

## Introduction

- During the last decade there has been an increase in the proportion of diabetics among patients initiating dialysis worldwide. Patients with diabetes and cardiovascular and peripheral vascular disease were previously often excluded from programs of chronic dialysis even in developed countries.
- Nowadays, diabetic dialysis patients remain at higher risk for morbidity than non-diabetic patients. This is related to the nature and the frequency of both micro- and macrovascular complications at the initiation of dialysis and the acceleration during dialysis.

## Objective

- The aim of this study, conducted in a cohort of Saudi hemodialysis patients, was to evaluate the impact of diabetes as a cause of end-stage renal disease on :
  - hospitalization patterns (number and duration)
  - all causes of death

## Methods

- We included all patients admitted to DaVita-KSA clinics to continue chronic hemodialysis during the period between October 2014 and December 2018.
- Baseline data, including demographic and clinical characteristics, recorded at admission, were compiled from monthly reports elaborated by DaVita-KSA clinics. Deaths and morbid events necessitating hospital admission were also recorded during the follow-up period.
- The study population was divided into **Group 1**, corresponding to patients referred with the diagnosis of diabetes as cause of ESRD and, **Group 2**, in whom ESRD was attributed to other causes, with or without diabetes as a comorbidity.
- Patient survival was analyzed from the date of starting dialysis in DaVita-KSA clinics to endpoint corresponding to kidney transplantation, patient transfer to other dialysis facility, death, or December 31, 2018 (end of study).
- Mortality and hospitalization rates were calculated by dividing the number of events by the cumulative period of follow-up. Confidence intervals were calculated and compared as appropriate.
- Logistic regression was used to identify parameters that were independently associated with mortality and hospitalization.
- Comparative analyses were performed using Student's unpaired-test for quantitative variables and  $\chi^2$  test for qualitative variables.
- The level of statistical significance was set at 5%.

## Results

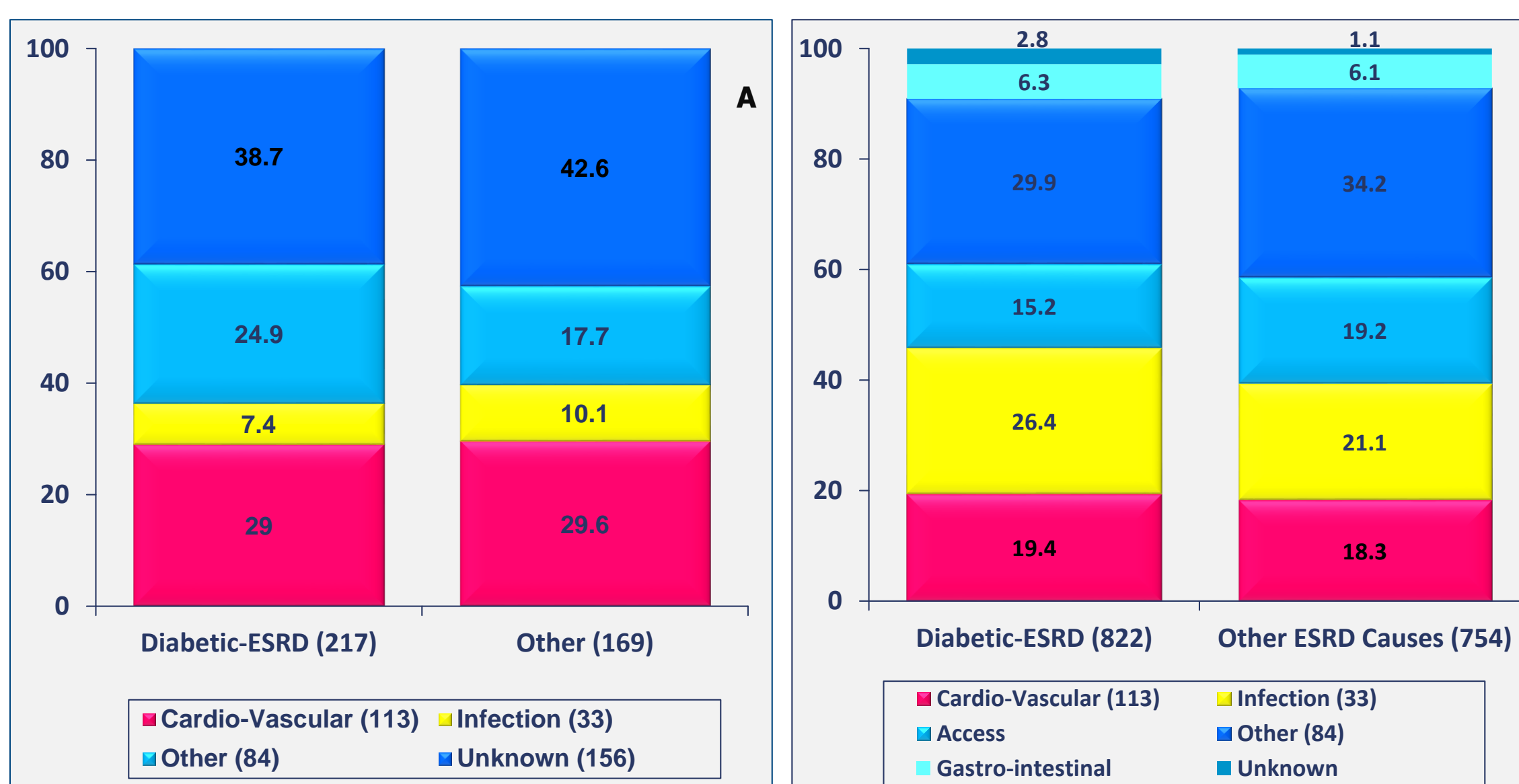
**Table 1: Baseline Characteristics of the Study Population by Cause of ESRD (Group 1: Diabetic-ESRD, Group 2: Other Causes)**

	Group 1 n= 1412	Group 2 n= 2096	Total n=3508	P-Value
<b>Sex, n (%)</b>				
Male	772 (54.7)	1125 (53.7)	1897 (54.1)	NS
Female	640 (45.3)	971 (46.3)	1611 (45.9)	
<b>Age, years, n (%)</b>				
< 40	175 (20.1)	695 (79.1)	870 (24.8)	<0.0001
[40-60]	560 (40.6)	821 (59.4)	1381 (39.5)	
≥60	673 (53.7)	579 (46.3)	1252 (35.7)	
<b>Region, n (%)</b>				
Centre + North	370 (43.2)	486 (56.8)	856 (24.4)	<0.0001
West	505 (39.1)	785 (60.9)	1290 (36.8)	
South	281 (31.2)	619 (68.8)	900 (25.6)	
East	256 (55.4)	206 (44.6)	462 (13.2)	
<b>Cause of ESRD</b>	1412 (40.2)	-		
Diabetes	-	1254 (35.7)		<0.0001
Hypertension	-	127 (3.6)		
Glomerulonephritis	-	144 (4.1)		
Congenital/Hereditary	-	100 (2.9)		
Interstitial/Obstructive	-	471 (13.5)		
Other/Unknown	-	-		
<b>Period of Transfer to DaVita-Clinic, n (%)</b>				
2014 - 2016	584 (38.5)	828 (41.5)	1412 (40.2)	NS
2017 - 2018	931 (61.5)	1165 (58.5)	2096 (59.8)	
<b>Dialysis Duration before DaVita-Clinic Admission, months, n (%)</b>				
≤3	630 (44.7)	666 (31.8)	1296 (37)	<0.0001
[3-12]	231 (16.4)	289 (13.8)	520 (14.8)	
[12-60]	381 (27.1)	618 (29.5)	999 (28.5)	
≥60	166 (11.8)	522 (24.9)	688 (19.7)	
<b>Initial Vascular Access n (%)</b>				
Autogenous	388 (27.5)	903 (43.1)	1291 (36.8)	<0.0001
Prosthetic	24 (1.7)	25 (1.2)	49 (1.4)	
Tunnelled catheter	890 (63)	1062 (50.7)	1952 (55.7)	
Non-tunnelled catheter	110 (7.8)	105 (5)	215 (6.1)	
<b>Body Mass Index, kg/m<sup>2</sup>, n (%)</b>				
< 18.5	77 (5.6)	376 (18.2)	453 (13.1)	<0.0001
[18.5-25[	499 (36.1)	903 (43.7)	1402 (40.7)	
[25-30[	423 (30.6)	443 (21.4)	866 (25.1)	
≥30	382 (27.7)	344 (16.7)	726 (21.1)	
<b>Hemoglobin rate, g/dl, n (%)</b>				
<10	800 (56.8)	1057 (50.7)	1857 (53.1)	<0.002
[10-12[	456 (32.4)	748 (35.8)	1204 (34.5)	
>12	153 (10.8)	281 (13.5)	434 (12.4)	
<b>Hepatitis C Antibodies, n (%)</b>				
HCV (+)	68 (4.8)	262 (12.5)	330 (9.4)	<0.0001
HCV (-)	1344 (95.2)	1833 (90.9)	3177 (90.6)	
<b>Hepatitis C PCR, n (%)</b>				
Positive	32 (2.3)	108 (5.2)	140 (4)	<0.0001
Negative	1366 (96.4)	1959 (94.8)	1969 (96)	
<b>Hepatitis B, HbS Antigen, n (%)</b>				
Positive	51 (3.6)	75 (3.6)	126 (3.6)	NS
Negative	1360 (96.4)	2018 (96.4)	3378 (96.4)	

**Table 2 : Morbi-Mortality and Outcome Patterns by Cause of ESRD (Group 1: Diabetic-ESRD, Group 2: Other Causes)**

	Group 1 n= 1412	Group 2 n= 2096	Total n=3508	P-Value
<b>Follow up Duration, years</b>				
Total HD duration	2118.2	3465.9	5584.1	<0.0001
Mean HD duration, ± SD	1.5 ± 1.08	1.65 ± 1.12	1.59 ± 1.1	
<b>Hospitalizations</b>				
Admitted Patients, n (%)	447 (31.7)	467 (22.3)	914 (26)	<0.0001
Recorded Events, n (mean)	822 (0.58)	754 (0.36)	1576 (0.45)	
<b>Hospitalization and Hospital Stay , Annual rates, % patients (95%, CI)</b>				
Hospitalization Rate	38.8 [36.1-41.5]	21.7 [20.2-23.3]	28.2 [26.8-29.6]	<0.05
Hospital Stay, days	4.8 [4.7-4.9]	2.48 [2.43-2.54]	3.4 [3.33-3.43]	
<b>Overall Outcome, n (%)</b>				
Kidney Transplantation	48 (3.4)	197 (9.4)	245 (7)	<0.0001
Transfer	195 (13.8)	266 (12.7)	461 (13.1)	NS
Death	222 (15.7)	176 (8.4)	398 (11.3)	<0.0001
<b>Mortality , % patient-years, [95 % CI]</b>	10.5 [9.1-11.9]	5.1 [4.3-5.8]	7.1 [6.4-7.8]	
<b>Actuarial Survival, %</b>				
3 Months	97.5	98.3	98	<0.0001
12 Months	92.2	95	93.9	
24 Months	82.1	91.3	87.7	
36 Months	69.6	85.2	79.2	
48 Months	62.1	80.6	73.3	

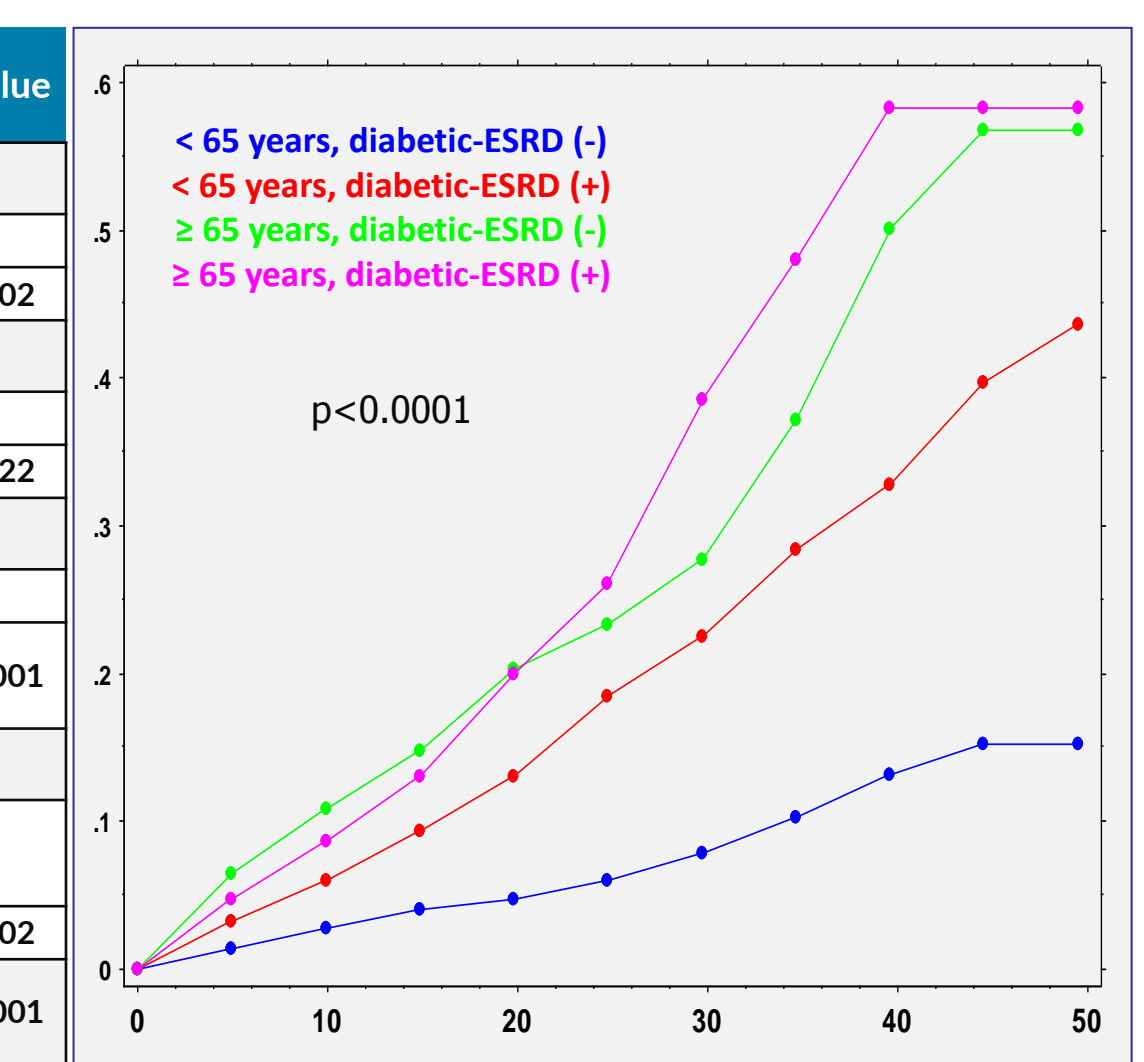
**Figure 1: Hospitalization (A) and Death (B) Causes**



**Table 3 : Independent Factors influencing Hospitalization**

	Relative Risk (RR)	95% Confidence Interval (CI)	P-Value
<b>Gender</b>			
Male	1	Reference	-
Female	1.34	[1.15-1.56]	0.0002
<b>Age Category, Years</b>			
< 65	1	Reference	-
≥ 65	1.32	[1.11-1.58]	0.0022
<b>Cause of ESRD</b>			
Others	1	Reference	-
Diabetes	1.61	[1.38-1.89]	<0.0001
<b>Initial Vascular Access</b>			
Autogenous/ Prosthetic	1	Reference	-
Catheter	1.38	[1.17-1.63]	0.0002
<b>Dialysis Duration, per year</b>	1.44	[1.34-1.55]	<0.0001

**Figure 2 : Cumulative Mortality Rate by Cause of ESRD & age Category**



## Conclusions

- Our study included nearly 20% of the overall dialysis population in KSA and diabetics accounted for 50 % of prevalent dialyzed patients in 2017.
- Both hospitalizations and mortality were significantly higher among diabetic patients compared to non-diabetics.
- Apart from diabetes, female gender, age ≥65 years, and use of dialysis catheter were independently associated with hospitalization.
- Survival in diabetics on dialysis for up to 2, 3, and 4 years was 82%, 70%, and 62%, respectively.
- It is well established that long-term prognosis is mainly related to the prevalence of risk factors, e.g. cardiovascular disease including ischemic heart disease, left ventricular hypertrophy, peripheral vascular disease, hypertension, dyslipidaemia and poor glycemic control. The impact of these factors was not included in our analysis in view of the lack of reliable information,

## References

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- Rayner HC et al. Mortality and hospitalization in haemodialysis patients in five European countries: results from the Dialysis Outcomes and Practice Patterns Study (DOPPS). Nephrol Dial Transplant. 2004; 19: 108-120.
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