

Biochemical Profile of Post-renal Transplant in Kashmiri patients

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ABSTRACT

Background: Kidney transplant has become the preferred methods of treatment for many ESRD patients. Biochemical profile is the most widely used marker of renal function. Serum urea level of more than 50 mg/dl and creatinine level of more than 1.8 mg/dl indicates impaired kidney function. A strong association exists between hemoglobin concentration and renal graft transplantation. Biochemical profile after kidney transplantation is associated with short and long term graft survival. In this study we tried to explore if renal transplant was better available treatment for CRF with ESRD patients.

Objective: To monitor various biochemical parameter levels for fresh kidney transplant patients

Design: Our study involved the retrospective as well as prospective biochemical profile of 34 renal transplant patients. Retrospective data included biochemical profile before and after transplant from patient records. For prospective data, blood samples were taken from these 34 patients for monitoring biochemical profile for a period of three months.

Settings: Clinical Biochemistry lab and Nephrology clinic of SKIMS, Soura, Srinagar

Results: Within one month of renal transplant levels of creatinine, urea and glucose fall from abnormal levels while as hemoglobin level rises to normal level. The normal levels are however attained within six months of transplant.

Conclusion: Renal transplant is the better treatment for CRF with ESRD patients. [IJEM 2008;12(8):11-14]

Keywords: Renal transplantation, renal function, CRF

INTRODUCTION

Kidneys are primarily concerned with the elimination of body waste and maintenance of body fluids(1). They can fail for a number of reasons(2). Replacement of renal function by dialysis has its own limitations which has necessitated evolving a better method that is renal transplantation. There are a number of disorders associated with the kidneys. Chronic renal failure (CRF) is one of the major health and economic problem. CRF is a functional diagnosis characterized by a progressive and generally irreversible decline in glomerular filtration rate (GFR). It is caused by a large number of diseases like Diabetes mellitus, Hypertension, Interstitial nephritis, Atheroembolic disease, Bilateral renal artery stenosis, AIDS and other multisystem disease reflux nephropathy(3). The most common diseases that result in referral of patients for transplantation are Diabetes mellitus with renal failure and hypertensive renal disease and glomerulonephritis(4,5). These three causes of

ESRD account for nearly 75% of candidates. It has been estimated that as a result of irreversible loss of renal function, between 50 & 75 persons / million populations annually die, receive a renal transplantation, or placed on a chronic dialysis program. Although kidney transplant has become the preferred methods of treatment for many ESRD patients, fewer than 25% of patients entering ESRD programs receive renal transplantation because of age, associated disease, anatomic abnormalities of the urinary tract, the presence of preformed cytotoxic antibodies or lack of availability of a suitable donor(6). A transplantation procedure involves to check the renal function by doing biochemical profile of renal transplant patients. This profile includes creatinine, urea, glucose & Hb levels. These levels suggest the renal function. Biochemical profile after kidney transplantation is associated with short and long term graft survival. As the short term renal transplant continues to improve, attention is increasingly focused on alternative measures of outcomes such as renal function. The present study was carried out to explore if renal transplant is the better available treatment for CRF with ESRD patients. The successful short and long term graft survival though with some complications has been suggested.

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MATERIALS AND METHODS

We performed a combined prospective and retrospective study of the 34 post-renal transplant patients with 30 males and 4 females in the age group of 20-60 years at the Department of Nephrology SKIMS, Srinagar. The retrospective study included the history and biochemical profile of patients before and after transplant. The prospective study included the biochemical profile of these patients from the month of June to August 2007. Comparative study of pre-transplant and post-transplant biochemical profile of post-renal transplant patients was also performed. Based on the age and sex, 34 patients were categorized into 4 groups. First group included 4 patients which were in between 20-30 yrs in which 75% were males and 25% were females, second group included 12 males and 1 female in the age group of 30-40 yrs, group third included 9 males and 2 females within the age group of 40-50 yrs and the fourth group consisted of 6 males only between the age group of 50-60 years. Basic disease of these 34 patients which causes CRF and ESRD and lead to renal transplantation were also studied.

Random blood samples were collected in a plain tube from each participant for haematological investigations. Serum was separated immediately and analysed for urea & creatinine. The level of urea in the samples was estimated by Diacetyl monoxime method, Creatinine by Joffe's reaction, glucose by glucose oxidase method while hemoglobin was estimated by Cyanmethemoglobin method.

The data obtained was analysed, and the differences in the mean of various parameters were compared by statistical analysis.

RESULTS & DISCUSSION

Biochemical profile is the most widely used marker of renal function. A transplantation proceeding involves to check the renal function by doing biochemical profile of renal transplant patients. This profile includes creatinine, urea, glucose and Hb levels. These levels suggest the renal function. This study comprised of 3 phases. During the first phase, the biochemical profile of post-renal transplant patients within immediate 6 months after transplant was studied which involved data collection of urea, creatinine, Hb, and glucose serum levels. The data obtained was analysed and the differences in the mean values were

compared using statistical analysis.

Urea and creatinine are the substances eliminated by the kidneys which led to the use of these parameters as a test of renal function. The principal clinical utility of the determination of plasma/serum urea level lies in the measurements in conjunction with the measurements of the level of plasma/serum creatinine. A ratio between the two ratios (urea nitrogen ratio/ creatinine ratio) is calculated and used to discriminate between pre renal and post renal uremia. In post renal conditions, both the plasma creatinine and urea levels are increased, a greater increase often is present in the plasma urea than in the plasma creatinine. Plasma urea levels in an individual with untreated chronic renal failure typically reach 108-135mg/dl. Measuring serum creatinine is a useful and inexpensive method of evaluating renal dysfunction. Creatinine is freely filtered and therefore serum creatinine level depends on the Glomerular filtration rate (GFR). The validity of creatinine as a test of renal function is based on the assumption that in a normal subject under steady state conditions, as creatinine is released from muscle stores at a constant rate throughout the day, accumulation in the body is prevented by a renal excretory mechanism. Renal dysfunction diminishes the ability to filter creatinine and serum creatinine rises. The serum creatinine levels remained almost normal and constant which means the graft is working properly. A strong association exists between haemoglobin concentration and renal graft function. Measurement of Hb levels before and after renal transplant is a useful and inexpensive method of evaluating renal dysfunction. Impaired production of erythropoietin or haematopoietin improves with good renal function following renal transplantation. The Hb value increases at the rate of approximately 1% per day, resulting in a return to normal values after transplant(35). The test measures the amount of this substance in a specific volume of blood. It also indicates the amount of intracellular iron. Glucose metabolism is impaired in CRD patients as evidenced by a slowing of the rate at which blood glucose levels decline after a glucose load. New onset diabetes after renal transplantation (PTDM), a common consequence of immunosuppression is associated with reduced patient survival. To investigate this problem, glucose levels are frequently checked in renal transplant patients.

Table 1 shows the mean observation levels of creatinine, urea, glucose and Hb within 6 months of transplant as their

Table 1: The mean observation levels of creatinine, urea, glucose and Hb within 6 months of transplant

Month	Urea		Creatinine		Hemoglobin		Glucose	
	Range	Mean±S.D	Range	Mean±S.D	Range	Mean±S.D	Range	Mean±S.D
1st month	10-88	49±16.68	3.41-0.69	1.64±0.97	5.2-15.8	12.14±2.9	57-286	116.73±49.18
2nd month	20-73	47.3±19.66	3.6-0.98	1.77±0.89	6.8-16.4	12.27±2.61	63-262	118.5±43.88
3rd month	19-75	46±18.69	3.5-0.5	1.6±0.72	8.8-16.2	12.46±2.24	63-330	116.17±54.65
4th month	10-82	41.6±17.46	3.05-0.8	1.61±0.66	6.6-16.8	12.75±2.3	63-284	113.08±54.89
5th month	18-19	45.5±15.73	3.66-0.91	1.62±0.56	6.2-17.5	13.24±2.45	66-273	104.79±43.99
6th month	20-87	43.5±15.2	2.72-0.68	1.65±0.66	7.5-16.5	13.35±2.1	39-393	120.85±74.54

mean values. There was a decrease in serum urea level during 6 months after transplant remains normal and almost constant which indicates the proper working of the graft. Maximum patients were normal within 6 months and the patients with raised level trying to reach normal. 82% patients show their urea levels returning to normal and 8% show slightly elevated levels. Decreasing levels of serum urea improves with good renal function following renal transplantation. Similarly, 82% patients show their serum creatinine levels returning to normal and 8% show slightly elevated levels but not any rejection. Patient with raised levels trying to reach normal levels or improve over time. Hb levels during 6 months after transplant shows progress to some extent and try to reach normal levels. The Hb begins to rise and reaches to normal within 6 months of transplantation as erythropoietin activity returns to normal. The correction of the anaemia probably is the major factor accounting for the improved well being of the patient. Therefore, it was found that the patients within 6 months of transplant showed no rejection. This is due to the help of immunosuppressive drugs which helps in graft acceptance. The patients improve with good renal function following transplantation.

During the second phase, the biochemical profile of post-renal transplant patients in groups based on their time durations from transplant upto the month of August 2007 was studied. 34 patients were divided into 3 groups. Group A involved 16 patients with < 1yr time duration from transplant upto the month of August 2007. Table 2 shows the

12, 18, 24 and 30 months. These observations showed that urea levels of the patients remain normal within 24 months of transplant but its level raises after 30 months. Creatinine levels showed an increase during this period. Hb levels after transplantation start improving in the beginning but maximum patients being still anaemic. After 30 months the patients showed improvement as compared to their pre transplant conditions by being moderately anemic not severely anemic. Two years after transplant mean glucose level was 126±55 mg/dl but 12.5% patients developed Post Transplantation Diabetes Mellitus (PTDM) which is a serious complication of kidney transplantation. After 30 months glucose level in the rest of cases was found to be normal. These results show that the patients were normal within 24 months of transplant but after that period there may occur some complications.

Group C involves 7 patients, their time duration from transplant upto the month of August 2007 is 5 yrs. Table 4 shows the comparative mean observation levels of urea, creatinine, Hb and glucose after transplant of group C after 1st, 2nd, 3rd, 4th and 5th yr. Increased levels of urea were found in 1st and 2nd year and started coming to normal from 3rd to 5th year. Creatinine level was found to be normal in Group C patients after transplant. They were found to be moderately anemic in 2 yrs of transplant but from 3rd yr Hb begins to rise and reach normal levels. Glucose levels showed an increase only in 3rd yr of transplant. Therefore, it can be concluded that renal function improves over time but there

Table 2: The comparative mean observation levels of urea, creatinine, Hb and glucose after transplant of group A after 3,6,9 & 11 months

Time after transplant	Urea		Creatinine		Hemoglobin		Glucose	
	Range	Mean±S.D	Range	Mean±S.D	Range	Mean±S.D	Range	Mean±S.D
3 months	19-60	38.2±12.05	1.1-2.4	1.68-0.5	10.7-15.9	13±1.8	73-330	131.3±69
6 months	20-63	39±10.65	0.8-2.54	1.6±0.56	11.2-17.4	14±1.5	63-387	128.9±84
9 months	26-52	39±7	1.2-2.07	1.61±0.4	10-17.3	14.17±2.5	68-132	111±32
<1 year	23-73	42±22	1.32-2.5	1.5±0.6	14-16.2	15.5±1.1	65-298	120±60

comparative mean observation levels of urea, creatinine, Hb and glucose after transplant of group A after 3, 6, 9 and 11 months which was found to be normal in each case. This reveals the short term improvement without any complications.

Group B involved 23 patients, their time duration from the transplant upto the month of August 2007 is <3 yrs. Table 3 shows the comparative mean observation levels of urea, creatinine, Hb and glucose after transplant of group B after 6,

may occur some long term complications also.

The third phase involved the comparative study of pre-transplant and post-transplant biochemical profile of 34 post-renal transplant patients. Table 5 shows the comparative pre and post-transplant mean observation levels of urea, creatinine, Hb and glucose after 1, 6, 12, 24, 36, 48 and 50 months. After 1 month urea, creatinine and glucose level decreases but Hb level showed an increase. The decreased levels of urea, creatinine and glucose started improving with

Table 3: The comparative mean observation levels of urea, creatinine, Hb and glucose after transplant of group B after 6,12,18,24 and 30 months.

Month	Urea		Creatinine		Hemoglobin		Glucose	
	Range	Mean±S.D	Range	Mean±S.D	Range	Mean±S.D	Range	Mean±S.D
6 months	28-72	47.3±16	1.2-4.27	1.89±0.6	7.5-16.4	12.95±2.43	59-214	109.8±36
12 months	18-151	47±29.3	1.3-3.5	2.09±1.4	6.8-15.6	12.55±2.3	73-146	97.8±21.5
18 months	28-70	44.5±18.5	1-4.4	2.03±0.9	9.6-15.6	13.15±1.9	74-281	120.4±54.3
24 months	28-53	42.1±8.5	1.7-3.33	2.15±0.7	9.6-16.1	13.6±2.15	93-259	126±55
30 months	57-86	70.5±10.8	2.06-4.07	2.94±0.8	9.1-14	12±1.95	69-146	113.3±30

Table 4: The comparative mean observation levels of urea, creatinine, Hb and glucose after transplant of group C after 1, 2, 3, 4 & 5 yr

Month	Urea		Creatinine		Hemoglobin		Glucose	
	Range	Mean±S.D	Range	Mean±S.D	Range	Mean±S.D	Range	Mean±S.D
1-year	44-105	62.6±20	0.5-2.4	1.66±0.7	9.8-14.2	12.8±1.8	60-212	122.7±56
2-year	30-109	59.7±44.3	2-2.7	1.57±0.5	10.4-15.2	12.6±1.5	73-211	124.2±50.4
3-year	25-65	44.7±78.2	1.25-2.09	1.49±0.4	11.2-14.7	13±1.2	60-283	152±85
4-year	29-69	47±15	1.11-1.8	1.51±0.3	9-12.9	13±1.2	72-169	107.4±40
5-year	25-83	54±23.6	1.32-1.5	1.38±0.1	12.3-14.2	13.3±0.8	65-193	111±58

Table 5: The comparative pre and post-transplant mean observation levels of urea, creatinine, Hb and glucose after 1,6,12,24,36,48 and 50 months

	Time	Urea		Creatinine		Hemoglobin		Glucose	
		Range	Mean±S.D	Range	Mean±S.D	Range	Mean±S.D	Range	Mean±S.D
Pre-transplant	1 week	140-262	222±39	4.8-10.9	8.9±3	5.9-8.9	7.7±0.8	256-350	286
	1 month	10-88	49±16.68	0.69-3.41	1.64±0.97	5.2-15.8	12.14±2.9	57-286	116.8±49.2
	6 months	20-87	43.5±15.2	0.68-2.72	1.65±0.66	7.5-16.5	13.35±2.1	59-393	120.9±74.6
Post-transplant	12 months	18-151	54.7±28	0.5-2.94	1.96±0.7	6.8-15.6	12.6±2.2	60-212	105.3±36.3
	24 months	28-109	50.9±22	1.3-3.3	1.86±0.7	9.6-16.1	13.1±1.9	30-295	92.8±54.5
	36 months	25-65	44.7±78.2	1.25-2.09	1.49±0.4	11.2-14.7	13±1.2	60-283	152±85
	48 months	29-69	47±15	1.11-1.8	1.51±0.3	9-12.9	11.5±1.4	72-169	107±40
	50 months	25-83	53.3±23.6	1.32-1.5	1.38±0.1	12.3-14.2	13.3±0.8	65-193	111±58

good renal function after 6 months. The Hb level also raises and return to normal as erythropoietin activity returns to normal. This shows that after transplantation patients not only recover but also show progressive increase in short term as well as long term improvement and graft survival from 1 to 5 years.

CONCLUSIONS

This study concluded that the transplantation is the successful treatment for the CRF with ESRD patients. This approach is not only to keep patients alive, but to enable them to continue as useful members of the community. Today there are hundreds of transplantation teams throughout the world, with majority of them reporting the patients survival rates of 90% or more at 1 year after transplantation while graft survival rate averages 80-90% over the same period.

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