



CLINICAL AND EPIDEMIOLOGICAL PROFILE OF END STAGE RENAL DISEASE (ESRD) PATIENTS UNDERGOING RENAL TRANSPLANTATION IN A TERTIARY CARE CENTER.

Nephrology

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ABSTRACT

BACKGROUND : Chronic Kidney Disease (CKD) is one of the most common causes of morbidity and mortality due to renal causes. CKD is classified as per the glomerular filtration rate (GFR). The fifth stage of the CKD when the GFR is less than 15 ml/min/ 1.73 m² is called the End Stage Renal Disease (ESRD).

AIMS AND OBJECTIVES : To study the clinical and epidemiological profile of End Stage Renal Disease (ESRD) patients undergoing renal transplantation in a tertiary care center .

METHODS : A total of 120 patients of End Stage Renal Disease (ESRD) admitted for renal transplantation were enrolled in our study. Clinical and epidemiological profile of these patients was observed in our study.

RESULTS : Majority of the patients in our study were males (86 patients , 72 %) with a male : female ratio of 2.5 : 1. Diabetic Nephropathy was the most common aetiology of End Stage Renal Disease (ESRD) in our study.

CONCLUSION : End Stage Renal Disease (ESRD) is the final stage of Chronic Kidney Disease (CKD). Identifying the patients in the early stages of CKD and treating the risk factors associated with it , constitutes the most important step in preventing the progressive renal damage. ESRD , once sets in requires some form of renal replacement therapy : Haemodialysis or Renal Transplantation

KEYWORDS

Chronic Kidney Disease (CKD) ,Renal Replacement Therapy (RRT) , End Stage Renal Disease (ESRD) , Diabetic Nephropathy , Chronic Glomerulonephritis, Renal Transplantation.

INTRODUCTION

Chronic Kidney Disease (CKD) is one of the most common causes of morbidity and mortality due to renal causes. CKD is classified as per the glomerular filtration rate (GFR). Following the criteria proposed by the National Kidney Foundation, 2002, the CKD is divided into five stages, classified according to the degree of the patient's renal function. The fifth stage of the CKD when the GFR is less than 15 ml/min/ 1.73 m² is called the End Stage Renal Disease (ESRD). While in the first four stages of CKD , the management is mainly conservative , it is the fifth stage where the patient requires renal replacement therapy either in the form of haemodialysis or renal transplantation. ESRD is a major public health problem worldwide and is associated with considerable morbidity and mortality.^{1,2} It has been estimated that the prevalence of ESRD will rise over the next decades, driven by population aging, and increasing prevalence of diabetes mellitus and hypertension .^{3,4} Diabetes Mellitus , Hypertension and Chronic Glomerulonephritis are among the most common Causes of CKD and hence ESRD.

The course of CKD evolves over a period of time with gradual loss of renal function. Ultimately patient progresses to a stage of ESRD where some form of renal replacement therapy becomes mandatory. Transplantation was the first successful modality of renal replacement therapy (RRT) for irreversible chronic kidney disease (CKD; stage 5); however, its broad applicability has been limited by immunologic rejection, adverse effects of immunosuppressant agents, and a relative shortage of available organs. Notwithstanding strong evidence that transplantation is most successful when implemented before onset of long-term dialysis, only 2.5% of patients with ESRD undergo transplantation as initial RRT.^{5,6} Current data indicate recipient and allograft survival benefits for patients who receive a transplant within

the first year of RRT; with each additional year of dialysis therapy, survival is compromised.⁷ It is now well established that early kidney transplantation is associated with optimal outcomes in terms of patient and graft survival.⁸⁻¹⁰ Promising results have made renal transplantation the treatment of choice for majority of patients with ESRD.^{11,12} Today, the biggest challenge in kidney transplantation is organ shortage; hence, using deceased donor is increasingly encouraged although the outcome of living donor kidney transplantation (LDKT) is better than that of deceased donor kidney transplantation (DDKT).

MATERIALS AND METHODS

Aim: To study the clinical and epidemiological profile of End Stage Renal Disease (ESRD) patients undergoing renal transplantation in a tertiary care center.

Study design: This study was conducted at Sher I Kashmir Institute Of Medical Sciences (SKIMS), a tertiary care center in Srinagar , Jammu and Kashmir , India, between July 2013 to September 2015.

Study population

Inclusion criteria : All the patients of ESRD who underwent renal transplantation in this period were included in this study . ESRD was defined on the basis of Modification of Diet In Renal Disease (MDRD) formula¹³ as patients having a GFR of less than 15 ml/min/1.73 m² , bilateral shrunken kidneys on ultrasound and the presence of clinical or biological signs of uremia.

Exclusion Criteria: The patients of ESRD who were on maintenance hemodialysis and did not undergo renal transplantation were not

included in this study.

Consent: An informed consent was taken from all the patients who underwent renal transplantation.

Ethical Clearance : The study was cleared by Institutional Ethics Committee.

Evaluation : 120 patients who were diagnosed with End Stage Renal Disease (ESRD) and underwent renal transplantation were included in this study. All the patients were subjected to detailed history taking and clinical examination. Routine laboratory investigations in the form of Complete Blood count (CBC), Kidney Function Tests (KFT) , Liver Function Tests (LFT) , Serum electrolytes , Ultrasonography (USG) abdomen with pelvis, Electrocardiogram (ECG), Urine routine, were done in all the patients . Special Investigations like Two Dimensional Echocardiography (2-D ECHO) and Renal Doppler were done in all the patients before renal transplantation. Etiological diagnosis was made on the basis of history, clinical examination, and investigations. Records of renal biopsy wherever available were used to make help in diagnosis. Fundoscopic findings were considered as supportive evidence to label diabetic and hypertensive nephropathy. Shrunken kidneys were defined by comparing renal length of patients with reference renal length in Indian literature which takes normal renal length as $as9.66\pm0.65\text{ cm}$.¹⁴

After proper evaluation of all the patients , they were subjected to renal transplantation. All the patients received Living Donor renal transplantation (LDRT)

RESULTS

In our study a total of 120 patients who underwent renal transplantation were enrolled. A total of 86 patients were males (72 %) and 34 patients (28 %) were females with p value < 0.05. There was a male : female ratio of 2.5 : 1. The mean age of the patients undergoing renal transplantation was 40 years. The youngest patient was 18 years old and the eldest was 64 years old. Maximum patients undergoing renal transplantation were in the age group of 31 to 50 years of age (72 patients , 60%).

Table no (1) showing the age distribution of patients

AGE (YEARS)	TOTAL	PERCENTAGE (%)
<20	6	5
21-30	24	20
31-40	42	35
41-50	30	25
51-60	15	12.5
61-70	3	2.5
TOTAL	120	100

A positive history of smoking was present in 58 patients (48 %) and a positive history of alcohol intake was present in only 7 patients (6 %). Majority of these patients (90 patients : 75 %) had history of one or multiple admissions in the past in a state of volume overload. Thus volume overload was the most common cause of morbidity in these patients.

A detailed history and physical examination was followed by laboratory investigations. Values of various laboratory parameters in patients of ESRD are shown in below mentioned tables.

Table no (2) showing serum urea in patients of ESRD

SERUM UREA (mg/dl)	TOTAL NUMBER OF PATIENTS
<40	0
40-80	6
80-120	24
120-160	36
160-200	40
>200	14
TOTAL	120

Table no (3) showing serum creatinine in patients of ESRD

SERUM CREATININE (mg/dl)	TOTAL NUMBER OF PATIENTS
0-4	18
4-8	76
>8	26
TOTAL	120

Table no (4) showing serum calcium in patients of ESRD

SERUM CALCIUM (mg/dl)	TOTAL NUMBER OF PATIENTS
>8	20
6-8	36
4-6	60
<4	4
TOTAL	120

Table no (5) showing serum phosphorus in patients of ESRD

SERUM PHOSPHORUS (mg/dl)	TOTAL NO OF PATIENTS
3- 4.5	38
4.5-6	52
6-8	30
TOTAL	120

Table no (6) showing haemoglobin level in patients of ESRD

HAEMOGLOBIN (gm/dl)	TOTAL NUMBER OF PATIENTS
<5	6
5-8	80
8-11	30
>11	4
TOTAL	120

Table no (7) showing serum potassium level of ESRD patients

SERUM POTASSIUM (mEq/L)	NUMBER OF PATIENTS
<3.5	0
3.5-5.5	82
>5.5	38
TOTAL	120

Table no (8) showing renal size of ESRD patients

RENAL SIZE	NUMBER OF PATIENTS
NORMAL	24
INCREASED	02
DECREASED	94
TOTAL	120

Renal size as measured by renal length is shown in table no (8). A total of 94 patients (78.3 %) had decreased renal size. In 24 patients (20 %) , renal size was normal. These 24 patients had diabetic nephropathy. And 2 patients (1.66 %) had increased renal size. These two patients had autosomal dominant polycystic kidney disease (ADPKD) as the cause of their renal disease.

Table no (9) showing aetiology of ESRD

AETIOLOGY	NUMBER OF PATIENTS
DIABETIC NEPHROPATHY	40
CHRONIC GLOMERULONEPHRITIS	32
HYPERTENSIVE NEPHROSCLEROSIS	28
OBSTRUCTIVE UROPATHY	12
AUTOSOMAL DOMINANT POLYCYSTIC KIDNEY DISEASE (ADPKD)	2
UNKNOWN	6
TOTAL	120

The most common aetiology of ESRD was diabetic nephropathy which was seen in 40 patients (33.3%) followed by chronic glomerulonephritis seen in 32 patients (27 %)

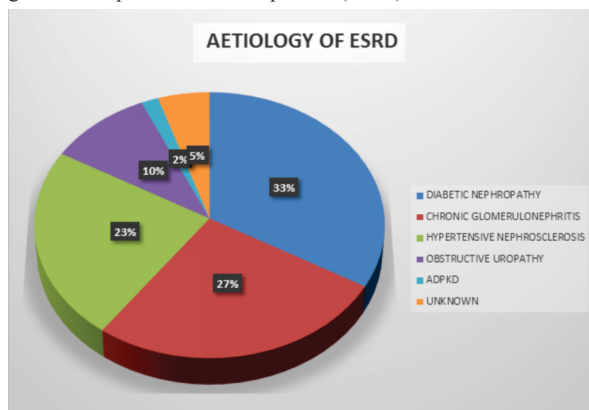


Figure no (1) showing aetiology of ESRD patients

DISCUSSION

Majority of ESRD patients in our study were males (86 patients , 72 %) with a male to female ratio of 2.5 : 1. Our findings are consistent with Rajapurkar et al.,¹⁵ who found that the mean age of ESRD patients was 50.1 ± 14.6 years, with Male :Female ratio of 70:30. Patients from North Zone were younger than those from the East Zone. In our study the most common cause of ESRD was diabetic nephropathy (33%) followed by chronic glomerulonephritis (27 %). This finding is consistent with several studies conducted from time to time which shows the most common cause of ESRD is diabetic nephropathy , not only in India but worldwide. S.K Agarwal et al.¹⁶ concluded in their study that diabetic nephropathy was the most common cause of ESRD in India. The most common presenting symptom in ESRD patients was volume overload . Sandip T. Chaudhar et al.¹⁷ concluded in their study that the most common presenting symptom in the ESRD patients was a state of fluid overload.

Metabolic abnormalities in the form of hypocalcemia , hyperphosphatemia , azotemia and metabolic acidosis were seen in all the patients in various degrees. Bilateral small shrunken kidneys with loss of corticomedullary differentiation (CMD) was seen in majority of the patients (78.3 %). Majority of the patients of diabetic nephropathy had normal sized kidneys. Two patients of Autosomal Dominant Polycystic Kidney Disease (ADPKD) had increased size of kidneys.

Haemoglobin was less than 11g/dl in 116 patients (97 %). McGonigle, Wallin et al.¹⁸ studied 863 patients of ESRD for anemia and found up to 90% of patients to have hemoglobin less than 10 gm/dl.

After proper evaluation of all the patients , they were subjected to renal transplantation. All the patients received living Donor renal transplantation (LDRT)

The early stages of CKD which are managed by conservative methods gradually lead to the development of ESRD. It is therefore necessary to diagnose the patients of CKD in the early and comparatively asymptomatic stage. At these stages it is feasible to slow down the loss of nephrons by controlling the underlying factors like diabetes and hypertension. But once the stage of ESRD sets in , renal transplantation is the preferred modality of renal replacement therapy.

REFERENCES

- Reikes ST. Trends in end-stage renal disease. Epidemiology, morbidity, and mortality. *Postgrad Med.* 2000;108(1):124-6. 129-131, 135-126
- Grassmann A, Gioberge S, Moeller S, Brown G. ESRD patients in 2004: global overview of patient numbers, treatment modalities and associated trends. *Nephrol Dial Transplant.* 2005;20(12):2587-93.
- Peer N, Kengne A-P, Motala AA, Mbanya JC. Diabetes in the Africa region: 2013 update for the IDF diabetes Atlas. 2013.
- Twagirimukiza M, De Bacquer D, Kips JG, de Backer G, Vander Stichele R, Van Bortel LM. Current and projected prevalence of arterial hypertension in sub-Saharan Africa by sex, age and habitat: an estimate from population studies. *J Hypertens.* 2011;29(7):1243-52.
- Ashby VB, Kalbfleisch JD, Wolfe RA, Lin MJ, Port FK, Leichtman AB: Geographic variability in access to primary kidney transplantation in the United States, 1996-2005. *Am J Transplant* 7[Suppl 1]: 1412-1423, 2007
- Meier-Kriesche HU, Port FK, Ojo AO, Rudich SM, Hanson JA, Cibrik DM, Leichtman AB, Kaplan B: Effect of waiting time on renal transplant outcome. *Kidney Int* 58: 1311-1317, 2000
- Meier-Kriesche HU, Kaplan B: Waiting time on dialysis as the strongest modifiable risk factor for renal transplant outcomes: A paired donor kidney analysis. *Transplantation* 74: 1377-1381, 2002
- Gill JS, Tonelli M, Johnson N, Pereira B: Why do preemptive kidney transplant recipients have an allograft survival advantage? *Transplantation* 78: 873-879, 2004
- Mange KC, Joffe MM, Feldman HI: Effect of the use or nonuse of long-term dialysis on the subsequent survival of renal transplants from living donors. *N Engl J Med* 344: 726-731, 2001
- Innocenti GR, Wadei HM, Prieto M, Dean PG, Ramos EJ, Textor S, Khamash H, Larson TS, Cosio F, Kosberg K, Fix L, Bauer C, Stegall MD: Preemptive living donor kidney transplantation: Do the benefits extend to all recipients? *Transplantation* 83: 144-149, 2007
- Wolfe RA, Ashby VB, Milford EL, Ojo AO, Ettenger RE, Agodoa LY, et al. Comparison of mortality in all patients on dialysis, patients on dialysis awaiting transplantation, and recipients of a first cadaveric transplant. *N Engl J Med.* 1999;341(23):1725-30. doi: 10.1056/NEJM199912023412303.
- Al-Wakeel J, Mitwalli AH, Tarif N, Malik GH, Al-Mohaya S, Alam A, et al. Living unrelated renal transplant: outcome and issues. *Saudi J Kidney Dis Transpl.* 2000;11(4):553-8.
- Levey AS ,Greene T ,Kusek J, Beck GL ; MDRD Study Group. Simplified equation to predict glomerular filtration rate from serum creatinine. *J Am Soc Nephrol .* 2000 ; 11:155A
- Muthusami P, Ananthkrishnan R, Santosh P. Need for a nomogram of renal sizes in the Indian population-findings from a single Centre sonographic study. *Indian J Med Res.* 2014; 139(5):686-93.
- Rajapurkar MM, John GT, Kirpalani AL, Abraham G, Agarwal SK, Almeida AF, et al. What do we know about chronic kidney disease in India: First report of the Indian CKD registry. *BMC Nephrol.* 2012; 13(1):10.
- S.K. Agarwal , R.K. Srivastava . Chronic Kidney Disease in India: Challenges and Solutions. *Nephron Clin Pract* 2009;111:c197-c203
- Sandip T. Chaudhari 1 , Ashwin V. Sadavarte and Deodatta Chafekar. Clinical Profile of End Stage Renal Disease in Patients Undergoing Hemodialysis. *MVP Journal of Medical Sciences*, Vol4(1), 8-13, January-June 2017
- Mc Gonigle RJ, Wallin JD, Shaddock RK, Fisher JW. Eryth- ropoietin deficiency and inhibition of erythropoiesis in re- nal insufficiency. *Kidney Int.* 1984; 25:437-44