Sociedad Española de Nefrología

nefrología
Revista de la Sociedad Española de Nefrología
www.revistanefrologia.com

Letter to the Editor

Morbidity, mortality, and renal replacement therapy for chronic kidney disease in Mexico between 2016 and 2018

Morbilidad, mortalidad y terapia de reemplazo renal por enfermedad renal crónica en México entre 2016 y 2018

Dear Editor:

Due to the availability, access, and the administration of specialised health services for chronic illnesses in Mexico, the clinical epidemiology of risk factors associated to Chronic Kidney Disease (CKD)[1] is not homogenous throughout the country; the state of Yucatan in Mexico, according to the National Health and Nutrition Survey in 2016 and 2018,[2] has the highest prevalence of obesity and diabetes, while leading the rate of urolithiasis hospitalizations and hospitalizations due to urinary tract stones that far exceeds that of other states of Mexico,[3] which implies that the burden of CKD in the state of Yucatan could also exceed proportionally the trends at the national level. The objective of the present study is to describe the epidemiology of CKD in Mexico, during the years 2016, 2017 and 2018, with emphasis on Yucatan, with respect to hospitalizations, in-hospital deaths, general deaths, and Renal Replacement Therapy (RRT).

The present is a retrospective cross-sectional, descriptive study with a focus on clinical epidemiology of chronic kidney disease in Mexico, based on Open Access Datasets from the General Directorate of Health Information,[4] the National Institute of Statistics and Geography[5], and the National Centre of Transplants[6] corresponding to the period between January 2016 and December 2018 The analyses were conducted using Stata 15® software.

Hospitalizations due to CKD, stage of CKD, in-hospital deaths, and general mortality

A total of 350, 997 hospital discharges due to CKD were recorded in Mexico during the period studied, with 2017 exhibiting the greatest number of discharges ($n = 120{,}746$), compared to years 2016 ($n = 116, 218$) and 2018 ($n = 114, 033$); with 7646 aged <15 years.

Both, at the national level (71.84%; $n = 249{,}130$) and in Yucatan (91.17%; $n = 3832$), in most discharges, the stage of CKD was not specified or recorded in the adult population. Among the records of patients admitted with a first-time diagnosis, women experienced greater hospital mortality (8.38%; $n = 212$) ($p = <0.01$).

In general, 28,783 deaths due to CKD took place in Mexico in the studied period (2135 < 15 years of age) mortality rate from this cause was 23 per 100,000 inhabitants at the national level and 25 per 100,000 in Yucatan. 82.77% ($n = 23, 349$) of the national deaths and 86.50% ($n = 487$) of those that occurred in Yucatan were not classified by stage of CKD. In Yucatan, there were a proportionally greater mortality among patients <15 years (Table 1).

Hospital procedures and renal replacement therapy (RRT)

In Mexico, 9316 kidney transplants were recorded, the modal year was 2017 during the study period, at a national level, but in Yucatan there was a decrease in transplants between 2016 and 2018. For receivers of age ≥15, the percentage of live donors was significantly greater. The transplant rate per 1,000,000 inhabitants was 74 at the national level and 41 in Yucatan. In the state of Yucatan, a progressive decrease in the proportion of cadaver donors per year (50%–23%), whilst the live donors were observed to be increasing (50%–77%) (Table 2). A total of 516,287 dialysis procedures were recorded during the period, of these, the Haemodialysis (HD) was the most common RRT (79.65%, $n = 411{,}222$), whilst Peritoneal Dialysis (PD) was less common (20.35%, $n = 105{,}065$), as shown in Table 2.

We have presented the epidemiological panorama of CKD in México, with emphasis on the state of Yucatán. The frequency of intrahospital infections was increased as the days of hospitalization also increased, which is consistent with what has been reported in other studies[7,8]; additionally, the hospital infection was most frequent among those that were discharged due to death.

Table 1 – Hospitalizations, in-hospital deaths, and general mortality due to CKD in Mexico between 2016 and 2018.

Hospitalizations[a] due to Chronic Kidney Disease in Mexico and Yucatan, by age groups (*N* = 350,997).

Variables	≥15			<15		
	Mean ± SD		*P* value	Mean ± SD		*P* value
	Mexico (*n* = 339,154)	Yucatan (*n* = 3975)		Mexico (*n* = 7418)	Yucatan (*n* = 228)	
Age (years)	**45.36 ± 17.31**	**53.88 ± 14.08**	**<0.001**	**10.20 ± 3.93**	**9.05 ± 3.93**	**<0.001**
Length of hospitaliaation (days)	**1.69 ± 7.13**	**4.81 ± 7.34**	**<0.001**	**2.64 ± 7.62**	**4.37 ± 6.82**	**<0.001**
	% (*n*)			% (*n*)		
Gender (male)	**37.31 (183,899)**	**54.22 (1483)**	**<0.001**	54.12 (4014)	57.46 (131)	0.319
First-time hospitalizations	**36.34 (123,242)**	**63.72 (2533)**	**<0.001**	**15.72 (1166)**	**71.93 (164)**	**<0.001**
Inhospital infection	0.5 (1681)	0.53 (21)	0.771	0.42 (31)	0.44 (1)	0.962
In-hospital mortality	**1.92 (6504)**	**5.72 (227)**	**<0.001**	1.29 (96)	2.19 (5)	0.242
Stage at first hospitalization	General		≥15		<15	
	Mexico (*n* = 346,794)	Yucatan (*n* = 4203)	Mexico (*n* = 339,154)	Yucatán (*n* = 3975)	Nacional (*n* = 7418)	Yucatan (*n* = 228)
			% (*n*)			
Stage 3	0.15 (512)	0.36 (15)	0.15 (500)	0.38 (15)	0.16 (12)	–
Stage 4	0.26 (910)	0.33 (14)	0.26 (892)	0.30 (12)	0.24 (18)	0.88 (2)
Stage 5	27.75 (96,242)	8.14 (342)	26.87 (91,132)	8.1 (322)	65.92 (4890)	8.77 (20)
Unclassified Stage	71.84 (249,130)	91.17 (3832)	72.72 (246,630)	91.22 (3626)	33.67 (2499)	90.35 (206)

General deaths due to CKD in Mexico and in Yucatan, by age group and stage (N = 28,773)

Variables	≥15 (*N* = 26,638)			<15 (*N* = 2135)		
	Mexico (*n* = 26,118)	Yucatan (*n* = 520)	*P* value	Mexico (*n* = 2092)	Yucatan (*n* = 43)	*P* value
	Mean ± SD			Mean ± SD		
Age (years)	**65.74 ± 19.91**	**69.11 ± 16.39**	**<0.001**	**5.77 ± 3.06**	**4.79 ± 2.90**	**0.037**
	% (*n*)			% (*n*)		
Gender (male)	**57.37 (14,985)**	**51.73 (269)**	**0.01**	**57.46 (1202)**	**41.86 (18)**	**0.041**
Rural community	**21.41 (5503)**	**15.34 (86)**	**<0.001**	19.46 (400)	17.07 (7)	0.703
Medical assistance at death	**94.17 (23,435)**	**96.80 (491)**	**0.016**	95.74 (1908)	100 (37)	0.199
Affiliation to Health Services[a]	**86.77 (20,844)**	**95.25 (461)**	**<0.001**	88.87 (1741)	97.44 (38)	0.09
CKD stage at death	General		≥15		<15	
	Mexico (*n* = 28,220)	Yucatan (*n* = 563)	Mexico (*n* = 26,118)	Yucatan (*n* = 520)	Mexico (*n* = 2092)	Yucatan (*n* = 43)
			% (*n*)			
Stage 3	0.17 (47)	0.18 (1)	0.16 (43)	0.19 (1)	0.19 (4)	–
Stage 4	0.41 (117)	0.53 (3)	0.41 (106)	0.58 (3)	0.48 (10)	–
Stage 5	16.68 (4707)	12.79 (72)	16.34 (4268)	12.88 (67)	20.94 (438)	11.63 (5)
Unclassified stage	82.74 (23,349)	86.50 (487)	83.09 (21,701)	86.35 (449)	78.39 (1640)	88.37 (38)

[a] Hospitalization data refers only to public hospitals.

Table 2 – Clinical epidemiology of Renal Replacement Therapy in Mexico between 2016 and 2018.

Percentage of kidney transplants, according to the type of donor, by year in Mexico and Yucatan (N = 9316)

Year	Mexico (n = 9225)		Yucatan (n = 91)	
	Cadaveric donor	Living donor	Cadaveric donor	Living donor
	% (n)			
2016 (n = 3037)	28% (n = 848)	72 (2155)	50% (n = 17)	50% (n = 17)
2017 (n = 3168)	29% (n = 923)	71% (n = 2219)	46% (n = 12)	54% (n = 14)
2018 (n = 3111)	32% (n = 977)	68% (n = 2103)	23% (n = 7)	77% (n = 24)

Kidney transplant in patients ≥15 years old in Mexico and Yucatan (N = 8880)

Variable	Mexico (n = 8790)	Yucatan (n = 90)	Difference	P value
	Mean ± SD			
Age (years)	35.15 ± 13.44	36.62 ± 13.37	1.48	0.297
Time elapsed until transplant	315.09 ± 654.12	289.50 ± 478.49	25.59	0.711
	% (n)			
Gender (male)	63.90 (5617)	58.89 (53)	0.05	0.325
Cadaveric donor	**28.96 (2546)**	**38.89 (35)**	**0.1**	**0.039**

Therapeutic procedures of hemodialysis and peritoneal dialysis in Mexico 2016–2018 (N = 516,287)

Year	Hemodialysis (n = 411,222)	Peritoneal dialysis (n = 105,065)
	% (n)	
2016	80.37 (135,849)	19.63 (33,171)
2017	79.51 (134,033)	20.49 (34,532)
2018	79.09 (141,340)	20.91 (37,363)

Mexico ranks second place in Latin American countries in respect to the number of patients that are using PD modality. However, it has been reported that the access to RRT, is unequal in the population due to their affiliation with the health services, A large part of the population is affiliated with public services; however, medical coverage is limited in these patients, because CKD and RRT translates to a large economic burden for the patients and struggle to comply with the expenses for the adequate care necessary for disease management.[9,10] Finally, it is important to mention that the current surveillance system of CKD in Mexico does not include patient-centred statistics, follow ups nor a record of patients that have PD at home. New efforts are needed to improve monitoring of patients since their diagnosis, this could orient on progression timing, survival and other indicators that could be sensible to change along with new health approaches and therapeutic innovations and permit contrasting the Mexican trends in CKD with those from around the world. Improving health care and timely diagnosis in Mexico, particularly in the states with higher prevalence of obesity, diabetes, and hypertension, such as Yucatan may be considered as essential for the well being and prognosis of patients.

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Luis Alberto Dorantes-Carrillo[a], Martha Medina-Escobedo[b], Yaseth Aridai Cobá-Canto[c], Alberto Alvarez-Baeza[c], Nina Méndez Domínguez[b,*]

[a] *Universidad Autonoma de Yucatan, Facultad de Medicina, Merida, Mexico*
[b] *Hospital Regional de Alta Especialidad de la Peninsula de Yucatan, Merida, Mexico*
[c] *Universidad Marista de Merida, Escuela de Medicina, Merida, Mexico*

* *Corresponding author.*
E-mail address: nina.mendez@salud.gob.mx (N. Méndez Domínguez).
https://doi.org/10.1016/j.nefro.2020.11.021

Synergy of sodium thiosulphate treatment and expanded hemodialysis in the management of calciphylaxis? A case report

¿Sinergia del tratamiento con tiosulfato sódico y hemodiálisis extendida en el manejo de la calcifilaxis? A propósito de un caso

Dear Editor,

Calciphylaxis, also known as calcific uraemic arteriolopathy (CUA), is a serious and uncommon complication in patients on chronic haemodialysis.[1] In its pathogenesis, in addition to the involvement of bone-mineral metabolism, the possible deleterious role that certain medium-sized molecules could play has been hypothesised.[2] Expanded haemodialysis (HDx) facilitates the effective removal of this type of molecules, so we believe that they could play a role in the management of this condition.

We present the case of a 47-year-old woman with a history of long-standing and poorly-controlled type 1 diabetes mellitus, arterial hypertension, chronic ischaemic heart disease, and severe aortic stenosis, who required aortic valve replacement with initiation of anticoagulation with acenocoumarol two months before admission. The patient also had secondary hyperparathyroidism and chronic kidney disease category G5 according to KDIGO 2012 of probable diabetic aetiology, receiving chronic haemodialysis through a radiocephalic arteriovenous fistula placed in the left upper limb.

She reported a two-week history characterised by the presence of initially small and erythematous lesions that progressed to being ulcerative, some of them were circular with a blackish centre, very painful, and with exudate that was positive for *Pseudomonas aeruginosa*. A skin biopsy of one of the lesions was consistent with calciphylaxis, so the patient was admitted to nephrology ward. The following blood test results were obtained: procalcitonin 1.49 ng/m; C-reactive protein 26.6 mg; neutrophil-to-lymphocyte ratio (NLR) 5.75; platelet-to-lymphocyte ratio (PLR) 413.70 and systemic immune-inflammation index (SII) 1,737; calcium 10.30 mg/dl; phosphate 5.05 mg/dl; biointact parathyroid hormone (PTH) (1–84) 490 pg/m and 25-OH-vitamin D 10.8 ng/m. Cervical ultrasound showed a hypoechoic nodule 1.38 cm in diameter suggesting parathyroid gland hyperplasia vs hypertrophy.

Joint management with dermatology was decided upon with treatment every 48 hours with topical sodium thiosulfate, in addition to intravenous sodium thiosulfate at a dose of 12.5 g post-haemodialysis (three times a week). The dialysis dose was intensified with daily 210-minute sessions and changed to expanded haemodialysis with Theranova 500® 2 m^2 filter (Baxter International Inc., Deerfield, IL, USA) with a mean Qb of 313 ml/min, a mean Qd of 500 ml/min and a mean Kt of 41 L. Among other measures, the patient was changed to anticoagulation with enoxaparin and her treatment with paricalcitol, vitamin D and iron was suspended. Management of the patient's secondary hyperparathyroidism was optimised with cinacalcet, non-calcium-based phosphate binders and a low-calcium dialysis bath (1.25 mEq/L). Combination antibiotic therapy with ceftazidime and vancomycin was administered.

At discharge, there was evidence of improved inflammatory parameters along with favourable skin lesion progression until their complete resolution five months after the start of treatment (Table 1 and Fig. 1). However, we observed a worsening of PTH despite progressively increasing the calcimimetic dose. It was decided to start intradialysis etelcalcetide, pending progression at the present time.

Despite correct treatment, a large percentage of patients die (35% in one year, despite treatment and 55% if not treated).[3] It has been reported that the alteration of bone-mineral metabolism is the main predisposing factor for this disease.[1] However, this case highlights the possible role other non-traditional factors might play given the persis-

DOI of original article:
https://doi.org/10.1016/j.nefro.2021.02.002.