

Comparison of Spectrum of Complications of Hemodialysis in Pre and Post Transplanted Renal Failure Patients

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ABSTRACT

Objective: To compare complications of hemodialysis in pre and post transplanted renal failure patients; to determine the prevalence of observed complications; to evaluate underlying comorbid illness between two groups.

Study Design: A cross-sectional study observational study

Place and Duration of Study: This study was conducted at the department of Nephrology in Nishtar Medical University & Hospital Multan from July 2020 to December 2020 for a period of six months.

Materials and Methods: 100 patients with confirmed renal failure and on hemodialysis treatment were included in the study. Among them, 50 never had a transplant while other half were on dialyses after graft rejection. Patients were observed during hemodialysis and symptomatic complications were recorded. In addition, medical history of participants was obtained to evaluate underlying comorbidities. SPSS 25.0 was used for statistical evaluation. One way analyses of variance (ANOVA) and student's t-test were used to compare two study groups.

Results: A total of 100 patients of renal failure underwent conventional HD. Patients from Bothe the groups showed no significant difference in basic characteristics. However, significant difference ($p>0.05$) was found between frequency of acute complication between two groups. Similarly, higher incidences of variable comorbidities is found among graft rejected renal failure patients.

Conclusion: Hemodialysis act as the major life saving maintenance treatment among renal failure patients. However, multiple complications are associated with this therapeutic approach. Given the findings, it is suggested to modify dialysis procedures to mask the effects of underlying comorbidities during dialysis especially for the graft rejected renal failure patients.

Key Words: Renal failure, Chronic Kidney disease, Hemodialysis, Graft Rejection, Acute Complications

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INTRODUCTION

Chronic kidney disease (CKD) or Rena failure is described as atypical functionality or morphological appearance for more than 3 months⁽¹⁾. Annually, around 8% to 16% of individual worldwide are diagnosed of chronic kidney disease. The affected individual mostly belong to developed or under developing countries⁽²⁾.

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Mostly, diabetes or hypertension serve as significant underlying disorders but pathology can be contributed to infection, glomerulonephritis, environment generated factor, including herbal remedies, air pollution and pesticides, or genetic alterations⁽²⁾. The diagnostic criteria of CKD is decline of glomerulus filtration rate (GFR) by less than 60ml/min/1.73m²; secretion of at least 30mg of albumin in 24hrs, or persistence of other sign of kidney damage such as hematuria for more than 3 months⁽³⁾. Facts state that, in the USA every year 1ml/min/1.73m² GFR decline on average among the population and 50% of them are at risk to suffer from chronic renal damage in their life time^(4,5).

The CKD patients often prefer to undergo transplantation as it provides superior survival and quality life style; however, low supply of donor kidney remains a limiting factor and graft survival rate is around 15 years. After this survival time, most of transplanted kidneys lose their functionality^(6,7). Apart from this haemodialysis is only life-saving treatment approach that is under operation from last 35 years⁽⁸⁾. Haemodialysis is recommended to begin when creatinine clearance rate of symptomatic individual becomes 15ml/min and 10ml/min in diabetic and non-

diabetic patients and 3 dialysis per week are required to maintain urea clearance rate of 20ml/min in 70kg individual⁽⁹⁾. Although, data suggest that one in 75,000 treated individuals are at mortality risk due to technical errors; yet, several acute complications are reported during treatment which decline the quality of life of treated individuals⁽⁸⁾.

Several studies have been evaluating the incidence of various complications of haemodialysis yet no study so far has compared the complications between first term renal failure patients and those who lost their kidney functionality after the transplant, termed as second term renal failure patients. The following study aimed to compare severity and occurrence of complications in pre and post-transplant renal failure patients. Moreover, evaluation of underlying comorbid illness between two study groups is also the matter of interest of the study.

MATERIALS AND METHODS

A cross-sectional observational study was conducted in Nishtar Medical University & Hospital, Multan for the period of six months from 7th July 2020 to 7th December 2020. Both male and female patients who were diagnosed of end stage renal disease and sustaining on regular haemodialysis were enrolled in the study. Initially, complete clinical history of participants was obtained to determine the presence of any comorbidity. The participants were divided into two groups based on their transplant history: First group comprised of renal failure patients who had yet not undergone kidney transplantation while the second group consisted of patients who were on hemodialysis for second time after their transplanted went into failure again. A complete Performa was prepared to record the hemodialysis complications for each patient which was to be filled by on-duty doctor or technician during each hemodialysis session for the period of six months. Every patient was evaluated for body weight, blood pressure, respiratory rate, pulse, and temperature before the start of dialysis session and then after every 45 minutes during the session. Studied complication included muscular cramps, vomiting, hypotension, abnormal pulse rate, chest pain, restless leg and sugar level alterations. Patients with acute renal failure and acute on chronic renal failure were excluded from the study.

Statistical Analyses: Collected data was analysed through SPSS version 25.0. Results were reported as mean, standard error of mean (SE), and frequency of complications. The difference between continuous and categorical variables were compared for statistical significance between two groups through student's t-test and one-way ANOVA.

RESULTS

During the study period, a total of 1000 hemodialysis (HD) sessions were observed for 100 patients, 50 first

term and 50 second term renal failure patients with a mean of 5.5 sessions per patients. The participants included 78 male and 22 female patients with the mean age of 39.8 ± 15.2 years and 47.5 ± 7 years of first term and second term renal failure respectively. Similarly, no significant difference was found between duration of disease and ultrafiltration rate between two groups. The patients showed association between their underlying comorbidities and the acute complications they suffered during HD sessions. It was found that except of obesity significant difference was found between incidences of comorbidities.

Table No.1: Comparative Analyses of Comorbidities between Two Studied Groups (n=100)

	First term renal failure	2 nd term renal failure	P-Value
Characteristics			
Age (SE)	39.8 (15.2)	47.5(7)	0.77
Duration of Dialysis	3.9	4.7	0.87
Ultrafiltration rate	8.7ml/kg/hr	10.2ml/kg/hr	0.63
Comorbidities			
Obesity	39%	43%	0.61
Myocardial infarction	3%	8%	0.50
Congestive heart failure	8%	13%	0.43
Diabetes	20%	35.4%	0.002
Diabetes with serious complications	9.1%	22%	0.001
Hepatitis B/C	33.2%	45%	0.05
Liver disease	33.2%	45%	0.05
Hypertension	54%	87%	0.0001

Table No.2: Comparison of Acute Complications of Hemodialysis between Two Studied Groups (n=100)

Acute Complications (%age)	First term renal failure	2 nd term renal failure	P-Value
Hypotension	7.2%	13%	0.43
Muscular cramps	10%	22%	0.001
Vomiting	3.2%	3.7%	0.67
Abnormal Pulse rate	20.9%	31.4%	0.03
Restless Leg	4.3%	7.1%	0.002
Sugar Level Alteration	12.3%	35.2%	0.001

It was analyzed that difference in occurrence of severe diabetes ($p=0.002$), hypertension ($p=0.0001$), liver disease including hepatitis B/C (0.05), and cardiac disorders reached the significance threshold (Table I).

Among the observed acute complications, it was found that occurrence of complications was magnified in second term renal failure patients as compared to First term renal failure patients to significant level. We observed that majority of second term renal failure patients were repeatedly suffering from the observed complication in their regular HD sessions and the intensity of complication was also greater than first term renal failure patients (Table 2).

DISCUSSION

Around 8 to 16% of individuals around the world are suffering from chronic renal failure and are sustaining on haemodialysis to maintain the quality of life. Moreover owing to immunogenic reaction against the graft, mostly maximum survival time of allograft is restricted to 15 years (10) after which patients return to haemodialysis. We have conducted this study to ascertain the difference in complications of HD between first term renal failure patients and second term renal failure patients.

In the study it has been found that significant difference exists between the incidences of complications between two groups. It was observed that evaluated complications were found in both groups but the frequency of occurrence multiplied in second term renal failure patients. The most contrasting difference occurred in hypotensive and sugar level variability episodes between two study group. These results are found to be consistent with previous studies results.

In a study conducted by Yoowannakul et al., 57.7% of patients suffered from fall in systolic blood pressure (11). The authors observed that fall in blood pressure was not only related to patient's hydration status before the start of HD session, but also to cardiac morphology. Similarly, ultrafiltration rate also influences the cardiac load. In our study, it can be predicted that second term renal failure patient were maintained on higher ultrafiltration rate and had greater underlying cardiac comorbidities which influenced their blood pressure levels. Kim et al., found out diabetic neuropathy as a significant cause of graft rejection (12). Thus, in our study most of the graft rejected patients had severe diabetes and suffered from extreme sugar level variations during HD sessions. On comparison, first term renal failure patients had significantly moderate intensity of diabetes mellitus, so they showed lesser degree of sugar level alterations during HD session.

Similarly, significant difference was observed in pulse rate between the patients of two groups. Literature suggests that patients on chronic dialysis witness morphological and functional abnormalities of heart which intensify with age (13). In our study, second term renal failure patients were of comparatively high age; therefore, cardiac abnormalities can be predicted among them. It is recommended to conduct cardiac diagnostic

and imaging tests in graft rejected renal failure patients in future studies to validate our interpretation.

Besides, patients from both the groups also reported restless leg syndrome disorder; however, the frequency was higher in graft rejected renal failure patients. Studies have confirmed that iron deficiency, uremia, and diabetes mellitus 2 are some of the secondary causes of this presentation (14). Therefore, it is very likely that in given conditions the presentation of syndrome is magnified in second term renal failure patients. We have also reported the frequency of comorbidities among the patients from both the groups which in already reported in several studies (15,16). However, no established study is made so far regarding differences between two types of renal failure patients. Thus, the current study can be used as guiding light for future research in this area.

CONCLUSION

Hemodialysis act as the major life saving maintenance treatment among renal failure patients. However, multiple complications are associated with this therapeutic approach. Given the findings, it is suggested to modify dialysis procedures to mask the effects of underlying comorbidities during dialysis especially for the graft rejected renal failure patients.

Author's Contribution:

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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