

## ORIGINAL ARTICLE

# Frequency of New Onset Diabetes Mellitus in Patients with Live Related Renal Transplant

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## ABSTRACT

**Background:** Kidney transplant is only the cure of end stage renal diseases. It is because it provides the maximum replacement of renal functions. New onset diabetes after transplantation is one of the serious and chronic problem of renal transplant. NODAT is reported to occur in 4%-25% of renal transplant recipients. New onset diabetes may be identified after the renal transplant at any time.

**Objective:** The study aimed to determine the frequency of new onset of diabetes mellitus in the patients with live related renal transplant.

**Study design:** It is a retrospective study conducted in the department of nephrology and transplantation, Pir Abdul Qadir Shah Jeelani Institute of Medical Sciences, Gambat for the duration of six months from July 2022 to December 2022.

**Material and Methods:** There were 50 patients in PTDM group and 70 were in the non PTDM group. The anthropometric and clinical characteristics were recorded. The SPSS software was used for the analysis. The Patients were divided into two groups according to the diagnosis.

**Results:** The average age of patients in PTDM group is 43.2 years whereas in non-PTDM group the average age is 45 years. Statistical analysis revealed that results are statistically significant with 95% CI. Most of the cases appeared during 2 weeks of transplant however, 14 patients also reported about diabetes after 2 months of transplant.

**Conclusion:** Common metabolic disease PTDM is usually diagnosed during first 6 weeks of renal transplantation. Old age, family history of diabetes, the presence of IGF during first week of transplantation are some of the risk factors that lead to PTDM prevalence. The PTDM was observed in the 40% patients in our study.

**Keywords:** renal functions and post-transplant diabetes mellitus.

## INTRODUCTION

Kidney transplant is only the cure of end stage renal diseases. It is because it provide the maximum replacement of renal functions. New onset diabetes after transplantation is one of the serious and chronic problem of renal transplant. In this condition organ transplant recipients develop the diabetes mellitus just after the transplant of kidney. It is the powerful and independent forecaster of graft failure, death-censored graft failure, and global mortality. NODAT is reported to occur in 4%-25% of renal transplant recipients. New onset diabetes may be identify after the renal transplant at any time. The factors of new onset diabetes mellitus divided into three groups that are non-modifiable, modifiable and potentially modifiable. The first one non modifiable risk factor such as patient age, family history of diabetes mellitus, ethnicity, presence of human leukocytes antigen. There is the higher risk of NODAT<sup>1-3</sup> in the patients with the age higher than 45. For every 10 year increase in age the risk of NODAT is increase about 50%. The risk become 2.5 fold at the age of 60. The second one is modifiable risk factor that is obesity and type of immunosuppressive agents. The last and third one is potentially modifiable risk factor like hepatitis C virus inflammation and pretransplant impaired fasting glucose. Kidney transplant helped to improve the several diabetic problems and glycometabolism. New onset diabetes after transplantation (NODAT) critically influence the standard of long term survival rate of renal transplant recipients. Now the renal transplant recipient's survival time is increases day by day.<sup>4-6</sup> This is because of the survival rate during the perioperative period is enhanced. The long-term obstacles and the standard of transplant recipient's life have gained maximum attention as the consequences of improvement in therapy with anti-rejection drugs. Diabetes mellitus cause the cardiovascular diseases and also cause the failure of multiple organ. Diabetes mellitus patients increasing day by day and become double to the previous one. It became the seventh leading cause of death. Diabetes mellitus increase among the many populations especially among the kidney transplant recipients.

NODAT is also linked with autosomal dominant<sup>7-9</sup> polycystic kidney diseases. It is also connected with autosomal recessive

polycystic kidney diseases. The one of the main risk factor for NODAT is diagnosed glucose intolerance which is diagnosis recently. At the onset of pregnancy, there is the most suitable moment for the diagnosis<sup>10</sup> of glucose intolerance. The occurrence of IGF during the first week of transplantation also was linked to PTDM. As per studies it was seen that older age and obesity along with family history of diabetes mellitus lead to enhanced chances of PTDM among patients. The study aimed to determine the new diabetes mellitus onset frequency in the patients with live related renal transplant.

## MATERIAL AND METHODS

It is a retrospective study conducted in the department of nephrology and transplantation, Pir Abdul Qadir Shah Jeelani Institute of Medical Sciences, Gambat for the duration of six months from July 2022 to December 2022. The patients were fully aware of the study objective and signed the consent willingly. The adult non-diabetic patients were selected for the study. The American diabetes criteria was used to diagnose the new onset of diabetes after transplantation NODAT. The patients who information was missing and already diagnosed with the diabetes were excluded from the study. The anthropometric and clinical characteristics were recorded. The data was collected and statistical analysis was performed. The results were recorded in the form of tables. The SPSS software was used for the analysis. The Patients were divided into two groups according to the diagnosis. The NODAT and without NODAT groups were labelled for the statistical comparison of the data.

## RESULT

The study was done to find the frequency of post-transplant diabetes mellitus patients after experiencing live related renal transplant. The study was divided into two groups. PTDM group contained patients with post-transplant diabetes onset and non-PTDM group contained patients that face transient hyperglycemia. There were 50 patients in PTDM group and 70 were in the non PTDM group. Clinical profile and demographic data of patients is described in table no.1. The average age of patients in PTDM

group is 43.2 years whereas in non-PTDM group the average age is 45 years. There were 31 males and 19 female included in the study in PTDM group. There were 52 males and 18 females in non-PTDM group. The factors like BMI, duration of dialysis, pre transplant fasting sugar of patients was analyzed. After transplant the serum creatinine levels (mg/dl), rejection attacks and the presence of IGF after one year was analyzed. Results were compared for both groups for precise analysis.

Table 1: Clinical profile and demographic data of post-transplant diabetes mellitus and non PTDM patients

Factors	PTDM Patients n=50	Non PTDM patients n=70	P-value
Age in years	43.2 years	45 years	0.000
Male/female	31/19	52/18	0.005
Body mass index kg/m <sup>2</sup>	26.7	23.3	0.001
Duration of dialysis (months)	57.5	32.2	NS
Pre-transplant fasting glucose mg/dl	94.3	92.2	0.000
Pre-transplant cholesterol level mg/dl	121.9	106	0.043
Pre-transplant TG level mg/dl	256	191	
Follow-up period (month)	44	40	0.005
The IGF presence during 1 <sup>st</sup> week after transplantation (%)	66.5	6.7	0.003
Rejection attacks	3.1	6.2	0.005
Serum creatinine level mg/dl	1.0	1.0	0.911
Use of tacrolimus %	88.3	87	0.000

(Tacrolimus-induced rise in plasma triglyceride concentrations after administration to renal transplant patients is partially due to a decrease in lipoprotein lipase activity and plasma concentrations)

The multivariate logistic analysis was also carried out for age, BMI, post-transplant IGF and pre transplant PTH, as shown in table no.2. Statistical analysis revealed that results are statistically significant with 95% CI.

Table 2: Multivariate logistic regression analysis

Parameters	P-value	Odds ratio (95% confidence interval)
Age	0.032	1.05 (1.01-1.09)
BMI	0.043	1.12 (1.00-1.23)
Post-transplant IGF	<0.002	18.9 (7.98-43.2)
Pre transplant PTH	<0.001	1.01 (1.00-1.03)

The duration of live related renal transplant was also studied so that time of onset of post-transplant diabetes can be observed. Most of the cases appeared during 2 weeks of transplant as shown in table no.3, however, 27 patients also reported about diabetes after 2 months of transplant.

Table 3: Duration between kidney transplantation and occurrence of diabetes

Time after transplantation	Cases	
	n	%
1 week	8	16
2 week	21	42
3 week	6	11
2 months	14	27
1 year	1	2

**DISCUSSION**

The study showed that incidence of PTDM was highest after 2 weeks of transplant. Family history of diabetes, hyperthyroidism and dyslipidemia in their family. The occurrence of IGF during the first week of transplantation also was linked to PTDM. As per studies it was seen that older age and obesity along with family history of diabetes mellitus lead to enhanced chances of PTDM among patients<sup>11</sup>. There was no link of PTDM and

immunosuppressive treatment found in our study. Similar results were found in previous studies where there was no connection found between immunosuppressive treatment and PTDM<sup>12-13</sup>. PTDM is an acute metabolic condition that produce multiple complications after renal transplant dysfunctional renal graft and in some cases death<sup>14</sup>. There are multiple studies going on at cellular level or on animal models that help to find the duration of PTDM. As per studies, the incidence of renal transplant associated diabetes mellitus varies depending upon follow-up period and history of the patient<sup>15-16</sup>. In our study the incidence of PTDM was found mainly within 2 months of the transplant. There were 8 patients that got diabetes after 1 week, 21 got the disease after 6 weeks and there were 14 patients that reported about diabetes mellitus after 2 months. After a follow-up of 1 year there was 1 patients that complaint about high blood glucose level after their transplant. The multivariate logistic regression analysis was also carried out, p values were calculated and odds ratio were analyzed with 95% confidence interval. The clinical profile data as shown in table no.1 revealed that duration IGF concentration was quite high 66.5% in case of PTDM patients as compared to 6.7% of non-PTDM patients. the follow-up period was 44 months and 40 months in PTDM and non-PTDM groups respectively. The pre-transplant cholesterol level was also analyzed in patients. In our study the patients that had transient hyperglycemia were excluded from the PTDM group and were included in the non-PTDM group. We can say that the patients who were at the time of study taking medication to treat diabetes were included in the PTDM group. The average age of patients in PTDM group is 43.2 years whereas in non-PTDM group the average age is 45 years. There were 31 males and 19 female included in the study in PTDM group. There were 52 males and 18 females in non-PTDM group. The factors like BMI, duration of dialysis, pre transplant fasting sugar of patients was analyzed. After transplant the serum creatinine levels (mg/dl), rejection attacks and the presence of IGF after one year was analyzed. Results were compared for both groups for precise analysis. During the follow-up sessions there were 2 patients that died with functional graft condition. As per studies there were 15 patients that died after renal transplant who were suffering from diabetes mellitus<sup>17</sup>. The lipid profile of the patient was analyzed, the IGF produced during first week after transplant was calculated in both groups. As per previous studies the hepatitis B and C tests were also conducted on the patients before and after transplantation for both PTDM and non-PTDM group<sup>18-19</sup>. Studies have shown that patients also used mTOR inhibitors for both groups. similar ratio of patients in both groups reported about using mTOR inhibitor<sup>20</sup>. Our study showed that TG level before transplant acts as a risk factor for PTDM. If the TG levels are high before transplant the chances are there that after transplant the patient will lead towards PTDM. Hypertriglyceridemia is therefore considered as risk factor for PTDM as it is somehow linked to insulin resistance in many cases. Another risk factor included the presence of IGF during first week of transplant. Studies have shown that the high level of pancreatic stress lead to hyperglycemic condition and insulin resistance after transplantation<sup>21</sup>. The study was single center based study, if patients were taken from different hospitals it would lead to more precise results. Moreover, the patients were limited to one hospital therefore the number of patients is less. The patients should be screened for hyperglycemia; family history should be checked before performing transplantation. Moreover, after transplant the IGF levels in the first week should be checked so that risk of development of PTDM can be avoided.

**CONCLUSION**

Common metabolic disease PTDM is usually diagnosed during first 6 weeks of renal transplantation. Old age, family history of diabetes, the presence of IGF during first week of transplantation are some of the risk factors that lead to PTDM prevalence. Patients who are obese or who have family history of diabetes should be monitored carefully so that risk of PTDM can be

avoided. The PTDM was observed in the 40% patients in our study.

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