

# Diabetes Mellitus Among Renal Failure Patients

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**Abstract:** Diabetes mellitus is one of the leading causes of diabetic nephropathy around the world. Diabetic nephropathy is strongly associated with macro vascular complications and is responsible for many deaths due to renal failure. According to the report of the United States Renal Data System (2015), the incidence of diabetic nephropathy is 334 per million of the US population per year [1]. The present study was conducted with an aim to find out relation between diabetes mellitus and renal failure among End Stage Renal Disease (ESRD) patients. Seventy patients, undergoing maintenance hemodialysis, were selected from a local hospital of Jaipur city, Rajasthan, for which purposive sampling, irrespective of sex was followed. The data related to demographic profile, anthropometric measurements, lifestyle and medical history was collected using an interview schedule. The results revealed 35.7% of patients suffering from renal failure had a medical history of diabetes mellitus, of which, half of them also had hypertension (17.1%). Besides this, 47% of the patients were hypertensive and had associated problems viz. glomerulonephritis, polycystic kidney disease, medication errors and post-surgery effect that led to renal failure. It was also observed that 4 patients achieved normal blood sugar levels when they were put on hemodialysis. Thus, study concludes that diabetes mellitus is the second major cause for renal failure after hypertension and dialysis therapy can bring the blood sugar levels back to normal.

**Key words:** Diabetes mellitus, Diabetic nephropathy, ESRD, Glomerulonephritis, Hypertension, Renal failure

## Introduction

Chronic kidney disease (CKD) is a risk factor for ESRD [2]. It is associated with an increased risk for mortality due to cardiovascular disease and the risk doubles in the patients with both, hypertension and diabetes [3]. In India, incidence rate of ESRD has been estimated to be 229 per million population. There are rising incidences of CKD that are likely to pose major problems for both healthcare and the economy in future years [4]. It is becoming more common due to increased cases of diabetes, hypertension and obesity in ageing population in India [5]. The approximate prevalence of CKD is 800 per million population and incidence of ESRD is 150-200 per million population [6].

The population of India crossed one billion and is projected to become the major reservoir of chronic diseases, like diabetes and hypertension. With 25–40% of these subjects likely to develop CKD, the ESRD burden will rise, and the more economy would need to take care of these individuals. The treatment of ESRD is very expensive, which indirectly increases economic burden on the family, as well as, on the country. This disease results in poor quality of life in many ways. The present study provides incidence of ESRD in Jaipur, and determines the contribution of diabetes mellitus to ESRD. Further, an effort has been made to assess the nutritional status of ESRD patients undergoing hemodialysis.

## Methodology

The present study was conducted in Jaipur city, Rajasthan. The data was collected from the dialysis unit of Fortis Escorts hospital, Jaipur. The study constituted 70 CKD stage V patients (ESRD), selected using purposive sampling technique. The sample included patients undergoing maintenance hemodialysis (twice or thrice per week from at least last 1 to 4 years), having  $GFR \leq 15 \text{ ml/min/1.73m}^2$  and were willing to participate in the study. Consent forms were filled by the patients before including them as subjects.

To gather the information regarding general profile, anthropometric measurements, dietary and lifestyle pattern and medical history, an interview schedule was prepared and validated with the help of biostatistician. The section general information included patient's name, age, sex, religion, education, occupation and marital status. Anthropometric data related to height, body weight, hip circumference and waist circumference of the patients, was collected using standard tools and techniques. From the collected data, Body Mass Index (BMI) and Waist Hip Ratio (WHR) were calculated [7], [8]. Dietary and life style data included dietary habits of the selected patients, their activity pattern and smoking and alcohol consumption habits. In the present study, Centers for Disease Control and Prevention (CDC) Atlanta tool (2008) was used for measuring the physical activity of the patients[9]. Medical information was collected from the patients themselves regarding duration of the disease, etiology and frequency of the dialysis in a week. Process of data collection was started after taking permission from the ethical committee of the hospital.

## Results and discussion

The findings of the present study, carried out on 70 patients suffering from CKD stage V (ESRD), have been presented under following sub heads – general profile, anthropometric measurements, lifestyle pattern and medical history.

### General Profile

General profile of the selected patients included information related to their age, sex, religion, occupation and marital status.

**Table 1: Demographic characteristics of the ESRD patients on dialysis**

Characteristics	Number of patients (n=70)
<b>Age (years)</b>	
25-50	16(22.8)
50-70	48(68.6)
70-80	6 (08.6)
<b>Gender</b>	
Male	52 (74.3)
Female	18 (25.7)
<b>Religion</b>	
Hindu	66 (94.3)
Muslim	3 (4.3)
Christian	1 (1.4)
<b>Occupation</b>	
Government job	26(37.1)
Private job	7(10.0)
Business	11(15.7)
Agriculture	1(1.4)
Self employed	3(4.3)
Home makers	15(21.4)
Unemployed/ Retired	7(10.0)
<b>Marital status</b>	
Married	61(87.1)
Unmarried	5(7.2)
Widow/Widower	4(5.7)

Figures in parentheses denote percentages.

Table 1 shows age wise distribution of the selected ESRD patients, where majority of the patients (68.6 %) were in the age range of 50 to 70 years, indicating higher prevalence of CKD stage V in the middle and older age population. The percentage of male patients (74%) was nearly three times more than their female counterparts (26%). Anupama and Uma (2014), too reported 38 per cent of the subjects in the age range of 50-69 years, and higher percentage of males (58.7%) suffered from CKD than females(41.3%)[10].Data on religion and caste revealed majority of them to be Hindus (94.3%) and around 84% of the patients to be from general category. Occupation data showed majority of them (37.1%) to be in the government jobs. Most of the patients were educated up to post graduate level (31.4%) or up to graduate level(24.3%). Out of 70 patients, 87.1 % were married.

### Anthropometry

Height (cm), weight (kg), and waist and hip circumferences (cm) of the selected patients were measured, using standard tools and techniques. On the basis of these measurements, BMI ( $\text{kg}/\text{m}^2$ ) and WHR were calculated (Table 2).

**Table 2. Mean height, weight, BMI and WHR of the selected ESRD patients**

Anthropometric measurements	Renal patients on dialysis(n=70)	
	Male (n=52)	Female (n=18)
Height (cm)	169.81±7.78	157.22±3.10
Weight (kg)	67.33±14.33	59.64±13.97
BMI ( $\text{kg}/\text{m}^2$ )	23.42±4.37	24.20±5.80
Waist circumference (cm)	35.54±7.51	36.30±8.40
Hip circumference (cm)	39.35±6.04	39.68±7.03
Waist hip ratio	0.90±0.09	0.90±0.07

Mean values±SD

Mean height and weight values of the patients were found to be more among male patients in comparison to their female counterparts (Table 2).On the other hand, mean BMI and waist circumference values were slightly more in females.Waist hip ratio, however,was almost similar in patients of both the groups (Table 2).The percentage of female patients having waist hip ratio, above cut off range, was much more (89%) in comparison to male patients (19.2%).According to Koning et al. (2007), waist hip ratio (WHR) is considered to be a better index of renal risk than BMI. It gives an assessment of abdominal obesity[11].

### Lifestyle and dietary history

Data on lifestyle and dietary history included smoking habits, alcohol consumption habits, dietary habits and activity pattern of the patients, before they were diagnosed with CKD.

**Table 3: Frequency distribution of the renal failure patients on the basis of their lifestyle pattern**

Lifestyle habits	Number of patients
<b>Smoking habit</b>	17 (24.3)
<b>Alcohol consumption habit</b>	16 (22.8)
<b>Dietary habits</b>	
Vegetarian	38 (54.3)
NonVegetarian	24 (34.3)
Eggetarian	08 (11.4)
<b>Physical activity</b>	
<b>Yes</b>	23 (32.9)
Light Activity *	17 (73.9)
ModerateActivity**	4 (17.4)
VigorousActivity***	2(08.7)

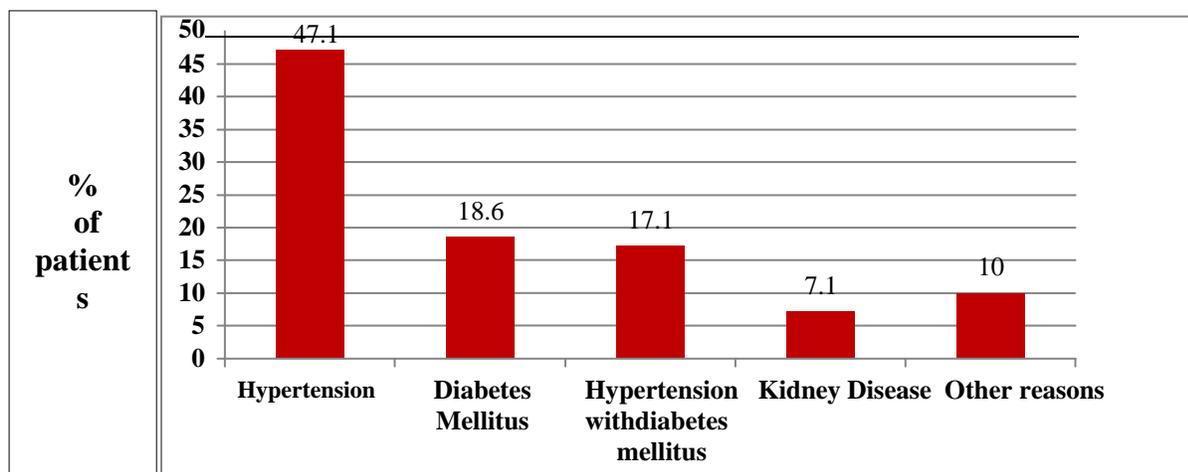
Figures in parentheses denote percentages.

\* Light activity –walking and stretching. \*\*Moderate activity –brisk walk, yoga, games.\*\*\* Vigorous activity–running.

The data presented here is about smoking and alcohol consumption habits of 70 ESRD patients before they were diagnosed with the disease. Out of total selected ESRD patients, around 24% were in the habit of smoking and consuming alcohol (23%) (Table 3). The data on dietary habits of the patients revealed around 54% of them to be vegetarian. Knowledge related to renal diet for patient on dialysis showed low scores among 75% of the patients and their attendants. The data on physical activities revealed nearly 1/3<sup>rd</sup> of the selected patients(33%)to be involved in varied types of physical activities, at least 4 to 5 times in a week (Table3).

### Medical history

The data on medical history of the ESRD patients showed that around 47% of the patients had hypertensive nephropathy, signifying hypertension to be one of the common risk factors for renal failure. After hypertensive nephropathy, diabetic nephropathy (18.6%) was found to be the second prevalent cause for renal failure. Another 17 % patients were found to have both hypertension and diabetes mellitus (Figure 1).

**Figure 1: Percentage of renal failure patients diagnosed with other medical problems**

Other factors for renal failure included reasons like, congenital, medication error, surgery and severe medical illnesses (10%). Kidney diseases like, kidney stones and glomerulonephritis, which were found to have caused renal failure in nearly 7% of the patients(Figure 1). Atkins (2005) reported both, diabetes and hypertension, to be the major causal factors for ESRD[12].

Further, data on medical history revealed that out of total diabetic patients(25), 52% patients had only diabetes mellitus (DM) and another 48% patients had diabetes along with hypertension. Out of all the diabetic patients,4 patients showed normal sugar levels, after they were placed on maintenance hemodialysis.

## Conclusion

It was concluded from the study that diabetic nephropathy was the second leading cause for renal failure, hypertension being the first. It was also concluded that after placing the patient on maintenance hemodialysis, elevated blood sugar levels may return to normal levels. These patients do not need further treatment for diabetes. It can also be concluded that the females who had diabetic nephropathy had WHR beyond the cut off range.

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