EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 7
Issue: 9
49-54
Year: 2020

FREQUENCY OF CO MORBIDS AND COMPLICATIONS OCCURRING IN ESRD PATIENTS

[1]Tayyaba Naz, Saima Ambreen[2], Hajra Batool[3], Hassan Mumtaz[4]*, Ahsan Shafiq[5], Shamim Mumtaz[6], Tehreem Fatima[7] and Manahil Rahat[8]

[1]House Physician, Holy Family Hospital Rawalpindi.
[2]Associate Professor of Medicine, Holy Family Hospital Rawalpindi.
[3]House Physician, Holy Family Hospital Rawalpindi.
[4]House Physician, Holy Family Hospital Rawalpindi.
[5]Post Graduate Trainee, Holy Family Hospital Rawalpindi.
[6]Professor of Microbiology.
[7]House Physician, Holyfamily Hospital.
[8]Demonstrator Islamabad Medical & Dental College.

***Corresponding Author: Hassan Mumtaz**
House Physician, Holy Family Hospital Rawalpindi.

Article Received on 05/05/2020 **Article Revised on 25/05/2020** **Article Accepted on 15/06/2020**

ABSTRACT
End stage renal disease is a huge issue worldwide. This study was done to understand the relationship between complications and co morbids in patients of ESRD. We had 46 patients between the age group 23–77 years, mean age group was 41-60 years who urgently initiated dialysis therapy at Holy Family Hospital, Rawalpindi Medical University between June 2020 and July. We had 29 males and 17 females. 29 patients (63%) were hypertensive & diabetic, while 5 (10.9%) patients had hypertension only, whereas 12 patients (26.1%) had no comorbidities. Uremic encephalitis occurred in 20 (43.5%) of patients, while 19 (41.3%) patients developed pulmonary edema. Sepsis developed in 7 (15.2%) patients. Hypertensive patients developed pulmonary edema in 3 (60%) of the patients, followed by Uremic Encephalitis and sepsis in 1 patients (20% each). 15 patients (51.7%) of ESRD patients with hypertension and diabetes both developed Uremic Encephalitis, followed by Sepsis in 9 patients (31%) and pulmonary edema in 5 patients (17.2%). Our study had certain limitations, because of time constraints we could not retain patients for much longer period to observe changes in various other parameters. Controlling blood pressure and blood sugar levels can lead to a decrease in the development of various complications as well as co morbids in ESRD patient, thus decreasing the number of hospital visits and increasing survival rate leading to decreasing the burden on our health care system.

KEYWORD: ESRD, morbids.

INTRODUCTION
Chronic kidney disease (CKD) is a major global public health issue, affecting over 10% of the population worldwide.[1] The problem was ranked 16th among the leading causes of death in 2016, and is expected to rise to 5th ranked by 2040.[2] While Pakistan is the eighth largest country with high prevalence of kidney diseases causing 20 thousand deaths annually.[1]

Chronic kidney disease is defined as an abnormality of kidney functions or its structure for ≥ 3 months.[3] CKD is a significant burden for individuals, health care systems and societies as it is associated with increased hospitalization, productivity loss, morbidity and early mortality. Diabetic kidney disease is the leading cause of CKD;[4] other common causes of CKD are hypertension, glomerulonephritis and autosomal dominant polycystic kidney disease.[5] Many individuals have no known cause of CKD.

Classification of CKD is usually based on abnormal urinalysis and/or renal tract structure and estimated glomerular filtration rate (eGFR), With the most advanced stage, CKD stage 5, comprises of individuals with an eGFR <15 ml/min/ patients with end-stage disease.[1]

Despite recent advancements in cardiovascular diseases (CVD) in ESRD patients we do not understand the relationship of these co-morbid diseases. In addition, the effect of renal replacement therapy (RRT) on cardiovascular function and injury is not well understood and may be a contributing factor for the accelerated development of Type 4 cardiorenal syndrome (CRS) &

Chronic kidney disease (CKD) leading to an impairment of cardiac function.

Chronic kidney disease is managed through treatment of its risk factors, such as hypertension and diabetes mellitus.[3] A small proportion of patients with CKD progress to ESRD requiring renal replacement therapy (RRT) with dialysis and/or kidney transplantation (KTx).[6] Dialysis treatment can be provided at home (peritoneal dialysis (PD) or home haemodialysis (HHD)), or as in-centre haemodialysis (ICHD) at a satellite dialysis unit or hospital.[7] Conservative care is an alternate to RRT for patients who would not have a survival or quality of life benefit from RRT or who choose not to receive RRT, and only provides a means for management of symptoms associated with CKD.[8] In 2010, approximately 2.62 million patients received RRT worldwide, and the numbers are expected to double by 2030, in part due to trends in obesity and diabetes mellitus and in part due to an ageing population in many countries.[9] The increasing incidence of ESRD treatment can also be linked to the improved access to ESRD services in developed countries.[10]

It is associated with an increased risk of adverse cardiovascular outcomes, progression to end-stage renal disease (ESRD), and decreased survival. As the kidneys play a central role in the regulation of body fluids, electrolytes and acid-base balance, CKD and ESRD predictably result in multiple derangements including hyperkalemia, metabolic acidosis and hyperphosphatemia which, in turn, lead to serious complications including muscle wasting, bone-mineral disorder, vascular calcification and mortality. Although, in patients with ESRD, some derangements can be corrected by the renal replacement therapy, existing dialysis modalities are far from ideal. In this review, we discuss the current understanding of disease process, diagnosis, and treatment strategies in the areas of electrolyte and acid-base regulation relevant to CKD and ESRD, with specific emphasis on dyskalemia, acidosis and mineral bone disorder (MBD).

Moreover, many patients who progress to ESRD, even with regular nephrology follow-up, do not have a distinct plan at the time of initiating dialysis therapy, resulting in an urgent need for dialysis. Urgent-start dialysis refers to urgent initiation of dialysis for ESRD patients with no pre-established functional vascular access or peritoneal dialysis (PD) catheter. Hemodialysis (HD) is preferred in most centers with a high rate of central venous catheter (CVC) use at the time of initiating dialysis among HD patients.[11]

The main purpose of this study was to find about frequency of co-morbids observed in ESRD Patients and whether uncontrolled hypertension or uncontrolled diabetes mellitus is associated with production of complications in ESRD patients.

MATERIAL AND METHODS

This Cross sectional Study was carried out in the Department of Medicine Unit 1 Holy Family Hospital, Rawalpindi affiliated with Rawalpindi Medical University, Pakistan. The study protocol was approved by the Ethics Committee of Holy Family Hospital Rawalpindi.

This instituite is situated in the heart of Rawalpindi city. Rawalpindi has a population of 2,098,231 having an area of 259 km.[2]

All ESRD patients, 23–77 years of age, who urgently initiated dialysis therapy at Holy Family Hospital, Rawalpindi Medical University between June 2020 and July 2020 were included in the study. Urgent-start dialysis was defined as ESRD patients who required urgent initiation of dialysis without pre-established functional vascular access or a PD catheter.. All of the patients received a CVC immediately and started HD immediately after catheter insertion. All patients included in this study were educated about renal replacement therapy modalities (both PD and HD). The patients were provided a modality recommendation by an experienced nephrologist, but freely made their own decision regarding the dialysis modality. Patients were grouped according to the dialysis modality (PD and HD). Decisions of when to start dialysis therapy were made by experienced nephrologists on the basis of clinical conditions and laboratory parameters of individual patients. The study was conducted between June 2020 and July 2020

The data collected included patient demographics, primary diseases, co-morbid diseases, medical history, and laboratory parameters. Data recorded at the time of initiating dialysis included age, gender, primary etiology of ESRD, presence of co-morbid diseases (diabetes, hypertension, cardiovascular disease, chronic heart failure, cerebrovascular disease, and malignancy, and early referral to nephrologists in 6 months. Laboratory parameters were collected at the time of initiating dialysis, including the estimated glomerular filtration rate, serum creatinine, serum urea, serum sodium, serum potassium, serum chloride ,pH, serum bicarbonate, hemoglobin, serum calcium, serum corrected calcium, serum phosphate,. Ultrasound was also done to check the grade of echogenic kidney.

The primary outcomes of the study were the incidence of dialysis-related complications (infectious and non-infectious complications) and dialysis-related complications requiring catheter re-insertion and bacteremia during the first 30 days after catheter insertion. Dialysis-related complications (episodes, type, intervention strategy, and outcome) and patient outcomes (death, transfer to other centers, or loss to follow-up) were carefully tracked and recorded All statistical analyses were performed using SPSS version 20 for MacBook Air.

Comparisons of percentages between groups were performed using the chi-square test. Logistic regression analysis was used to determine the factors associated with dialysis-related complications and patient survival rate. Variables with a p value <0.10 based on univariate analysis were introduced in logistic regression analysis using the backward elimination method.

RESULTS

Table 1: Frequency of ESRD in different age groups.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-40	15	32.6	32.6	32.6
	41-60	22	47.8	47.8	80.4
	61-80	9	19.6	19.6	100.0
	Total	46	100.0	100.0	

Out of total 46 patients, 47.8 % patients were between the age group 41-60 years, followed by the age group 20-40 years (32.6%) and 61-80 age group (19.6%). (Table 1)

Table 2: Gender related frequency of ESRD patients.

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	29	63.0	63.0	63.0
Female	17	37.0	37.0	100.0
Total	46	100.0	100.0	

Out of 46 patients, 63 % were male and 37% were female (Table 2)

Table 3: Associated Comorbidities in ESRD Patients.

	Frequency	Percent	Valid Percent	Cumulative Percent
Hypertension	5	10.9	10.9	10.9
hypertension and diabetes mellitus	29	63.0	63.0	73.9
non hypertensive and non diabetic	12	26.1	26.1	100.0
Total	46	100.0	100.0	

About 63% of ESRD patients were hypertensive & diabetic, while 10.9% patients had hypertension only, whereas 26.1 % had no comorbidities. (Table 3)

Table 4: Types of Complications occurring in ESRD Patients.

	Frequency	Percent	Valid Percent	Cumulative Percent
pulmonary edema	19	41.3	41.3	41.3
Uremic encephalitis	20	43.5	43.5	84.8
sepsis	7	15.2	15.2	100.0
Total	46	100.0	100.0	

Uremic encephalitis occurred in 43.5 % of ESRD patients, while 41.3 % ESRD patients developed pulmonary edema. Sepsis developed in 15.2 % patients (Table 4)

Table 5: Frequency of Complications related to comorbidities in ESRD Patients.

	Pulmonary Edema	Uremic Enceph	Sepsis	Total
Hypertension	3 (60%)	1(20%)	1 (20%)	5
Hypertension & Diabetes Mellitus	5 (17.2%)	15 (51.7%)	9 (31%)	29

ESRD with hypertension developed pulmonary edema in 60% of the cases, followed by Uremic Encephalitis and sepsis (20% each). 51.7% of ESRD patients with hypertension and diabetes and hypertension developed Uremic Encephalitis, followed by Sepsis (31%) and pulmonary edema (17.2%). (Table 5)

Table 6: Statistics in ESRD patients.

	AGE	GENDER	COMORBIDS	COMPLICATIONS
Valid	46	46	46	46
Missing	0	0	0	0
Mode	2.00	1.00	3.00	2.00
Range	2.00	1.00	3.00	2.00
Minimum	1.00	1.00	1.00	1.00
Maximum	3.00	2.00	4.00	3.00

Explains the statistics between age, gender, comorbidities & complications occurring in ESRD Patients. (Table no 6)

DISCUSSION

The result depicts that out of total 46 patients, 47.8 % patients were between the age group 41-60 years, followed by the age group 20-40 years (32.6%) and 61-80 age group (19.6%). According to a study being done in 1991 Washington (DC), 27 % of the ESRD patients were over 65 years of age.[12] In our study 63% of patients were male while female patients counts for 37% of total. This is in comparison with an italian study conducted during 2019 which revealed that 59.4% of men developed ESRD.[13] In a study conducted in Virginia Aug 2016, reveals ESRD affects persons of all ages, but it is more common with advancing age, with one of every two patients starting hemodialysis over 65 years of age.[14][15] According to the United States Renal Data System published in 2015, People in this age group comprise the fastest growing segment of the kidney failure population and those over 80 years of age are at even higher risk for ESRD.[15][16]

In our study 63% patients had hypertension & diabetes mellitus, while 10.9% of the patients had hypertension alone, whereas 26.1 % had no comorbidities but no ESRD patient had diabetes alone in our study group. According to a study done in Virginia, Aug 2016 Diabetes now accounts for an estimated 45% of new cases of kidney failure and hypertension for an additional 30%. These conditions are even more common among ESRD patients with increasing age.[14][15] Where as in a Finland based study conducted in October 2005, type 1 diabetes accounts for two thirds of diabetic ESRD cases.[17]

Three most common complications observed in admitted ESRD patients were uremic encephalitis (43.5 %), pulmonary edema (41.3%) and sepsis (15.2%).

ESRD with hypertension developed pulmonary edema in 60% of the cases, followed by Uremic Encephalitis and sepsis (20% each). About 51.7% of ESRD patients with both hypertension and diabetes developed Uremic Encephalitis, followed by Sepsis (31%) and pulmonary edema (17.2%). Furthermore, it was noted that rate of development of complications were more in diabetic and hypertensive patients as compared to hypertensive only or diabetics only or normoglycemic and normotensive patients. Increasing age, diabetes, cardiovascular disease and poor nutrition are the most important co-existing conditions that predict worse outcomes for patients with end-stage renal disease.[18]

It was observed that majority of the ESRD patients had hypertension which could be explained by the fact that hypertension causes thickening of arteries in general which includes renal arteries and arterioles. This leads to decreased blood flow towards kidneys leading to renin production that causes further hypertension making it a vicious cycle. It will cause renal failure and eventually ESRD if not checked in time. Exact reason for development of uremic encephalopathy is unclear but it pertains to the idea of imbalance of neurotransmitters.[19]

Sepsis in an ESRD patient can be explained by urinary retention leading to urinary stasis and thus production of bacteria (especially gram negative) which will lead to sepsis when they enter blood stream unchecked. According to a study, it has been suggested that increased pulmonary capillary permeability may contribute to the development of pulmonary edema in ESRD.[20] In a study conducted at Shanghai in November 2016, variety of complications associated with the placement and use of CVC, including catheter-related infections, thromboses, catheter malfunction, and hemodynamic instability, result in a negative effect on patient survival.[21][22][23][24] A Norwegian study conducted in October 2017 reveals that the accumulative incidence of ESRD was 0.7% (95% CI 0.4-1.0) at 20 years' diabetes duration, 2.9% (2.3-3.7) at 30 years' duration, and 5.3% (4.3-6.5) at 40 years' duration. The risk of the development of ESRD was lower in women than in men (hazard ratio [HR] 0.61; 95% CI 0.41-0.91) and higher in individuals in whom diabetes had been diagnosed at 10-14 years of age compared with those in whom it was diagnosed before 10 years of age (HR 1.29; 1.06-1.56).[25]

There is limited data regarding comorbidities in developing countries. Current data shows that hypertension, diabetes, and various cardiovascular disorders are the leading comorbidities.[26] It supports the idea of controlling blood pressure and blood sugar levels in an ESRD patient to decrease development of symptoms of various complications, decrease number of hospital visits, increase survival rate and thus decrease burden on our health care system. To reduce the ESRD population, it will be necessary to establish more effective treatment methods to delay exacerbation of

progressive renal diseases.[25] Over the past 4 decades, age-specific survival in patients with ESRD has improved, but has not kept pace with that of the general population.[27] A multi instituitional study from japan conducted in march 2003 shows a significant positive linear relationship between year and mean age at start of Renal Replacement Therapy (RRT) also was observed ($P < 0.001$).[28]

Our study had certain limitations, because of time constraints we could not retain patients for much longer period to observe changes in various other parameters. Secondly, this study was mostly based on people coming to Holy Family hospital, so it can't be generalized to the whole population based upon the results of a small subset of patients in a tertiary care hospital.

CONCLUSION

This study concludes that diabetic and hypertensive patients of ESRD have more complications especially in 40 to 60 years age group. Controlling blood pressure and blood sugar levels can lead to a decrease in the development of various complications as well as co morbids in ESRD patient, thus decreasing the number of hospital visits and increasing survival rate leading to decreasing the burden on our health care system. To reduce the ESRD population, it will be necessary to establish more effective treatment methods to delay exacerbation of progressive renal diseases. Having said that, similar data needs to be compiled from other major hospitals in the locality to strengthen the idea and thus eventually make a meta analysis out of it before generalizing it.

REFERENCES

1. Jha V, Garcia-Garcia G, Iseki K, Li Z, Naicker S, Plattner B, et al. Chronic kidney disease: Global dimension and perspectives. Lancet, 2013; 382 (9888): 260–272. pmid:23727169
2. Foreman KJ, Marquez N, Dolgert A, Fukutaki K, Fullman N, McGaughey M, et al. Forecasting life expectancy, years of life lost, and all-cause and cause-specific mortality for 250 causes of death: Reference and alternative scenarios for 2016–40 for 195 countries and territories. Lancet, 2018; 392 (10159): 2052–2090. pmid:30340847
3. Fraser S, Blakeman T. Chronic kidney disease: Identification and management in primary care. Pragmat Obs Res, 2016; 7: 21–32. pmid:27822135
4. Alicic RZ, Rooney MT, Tuttle KR. Diabetic kidney disease. Clin J Am Soc Nephrol, 2017; 12 (12): 2032–2045.
5. Cornec-Le Gall E, Alam A, Perrone RD. Autosomal dominant polycystic kidney disease. Lancet, 2019; 393(10174): 919–935. pmid:30819518
6. Nissenson AR, Marsh JT, Brown WS, et al. Central nervous system function in dialysis patients: a practical approach. Semin Dial, 1991; 4: 115–123.
7. Gilli P, De Bastiani P. Cognitive function and regular dialysis treatment. Clin Nephrol, 1983; 19: 188–192.
8. Pliskin NH, Yurk HM, Ho LT, et al. Neurocognitive function in chronic hemodialysis patients. Kidney Int, 1996; 49: 1435–1440.
9. Ratner DP, Adams KM, Levin NW, et al. Effects of hemodialysis on the cognitive and sensory-motor functioning of the adult chronic hemodialysis patient. J Behav Med, 1983; 6: 291–311.
10. Sehgal AR, Grey SF, DeOreo PB, et al. Prevalence, recognition, and implications of mental impairment among hemodialysis patients. Am J Kidney Dis, 1997; 30: 41–49.
11. United States Renal Data System. USRDS 2015 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States. Vascular access. Bethesda, MD: National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, 2015.
12. Institute of Medicine (US) Committee for the Study of the Medicare End-Stage Renal Disease Program; Rettig RA, Levinsky NG, editors. Kidney Failure and the Federal Government. Washington (DC): National Academies Press (US); 1991. 5, The ESRD Patient Population: Special Groups. Available from: https://www.ncbi.nlm.nih.gov/books/NBK234393.
13. Roberto Minutolo , Francis B Gabbai , Paolo Chiodini, et al. Sex Differences in the Progression of CKD Among Older Patients: Pooled Analysis of 4 Cohort Studies, 2019; 10. doi: 10.1053/j.ajkd.2019.05.019.
14. Kurella Tamura M. Incidence, management, and outcomes of end-stage renal disease in the elderly. Current Opinion in Nephrology and Hypertension, 2009; 18: 252–257. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2738843/pdf/nihms139809.pdf.
15. Harford R, Clark MJ, Norris KC, Yan G. Relationship Between Age and Pre-End Stage Renal Disease Care in Elderly Patients Treated with Maintenance Hemodialysis. Nephrol Nurs J, 2016; 43(2): 101-108.
16. United States Renal Data System. USRDS annual data report: Epidemiology of kidney disease in the United States. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases; Bethesda, MD, 2015.
17. Finne P, Reunanen A, Stenman S, Groop P, Grönhagen-Riska C. Incidence of End-stage Renal Disease in Patients With Type 1 Diabetes. JAMA, 2005; 294(14): 1782–1787. doi:10.1001/jama.294.14.1782
18. Sarah S.Prichard . Comorbidities and their impact on outcome in patients with end-stage renal disease, 2000; 100-104. https://doi.org/10.1046/j.1523-1755.2000.07417.x
19. https://emedicine.medscape.com/article/239191-overview#a5

20. Anthony G. Morgan.Contribution of Uremia to Pulmonary Edema in ESRD. https://doi.org/10.1111/j.1525-139X.1989.tb00601.x
21. Liangos O, Gul A, Madias NE, Jaber BL. Unresolved issues in dialysis: long-term management of the tunneled venous catheter. Blackwell Publishing Inc. Sem Dialysis, 2006; 19: 158–164.
22. Rehman R, Schmidt RJ, Moss AH. Ethical and legal obligation to avoid long-term tunneled catheter access. Clin J Am Soc Nephrol, 2009; 4: 456–460. pmid:19158368
23. Ravani P, Palmer SC, Oliver MJ, Quinin RR, MacRae JM, Tai DJ, et al. Associations between hemodialysis access type and clinical outcomes: a systematic review. J Am Soc Nephrol, 2013; 24: 465–473. pmid:23431075
24. Haijiao Jin, Wei Fang, Mingli Zhu, Et al. Urgent-Start Peritoneal Dialysis and Hemodialysis in ESRD Patients: Complications and Outcomes. November 8, 2016. https://doi.org/10.1371/journal.pone.0166181.
25. Vibeke Gagnum[1,2], Maryam Saeed[3,2], Lars C Stene. Low Incidence of End-Stage Renal Disease in Childhood-Onset Type 1 Diabetes Followed for Up to 42 Years. Diabetes Care, 2018; 41(3): 420-425. doi:10.2337/dc17-0906.
26. Somchai Eiam-Ong, Visith Sitprija. Comorbidities in Patients with End-Stage Renal Disease in Developing ountries. https://doi.org/10.1046/j.1525-1594.2002.07064.x.
27. KunihiroYamagata, HidetoTakahashi, SohSuzuki. Age distribution and yearly changes in the incidence of ESRD in, 2004; 433-443.
28. https://doi.org/10.1053/j.ajkd.2003.11.005Carlvan Walraven, Douglas G.Manuel, GregKnoll. Survival Trends in ESRD Patients Compared With the General Population in the United States, 2014; 491-499. https://doi.org/10.1053/j.ajkd.2013.09.011.