

## ORIGINAL ARTICLE

## SURVIVAL ANALYSIS OF DIALYSIS PATIENTS IN SELECTED HOSPITALS OF LAHORE CITY

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**Background:** There are several reasons which are directly or indirectly relate to affect the survival time of End Stage Renal Disease (ESRD) patients. This study was done to analyse the survival rate of ESRD patients in Lahore city, and to evaluate the influence of various risk factors and prognostic factors on survival of these patients. **Methods:** A sample of 40 patients was taken from the Jinnah Hospital Lahore and Lahore General Hospital by using the convenience sampling technique. The Log Rank Test was used to determine the significant difference between the categories of qualitative variables of ESRD patients. Multivariate Cox Regression Analysis was used to analyse the effect of different clinical and socio-economic variables on the survival time of these patients. **Results:** Different qualitative variables like: age, marital status, BMI, comorbid factors, diabetes type, gender, income level, place, risk factor like diabetes, ischemic heart disease, hypertension and Hepatitis status were analysed on the basis of Log Rank Test. While age and comorbid factors were found to be statistically significant which showed that the distribution of age and comorbid factors were different. By using the Cox Regression analysis the coefficient of Mass, serum albumin and family history of diabetes were found to be significant. **Conclusions:** There were some of the factors which had been taken for the analysis came out less or more significant in patients of ESRD. So it was concluded that mostly clinical factors which were Mass of the Patient, Serum Albumin and Family History of Diabetes made significant contribution towards the survival status of patients.

**Keywords:** End Stage Renal Disease, Comorbidity, Family History of Diabetes (FHDiab)

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## INTRODUCTION

Chronic kidney disease (CKD) is explained by reduction in the glomerular filtration rate (GFR) or the presence of proteinuria. The severity of chronic kidney disease is classified from 1 to 5 depending upon the level of glomerular filtration rate (GFR).

There are five classifications of Chronic Kidney Disease. In first stage of CKD the range of glomerular filtration rate (GFR) is  $\geq 90$  mL/min+ proteinuria (Normal or increase GFR). In second stage of CKD the range of GFR is 60–89 mL/min+ proteinuria (Mildly decreased GFR). In the third stage of CKD the range of GFR is 30–59 mL/min (moderate reduction in GFR). In the fourth stage of CKD the range of GFR is 13–29 mL/min (severe reduction in GFR). In the fifth stage of CKD the range of GFR is  $< 15$  mL/min.<sup>1</sup>

Dialysis is a treatment through which the toxic substances (impurities or wastes) from the blood are removed when the kidneys are unable to remove this substances.<sup>2</sup> There are two types of dialysis: 1) Haemodialysis, and 2) Peritoneal dialysis. When kidneys do not perform their functions such as they are not able to remove the waste from the blood they are called to be failing. There are some most common reasons of kidney failure: 1) Diabetes 2) High blood pressure 3) Cardiovascular disease.<sup>2</sup> Generally the closely related factors which affect the

survival rates of the kidney failure patients are diabetes, blood pressure and heart diseases.<sup>3-5</sup>

The objective of this study was to compare the survival distribution of the different qualitative variables related to the End Stage Renal Failure Patient and further to check the effect of hazard on the patients and to determine the newly factors which can affect the survival rate of the patients, for different clinical variables.

## MATERIAL AND METHODS

A sample of 40 patients of End Stage Renal Disease (ESRD) on dialysis treatment was conveniently selected from two hospitals of Lahore, i.e., Jinnah Hospital Lahore and Lahore General Hospital. All the patients were followed up during the study duration of 122 days. According to the Survival Analysis Study we have option to fix the time for the study or wait until the fix numbers of events occur further there would be randomness for the entry time of the patients, so this study is time fixed study and is representative for the 122 days. Questionnaire on kidney dialysis was used to collect the primary data from the patients.

This paper contains the analysis of survival data by using survival analysis techniques Log Rank Test and Cox Regression model. Log Rank Test was used at 5% level of significance to compare the survival distributions of variables: Age and

Comorbid Factors. Whereas the variables, i.e, age was taken as age $\leq$ “50” years and age“>50” years and comorbid factors as “None”, “PVD”, “Hypertension(comorbid)”, “Chronic Respiratory Disease”, “Hepatitis”, “Diabetic (Comorbid)”, “IHD (Ischemic Heart Disease)” and “More than one Diseases”, and for the multivariate analysis the semi parametric technique Cox Regression Model was applied to predict the survival time in days. Odds ratios with 95% confidence interval were calculated to find the estimated hazard in variables related to ESRD. Data were analysed through SPSS.

**RESULTS**

The Table-1 shows the classification of age as “ $\leq$ 50 years” and “>50 years” in the entire sample of 40 observations. Patients having Age  $\leq$ 50 years are 17 which are less than the patients having Age >50 years. The survival distributions of age groups were found significantly different ( $p<0.05$ ) by the Log Rank (Mantel-Cox). Test as we can see by the number of events occurred in the age >50 years group. Further table-1 shows the occurrence of events in different groups of comorbid disease. Most of the patients are with more than one disease that is 12 in number, and most of the events have occurred in this group which is 4 in numbers. After that Peripheral Vascular Disease (PVD) and Chronic Respiratory Disease are also comorbid factors which are most common in the patients. So the PVD and Chronic Respiratory Disease could be most dangerous comorbid factors for the patients. The survival distributions of comorbid factors groups were found significantly different ( $p<0.05$ ) by the Log Rank (Mantel-Cox) Test. This result shows that survival distributions of all the groups of comorbid factors are significantly different by the survival status of each group.

The table-2 of Cox regression shows the predictive model coefficient; the Cox regression forward stepwise likelihood ratio was applied for the selection of the variables and goodness of fit of the Cox regression model was examined by omnibus test ( $p<0.05$ ) that showed model was good fit. Further the Odds Ratios with 95% CI was calculated. The Cox regression model table shows the Odds Ratio for the Mass means that the hazard for the patients is 11.7% less with the increase in the one unit of the Mass. The reference has been fixed for the first category for each categorical/qualitative variable. Odds Ratio for the SALB (Serum Albumin) is creating much more hazard. Whereas the category of Family history of diabetes that is “yes” for the patient’s family history status is hazard with respect to the family history of diabetes (1) which is “unknown” category and less hazard with respect to the family history of diabetes (2) “no” category.

**Table-1: Survival distribution comparison of variable’s groups by Log Rank (Mental-Cox) Test**

Variable	Total	Survive	No of Events	p
<b>Age</b>				
$\leq$ 50 years	17	16	1	.012
>50 years	23	15	8	
Total	40	31	9	
<b>Comorbid Factors</b>				
None	12	12	0	.008
PVD	5	3	2	
Hypertension (Comorbid)	1	1	0	
Chronic Respiratory Disease	2	0	2	
Hepatitis	6	5	1	
Diabetic (Comorbid)	1	1	0	
IHD	1	1	0	
More than one diseases	12	8	4	
Total	40	31	9	

**Table-2: Cox Regression Analysis, Coefficient, Odds Ratios and 95% CI**

Variables	Beta	p	Odds Ratio	95% C.I
Mass	-0.125	0.026	0.883	0.791–0.985
Serum Albumin	2.694	0.024	14.796	1.420–154.19
Family History of Diabetes		0.002		
Family History of Diabetes (1)	-7.538	0.000	0.001	0.000–0.036
Family History of Diabetes (2)	-4.849	0.005	0.008	0.000–0.229

**DISCUSSION**

The present study was carried out to assess these factors in the selected hospitals of Lahore City. We found that family history of diabetes ( $p<0.05$ ) contributed less risk to the survival of the patients, and serum albumin level ( $p<0.05$ ) showed the great risk to the survival of the patients. The socio-economic and family history of smoking habit and family history of heart disease were analysed through Cox regression model but in this study these variables did not contribute significantly to the survival status of the patients. Other studies so many factors related to dialysis patients were assessed in terms of psycho-social factors, gender, diabetes mellitus (DM), hypertension, peripheral vascular disease, cerebrovascular disease, Ischemic heart Disease, chronic obstructive pulmonary disease, smoking habit and cancer, previous history of diabetes, age >55 years at start of haemodialysis treatment and laboratory variables like serum albumin.<sup>6-9</sup>

A study<sup>10</sup> also analysed that the increasing mortality rate of the dialysis patients is not due to the declining quality of dialysis treatment but rather is a consideration of accepting patients with older age and comorbid factor. So in this study we analysed that the survival distributions of these two variables age and comorbid factors were compared to assess the survival rate of the patients, for this the Log Rank Test was used it was found that age group >50 years significantly differ from the age group  $\leq$ 50 years. In

similar way the comorbid factor group patients with more than one disease is significantly different from rest of the categories of comorbid factor variable.

Influence of obesity on the survival in ESRD patients as linked to dialysis modality it was concluded in a study that any survival advantage associated with obesity among chronic dialysis patients is significantly less in peritoneal dialysis patients as compared to haemodialysis patients.<sup>11</sup> We took both the variables Mass and Body Mass Index of the patients after analysing the Cox regression model we found that Mass of the patient is not contributing significantly in survival of the haemodialysis patients and showed 11.7% less hazard.

## CONCLUSIONS

By analysing the whole clinical data it was concluded that there were some factors such as Mass, Serum Albumin and Family History of Diabetes which were taken for the analysis.

They came out to be less and more significant factors in the patients of ESRD. Whereas the family history of diabetes and mass of the patients showed less hazard and Serum Albumin showed great hazard in the survival of the patients with respect to survival time. And variable age as older age >50 and comorbid factor having more than one disease group showing significantly difference in the survival rate of the patients.

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