



Impact of Haemodialysis on Biochemical Parameters in Patients Undergoing Maintenance Haemodialysis

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ABSTRACT

To evaluate the variation in the biochemical parameters in patients undergoing maintenance haemodialysis. A Prospective study was conducted in tertiary care Hospital, for a period of six months. 60 maintenance haemodialysis patients were recruited for this study. Quantitative data were analyzed using paired t test in SPSS software, $p < 0.05$ was considered statistically significant. On evaluating the biochemical parameters such as random blood glucose level, hemoglobin, electrolytes, liver function test shows significant variation in uric acid, calcium and phosphorus during the baseline and follow up visit, Variation with certain biochemical parameters leads to complication. So, study suggests that biochemical parameters should be closely monitored periodically, so that variation in the biochemical parameters can be identified in individual patient and their mortality rates can be minimized.

Keywords: Maintenance haemodialysis, Biochemical parameters, Chronic kidney disease

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INTRODUCTION

The Human renal system plays a vital role in the homeostatic regulation of blood by removing metabolic waste products and toxins like urea, uric acid, creatinine from blood and excretes it through urine [1]. Any abnormalities in the anatomy or physiology of the kidneys can lead to the development of Acute kidney injury, which is reversible but in certain cases, it can progress into chronic kidney disease (CKD) [2]. CKD is a progressive condition characterized by structural and functional changes of the kidney, due to various causes, characterized by decreased kidney function and an estimated glomerular filtration rate of less than 60 ml/min/1.73 m. sq. [3]. Condition in which the GFR rate less than 15 ml/min/1.73 m. sq. is called End Stage Renal Disease (ESRD). Renal replacement therapy such as haemodialysis is referred as the treatment for the patient with ESRD. In dialysis, the kidney's role of filtration of blood is supplemented by artificial equipment which removes excess water, solutes and toxins. It ensures the maintenance of homeostasis [4]. In this study, we highlight the complications that may occur during haemodialysis treatments and offer measures to minimize them [5]. We also assessed the variations in the biochemical parameters of the patients, such as Liver Function tests, electrolytes, haemoglobin, uric acid, creatinine and urea.

MATERIAL AND METHODS

The aim of the study is to evaluate the variation in the biochemical parameters in patients undergoing maintenance haemodialysis. The study design was Hospital based prospective study conducted in tertiary Medical Care Hospital, with the approval of the Institutional Ethical Committee (Ref.no:SVCP/1EC/SEP/2021/09). The study was carried out for six months. 55 patients were included in the study using non-probability, purposive sampling. This study included both male and female patients undergoing maintenance haemodialysis for at least 3 months or more, patients with or without comorbidities, prevalent patients and consecutive patients who are newly enrolled. This study excluded patients undergoing haemodialysis for indications other than ESRD, planned renal transplant within study period, unwilling to participate in the study.

The data was collected from case sheets and direct interview with patients and caretaker in specially designed data entry form. It consists of demographic details such as name, age, gender, biochemical parameters such as random blood glucose level, haemoglobin, electrolytes, liver function test.

STATISTICAL ANALYSIS

All categorical variables were expressed as frequencies and percentages, and continuous variables were expressed as mean with standard deviation. Quantitative data were analyzed using paired t test in SPSS software, p <0.05 was considered statistically significant.

RESULT

BASELINE CHARACTERISTICS OF HAEMODIALYSIS PATIENTS:

Maintenance haemodialysis patients demographic details were collected and categorized was presented in Table 1.

TABLE 1: BASELINE CHARACTERISTICS OF HAEMODIALYSIS PATIENTS

PARAMETERS	CATEGORIES	NO. OF PATIENTS	PERCENTAGE
AGE (IN YRS)	31-41	6	10.9
	41-50	8	14.5
	51-60	18	32.7
	61-70	16	29.1
	71-80	7	12.7
GENDER	MALE	46	81.8
	FEMALE	9	18.2
SOCIAL HISTORY	MALE		
	SMOKER	20	43.4
	ALCOHOLIC	11	23.9
	TOBACCO	5	10.8
	ALL THE ABOVE	6	13
	NONE	4	8.6
	FEMALE		
TOBACCO	3	33.3	
NONE	6	66.6	
DURATION (IN YRS)	0-1	20	36.4
	1-2	18	32.7
	2-3	4	7.3
	ABOVE 3	13	23.6

*n=55

BIOCHEMICAL PARAMETERS OF HAEMODIALYSIS PATIENTS:

Collected biochemical parameters of each maintenance haemodialysis patients were analysed. Of all biochemical parameters, statistical significance (p value <0.005) was found between the baseline and follow up values of calcium, uric acid, phosphorus. This was represented in Table 2.

TABLE 2: STATISTICAL COMPARISON OF BASELINE AND FOLLOW UP OF BIOCHEMICAL PARAMETERS IN HAEMODIALYSIS PATIENTS.

BIOCHEMICAL PARAMETERS		MEAN	STANDARD DEVIATION	P VALUE
RANDOM BLOOD GLUCOSE LEVEL	BASELINE	.6784	.5867	.678
	FOLLOW UP	.2456	.6754	
HEMOGLOBIN (MALE)	BASELINE	.9273	.50386	.498
	FOLLOW UP	1.000	.5774	
HEMOGLOBIN (FEMALE)	BASELINE	.218	.5337	.674
	FOLLOWUP	.1818	.47496	
BLOOD UREA	BASELINE	3.000 ^a	.0000	.142
	FOLLOW UP	3.000 ^a	.0000	
CREATININE	BASELINE	3.000	.0000	.322
	FOLLOW UP	2.982	.1348	
URIC ACID	BASELINE	2.164	.4620	.005**
	FOLLOW UP	2.418	.5673	
CALCIUM	BASELINE	1.636	.5222	.041**

** P < 0.05 using Paired t test, SD –Standard deviation.

DISCUSSION

In this study, majority of patients underwent maintenance haemodialysis were observed within the age group of 51-60 (32.7 %). Studies conducted by Allison Tong et al [6] shows similar results that maintenance haemodialysis procedure associated with CKD -ESRD is predominantly done between the age group of 50-59 in years, this might be due to decline in renal function, prevalence of comorbidities, social history such as smoking, tobacco, alcohol and genetic factors.

In our study, haemodialysis procedure was majorly done in male patients (81.8%) than compared to female patients (18.2%). This result was found to be correlated with the study conducted by Allison Tong et al [6] which shows that prevalence of CKD -ESRD is more in men. Since, kidney function declines faster in men than women, owing to unhealthier lifestyles and higher prevalence of hypertension. Prevalence of higher rate of diabetes mellitus, hypertension was found in our study population as comorbid condition. In diabetes patients, incidence of kidney disease results due to diabetic nephropathy and with hypertension increased blood pressure results to the development of arteriolar nephrosclerosis which might impair the renal function. Our study outcome shows that majority of male patient in our study population were with the social history of smoking, alcohol intake, tobacco users (91.1%) and female with (33.3%) tobacco users. Patients had quit smoking and alcohol intake by the time they were diagnosed to Chronic Kidney Disease. In our study, nearly 21.8% of patients had the family history with kidney disease. As, chronic kidney Disease has familial predisposition and history of kidney disease in family hereditary has the higher risk for the developing of Chronic Kidney Disease. About 36.4 % of our study population was on maintenance haemodialysis for last one year. Nearly 32.7% of patients were on continuous haemodialysis for duration of 1-2 years. [TABLE: 1]. Our study results indicates that there is variations in haemoglobin from initial and follow up visit as Anemia was a multifactorial condition which is more prevalent in Chronic kidney Patients due to the decreased production of erythropoietin, the hormone which is responsible for the stimulation of red blood cells due to impaired kidney function. This was found correlated with study conducted by Heleen van Haalen, et al [7] concluded that anemia commonly prevalent among Chronic Kidney Disease and it was also associated with the poor quality of life in maintenance haemodialysis patients. From our study, we found there were no significant changes in serum creatinine, blood urea, sodium, chloride, potassium level during the period from baseline to follow up in patients with CKD-ESRD.

In this study, we observed that the prevalence of abnormal serum uric acid level with patients undergoing maintenance haemodialysis. This observation was correlated with the study conducted by Marie Doualla, et al [8] which states that patients on haemodialysis for two sessions per week has only a moderate efficacy in clearance of increased uric acid levels, so in order to improve efficacy in uric acid clearance, dietary modifications that help to lower elevated serum uric acid levels should be combined with the haemodialysis procedure. Presence of uric acid in serum concentration is a major risk associated with gout and cardiovascular diseases. During our study period, we also observed abnormal serum calcium levels in patients on maintenance haemodialysis. This same condition was also observed in a retrospective study conducted by Jun Jie Benjamin Seng [9], which concluded that the majority of their study population developed hypercalcemic condition. This condition has the risk of developing, alter serum parathyroid level, vascular calcification and increase the mortality rate in maintenance haemodialysis patients.

From our result, we found significance change in serum phosphorus level with our study population which was related to the study conducted by Wang M, et al [10]. The study conclude that variation in serum phosphorus was observed in maintenance haemodialysis level. This condition leads to increased incidence of cardiac artery calcification. During the study period, SGOT & SGPT was found to be insignificant in the patients. Serum liver enzyme was monitored in the patients on maintenance haemodialysis since there exist an interrelationship between the kidney and the liver. Decline in the renal function decrease liver function due to increased splanchnic and systemic vasodilation, neurohormonal activation and renal vasoconstriction cause liver cirrhosis In somecase it has the higher risk of Hepatitis C, Hepatitis B. [TABLE:2]

CONCLUSION

On evaluating the baseline and follow-up values of all the biochemical parameters, statistical significance was found with uric acid, calcium, and phosphorus levels. Overall, study suggests that biochemical parameters should be closely monitored periodically, so that variation in the biochemical parameters can be identified in individual patient and their mortality rates can be minimized. Recession of variation can be maintained by patient-centred health education regarding their disease, dietary management and lifestyle modifications.

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CONFLICT OF INTEREST

There is no conflict of interest

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