Original Article موضوع أصيل

EPIDEMIOLOGICAL CHARACTERISTICS OF CHRONIC RENAL FAILURE PATIENTS IN SOUTHERN PROVINCES OF IRAQ 2012

الخصائص الوبائية لمرضى القصور الكلوي المزمن في محافظات العراق الجنوبية لعام 2012

Alaa Abdullatif Alaugili, MBChB, Ph.D; Faris Hasan Alami, MBChB, Ph.D

د. علاء عبد اللطيف مزعل العقيلي، د. فارس حسن اللامي

ملخص البحث

هدف البحث: تهدف هذه الدراسة إلى تقييم عبىء حالات القصور الكلوي المزمن وتطوير قاعدة بيانات حول الأمراض الكلوية بالمراحل النهائية ESRD في المحافظات الجنوبية من العراق من خلال تقييم معدلات الانتشار، معدل الحدوث ومعدل إماتة الحالة ومعدل الوفيات المرتبط بالسبب لحالات الأمراض الكلوية بالمراحل النهائية، وتقييم الموارد البشرية والبنى التحتية ومشعرات نوعية بعض الخدمات المقدمة.

طرق البحث: تضمنت هذه الداسة المقطعية المستعرضة 243 من المرضى الموضوعين على التحال الدموي (الديلزة) في المحافظات الجنوبية للعراق (البصرة، ميسان وذي قار) خلال الفترة بين 1 كانون الثاني وحتى 30 تموز لعام 2012. تم جمع البيانات باستخدام نموذج استبيان تم ملؤه عبر المقابلة المباشرة مع المرضى والأطباء المعالجين ومراجعة سجلات كل حالة. تم تقييم مشعرات المراضة والوفيات من خلال مراجعة سجلات وحدة التحال الدموي حتى نهاية عام 2012.

النتائج: شملت الدراسة 243 مريضاً (45% منهم من البصرة، 22% من ميسان والبقية من ذي قار). كانت نسبة الذكور 56.8% أعلى بقليل من الإناث 43.2%، كما أن ثلثي الحالات كانت دون سن 60 سنة و64% من المرضى كانوا من سكان الحضر. بلغ انتشار وحدوث الأمراض الكلوية بالمراحل النهائية في المحافظات الجنوبية 95 و78.8 لكل مليون نسمة على الترتيب. بلغ معدل الوفيات المرتبط بالحالة 61.3 لكل مليون نسمة فيما بلغ معدل إماتة الحالة 62.2%. تم إجراء زرع كلية عند 4.1% من مجمل مرضى التحال الدموي خلال عام 2012. لوحظ ارتباط هام لنسبة الوفاة بسبب المراحل النهائية للأمراض الكلوية مع ازدياد العمر (p=0.000)، الحالة الاجتماعية وحالة العمل والمحافظة التي ينحدر منها المريض (p=0.01)، دون وجود ارتباط هام مع الجنس، التعليم والسكن (p>0.05). بلغت نسبة وحدات الديلزة إلى تعداد السكان 0.6 لكل مليون نسمة، بينما بلغت نسبة أجهزة الديلزة إلى تعداد السكان 8.6 لكل مليون نسمة، نسبة المرضى لكل جهاز ديلزة واحد 11.4 فيما بلغت نسبة المرضى لكل كادر طبي واحد 10.2. خضع 13.6% فقط من المرضى لثلاث جلسات تحال أسبوعياً، في حين أن غالبية الحالات (62.1%) خضعت لجلستين فقط في الأسبوع، و24.3% من المرضى خضعوا لجلسة واحدة أسبوعياً فقط، بلغ معدل مدة جلسات التحال الدموي 5.1 ساعة أسبوعياً.

الاستنتاجات: على الرغم من تشابه معدلات الحدوث والانتشار للأمراض الكلوية بالمراحل النهائية مع المعدلات الملاحظة في البلدان المجاورة، إلا أن معدلات الوفيات الملاحظة كانت أعلى بكثير مع وجود ضعف كبير في مشعرات البنى التحتية وهو ما يعكس سوء الخدمات الصحية المقدمة للمرضى.

ABSTRACT

Objective: *This study aimed to assess the burden and develop a baseline data on ESRD in the southern province through estimation the prevalence, incidence, case fatality rate and cause specific mortality rate of end stage renal disease ESRD, assess the human resources and logistics infrastructure, and assess some services quality indicators.*

Methods: *A cross sectional study was done on 243*

*Alaa Abdullatif Alaugili, MBChB. PhD; Community Medicine, Public Health of Basrah, Al-Moni Hospital, Iraq. E-mail: alaa_mazal@yahoo.co.uk

*Faris Hasan Alami, MBChB, Ms PhD, FPH; Assistant Professor, Department of Community Medicine and Family Medicine, Baghdad, Iraq.

hemodialysis patients at hemodialysis units of southern provinces of Iraq (Basra, Missan and Thiqar) during the period from 1 January to 30 July 2012 were included. Data collection was carried out using a questionnaire filled through direct interview with the patients and treating physicians and reviewing their case records. Morbidity and mortality indicators were estimated through reviewing the hemodialysis unit's registries on the end of 2012.

Results: *The total number of cases was 243. Around 45% of them were from Basra, 22% were from Missan and the remaining was from Thiqar. Males are 56.8% slightly more than females 43.2%. Around two thirds of the cases were below 60 years, and 64% of the cases were of urban residence. The prevalence and incidence of ESRD in Southern provinces were 98.5 pmp, and 78.8 pmp, respectively. The cause specific mortality rate was 61.3 pmp, and the case fatality ratio was 62.2%. Only 4.1% of HD patients had transplantation during 2012. Death due to ESRD was significantly increased with increasing age (p=0.000), marital status, employment status and with the province (p=0.01), while no significant association was found with gender, education, and residence (p>0.05). The HD unit to population ratio was 0.6 pmp, HD machine to population ratio was 8.6 pmp, patients to machine ratio was 11.4 and medical staff to patient ratio was 10.2. Only 13.6% had three HD session per week, the majority of the cases (62.1%) had two HD sessions per week, and 24.3% one HD session per week and the average duration of HD session was 5.1 hours (±1.3).*

Conclusions : *We concluded that while the incidence and prevalence of ESRD were almost comparable to neighboring countries, but the extremely high case fatality rate and poor infrastructure indicators are reflecting the poor delivered services.*

INTRODUCTION

Globally, there is noticeable increase in mortality and morbidity of end stage renal disease, as a consequence to increasing morbidity of chronic Non Communicable Diseases (NCDs). In Iraq, little is known about the prevalence of ESRD, little is known about the burden of the disease and the capacity of the health system to deal with the problem.

There was shortage in the demand number of HD beside the seriousness of the disease and its immense social and economic impact were the justifications behind conducting, studies were done in Baghdad on 2012 (1.4 pmp)[1] of hemodialysis unit to population ratio. Other countries like Jordan had 72 Hemodialysis Units in 2010, making Hemodialysis Units: Population Ratio 12: 1.000.000.[2] In Saudi Arabia there was 177 Hemodialysis Units in 2010, making Hemodialysis Units: Population Ratio of 7:1000000.[3] In Iran there are 305 Hemodialysis Units in 2006, making Hemodialysis Units: Population Ratio 4.24:1000000.[4] Similarly in Turkey there were 754 Hemodialysis Units in 2008, making Hemodialysis Units: Population Ratio of 10.41:1.000.000.[5]

The average recommended HD duration of 12 hours/ week.[6] In Iran, the frequency of three sessions per week was 60%[4] in Jordan it was 49%.[2] Globally, despite ongoing technical care, improvements in both dialysis and overall patient care, the annual mortality rate of patients with ESRD managed with thrice weekly HD remains high (10-22%).[7-8]

METHODS

A cross sectional study was conducted in the three hemodialysis units of the major hospitals in the three southern provinces in Iraq (Basra, Missan and Thiqar) and all the patients with ESRD on regular hemodialysis during first six months 2012 were included.

Hemodialysis related variables includes: first form determine the number of the sessions per hour in a week of each patient in the dialysis unit. Its recommended 12 hour per week.[6] The second form the investigator was enrolled the patient's admission during 2012 and before 2012 to determine incidence and prevalence in each province using the total population of each province obtained from the statistics departments in the province HD unit. In addition enrolled the outcome of ESRD in 2012 either done renal transplantation or deceased cases to (determine the case fatality rate and cause specific mortality rate this depend on total population). Patients who had HD in the first half of year were followed up in the second half of the same year to determine the characteristics of the deceased cases

and compare a lives with deceased cases. The third form includes questions on the number of HD units, machines, medical and paramedical staff in each province to assess human resources and logistics infrastructure.

Statistical analysis data were analyzed using "Statistical Package for Social Science"(SPSS) software version 17. Appropriate tables were used for presentation of the data. Chi square test was used for assessment of the association between categorical data. ANOVA and Tukey test were applied to reveal the significance differences in average duration of HD sessions between the three provinces. P<0.05 was considered statistically significant.

RESULTS

The total number of cases was 243 during the first six months of 2012 were identified in the three southern provinces. The distribution of the study group by basic demographic characteristics (Table 1). Males are slightly more than females. Although the major proportion aged 60+ (36.2%), still around two thirds of the cases were below this age and the mean age 53±8 years. Around 63.8% of the cases were of urban residence. Regarding the occupation, while housewives constituted about 32.9% of the cases, the currently employed group represented only 17.3%. Married patients represented the majority (68.7%). Around 74.9% of the cases were of low education (illiterate or primary school graduates).

As mentioned during the first six months of 2012, 243 cases were identified in the three provinces. This group was followed for the whole 2012, (up to Dec/31st), 133 (54.7%) had deceased. A comparison was made between deceased and alive patients by different demographic characteristics; the results are presented in Table 2. The proportion of deceased patients among the female group was 61.9% compared to 49.3% among the males. The difference is not statistically significant (p=0.06). The proportion of dead patients was significantly increasing with increasing age reaching the maximum among those aged more than 60 years (p=0.000). The proportion of deceased cases was significantly higher in Basra (71.6%) as compared to Missan (50.9%) and Thiqar (34.6%) (p=0.01). The proportion of deaths among urban residents was 59.9% compared to 46.6% among rural residents (p=0.055). Regarding employment, the highest proportion of death was among retired group (72.2%) followed by the housewives (62.5%) (p=0.01). Similarly the highest proportion of death was seen among the widowed (71%) and divorced (68.7%) (p=0.01). No statistical significant association was formed between education status and fatal outcome (p=0.492).

Characteristics	Categories	Count	%
Gender	Male	138	56.8
	Female	105	43.2
Age interval	40>	70	28.8
	40-59	85	35.0
	60+	88	36.2
Mean age	Mean ±sd	53±8	
Residence	Rural	88	36.2
	Urban	155	63.8
Occupation	Employed	42	17.3
	Non-employed	85	35.0
	House wife	80	32.9
	Retired	36	14.8
Marital status	Single	29	11.9
	Married	167	68.7
	Divorced	16	6.6
	Widow	31	12.8
Education	Low education	182	74.9
	Intermediate Education	41	16.9
	Higher Education	20	8.2
Exercise	Yes	32	13.2
	No	211	86.8
Alcohol	Regular drinker	6	2.5
	Occasional drinker	11	4.5
	Former drinker	11	4.5
	Never drinker	215	88.5
Smoking	Current smoker	6	2.5
	Ex smoker	63	25.9
	Never smoker	174	71.6

Table 1. Distribution of study group by basic demographic characteristics.

Regarding the morbidity and mortality indicators, all data of 2012 were used. The period prevalence was

Demographic characteristics		Alive*[1]	Dead*[2]	Total	p-value
		No. (%)	No. (%)	No. (%)	
		110 (45.2)	133(54.7)	243 (100)	
Gender	Male	70 (50.7)	68 (49.3)	138 (100)	0.06
	Female	40 (38.1)	65 (61.9)	105 (100)	
Age	<40	51 (72.9)	19 (27.1)	70 (100)	0.000
	40-59	37 (43.5)	48 (56.5)	85 (100)	
	60 and more	22 (25.0)	66 (75.0)	88 (100)	
Province	Basra	31 (28.4)	78 (71.6)	109(100)	0.01
	Missan	26 (49.1)	27 (50.9)	53 (100)	
	Thiqar	53 (65.4)	28 (34.6)	81(100)	
Residence	Rural	47 (53.4)	41 (46.6)	88 (100)	0.055
	Urban	63 (40.6)	92 (59.4)	155(100)	
Employment status	Employed	23 (54.8)	19 (45.2)	42 (100)	0.01
	Non employed	47 (55.3)	38 (44.7)	85 (100)	
	House wife	30 (37.5)	50 (62.5)	80 (100)	
	Retired	10 (27.8)	26 (72.2)	36 (100)	
Marital status	Single	20 (69.0)	9 (31.0)	29 (100)	0.01
	Married	76 (45.5)	91(54.5)	167 (100)	
	Divorced	5 (31.3)	11 (68.7)	16 (100)	
	Widow	9 (29.0)	22 (71.0)	31(100)	
Education Status	Low	83 (45.6)	99 (54.4)	182 (100)	0.492
	Intermediate	16 (39.0)	25 (61.0)	41 (100)	
	Higher	11 (55.0)	9 (45.0)	20 (100)	

*[1]Alive patients who are enrolled in the study during first 6 months of the year 2012.

*[2]Dead patients who are enrolled in the study when they are alive then follow of them during the second six months of the year 2012.

Table 2. The characteristics of deceased cases and comparison live and deceased cases.

Characteristics	Basra	Missan	Thiqar	Total
Total population[9]	2.600.000	920.000	1.454.200	4.974.200
No. of all cases registered in 2012	235	107	148	490
No. of cases before 2012	54	27	17	98
No. of new cases ,2012	181	80	131	392
*No. of death of ESRD	161	67	77	305
Period prevalence, 2012 /PMP	90.4	116.3	101.8	98.5
Incidence rate/ PMP	69.6	87.0	90.0	78.8
Cause specific mortality rate /PMP	61.9	72.8	52.9	61.3
% Case fatality ratio	68.5	62.6	52.0	62.2

Death of ESRD*, is the death of ESRD during 1st, Jan -31/Dec, 2012.

Table 3. Case fatality rate among ESRD patients in the southern provinces, Iraq, 2012.

(98.5 pmp), and the highest was in Missan (116.3 pmp). The incidence of ESRD was (78.8 pmp), the highest was in Thiqar (90 pmp). The mortality indicators showed that ESRD specific mortality rate was (61.3 pmp), the highest was in Missan (72.8 pmp). The case fatality ratio was 62.2%; the highest was in Basra (68.5%), Table 3.

The proportion of transplants to incident cases was highest in Thiqar (5.3%) and lowest in Basra (3.3%) and in general in the southern provinces of Iraq 4.1% had done renal transplantation, Table 4.

The average weekly duration of HD sessions hours (Table 5-A). In the three provinces was 5.1±1.34 the longest session was in Thiqar (6±1.7hr), and the shortest was in Basra 3.8±1.15 hrs. ANOVA and Tukey test were applied and revealed a statistically significant difference in average duration of HD sessions between Basra and Missan, Basra and Thiqar (p=0.000), but no significant difference between Missan and Thiqar (p=0. 41), Table 5-B.

The frequency of dialysis was reviewed in Table 6, and it was found that only 13.6% received dialysis three times a week. This proportion was higher in Thiqar (21.0%) and lowest in Missan (7.5%). The majority of the cases (62.1%) had two HD sessions per week, the lowest being in Thiqar (58.0%), Table 6.

Measurement	Basra	Missan	Thiqar	Total
Mean	3.798	5.66	6.000	5.1
Standard deviation	1.152	1.223	1.7	1.348
Lower bound	3.553	5.309	5.614	4.825
Upper bound	4.043	6.012	6.386	5.48

Table 5-A. Average (±Standard deviation) duration of hemodialysis session in the three provinces.

Provinces	Mean Difference	Stander Error	Sig
Basra Missan	-1.8622*	.21718	.000
Basra-Thiqar	-2.2018*	.23164	.000
Missan-Thiqar	-.3396	.26451	.406

Table 5-B. Tukey test results.

Although there was a clear difference in the total population in the three provinces, there is one single unit in each province. The overall unit per population ratio was 0.6 pmp. As expected, the highest was in Missan (1.1 pmp), and the lowest was in Basra (0.4 pmp). The total number of HD machines was 43, and the average machine per population was 8.6 pmp; the highest was in Missan (9.78 pmp), and the lowest was in Thiqar (6.87 pmp). The average patients to machine ratio was 11.4, the highest was in Thiqar (14.8), and the lowest was in Basra (9.8) as seen in Table 7.

Characteristics	Basra	Missan	Thiqar	Total
Total population	2.600.000	920.000	1.454.200	4.974.200[9]
No of new cases in 2012	181	80	131	392
(%) Transplant count	6 (3.3%)	3 (3.8%)	7 (5.3%)	16 (4.1%)
Transplant pmp	2.3	3.2	4.8	3.2

Table 4. Distribution of the ESRD outcome who had a renal transplant during 2012.

Frequency of dialysis	Provinces			Total
	Basra	Missan	Thiqar	
	Count (%)	Count (%)	Count (%)	Count (%)
Once a week	28 (25.7)	14 (26.4)	17 (21.0)	59 (24.3)
Twice a week	69 (63.3)	35 (66.0)	47 (58.0)	151 (62.1)
Thrice a week	12 (11.0)	4 (7.5)	17 (21.0)	33 (13.6)
Total	109 (100.0)	53 (100)	81 (100)	243 (100.0)

Table 6. Distribution of the study group by frequency of hemodialysis/week and provinces.

Characteristics	Basra	Missan	Thiqar	Total
Number units	1	1	1	3
Number of population	2.600.000	920.000	1.454.200	4.974.200[9]
Total patients number	235	107	148	490
Number of units pmp	0.4	1.1	0.7	0.6
Number of machines	24	9	10	43
Number of machines pmp	9.23	9.78	6.87	8.6
Ratio of patients to machines	9.8	11.8	14.8	11.4

Table 7. Hemodialysis units and hemodialysis machines to population and patient ratios in the southern provinces, 2012.

Regarding human resources, it was found that the total staff running the three units was 48. The average ratio of patients to medical staff was 10.2:1, the highest was in Thiqar (12.3:1), and the lowest was in Missan (7.1:1). Table 8.

Characteristics	Basra	Missan	Thiqar	Total
Number of medical staff	21	15	12	48
Total patients number	235	107	148	490
Ratio of patients to medical staff	11.2	7.1	12.3	10.2

Table 8. Ratios of patients to medical staff in southern province of Iraq, 2012.

DISCUSUON

End Stage Renal Disease (ESRD) has assume epidemic proportion worldwide hence its being regarded as the major public health challenge mean while data on incidence and prevalence of ESRD are available in developed countries because of reliability and functional renal registries, they are either unavailable or unreliable in developing countries.

Sociodemographic

Gender: The sociodemographic characteristics of HD patients show slight male preponderance. This is similar to another study in Baghdad in 2008 with male preponderance,[10] as the males have a higher risk for the two main risk factors of ESTD (Hypertension and Diabetes).[11]

Age: Mean age of HD patients in this study was 53.8 years, in study conduct in Baghdad 2009 the mean age was 46 year,[10] in Al Anbar province west of Iraq 2009 the mean age was 48 year,[12] less than 30% of HD cases were in the age group <40 years, and then the proportion increase with increasing age, then age group 60 year and above it reach 36.2%, ESRD is more common among elderly persons than other age groups,[13] this is mostly attributed to the increased incidence of risk factors for ESRD particularly hypertension and diabetes mellitus.[11,14,15,16]

Marital status: High proportion of patients in this study were married and widows, this similar study in Iran[17] while the majority of the females were found to be housewives, this is consistent with employment status of females in this part of Iraq.[18]

Educational status: Around three quarters of HD cases were of low education the illiteracy is widely spread in south of Iraq (39%) so the figure is close to the general population figures and only 22% of adult population in Iraq has never attended school and more than 9% have secondary school.[18]

Residence: most patients in the current study (63.2%) were from urban areas. This is almost compatible with the residence distribution of the population in the southern provinces of Iraq by ministry of planning in 2008, they found 64.2% of the populations are urban.[18]

Smoking habits: In contrast to another study by yacoub et al (2010)[19] most of our HD patients were non smoker.Variation in definition current smoker may be responsible for such variation. The current figure of smoker is much less than that of general population prevalence of smoking 21.9% with proportion among males was six folds than females.[11]

Period prevalence

The period prevalence in the current study was 98.5 pmp; the highest was in Missan (116.3 pmp). In Al-Anbar province west of Iraq, 2009, the prevalence was 141 pmp,[12] while the period prevalence of Hemodialysis in Baghdad, 2009 was 64 pmp.[10] Other study in Baghdad 2012 point prevalence was 84 pmp and in Ninwa 95 pmp.[1] The prevalence of ESRD in Jordan was 421, and 456 pmp in 2008 and 2010 respectively.[2-20] In Saudi Arabia the prevalence was 434 and 498 pmp in 2007 and 2010, respectively.[3-21] In Turkey, the point prevalence (pmp), in 2004; (444), 2005; (491), 2007; (709), 2008; (756).[5-22] In Malaysia the prevalence was 747, 812 pmp in 2009 and 2010 respectively.[23,24] In Egypt the prevalence was 483 pmp in 2008.[25] In the United Kingdom the prevalence was 293 in 2005, 311 in 2006, 323 in 2007, 342 in 2008 and lastly 354 pmp in 2009.[26]

On comparing the population pyramid in Iraq with other populations, it is reported that around 43.1% of Iraqi populations are below the age of 15 years,[27] compared to 15.3% in Europe, 19.6% in North America, 26.8% in South America, 40.3% in Africa, 25.1% in Asia, and at global level, the world population under 15 years old represent 26.3% of total population.[28] Since ESRD is mostly an age related disorder as the main risk factors are age related. We can anticipate a higher prevalence of ESRD in population with higher proportion of elderly people. Another factor that may explain the lower prevalence in our society is the tendency in western societies to provide early renal transplant therapy (RRT) for patients with ESRD, and thus increasing the number of patients receiving HD, meanwhile the availability of renal replacement therapies is limited in low and middle income countries. Most patients around the world with chronic kidney disease will die from kidney failure without receiving dialysis or transplantation.[29] In western countries, an increase in the prevalence of patients on RRT has been observed during the recent past, this result from a decreased mortality rate on the one hand and an increased in the incidence rate on the other.[30] Another reason for this low prevalence is the poor services delivered to the ESRD patients in Iraq that can lead to high case fatality rate in southern region. The service delivered indicators showed a high Patient: Machines Ratio, low Hemodialysis Units: Population Ratio and low Hemodialysis Machines: Population Ratio and short duration of HD, as compared to some neighboring countries like Jordan, Saudi Arabia and Turkey. The Hemodialysis Unit: Population Ratio in Jordan,[2] Saudi Arabia[3] and Turkey was. 12:1000000, 7:1000000, 11:1000000 respectively, Hemodialysis Machines: Population Ratio was 124:1000000, 177: 1000000, 202:1000000 respectively.[22]

Incidence The incidence of ESRD was 78.8 pmp, the highest was in Thiqar (90 pmp). The incidence of RRT in some countries of the developing world: in Egypt 190 PMP, in Saudi Arabia 130 PMP, Pakistan 40 PMP, India 100 PMP, Argentine 120 PMP, Venezuela 120 PMP, and Mexico 340 PMP.[31] The incidence of renal failure is increasing all over the world, in UK 93 new patients per millions were dialyzed in 2001. In USA, 336 new patients per millions are added each year.[32] In Yemen, in 2002, an incidence of 64 per million per year was reported.[33] So lower incidence was reported in the current study as compared to Egypt, S. Arabia, India, Argentine, Venezuela, USA and Mexico but higher than that of Pakistan and Yemen. Under diagnosis, possibility of early death shortly after diagnosis while they are receiving peritoneal dialysis is possibility.

Case Fatality Ratio (CFR): The case fatality ratio within 2012 was 62.2%, the highest was in Basra 68.5%. age is significance with deceased cases ESRD. Published reports demonstrated that the case fatality ratio in USA is 22.8%**,** in Canada it was 17.9%, in Western Europe it was 10.4 %.[34] In Saudi Arabia during the year 1997 to 2000 the death rate per annum was varied from 3.5 to 19.5.[35] In 2004 in Taiwan CFR was 5.18 within two years, and the cause mortality rate was 20.3 per 1000 person year.[36] The influencing factors for variation in death rate are: age at which patients are inducted

for maintenance hemodialysis program, associated co-morbid condition.[34] late arrival with complications at time of initiation of HD,[37] and compliance with HD.[38] The high mortality in south of Iraq is also due to the poor delivered services as indicated by the high Patient: Machines Ratio, low Hemodialysis Units: Population Ratio and low Hemodialysis Machines: Population Ratio.

Infrastructure of HD units

1. Human resources: Human resources working in HD units are unequally distributed throughout Iraqi southern provinces. The current ratio of all medical staff (including the specialized and non-specialized) in south of Iraq is far from global ratio. This is another discrepancy that may lead to poor quality of service offered to the ESRD patients. In Jordan 2008, the total number of Nephrologists caring of ESRD patients was 51 with the average of 52 patients for each Nephrologist.[20] In Saudi Arabia the total number of Consultant Nephrologists, Nephrology Specialists, General Practitioner and Nurses caring of ESRD patients was 172, 278, 246 and 3239 respectively in 2010.[3] Also in Turkey the number of Specialist Physicians, General Practitioner and Nurses caring for ESRD patients in 2008 was 733, 1051, and 4393, respectively.[22]

2. Hemodialysis unit and machinery resources: The total number of Hemodialysis Centers in the south of the Iraqi was three making very low ratio (0.6 pmp) as compared with Baghdad in 2012 (1.4 pmp).[1] Other countries like Jordan had 72 Hemodialysis Units in 2010, making Hemodialysis Units: Population Ratio 12: 1.000.000.[2] In Saudi Arabia there was 177 Hemodialysis Units in 2010, making Hemodialysis Units: Population Ratio of 7:1000000.[3] In Iran there are 305 Hemodialysis Units in 2006, making Hemodialysis Units: Population Ratio 4.24:1000000.[4] Similarly in Turkey there were 754 Hemodialysis Units in 2008, making Hemodialysis Units: Population Ratio of 10.41:1.000.000.[5] This low ratio in southern provinces in Iraq is one of the causes behind the high case fatality rate and low prevalence.

The total number of HD machines in southern provinces of Iraq was 43 and the number of machines per million populations was 8.6. In Baghdad city, 2012, the ratio was 27.25 machines /pmp, and in Ninawa it was 14.12 machines/pmp.[1] The ratio of patients to machines in south region was 11.3. In Bagdad, 2012 this ratio was 3.09 patients: machine ratio, and in Ninawa it was 6.7 patients: machine ratio.[1]

Frequency and duration of HD: In southern provinces of Iraq only 13.6% of the patients had three sessions per week while 62.1% had twice per week and 24.3 had once per week. In Iran, the frequency of three sessions per week was 60%[4]; in Jordan it was 49%.[2] Globally, despite ongoing technical care, improvements in both dialysis and overall patient care, the annual mortality rate of patients with ESRD managed with thrice weekly HD remains high (10-22%).[7,8] The low proportion of thrice weekly dialysis in the current study is one of the areas of poor services provided to HD cases and hence the high mortality. As compared to the recommended average HD duration of 12 hours/ week.[6] The mean duration of hemodialysis session was (5.1±1.3 hrs/week). In Baghdad, the average duration was 6.4 hours.[10] In Jordan, the mean duration was 9.6 hrs/week.[39] It is clear that the duration is far from the adequate adding the indicator of poor delivered services that lead to high case fatality ratio.

The average survival of HD patients in the three provinces was 13.3 months. This is compared to 26 months in Baghdad in 2009[10] and 4.3 years in Jordan, 2008.[2]

Renal transplantation: During the year 2012, the proportion of transplants to incident cases was only 4.1%. In the Gulf Co-operation Council countries (1994), the estimated incidence of ESRD was 75-120 new cases pmp per year, the proportion of transplants to incident cases was 30%; still it was presumed that about 60% of these patient need transplants (50-100 patients). While the ratio of transplantation per million population in the south of Iraq was 3.2 which is lower than GCC countries (in Bahrain 8 pmp, Kuwait 65 pmp, Oman 38 pmp, Qatar 29 pmp, Saudi Arabia 21 pmp ,and UAE 17 pmp)[40] and lower than the USA 2010 figure of 50 pmp.[41] The renal transplantation rate depends on many economic and social factors.[42]

CONCLUSIONS

Males had slightly higher proportion than females and around two thirds of the patients were below the age of 60 years. The prevalence and incidence of ESRD in Southern provinces are 98.5 pmp, and 78.8 pmp, respectively. The outcomes of ESRD the cause specific mortality rate was 61.3 pmp, and the case fatality ratio were 62.2%, Only 4.1% of HD patients in southern provinces of Iraq had renal transplant annually. Death due to ESRD high proportion with increasing age and high proportions with marital status, employment status and with provinces. The HD unit to population ratio was 0.6 pmp. HD machine to population ratio was 8.6 pmp, patients to machine ratio was 11.4:1 and medical staff to patient ratio was 10.2:1. All were below the international and regional figures. Average duration of HD session was 5.1 hours per week; less than half of the recommended duration, so we recommend that the extremely high case fatality ratio and low quality services should be addressed and approached the policy maker to ensure strong political commitment towards ESRD patients. Secondly the number of HD units, machines and the medical staff should be increased to meet the patient's needs, and ensure 12 hours weekly HD. Thirdly Develop Standardized Operation Procedures (SOPs) in the HD units and ensure strict implementations of these SOPs. Fourthly early detection of all patients at risk of impaired renal function through screening to minimize ESRD. Fifthly enhance renal transplantation in southern part of Iraq. Seventhly provision of adequate number of qualified medical and health personnel running HD unit. Lastly developing a national registry of End stage renal Disease.

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