

**Original Research Article**

# Profile of Chronic Kidney Disease (CKD) patients presenting in a tertiary care center in north India

**Rahul Sudan<sup>1</sup>, Mehroz Ahmed<sup>1\*</sup>, Imtiyaz Ahmed Wani<sup>2</sup>, Muzaffar Maqsood Wani<sup>3</sup>, Khurshid Ahmed Banday<sup>4</sup>, Gunjan Gupta<sup>5</sup>**

<sup>1</sup>Senior Resident, Department of General Medicine, Shri Guru Ram Rai Institute of Medical and Health Sciences, Shri Mahant Indires Hospital (SGRRIMHS, SMIH), Dehradun, Uttarakhand, India


<sup>2</sup>Associate Professor, Department of Nephrology, Sher I Kashmir Institute of Medical Sciences (SKIMS), Soura, Srinagar, Jammu and Kashmir, India

<sup>3</sup>Assistant Professor, Department of Nephrology, Sher I Kashmir Institute of Medical Sciences (SKIMS), Soura, Srinagar, Jammu and Kashmir, India

<sup>4</sup>Professor, Department of Nephrology, Sher I Kashmir Institute of Medical Sciences (SKIMS), Soura, Srinagar, Jammu and Kashmir, India

<sup>5</sup>Senior Resident, Department of Dermatology, Shri Guru Ram Rai Institute of Medical and Health Sciences, Shri Mahant Indires Hospital (SGRRIMHS, SMIH), Dehradun, Uttarakhand, India

\*Corresponding author email: [mirzamehroz786@gmail.com](mailto:mirzamehroz786@gmail.com)

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|   | International Archives of Integrated Medicine, Vol. 5, Issue 8, August, 2018.<br>Copy right © 2018, IAIM, All Rights Reserved.<br>Available online at <a href="http://iaimjournal.com/">http://iaimjournal.com/</a> |
|  | ISSN: 2394-0026 (P)                      ISSN: 2394-0034 (O)  |
|  | Received on: 01-08-2018                      Accepted on: 06-08-2018<br>Source of support: Nil                      Conflict of interest: None declared.  |
| <b>How to cite this article:</b> Rahul Sudan, Mehroz Ahmed, Imtiyaz Ahmed Wani, Muzaffar Maqsood Wani, Khurshid Ahmed Banday, Gunjan Gupta. Profile of Chronic Kidney Disease (CKD) patients presenting in a tertiary care center in north India. IAIM, 2018; 5(8): 72-80. |   |

## Abstract

**Background:** Chronic Kidney Disease (CKD) is one of the most common causes of morbidity and mortality due to renal causes. There are multiple causes of CKD with diabetes, hypertension and chronic glomerulonephritis among the most common causes. All of these causes gradually lead to the final common pathway of End stage renal disease (ESRD). Chronic Kidney Disease (CKD) is defined as Kidney damage for  $\geq 3$  months, as defined by structural or functional abnormalities of the kidney, with or without decreased GFR or  $GFR < 60 \text{ mL/min/1.73m}^2$  for  $\geq 3$  months, with or without kidney damage.

**Aim:** To study the profile of Chronic Kidney disease (CKD) patients presenting in a tertiary care center.

**Materials and methods:** This study was conducted at Sher I Kashmir Institute of Medical Sciences (SKIMS), a tertiary care center in Srinagar, Jammu and Kashmir, India, from July 2013 to January 2016. All the patients of CKD visiting our institute were enrolled in this study. This included patients on follow up at the Out Patient Department (OPD), patients presenting to emergency with complications of CKD, patients referred from other departments who were detected in initial stages of CKD during the routine investigations. A total of 300 patients were enrolled in this study.

**Results:** In our study, a total of 300 patients were enrolled. CKD was more common in males. The most common aetiology of CKD was diabetic nephropathy which was seen in 102 patients (34%) followed by chronic glomerulonephritis seen in 80 patients (27%). Volume overload was the most common cause of morbidity in these patients. Patients in the initial stages of CKD were managed with symptomatic treatment and 230 patients (76.66%) received peritoneal dialysis at some stage of their management. It was in the stage of ESRD that patients were offered some definitive form of renal replacement therapy in the form of renal transplantation or hemodialysis. Out of 160 patients of ESRD, only 12 patients (7.5%) received renal transplantation and the remaining 148 patients (92.5%) were managed with hemodialysis.

**Conclusion:** CKD is one of the leading causes of morbidity and mortality due to renal causes. 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 asymptomatic stages. 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.

## Key words

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

## Introduction

Chronic Kidney Disease (CKD) is one of the most common causes of morbidity and mortality due to renal causes. WHO has identified kidney diseases as 12<sup>th</sup> and 17<sup>th</sup> major cause of death and disability worldwide, respectively [1]. A recent study estimated that age-adjusted incidence rate of CKD in India is 229 per million populations, and more than 100,000 new patients enter renal replacement program every year in India [2, 3].

There are multiple causes of CKD with diabetes, hypertension and chronic glomerulonephritis among the most common causes. All of these causes gradually lead to the final common pathway of End stage renal disease (ESRD), and this syndrome is characterized by hypertension, anemia, renal bone disease, impaired quality of life, and reduced life expectancy. 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. ESRD is a major public health problem worldwide and is associated with considerable morbidity and mortality [4, 5]. 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 [6, 7].

Chronic Kidney Disease (CKD) is defined as Kidney damage for  $\geq 3$  months, as defined by structural or functional abnormalities of the kidney, with or without decreased GFR or  $\text{GFR} < 60 \text{ mL/min/1.73m}^2$  for  $\geq 3$  months, with or without kidney damage. GFR (glomerular filtration rate) is generally accepted as the best overall index of kidney function. Decreased GFR implies a  $\text{GFR} < 60 \text{ mL/min/1.73 m}^2$  for three months, with or without kidney damage [8].

## Criteria for diagnosis of CKD

Either of these (1 or 2) should be present for more than or equal to three months:

1. Markers of Kidney damage:

- A. Albuminuria > 30 mg/day.
- B. Urine sediment abnormalities e.g. hematuria, red cell casts etc.
- C. Electrolytes and other abnormalities due to tubular disorders.
- D. Structural abnormalities detected by imaging.
- E. History of Kidney Transplantation.

2. GFR < 60 ml/minute/1.73 m<sup>2</sup>

The most commonly used equations for the estimation of GFR are

- Cockcroft Gault formula
- MDRD formula (Modification of diet in renal disease study)

### Classification of CKD

CKD is classified based on cause, GFR category, and albuminuria category. The cause of CKD is assigned based on presence or absence of underlying systemic diseases and location of known or presumed pathologic abnormalities.

GFR category is assigned as G1 (>90 ml/min/1.73m<sup>2</sup>), G2 (60-89 ml/min/1.73m<sup>2</sup>), G3a (45-59 ml/min/1.73m<sup>2</sup>), G3b (30-44 ml/min/1.73m<sup>2</sup>), G4 (15-29 ml/min/1.73m<sup>2</sup>) and G5 (<15 ml/min/1.73m<sup>2</sup>).

Albuminuria categories are A1 (<30 mg/24hr), A2 (30-300 mg/24hr) and A3 (>300 mg/24hr).

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 hemodialysis or renal transplantation.

### Materials and methods

**Aim:** To study the profile of Chronic Kidney disease (CKD) patients presenting 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, from July 2013 to January 2016.

### Study population

**Inclusion criteria:** All the patients CKD visiting our institute were enrolled in this study. This included patients on follow up at the Out Patient Department (OPD), patients presenting to emergency with complications of CKD, patients referred from other departments who were detected in initial stages of CKD during the routine investigations. CKD was defined by criteria set by National Kidney Foundation. Kidney Disease Outcome Quality Initiative for diagnosing CKD [8]. GFR was calculated on the basis of Modification of Diet In Renal Disease (MDRD) formula.

**Exclusion criteria:** Patients below the age of 18 years, CKD with malignancy and liver disorders, were not included in this study. Those patients of CKD who were already registered for renal transplantation and were awaiting renal transplantation were also excluded from this study as these patients were fixed to receive a particular type of treatment.

**Consent:** An informed consent was taken from all the patients.

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

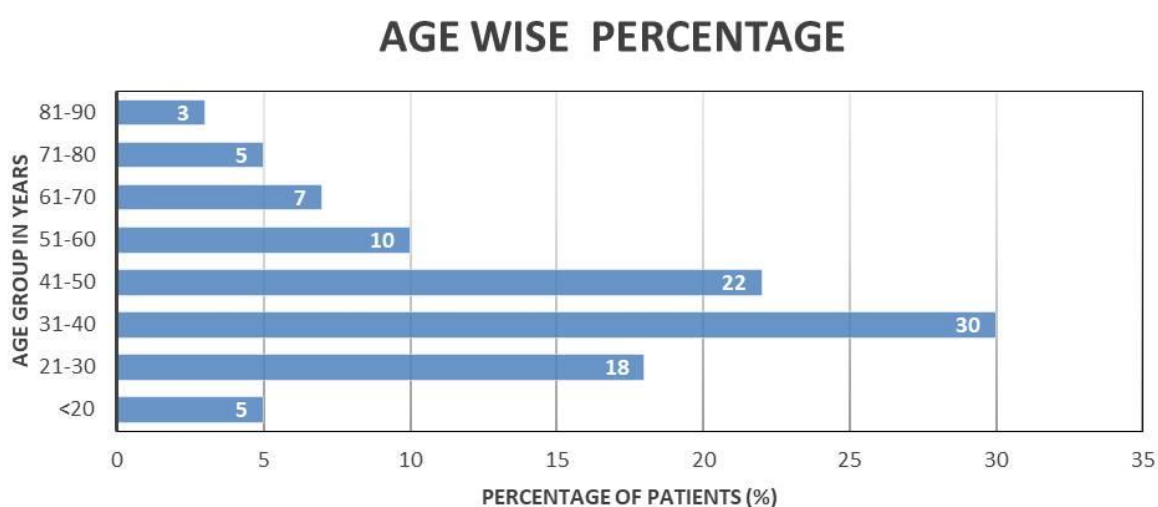
**Evaluation:** A total of 300 patients were enrolled in this study. All the patients were subjected to detailed history taking and clinical examination. Routine laboratory investigations in the form of Complete Blood count (CBC), Kidney Function Tests (KFT), Liver Function Tests (LFT), Serum electrolytes, 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  $9.66 \pm 0.65$  cm [9]. Once the patients were labelled with CKD, they were further categorized in to different stages of the CKD on the basis of GFR. These patients were observed for their epidemiological profile, clinical features, progression of renal disease, aetiology of CKD, and the treatment modality received.

## Results

In our study, a total of 300 patients were enrolled. A total of 198 patients were males (66%) and 102 were females (34%). There was a male: female ratio of 1.94: 1. The youngest patient was 18 years old and the eldest was 86 years of age. The mean age at presentation was 52 years. Majority of the patients were in the age group of 31 to 50 years (**Figure – 1**).

**Figure – 1:** Age distribution of patients in years.



A positive history of smoking was present in 144 patients (48%) whereas a positive history of alcohol intake was present in 24 patients (8%).

investigations. Values of various laboratory parameters in patients of CKD were as per **Table – 1** to **Table - 6**.

**Table – 1:** Serum urea of CKD patients.

| Serum urea ( mg/dl) | Total no. of patients |
|---------------------|-----------------------|
| <40                 | 5                     |
| 40-80               | 15                    |
| 80-120              | 60                    |
| 120-160             | 90                    |
| 160-200             | 100                   |
| >200                | 30                    |
| Total               | 300                   |

Majority of the patients (240 patients: 80%) had history of one or multiple admissions in the past in a state of volume overload. Thus volume overload was the most common presenting symptom in these patients. A detailed history and physical examination was followed by laboratory

**Table – 2:** Serum creatinine of CKD patients.

| Serum creatinine (mg/dl) | Total no. of patients |
|--------------------------|-----------------------|
| 0-4                      | 48                    |
| 4-8                      | 196                   |
| >8                       | 56                    |
| Total                    | 300                   |

**Table – 3:** Serum calcium of CKD patients.

| Serum calcium (mg/dl) | Total no. of patients |
|-----------------------|-----------------------|
| >8                    | 50                    |
| 6-8                   | 88                    |
| 4-6                   | 152                   |
| <4                    | 10                    |
| Total                 | 300                   |

**Table – 4:** Serum phosphate level of CKD patients.

| Serum phosphate (mg/dl) | Total no. of patients |
|-------------------------|-----------------------|
| 3-4.5                   | 92                    |
| 4.5-6                   | 126                   |
| 6-8                     | 82                    |
| Total                   | 300                   |

**Table – 5:** Serum potassium level of CKD patients.

| Serum potassium (mEq/L) | No. of patients |
|-------------------------|-----------------|
| <3.5                    | 0               |
| 3.5-5.5                 | 178             |
| >5.5                    | 122             |
| Total                   | 300             |

**Table – 6:** Hemoglobin level of CKD patients.

| Haemoglobin (gm/dl) | Total no. of patients |
|---------------------|-----------------------|
| <5                  | 15                    |
| 5-8                 | 148                   |
| 8-11                | 108                   |
| >11                 | 29                    |
| Total               | 300                   |

**Table – 7:** Renal size of CKD patients.

| Renal size | No. of patients |
|------------|-----------------|
| Normal     | 74              |
| Increased  | 6               |
| Decreased  | 220             |
| Total      | 300             |

**Table – 8:** Aetiology of CKD patients.

| Aetiology  | No. of patients |
|--|-----------------|
| Diabetic nephropathy                                 | 102             |
| Chronic glomerulonephritis                           | 80              |
| Hypertensive nephrosclerosis                         | 70              |
| Obstructive uropathy                                 | 26              |
| Autosomal dominant polycystic kidney disease (ADPKD) | 6               |
| Unknown  | 16              |
| Total  | 300             |

Renal size as measured by renal length is shown in **Table - 7**. A total of 220 patients (73.33%) had decreased renal size. In 74 patients (24.66%), renal size was normal. These 74 patients had diabetic nephropathy and 6 patients (2%) had increased renal size. These six patients

had autosomal dominant polycystic kidney disease (ADPKD) as the cause of their renal disease.

**Table – 9:** Number of patients in various stages of CKD.

| Stage of CKD   | No. of patients | %     |
|----------------|-----------------|-------|
| Stage 1        | 10              | 3.33  |
| Stage 2        | 18              | 6     |
| Stage 3        | 36              | 12    |
| Stage 4        | 76              | 25.33 |
| Stage 5 (ESRD) | 160             | 53.33 |
| Total          | 300             | 100   |

The most common aetiology of CKD was diabetic nephropathy which was seen in 102 patients (34%) followed by chronic glomerulonephritis seen in 80 patients (27%) as per **Table – 8, Figure – 2**.

It was seen that majority of the patients were in the advanced stages of the disease with 160 patients (53.33%) of ESRD (**Table – 9**).

Patients in the initial stages of CKD were managed with symptomatic treatment and 230 patients (76.66 %) received peritoneal dialysis at some stage of their management. It was in the stage of ESRD that patients were offered definitive form of renal replacement therapy in the form of renal transplantation or hemodialysis. Out of 160 patients of ESRD, only 12 patients (7.5%) received renal transplantation and the remaining 148 patients (92.5%) were managed with hemodialysis. All these 12 patients received living Donor renal transplantation (LDRT) as per **Figure - 3**.

## Discussion

In our study, a total of 300 patients were enrolled. A total of 198 patients were males (66%) and 102 were females (34%) with a Male: Female ratio of 1.94: 1. CKD was more common in males. This is consistent with various studies done on the same topic [10, 11]. Male predominance of CKD probably reflects the faster decline in GFR in males as compared to



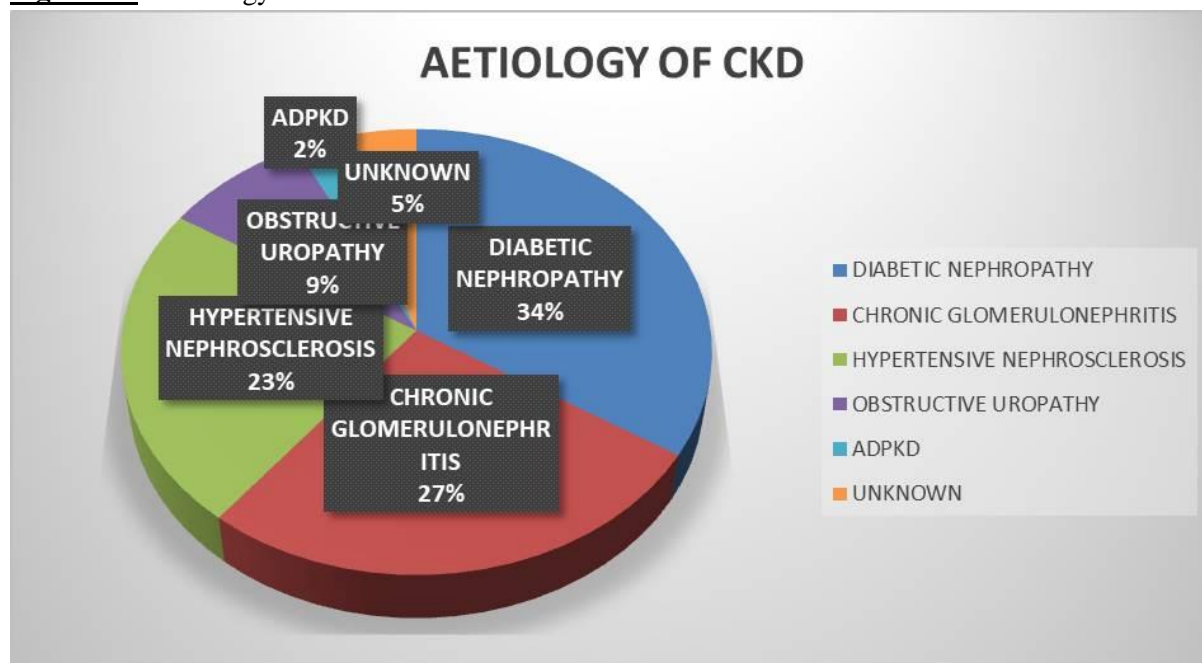
females due to hormonal influence [12, 13]. The mean age at presentation was 52 years.

A positive history of smoking was present in 144 patients (48%) whereas a positive history of alcohol intake was present in 24 patients (8%).

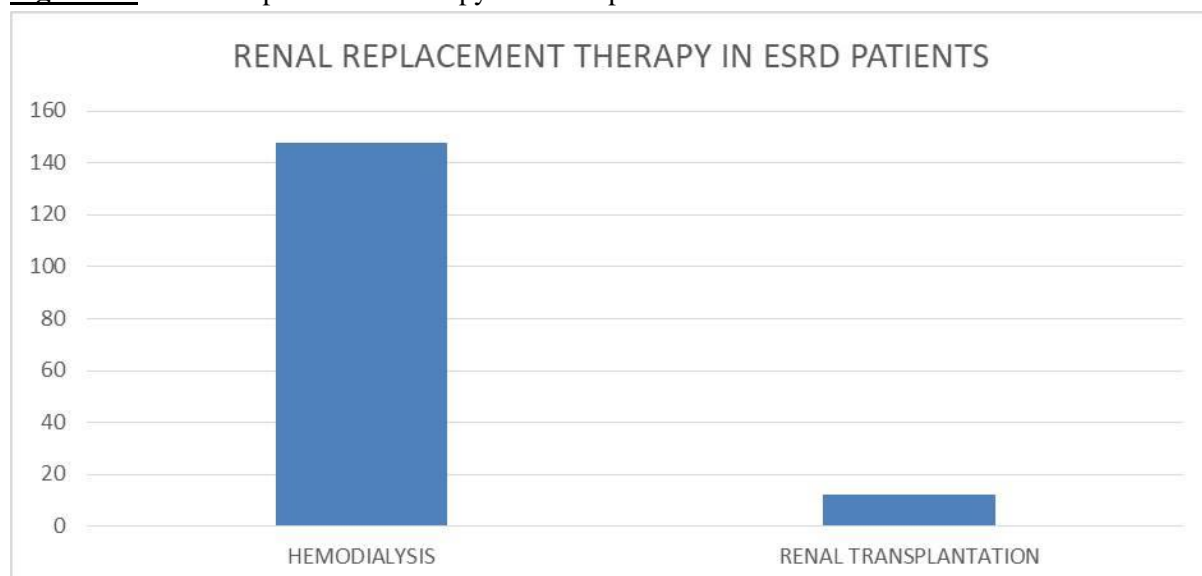
The most common aetiology of CKD was diabetic nephropathy which was seen in 102

patients (34%) followed by chronic glomerulonephritis seen in 80 patients (27%). This is consistent with the results of study conducted by Dash and Agarwal at the All India Institute of Medical Sciences [14]. In the study conducted by Xue, et al. the number of patients with diabetic nephropathy were almost 50% of the study groups [15].

**Figure – 2:** Aetiology of CKD.



**Figure – 3:** Renal Replacement Therapy in ESRD patients.



Volume overload was the most common presenting symptom in these patients. Sandip T. Chaudhar, et al. [16] concluded in their study that the most common presenting symptom in the CKD 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) were seen in majority of the patients (73.3%). Majority (72.5%) of the patients of diabetic nephropathy had normal sized kidneys. Six patients of Autosomal Dominant Polycystic Kidney Disease (ADPKD) had increased size of kidneys.

Haemoglobin was less than 11g/dl in 271 patients (90.33%). McGonigle, Wallin, et al. [17] studied 863 patients of ESRD for anemia and found up to 90% of patients to have hemoglobin less than 10 gm/dl.

It was seen that majority of the patients were in the advanced stages of the disease with 160 patients (53.33%) in the stage of ESRD.

Patients in the initial stages of CKD were managed with symptomatic treatment and 230 patients (76.66%) received peritoneal dialysis at some stage of their management. It was in the stage of ESRD that patients were offered some definitive form of renal replacement therapy in the form of renal transplantation or hemodialysis. Out of 160 patients of ESRD, only 12 patients (7.5%) received renal transplantation and the remaining 148 patients (92.5%) were managed with hemodialysis. All these 12 patients received living Donor renal transplantation (LDRT). This clearly showed that major proportion of the ESRD patients does not get renal transplantation early in the course of their disease. This can be attributed to non-availability of donors and long waiting list of recipients.

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. 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 [18]. It is now well established that early kidney transplantation is associated with optimal outcomes in terms of patient and graft survival [19-21]. Promising results have made renal transplantation the treatment of choice for majority of patients with ESRD [22, 23]. 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).

## **Conclusion**

CKD is one of the leading causes of mortality and morbidity due to renal causes. 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 asymptomatic stages. 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.

## **Acknowledgement**

We acknowledge with warm thanks the cooperation of all the patients for agreeing for enrolment. Sincere thanks to attending physicians of our institute for their valuable support.

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