

## Demographic and Characteristic Distribution of End Stage Renal Failure in Sulaimani Governorate, Kurdistan Region, Iraq

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### ABSTRACT

**Background:** End stage renal Disease (ESRD) is a major health problem and is rapidly progressing among population worldwide. There are limited data about the prevalence of ESRD in Iraq in general and in Sulaimani governorate in particular.

**Objectives:** The aim of this study is to measure the prevalence and characteristics of end stage renal disease in Sulaimani governorate in one year and measure the main risk factors that lead to the disease.

**Materials and Methods:** A cross-section study was conducted in seven dialysis centers in Sulaimani governorate. Patients on regular hemodialysis in Shar, Qirga, Shorsh, Ranya, Kalar, Halabja and Said-Sadiq centers were included in this study for one year from the 1<sup>st</sup> of January to 31<sup>st</sup> of December 2014.

**Results:** The prevalence of ESRD in Sulaimani governorate was 0.01%. More than half of patients were over 50 years. The commonest cause was diabetes (23.3%). There was a significant association between female gender and illiteracy, obesity and recurrent urinary tract infection. Most patients had dialysis frequency of three times per week (65%). The mean blood pressure was 132.3/85.2 ± 26.6/9.9 mmHg.

**Conclusions:** The prevalence of ESRD in Sulaimani was

0.01% (155.7 per million populations), with majority of patients were over 50s, and diabetes was the commonest cause. Most patients had a reasonable blood pressure control despite having less than four hours of dialysis per session. There was a significant association between female patients and illiteracy, obesity and recurrent urinary tract infections.

**Keywords:** Renal failure; Dialysis; Sulaimani.

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### INTRODUCTION

Chronic kidney disease (CKD) is defined as kidney damage or an estimated glomerular filtration rate (eGFR) below 60 ml/min/1.73 m<sup>2</sup> persisting for three months. The Kidney Disease Outcome Quality Initiative (KDOQI) guideline has classified CKD into five stages according to the severity of the disease.<sup>1</sup>

The true incidence and prevalence of CKD within a community are difficult to ascertain because mild to moderate CKD is usually asymptomatic. However, various epidemiologic studies suggest a prevalence of CKD of approximately 10% to 14% in the general population.<sup>2</sup> The incidence of ESRD in most national registries do not take into account patients not treated with renal replacement therapy (RRT) and therefore underestimate the true incidence of ESRD. This is true not only in countries where provision of RRT is

limited or absent, but also in countries where there is an active conservative management program for patients who opt not to have RRT.<sup>3</sup> The incidence of ESRD in United states, Taiwan and Japan showed some of the highest rates, at 355 per million populations (pmp), 347 pmp and 287 pmp in 2009.<sup>4</sup> In the Arab worlds this rate ranged from 64 pmp in Yemen, 212 pmp in Qatar and 93 pmp in Oman.<sup>5</sup>

In the developed world, the majority of community CKD is identified in older people. The average rate of decline of GFR in this population is approximately 0.75 to 1 ml/min/year after the age of 40. CKD affects those who have had a lifelong exposure to cardiovascular risk factors such as diabetes and hypertension that can also affect the kidneys.<sup>6</sup>

Community CKD in emerging countries is often multifactorial. In addition to poverty that has an impact on CKD individuals often develop infections that can cause CKD. They are also predisposed to obesity, diabetes, hypertension, and cardiovascular disease. The risks of CKD are increased further by air and water pollution, exposure to heavy metals, agricultural pollution, herbal toxins, pesticides and consumption of non-steroidal anti-inflammatory drugs (NSAIDs).<sup>7</sup> Progression of CKD tends to be slow. Some risks are non-modifiable such as age (older age), gender (worse in males), and ethnicity (worse in non-Caucasian, African Americans, Afro-Caribbean, Hispanics and Asians. Other risks could be modifiable such as hypertension, diabetes, atherosclerosis, proteinuria, obesity and smoking.<sup>8</sup> Despite all attempts to optimize the management of CKD, many patients will progress to ESRD. Patients with eGFR below 20ml/min/ 1.73 m<sup>2</sup> should receive education and counseling to aid their selection of the most appropriate RRT modality. Those who choose hemodialysis should have arterio-venous fistula created well in advance to allow time for maturation and those who will go for peritoneal dialysis should have peritoneal dialysis catheter inserted in advance to allow time for healing and training. Early kidney transplantation may be associated with improved long-term outcome, so patients should be assessed for their suitability and, when feasible, activated on the waiting list before dialysis is commenced.<sup>9</sup> Planned early initiation of dialysis is not associated with improvement in outcomes compared with commencement when indicated by signs and symptoms of uremia.<sup>10</sup>

#### AIM OF THE STUDY

The aim of this study is to look at the prevalence and demographic distribution of ESRD in Sulaimani governorate. It also studies the characteristic and risk factors of developing end stage kidneys in this area.

#### MATERIALS AND METHODS

A cross sectional study was conducted in all dialysis centers in Sulaimani governorate which includes Shar nephrology and transplant center, Qirga, Shorsh, Ranya, kalar, Halabja and Said-Sadiq centers for one year starting from the 1<sup>st</sup> January to the 31<sup>st</sup> Dec 2014. Patients of all ages and both sex were included in the study that are on dialysis. Those with CKD stage 5 who have not started dialysis yet; those who underwent renal transplant and those who opt out from dialysis and managed conservatively were excluded in the study due to difficulty to trace.

A total of 227 patients were recorded to be on hemodialysis in all centers in Sulaimani governorate. A questionnaire was made and patients were interviewed one by one. The demographic data was taken from statistic directory of Sulaimani by agreement with the directory of health. The socioeconomic status was estimated depending on Iraq Household Socio-Economic Survey 2012 second Round.<sup>11</sup> Hypertension was defined according to the American heart association (systolic 140 mm Hg or higher) or (diastolic 90 mmHg or higher)<sup>12</sup> and GFR was calculated according to the modification of diet in renal disease (MDRD) equation.<sup>13</sup>

#### Statistical analysis

All patients' data entered using computerized statistical software (Statistical Package for Social Sciences (SPSS) version 17). Descriptive statistics presented as mean  $\pm$  standard deviation and frequencies as percentages.

Kolmogorov Smirnov analysis verified the normality of the data set. Multiple contingency tables conducted and appropriate statistical tests performed, Chi-square used for categorical variables (Fishers exact test was used when more than 20% of the cells less than 5). In all statistical analysis, level of significance p value set at  $\leq 0.05$  and the result presented as tables.

#### RESULTS

The Prevalence of ESRD patients in Sulaimani governorate was 0.01%, for Sulaimani city 0.02%, Halabja 0.008%, Kalar 0.009%, Ranya 0.01% and Said-Sadiq 0.008%. (Table1)

More than half of ESRD patients were aged 50 years and older. Male and female distribution was almost similar. About two thirds of ESRD patients were living in moderate socioeconomic state and about 42% of ESRD patients were completed secondary educational level at least. (Table 2)

More than two thirds (71.3%) of ESRD patients were non-smokers, 43 patients (18.9%) ex-smokers and 22 (9.7%) of them were smokers. Thirty patients (13.2%) had first-degree family history of ESRD.

Mean BMI of patients were 26.5 $\pm$ 4.9 Kg/m<sup>2</sup>, 70 patients (30.8%) were overweight, 52 patients (23%) were obese and 27 (11.9%) were underweight. Mean blood pressure was 132.3/85.2  $\pm$  26.6/9.9 mmHg on non-dialysis days. (Table 3)

The commonest cause of renal failure of patients with ESRD was diabetes and hypertension (23.3%, 18% respectively). This followed by urological causes (14%) and then glomerular diseases (12.3%). (Table 4)

Table 1: Prevalence of ESRD patients in Sulaimani governorate.

Place	Total no. of Population	Number of patients	Total prevalence %	Dialysis center	Number of patients
Sulaimani	854541	169	0.02	Qirga	104
				Shar	58
				Shorsh	7
Halabja	104540	9	0.008		
Kalar	191485	17	0.009		
Ranya	223227	25	0.01		
Said-Sadiq	83764	7	0.008		
Total	1,457,557	227	0.01%		

**Table 2: Socio-demographic characteristics of ESRD patients.**

Variable	No.	%
<b>Age groups</b>		
11-20 years	8	3.5
21-30 years	32	14.0
31-40 years	21	9.2
41-50 years	45	19.8
51-60 years	63	27.7
61-70 years	49	21.5
71-80 years	9	3.96
<b>Gender</b>		
Male	120	52.8
Female	107	47.2
<b>Socioeconomic status</b>		
Low	71	31.2
Moderate	154	67.8
High	2	0.8
<b>Educational level</b>		
Illiterate	74	32.5
Primary	56	24.6
Secondary	95	41.8
University	2	0.8

**Table 3: Smoking, family history, BMI and blood pressure of ESRD patients.**

Variable	No.	%
<b>Smoking</b>		
Smoker	22	9.7
Non-smoker	162	71.3
Ex- smoker	43	18.9
<b>First degree family history of kidney disease</b>		
Yes	30	13.2
No	197	86.8
<b>BMI Mean±SD (26.5 ± 4.9 Kg/m<sup>2</sup>)</b>		
Underweight	27	11.9
Normal	78	34.3
Overweight	70	30.8
Obese	52	23
<b>Blood pressure in non-dialysis day Mean ± SD (132.3/85.2 ± 26.6/9.9 mmHg)</b>		

**Table 4: Renal failure causes in dialysis patients.**

Causes of renal failure	No.	%
Diabetes	53	23.35
Hypertension	41	18
Urological cause	32	14
Glomerular disease	28	12.33
Inherited	16	7.22
Others	15	6.6
Unknown	42	18.5
Total	227	100.0

Table 5: Dialysis characteristics of ESRD patients.

Variable	No.	%
<b>Dialysis frequency per week</b>		
Once/week	2	1
Twice/week	77	34
Thrice/week	148	65
Total	227	100.0
<b>Duration of dialysis (hours)</b>		
2 hrs	14	6
3 hrs	89	39
3.5 hrs	46	20
4 hrs	78	35
Total	227	100.0

Table 6: Distribution of socio-demographic characteristics according to gender.

Variable	Male		Female		$\chi^2$	P	
	No.	%	No.	%			
<b>Age groups</b>						7.3*	0.2
11-20 years	0	-	1	100.0			
21-30 years	10	66.7	5	33.3			
31-40 years	2	28.6	5	71.4			
41-50 years	12	46.2	14	53.8			
51-60 years	19	38.0	31	62.0			
61-70 years	16	53.3	14	46.7			
71-80 years	1	100.0	0	-			
<b>Socioeconomic status</b>						3.2*	0.2
Low	15	36.6	26	63.4			
Moderate	44	50.0	44	50.0			
High	1	100.0	0	-			
<b>Educational level</b>						16.1*	0.001
Illiterate	13	31.0	29	69.0			
Primary	10	31.3	22	68.8			
Secondary	36	65.5	19	34.5			
University	1	100.0	0	-			

\*Fishers exact test.

Table 7: Distribution of smoking, family history, BMI and blood pressure according to gender.

Variable	Male		Female		$\chi^2$	P	
	No.	%	No.	%			
<b>Smoking</b>						25.2	<0.001
Smoker	10	10.0	0	-			
Non-smoker	35	34.7	66	65.3			
Ex- smoker	15	78.9	4	21.1			
<b>First degree family history</b>						17.1	<0.001
Yes	5	15.2	28	84.8			
No	55	56.7	42	43.3			
<b>BMI groups</b>						11.3*	0.01
Underweight	5	71.4	2	28.6			
Normal	23	53.5	20	46.5			
Overweight	24	53.3	21	46.7			
Obese	8	22.9	27	77.1			
<b>Blood pressure</b>						0.1	0.6
Normotensive	13	50.0	13	50.0			
Hypertensive	47	45.2	57	54.8			

\*Fishers exact test.

**Table 8: Distribution of ESRD risk factors according to gender.**

Variable	Male		Female		$\chi^2$	P
	No.	%	No.	%		
<b>HT before ESRD</b>					8.04	0.005
Yes	41	39.8	62	60.2		
No	19	70.4	8	29.6		
<b>Analgesics history</b>					5.8	0.01
Yes	5	22.7	17	77.3		
No	55	50.9	53	49.1		
<b>Renal stones before ESRD</b>					0.1	0.6
Yes	12	42.9	16	57.1		
No	48	47.1	54	52.9		
<b>Recurrent UTI in more than 2 years</b>					21.7	<0.001
Yes	11	21.2	41	78.8		
No	49	62.8	29	37.2		

About two thirds of ESRD patients had dialysis three times per week and 35% of ESRD patients had dialysis duration of 4 hours per session. (Table 5)

In a sample of 120 patients selected randomly in all dialysis centers there were no significant differences between males and females ESRD patients regarding their age and socioeconomic state ( $p > 0.05$ ). However, there was a significant association between female patients and illiteracy ( $p = 0.001$ ). (Table 6)

A significant association was observed between male ESRD patients and smoking ( $p < 0.001$ ). There was also a significant association between female gender and family history of the disease ( $p < 0.001$ ). Besides, a significant association was also seen between obesity and female patients ( $p = 0.01$ ) but no significant differences were noted between both genders regarding their blood pressure ( $p = 0.6$ ). (Table 7)

There was a significant association between female patients and hypertension, analgesic history and recurrent urinary tract infection ( $p = 0.005, 0.01$  and  $< 0.001$  respectively). No significant differences were observed between patient's gender and renal stones ( $p = 0.6$ ). (Table 8)

## DISCUSSION AND CONCLUSION

The prevalence of ESRD varies from one country to another. In our country many patients undergo preemptive kidney transplantation due to readily available living donors either related or non-related. Others may opt out from dialysis either due to multiple co-morbidities or refusal to start dialysis for variety of reasons. In the absence of national renal data registry it is often difficult to trace all patients with ESRD. That's explain why our results is less than in some developed countries.<sup>4</sup>

In this study the estimated prevalence of ESRD in Sulaimani governorate was 0.01%, (155.7 per million populations). The highest was in Sulaimani city, followed by Ranya, then Kalar, and finally Halabjah and Said-sadiq. This rate was almost equivalent to the prevalence of ESRD in Saudi Arabia (0.0139%),<sup>14</sup> but higher than in Kuwait city (0.008%).<sup>15</sup>

More than half of ESRD patients were aged 50 years and older. This result agrees with several international studies that were conducted in Japan, France, Iran, and Korea that showed ESRD dramatically increases with aging.<sup>16-18</sup>

Our study showed that Mean BMI of ESRD patients were  $26.5 \pm 4.9$  Kg/m<sup>2</sup>. Studies conducted in USA showed that there is positive association between BMI and ESRD.<sup>19</sup> In concern with smoking history, a small number of patients claimed they were smokers. However, several other studies conducted in USA, Singapore, Norway, Germany, Italy and Austria showed that obesity and smoking are important independent risk factors for chronic kidney disease and ESRD.<sup>20-22</sup>

This study shows two thirds of ESRD patients were living in moderate socioeconomic state, other studies showed that those who live in low socioeconomic state are at high risk of developing advanced kidney disease.<sup>23</sup>

Regarding educational level, this study showed that there is a vast number of patients were not completed secondary school. Other studies showed a significant association between ESRD patients and illiteracy.<sup>24</sup>

The study result indicates that patients who have family members of ESRD may have a higher chance of developing the disease and this agrees with a study conducted in USA and another in Egypt.<sup>25,26</sup> This result may be explained by the genetic influence on developing renal diseases in some cases such as polycystic kidney disease, Alport's syndrome, cystenosis etc.

Diabetes is the leading cause of ESRD worldwide.<sup>27</sup> This agrees with our study which showed that diabetes was the cause in 23.35%. This followed by hypertension (18%), which again agrees with several other studies.<sup>28,29</sup> This may be explained by the fact that both diseases were common, progressive and often lead to end organ damages in which kidneys are one of them.<sup>30-33</sup>

There was a significant association between chronic analgesic uses and ESRD. A study in USA confirmed that frequently taken analgesic drugs (acetaminophen or Non-steroidal anti-inflammatory drugs) have an increased risk of ESRD.<sup>34</sup>

Regarding gender distribution this study shows ESRD prevalence among males was higher than females in Sulaimani city, Ranya and Said-Sadiq. However, in Halabja and Kalar the prevalence was slightly higher in females. This result was similar to a study done in Abu-Dhabi, which also showed a slight male predominance.<sup>35</sup> This could be due to lifestyle differences between both genders, such as dietary protein intake, salt consumption and smoking habit.<sup>24</sup>

Recurrent urinary tract infection (UTI) is common in young females. In the presence of abnormal kidney structures or incomplete management it may lead to future chronic kidney disease.<sup>36</sup>

Our study shows that there is a significant association between female ESRD and recurrent UTI ( $p < 0.001$ ) and this agrees with a study conducted in Iran.<sup>37</sup>

Lastly, no significant differences were observed between renal stone disease and ESRD. However, severe forms of nephrolithiasis remain underestimated cause of potentially avoidable ESRD and the need renal replacement therapy.<sup>38</sup>

In conclusion, this study showed that the prevalence of ESRD in Sulaimani was 0.01% (155.7 per million populations) with majority of patients was over 50s, and diabetes was the commonest cause. Most patients had a reasonable blood pressure control despite having less than four hours of dialysis per session. There was a significant association between female patients and illiteracy, obesity and recurrent urinary tract infections.

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