ORIGINAL RESEARCH PAPER

Medicine

EVALUATION OF FACTORS INFLUENCING SURVIVAL AMONGST PATIENTS ON MAINTAINENCE HAEMODIALYSIS

KEY WORDS: Survival Pattern, Esrd, Risk Factors, Albumin, Creatinine

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ABSTRACT

INTRODUCTION- Survival of patients on hemodialysis depend upon multiple risk factors. Common independent predictors of survival are age, race, serum albumin at the start of dialysis, activity level at the start of dialysis, and presence of certain comorbidities such as heart failure and cancer. The present study was thus conducted to assess the factors influencing survival among patients on maintenance haemodialysis.

METHODOLOGY- The study was conducted as a prospective study in Department of Medicine, Gandhi Medical College and associated Hamidia Hospital, Bhopal for a period of 2 year on 100 patients with ESRD. All adult patients with ESRD who survived first 3 months on maintenance hemodialysis and consenting for the study were included in the study. Detailed data pertaining to causes and risk factors of CKD, clinical conditions of patients at initiation and last session of dialysis and treatments given was obtained and entered in questionnaire. Patients were followed up at 4 monthly interval for a total duration of 2 years and survival was noted. Data was compiled using Ms Excel and analysed using SPSS software version 20.

RESULTS- Overall mortality in present study was documented to be 34% and mean survival time was observed to be 2.4 (CI-2.248-2.605) years. Mortality was significantly higher in patients with hypertension, severe anemia, hypalbuminemia, hypocalcemia, hyperphosphatemia, hypercholesterolemia, diabetic, high grade urea and creatinine, hypernatremia, hyperkalemia, diabetes and infections ($p<0.05$).

CONCLUSION- The present study documented overall mortality of 34% and the mean survival time was 2.4 (CI-2.248-2.605) years following initiation of dialysis.The risk factors associated with increased mortality were hypertension, severe anemia, severely deranged liver, lipid and renal profile ($p<0.05$). Also diabetes, anemia, infections and hypertension ($p<0.05$) were poor predictors of survival and were significantly associated with mortality.

INTRODUCTION-

Chronic kidney disease is considered as a general term for heterogeneous disorders which affect the structure as well as functions of the kidney. It is characterized by kidneys failure i.e. failure to function properly above 50% of their normal capacity. If glomerular filtration rate became <15 mL/min/1.73 m2, or there is a need for treatment with dialysis or transplantation, the so-called end-stage renal disease (ESRD) occurs.[1] Prevalence ESRD is increasing with enormous financial burden on society. Although maintenance dialysis methods have now successfully prolonged the life of patients, but it cannot completely reverse the function of the kidney and mortality remains high. Approximately 9-13% of patients on hemodialysis in India die within 1 year.[2,3]

Survival of patient who cannot afford adequate treatment such as regular dialysis or renal transplant is unimaginable poor due to several complications that is associated with the disease.[4] Survival of patients on hemodialysis depend upon multiple risk factors. Common independent predictors of survival are age, race, serum albumin at the start of dialysis, activity level at the start of dialysis, and presence of certain comorbidities such as heart failure and cancer.[5] Other patient characteristics that are associated with greater mortality risk, including white race, older age, low serum albumin levels, low and elevated serum phosphorus levels, anemia, and cardiovascular disease.[6] The present study was thus conducted to assess the factors influencing survival among patients on maintenance haemodialysis.

Objective- To determine the factors influencing survival among patients on maintenance haemodialysis.

Methodology- The present study was conducted as a prospective study in Department of Medicine, Gandhi Medical College and associated Hamidia Hospital, Bhopal for a period of 2 year from 1st August 2017 to 31st July 2019. The study included 100 patients with ESRD using purposive sampling. All adult patients with ESRD who survived first 3 months on maintenance hemodialysis and consenting for the study were included in the study. Patients with acute renal failure, severely ill patients, and patients who lost to follow up were excluded from the study.

Patients were diagnosed to have ESRD if they had an irreversible decline in renal function for more than 3months (estimated glomerular filtration rate by Cockcroft-Gault formula). The diagnosis of underlying kidney disease was based on clinical, pathological, laboratory and radiological features. Detailed data pertaining to causes and risk factors of CKD, clinical conditions of patients at initiation and last session of dialysis and treatments given was obtained and entered in questionnaire. Patients were followed up at 4 monthly interval for a total duration of 2 years and survival was noted. At baseline and each follow up, blood pressure was noted and various blood investigations such as hemoglobin, S. albumin, S. calcium, S. phosphorous, S. Cholesterol, RBS, urea, creatinine, sodium, potassium, etc. were also recorded and entered in questionnaire.

Data was compiled using Ms Excel and analysed using SPSS software version 20. Survival pattern was analysed using Kaplan Meier method. Chi square test was applied to assess the association of mortality with various risk factors and investigation findings. P value <0.05 was considered highly significant whereas $p<0.01$ was considered highly significant.

RESULTS-

Overall mortality in present study was documented to be 34%. Mortality were observed at all follow up but maximum mortality were observed during 16 months (13.9%) followed by 12 months (12.2%) follow up.

Table 1- Mean survival time following initiation of dialysis

Mean		
Estimate	Std. Error	95% onfidence Interval

		Lower Bound	Upper Bound
2.426	.091	2.248	2.605

Mean survival time following initiation of dialysis was observed to be 2.4 (CI-2.248-2.605) years.

Figure 1- Mean survival time following initiation of dialysis

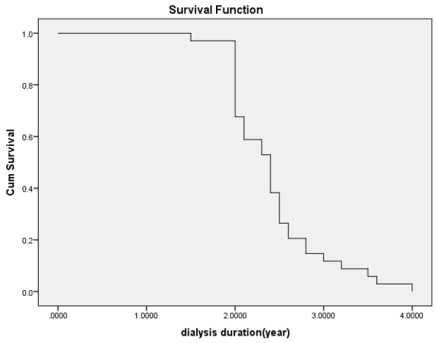

Table 2- Association of mortality with investigations

Variables		Total	Deaths	Alive	P value
BP	Pre HTN	40	3	37	0.001
	HTN	60	31	29	
Hb	Mild	18	3	15	0.001
	Moderate	64	13	51	
	Severe	18	18	0	
Albumin	Hypo	60	31	29	0.001
	Normal	40	3	37	
Calcium	Hypo	60	31	29	0.001
	Normal	40	3	37	
Phosphorous	Normal	43	6	37	0.001
	Hyper	57	28	29	
Cholesterol	Normal	40	3	37	0.001
	Raised	60	31	29	
RBS	Normal	21	3	18	0.04
	Pre	56	20	36	
	Diabetic	23	11	12	
Urea	Grade I	45	16	29	0.03
	Grade II	50	14	36	
	Grade III	5	4	1	
Creatinine	Grade I	12	0	12	0.03
	Grade II	49	19	30	
	Grade III	39	15	24	
Sodium	Normal	43	6	37	0.001
	Hyper	14	12	2	
	Hypo	43	16	27	
Potassium	Normal	40	3	37	0.001
	Hyper	60	31	29	

Mortality was significantly higher in patients with hyper tension, severe anemia, hypalbuminemia, hypoc alcemia, hyperphosphatemia, hyperchole sterolemia, diabetic, high grade urea and creatinine, hypernatremia and hyperkalemia ($p<0.05$).

Table 3- Association of mortality with risk factors

Risk factors	Total	Death	Alive	P value
Diabetes	51	24	27	0.005
Hypertension	46	20	26	0.03
Infections (Glomerulonephritis)	37	18	19	0.02
Anemia	30	15	15	0.02
Obstructive uropathy	19	6	13	0.66
Idiopathic	13	3	10	0.37
Congenital anomalies	10	3	7	0.28
Autoimmune disorders	3	0	3	0.21
Chronic liver disease	3	0	3	0.21
Neoplastic/ Metastatic disease	2	0	2	0.31

Mortality was significantly higher amongst patients with diabetes, anaemia, infections and hypertension ($p<0.05$).

DISCUSSION-

End-stage renal disease is associated with serious effects on the quality of life of patients which negatively affecting their social, financial, and psychological well-being.[7,8]

Kaplan Meier analysis revealed mean survival time following initiation of dialysis was 2.4 (CI-2.248-2.605) years. In a similar study by Shiburu et al, overall mortality was documented in 41 (45.1%) patients, of them 21 (23.1%) of patients died within the first 90 days of starting dialysis. Only 42.1% of them survived longer than a year. The causes of death documented in reference study were septicemia (34.1%) and cardiovascular diseases (29.3%).[9] Chandra shekhar et al documented comparatively lower mortality rate as compared to present study. They reported 19.8% mortality.[10]

Patients were followed up every 4 months in present study and their vitals were recorded, their Hemoglobin, and kidney function tests were assessed at various intervals. The present study observed that mortality was higher amongst hypertensive, severely anemic patients. Also mortality was higher in patients with hypoalbuminemia, hypocalemia, hyperphosphatemia, hypercholesterolemia (>200 mg/dl), uncontrolled blood sugar, increased urea and creatinine levels. Paradoxically with further follow up majority of patients were observed to have normal blood parameters. This observed trend towards normalization of blood parameters in present study were due to higher occurrence of mortality in patients with deranged blood parameters.

In present study, mortality was significantly higher in patients with hypertension, severe anemia, hypalbuminemia, hypocalcemia, hyperphosphatemia, hypercholesterolemia, diabetic patients, high grade urea and creatinine, hyperna tremia and hyperkalemia ($p<0.05$). End stage renal disease is characterized by increased urea and creatinine. However Chandrashekhar et al observed no difference in the outcome with regard to hemoglobin and calcium-phosphorus product levels. However using age adjusted multiple logistic regression analysis, the reference study revealed the hypokalemia to be the strong predictors of mortality. On the other hand, lower serum albumin (<4 g/l) did not predict mortality but they were shown to be associated with poor outcome in the univariate analysis. Both hypokalemia and hyperkalemia have been associated with increased mortality. Maintaining the serum potassium within the normal limits (3.5-5.5 mEq/l) and dialyzing against appropriate dialyzate bath may improve survival.[10]

In a study by Kovesdy et al, serum potassium <4.0 or > 5.6 mEq/l was significantly associated with decreased survival.[11] Prabha et al observed mean hemoglobin values was 6.67g/dl, and concluded anemia was not found to be an independent predictor of mortality. They observed in mortality group, 89.7% patients had calcium below 8.3 mg/dl. However, there was no statistical correlation between high calcium and phosphorous values and increased risk of death.[12]

Mortality was significantly higher amongst patients with diabetes, anaemia, infections and hypertension ($p<0.05$). Khazaei et al in their study showed that high BP along with diabetes mellitus are the dominant prognostic factors for poor survival, whereas polycystic kidney diseases and glomerulonephritis were associated with highest duration of survival in HD patients, respectively.[13] Survival rates were

significantly lower in patients with ESRD with cardiovascular disease as compared to ESRD alone or ESRD with pulmonary congestion($p<0.001$) in a study by Urrutia et al.[13] Several studies have suggested that Diabetes is a predictor of mortality, especially due to underlying cardiovascular causes arising from accelerated aterosclerosis.[14] Madsziarska et al revealed a different pattern of survival predictors in patients with diabetes treated by HD. The HD survivors were characterized by a lower IL-6 level ($p=0.04$), higher albumin concentration ($p=0.03$), and increased cholesterol ($p=0.004$). This shows that long-term survival in HD patients is associated with two categories of variables, reflecting inflammation (IL-6, albumin) and nutrition (cholesterol), whereas age was not significantly associated in the reference study.[14] Bradbury et al, in theirs study demonstrated 75% versus 22% risk of death between hypertensives and non-hypertensives, respectively, which was statistically significant similar to present study.[15]

Conclusion- The present study documented overall mortality of 34% and the mean survival time was 2.4 (CI-2.248-2.605) years following initiation of dialysis.The risk factors associated with increased mortality were hypertension, severe anemia, severely deranged liver, lipid and renal profile ($p<0.05$). Also diabetes, anemia, infections and hypertension ($p<0.05$) were poor predictors of survival and were significantly associated with mortality.

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