

Prevalence of erectile dysfunction among renal failure patients whom underwent hemodialysis or renal transplantation; a local study

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Abstract

Background and objectives: Renal failure is considered as a risk for erectile dysfunction, and habitually the causes are polygenic including those that are vasculogenic, neurologic, endocrinologic, psychological, biochemical and pharmacologic. The aim of the present study is to evaluate the prevalence of erectile dysfunction and its degree of severity in kidney transplant patients. **Methods:** The study was carried out on 41 male patients in Rizgary Teaching Hospital and Zheen International Hospital, over 18 years of age, with end stage renal disease, bearing a functioning kidney transplant at least 3 months post renal transplant and were attending the transplant clinic from 1st September 2018 to 30th April 2019 (group one). A control group was selected consisting of age matching patients on hemodialysis (group two). Patient's characteristics, blood tests and international index of erectile function were evaluated. **Results:** Totally; 76 patients were included consisting of 41 renal transplant recipients and 35 patients on hemodialysis. About 80% of hemodialysis patients and 39% of renal transplant recipient patients complained from erectile dysfunction. Renal transplant recipient group had statistically significant lower erectile dysfunction as compared with hemodialysis group. Diabetes mellitus, anemia, neuropathy were more likely to be observed in those with erectile dysfunction compared to potent transplant, the severity of erectile dysfunction increased with aging. **Conclusions:** in spite of successful renal transplantation, the prevalence of erectile dysfunction remains high. Age, anemia and presence of diabetes and/or peripheral neuropathy were shown to be the main variables associated with erectile dysfunction in the renal transplant recipients.

Key words: Erectile dysfunction, Hemodialysis, Renal transplantation.

Introduction

Erectile dysfunction ED is persistent and/or recurrent inability to attain and/or maintain sufficient penile erection for satisfactory intercourse¹. Erectile dysfunction cannot be attributed to a single cause but rather a result of multisystem disease, psychological factors, and chronic illness². Erectile dysfunction is a major health issue in modern life and is often underdiagnosed and underestimated due to the patient's unawareness about its high prevalence and impact on the quality of life³. The prevalence of ED increases with age as 55% of men are 75 years old, and 65% of men 80 years old, this high prevalence makes ED a relevant health problem. Although age is associated with an increased likelihood of many of the risk factors for ED, the assumption that ED is a natural concomitant of the ag-

ing process is not justified⁴. End-stage renal disease is one of the chronic illnesses causing ED by organic diseases (neuroendocrine disturbances, uremia, anemia, and atherosclerosis), neuroendocrine disturbances involving the hypothalamic-pituitary-gonadal axis are not reserved with dialysis but are improved by renal transplantation⁵. In total 50% of patients with ESRD and 75% of patients on chronic dialysis are affected by ED⁶. Renal transplantation is one of the renal replacement therapies in ESRD widely used nowadays improving therapies and procedures, the total number of renal transplants have increased⁷. The ability of patients to regain normal quality of life following renal transplantation has significantly increased nowadays⁸. The prevalence of erectile dysfunction in renal transplant patients varies between 24 to 55.7%⁹. Although several

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studies have shown significant improvement in ED after successful kidney transplantation¹⁰, some other studies reported the minimal effect of transplantation on the status of ED¹¹. It seems interesting to investigate the ED of renal transplant bearers as it is a relatively unknown problem. Knowledge of the factors associated with ED in this group of patients will allow us to design intervention strategies to solve the problem, and so to improve their health-related quality of life. Aims of the present study were to evaluate the prevalence of ED and its degree of severity in kidney transplant patients and patients with ESRD on dialysis determine the influential factors on ED.

Patients and methods

The study was carried out in Rizgary Teaching Hospital and Zheen International Hospital on 41 married male patients aged over 18 years with end stage-renal disease (ESRD) bearing a functioning transplanted kidney (group one), who were at least 3 months post-transplant and were in attendance at the transplant clinic from 1st September 2018 to 30th April 2019. The majority of our patients (39) received a single transplant and the remaining (2) received a second transplant. In all patients with single graft, the right internal iliac artery was used for the end to end arterial anastomosis except for 5 patients in whom end to end anastomosis done to the left internal iliac artery and one right external iliac artery was used with end to side anastomosis, and in two patients with second renal graft anastomosed end to end, to left internal iliac artery. A control group was selected (group two), consisting of 35 age-matched patients who had ESRD were on hemodialysis (HD). All patients gave their consent to participate in the study. The ED was evaluated using the five items of the international index of erectile function (IIEF-5) that is called sexual health inventory for male (SHIM) (which is a brief, self-administered questionnaire that is consist of 5 questions and was designed to address 5 relevant aspects of erectile function. The IIEF-5 score ranges from 5 to 25. A cutoff score of 21 best discriminates the presence of ED, with a sensitivity of 0.98 and a specificity of 0.88⁹. For the purpose of this study, ED was defined as an IIEF-5 score <22. We performed a retrospective chart review for all patients enrolled in this study. Patient's characteristics, including

age, time on dialysis, duration of current transplants, the vessel used for renal artery anastomosis, smoking, diabetes mellitus, hypertension, antihypertensive medications body mass index (BMI), and bulbocavernosus reflex was examined for every patient, and most recent serum creatinine, hemoglobin, fasting blood glucose and cholesterol were obtained, Serum testosterone was also obtained to determine any state of hypogonadism. Statistical packages for social sciences (SPSS v20) used for the analysis of the data. Student's test used to compare between means. Unpaired t-test used to compare between readings of case and control group. Chi-square test of association (McNemar test) used to compare proportions. A p-value of ≤ 0.05 was considered as statistically significant.

Results

Total number of 76 patients were included consisting of 41 renal transplant recipient RTR and 35 (age-matched) on HD. The compliance of ED was reported by 39% of 41 RTR (age range 21-58 y, mean36.8) according to the IIEF-5 score system. A significant increase in erectile function was observed in male RTR group compared to the HD group in which 80% affected by ED, Figure (1).

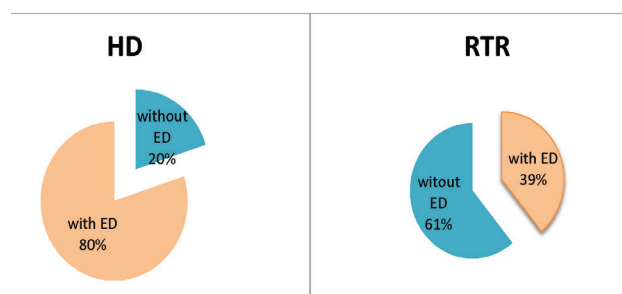


Figure (1): Distribution of RTR and HD patients with and without ED

Clinical and laboratory characteristics of the RTR group are summarized in Table (1) and Table (2). The mean age and the graft duration were significantly higher in RTR with ED compared to normal sexual functioning ones (p-value <0.008). Moreover, the severity of ED is increased with aging; the percentage of moderate and severe cases of ED increased from 32% in patients below 40 y to 68% in those over 40 years. Diabetes mellitus and anemia were more likely to be observed in those with ED compared to normal sexual functioning transplant (p-value <0.001 and 0.047, respectively). Another variable, which displayed a

statistically significant difference between the two groups, was the presence of associated neuropathy (detected by the absence of bulbocavernosus reflex) (p -value <0.05).

Table (1):Clinical characteristic in RTR, with and without ED (using No. and percentage %)

	With ED (no.=16)		Without ED (no.=25)		P-value
	NO.	%	NO.	%	
History of hypertension	12	75	18	72	NS
History of DM	5	31.2	2	8	0.01
smoking	4	25	4	16	NS
Body mass index $I>25$	3	18.7	2	8	NS
Negative bulbocavernosus reflex	3	18.7	0	0	0.03
Second transplant	1	2.4	1	2.4	NS
Type of arterial anastomosis					
End to end internal iliac art.	15	37.5	25	62.5	NS
End to side external iliac art.	1	6.25	0	0	NS
	Mean \pm SD	Range	Mean \pm SD	Range	
Age (years)	43.6 \pm 8	32-57	34 \pm 9	21-47	< 0.008
Duration of dialysis (months)	8 \pm 2.1	0-10	11 \pm 1.1	5-11	NS
Duration of the graft (months)	37 \pm 20	23- 180	54.6 \pm 17	3-103	<0.001

On the other hand, there were no statistically significant differences between both groups regarding the incidence of hypertension, history of smoking, duration of pre-transplant dialysis, type of arterial anastomosis, serum cholesterol and BMI. Also, there was no impact of the type or the number of antihypertensive on erectile function. In all, 97.5% of the sample studied displayed normal levels of total testosterone, and no statistically significant difference in serum levels were found in patients with and without ED Table (2).

Table (2):Laboratory characteristic in RTR with and without ED

	With ED (No. =16)		Without ED (No. =25)		p-value
	Mean \pm SD	Range	Mean \pm SD	Range	
Total serum testosterone	5 \pm 2.7	1-8	6.7 \pm 3	5-10	NS
Fasting serum cholesterol	198.6 \pm 50	83-377	196 \pm 55	75-394	NS
	No.	%	No.	%	
Hb <11 gm/dl	5	31.2	4	16	<0.047

In the group of HD patients, there was a statistically significant effect of age, duration of HD and DM Table (3).

Table (3):Clinical characteristic of HD patients, with and without ED (using Mean \pm S.D.)

	With ED (No.=28)		Without ED(No.=7)		p-value
	Mean \pm S.D	range	Mean \pm S.D	range	
Age (years)	42.6 \pm 2	31-57	32.1 \pm 7	20-42	<0.001
Duration of dialysis (months)	10.1 \pm 12	6-28	7.1 \pm 4	2-11	<0.03

Table (4):Clinical characteristic in HD patients with and without ED

	With ED (No. = 28)		Without ED (No.=7)		p-value
	No.	%	number	%	
History of hypertension	28	100	7	100	NS
History of DM	20	71.4	0	0	<0.05
Smoking	7	25	1	14	NS

Discussion

Initial studies reported the prevalence of ED among RTR to be in the range of 54 – 66%. Using the same index in our study, a prevalence of 39% was found in 41 sexually active RTR, this shows that in spite of successful renal transplantation, the prevalence of ED remains high. The effect of renal transplant on erectile function was studied since the 1970s, some authors reported improvement of erectile function after transplantation¹², and while others reported that in the majority of cases this procedure has no effect on the erectile function¹³. Age has been a matter for consideration in the origin of ED in the general population and could cause ED in different ways as atherosclerosis, decrease tactile sensation, degenerative changes that affect tunica albuginea and associated comorbid diseases¹⁴. The present study also showed a highly significant association between age and ED in RTR. In a single variable analysis, our results showed significant differences between RTR with and without ED regarding graft duration, in which those with longer graft duration complain more from ED, it is possible that the greater the age, the longer the duration of the graft, while several other authors reported no association between graft duration and erectile function¹⁵. In our study, the duration of dialysis was not a determinant factor when associated with the presence of ED in the population analyzed. In the Massachusetts Male aging study, the age-adjusted probability of complete ED was three times greater in diabetic patients on treatment than in those without diabetes, it is reasonable to suppose that diabetic RTR would exhibit an even greater prevalence of ED, as vascular pathology is an important cause of ED in RTR¹⁶. Diabetes mellitus had a significant negative impact on erectile function ($p=0.001$). The probability of ED was three times higher in patients with DM than non-diabetics. Peripheral neuropathy is frequently associated with ED. Peripheral neuropathy that occurs in RTR may be due to associated DM or residual effect of uremia¹⁷. In our study, 3 patients had peripheral neuropathy of which 100% had DM and ED. Since the 1980 s, several studies have been performed to assess the relationship between arterial hypertension and ED¹⁸. In the present study, the incidence of hypertension was similar between groups with and without ED (75 and 72% respectively, $p=0.3$), the

use and the type of antihypertensive drugs did not show any significant correlation with ED in the evaluated group. This could be explained by two points, first is that all our RTR receive nearly the same antihypertensive protocol, the second point is that the antihypertensive protocol consists of calcium blocking agents alone or in combination with angiotensin-converting enzyme inhibitors and both drugs have a minimal negative impact on erectile function¹⁹. The association between smoking and ED has been well documented in the literature. On the other hand, some studies reported no association between ED and smoking among RTR²⁰. In the current study, 19.5% of the patients were smokers, the incidence of smoking was comparable between impotent and potent ones (25% vs. 16%, $P=0.13$). Also, we found no relationship between testosterone and erectile function, this could be explained by the fact that all our RTR had a functioning graft, and none of them returned to dialysis and this may ensure normalization of any uremic endocrinal abnormalities. Anemia could participate in the etiology of ED in RTR because it worsens the general condition and aggravates asthenia in those patients. Also, hypoxia associated with anemia may lead to decreased activity of nitric oxide (NO) synthase enzyme and an increase in collagen synthesis resulting in impaired sinusoidal relaxation and ED²¹. Our results showed a significant correlation between anemia and ED, anemic patients had double the chance to have ED than non-anemic patients. Hypercholesterolemia is one of the significant risk factors in the development of vasculogenic ED. The mechanism of hypercholesterolemia-induced dysfunction of the corporal endothelium may be due to impaired ability of the endothelium to synthesize nitric oxide or decreased synthesis or availability of L-arginine²². In the current study, no statistically significant relationship between cholesterol levels and erectile function nor penile hemodynamic parameters could be noted, possibly because all the evaluated RTR had cholesterol level within the normal range. Type of renal anastomosis was not showing a statistically significant effect on erectile function mostly either due to patency of contralateral internal iliac artery or presence of accessory penile artery which presents in 35% of the general population²³. As expected from the classic correction of endocrine disorders and

improvement of the psychological status after transplantation; the sexual drive was comparable to those of the general population.

Conclusions

Renal transplantation can have varying effects on erectile function. In spite of successful renal transplantation, the prevalence of ED remains high (39%). The pathogenesis of ED in renal transplant patients is multifactorial. Erectile dysfunction is an extremely common problem in hemodialysis patients and has a major negative effect on the quality of life in these patients.

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