	72.5 (20)	70 (20)	77.5 (20)	0.823
RIDWG (%)	4.6 (2.1)	4.6 (2.1)	4.7 (2.0)	0.120
Delivered dose of dialysis				
spKt/V	1.60 (0.39)	1.30 (0.19)	1.71 (0.35)	<0.001
Laboratory				
Urea (mg/dL)	131 (75)	146.5 (101)	122.1 (66)	0.104
Creatinine (mg/dL)	8.7 (2.8)	10.5 (3.8)	8.6 (2.6)	0.009
Uric acid (mmol/L)	6.1 (1.6)	6.6 (1.9)	5.8 (1.4)	0.002
Sodium (mmol/L)	139 (3)	138.5 (3)	139 (3)	0.996
Potassium (meq/L)	5 (1.1)	5.1 (1.3)	4.9 (1.1)	0.850
Hemoglobin (g/dl)	10.3 (2.1)	10.8 (1.7)	10.2 (2.3)	0.621
Calcium (mg/dL)	8.7 (0.9)	8.5 (1.2)	8.8 (0.8)	0.684
Phosphorus (mg/dL)	5.4 (2)	5.4 (2)	5.3 (2)	0.925
CaxP	48.2 (19)	49 (23)	48.2 (19)	0.938
intact PTH (pg/ml)	355 (552)	416 (739)	344.5 (492)	0.383
Albumin (g/L)	3.9 (0.4)	3.8 (0.4)	3.9 (0.4)	0.951
TIBC (g/L)	207.5 (53)	233 (64)	203 (55)	0.008
Ferritin (ng/mL)	620 (562)	499 (892)	672 (533)	0.186
Total cholesterol (mmol/L)	166.5 (55)	168 (53)	164 (58)	0.881
LDL (mmol/L)	94.5 (46)	93 (45)	94.5 (44)	0.590
Triglyceride (mmol/L)	131 (75)	179 (105)	131 (79)	0.104
Bicarbonate (meq/L)	22.1 (3.0)	21.3 (1.7)	22.5 (3.1)	0.084
Hs-CRP (mg/L)	7.1 (17.5)	10.9 (10.4)	5.5 (24.5)	0.186

Table 2. Survival analysis according to the spKt/V groups.

MIS score	n	Death(n)	Survival Time (weeks)			P (Log Rank)	
			Estimate	Std. Error	% 95 Confidence Interval		
			Lower	Upper			
Group 1	20	5	43.9	2.412	39.223	48.667	0.003
Group 2	60	2	47.3	0.551	46.219	48.381	
Overall	80	7	46.4	0.755	44.983	47.942	

Table 3. Multivariate cox proportional hazard model for patient survival.

Predictors of mortality	P	ODDS	%95 Confidence Interval	
			Lower	Upper
Age	0.025	1.069	1.008	1.134
spKt/V	0.005	0.013	0.001	0.274

Table 4. Linear regression analysis of spKt/V as a predictor of death.

Predictor	Beta	p	%95 Confidence Interval	
			Lower	Upper
Age	0.253	0.030	-0.400	1.095
spKt/V	-0.286	0.014	-0.435	-0.050
BMI	-0.005	0.966	-0.014	0.013
Serum albumin	-0.021	0.852	-0.166	0.137

Figure 1. ROC analysis of the relationship between spKt/V and mortality.

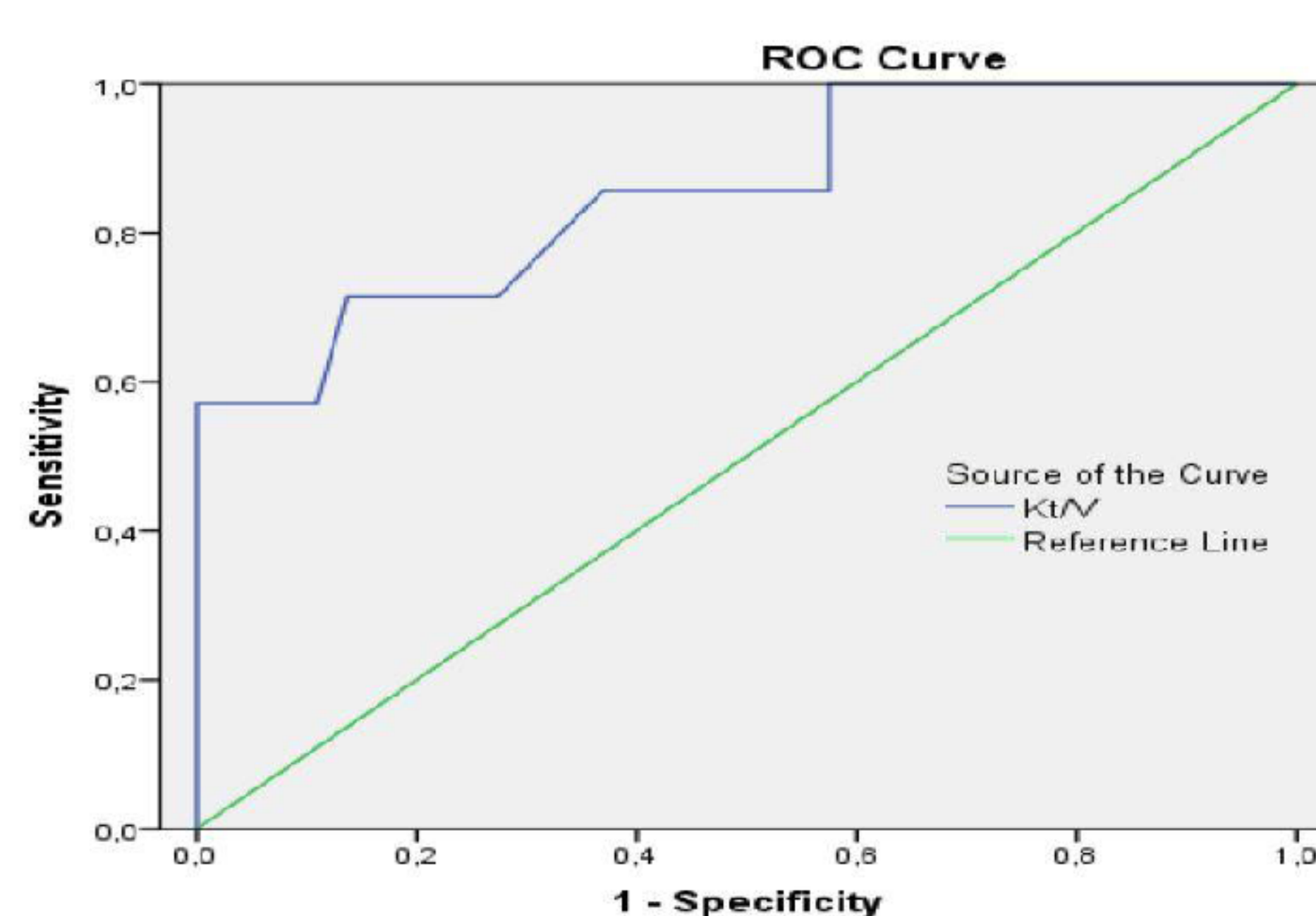
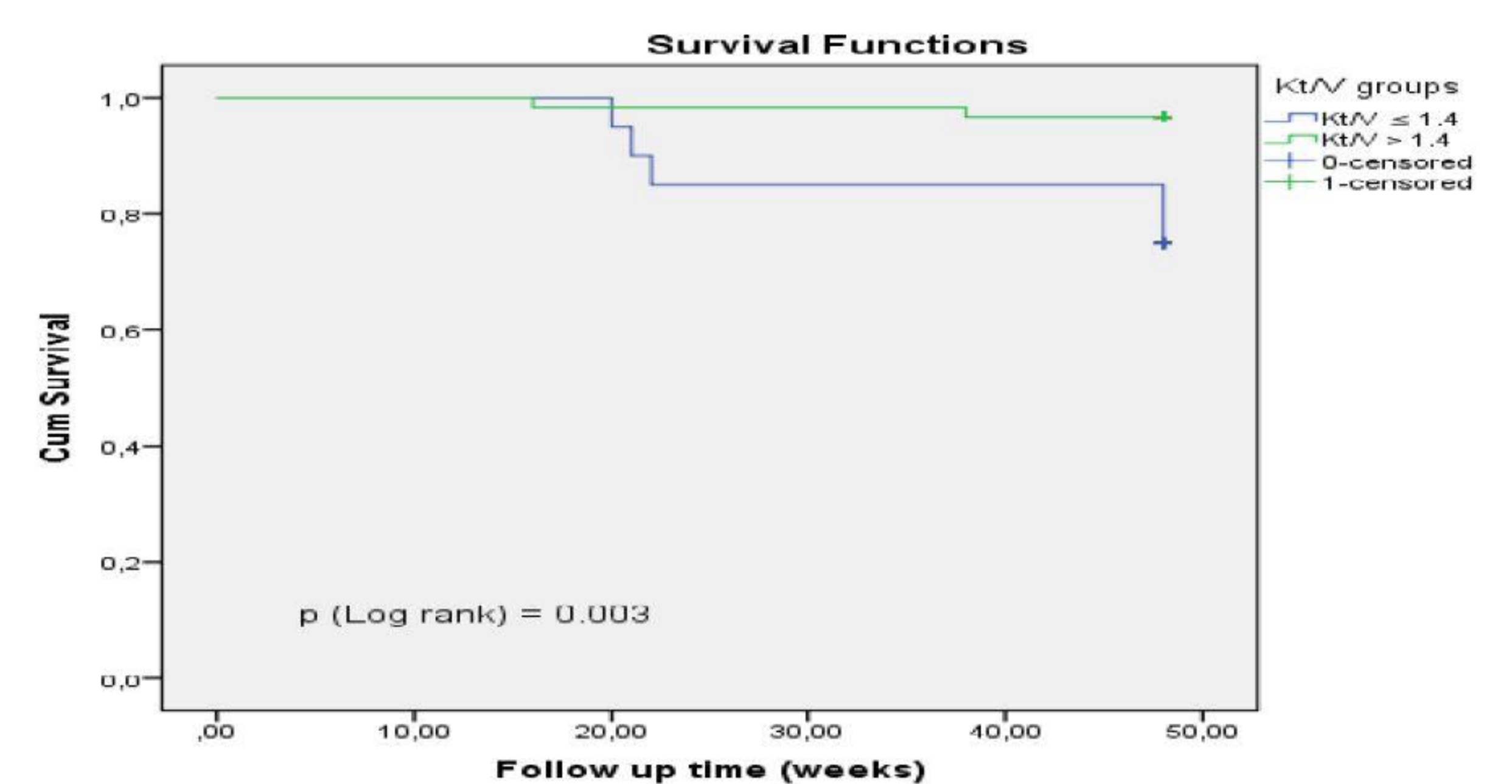


Figure 2. Patient survival according to spKt/V groups.



Results:

Median (IQR) age and hemodialysis vintage of 80 patients (M/F: 41/39) were 49.5 (29) years and 60 (94) months, respectively. There were no differences between 2 groups regarding age, gender, duration on HD, blood pressure, RIDWG, hemoglobin, serum urea, albumin, sodium, potassium, calcium, phosphorus, PTH, ferritin, lipids and hs-CRP levels. Compared to the group 2, group 1 patients had significantly higher dry weight, BMI, serum creatinine and uric acid levels. Seven patients died (5 in group 1 and 2 in group 2) during the 1 year observational period. One year mortality rate was significantly higher in group 1 compared to the group 2 (25% (5/20) vs. 3.3% (2/60), respectively). Compared to group 2, 1 year patient survival time of group 1 were found significantly lower (47.3±0.55 vs. 43.9±2.41 weeks, respectively, p (Log rank): 0.003). In the ROC analysis, we found that the optimal cut-off value of spKt/V for predicting death was 1.390 with the 71.4% sensitivity and 83.6% specificity (Area: 0.854, p: 0.002). Advanced age and low spKt/V levels were found independent risk factors of patient mortality in Cox proportional hazard model. Advanced age (p: 0.030) and low spKt/V levels (p: 0.014) remained significantly correlated with death in linear regression analysis even after adjustments were made for BMI and serum albumin.

Conclusions:

Our study showed that spKt/V is an independent predictor of 1 year mortality in non-diabetic MHD patients. Patients with spKt/V ≤ 1.4 had increased mortality risk and advanced age is an additional risk factor associated with short-term mortality.