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ORIGINAL ARTICLE

Analysis of sexual functions in male nondiabetic hemodialysis patients and renal transplant recipients

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Summary

Disturbance of sexual functions among hemodialysis patients and renal transplant recipients (RTRs) is controversial. Diabetes mellitus (DM) is known to have a significant negative impact on sexual functions. Most previous studies concerning the issue of disturbance of sexual functions among hemodialysis patients and renal transplant recipients have included diabetic patients also, which might have influenced their results. The aim of this study was to evaluate sexual functions of nondiabetic male (NDM) dialysis patients and RTRs, and to compare our findings with those of the others. Twenty-five nondiabetic male RTRs, 25 age-matched NDM hemodialysis patients, and 25 age-matched NDM controls were the subjects of this study. Sexual functions of all subjects were assessed using the International Index of Erectile Function (IIEF) questionnaire. Statistical analysis was performed using appropriate statistical tests with the level of significance set at $P < 0.05$. Data were described using mean, standard deviation (SD), median and interquartile range (IQR). Renal transplant recipients (RTRs) and hemodialysis patients had depressed erectile function (EF) and Intercourse satisfaction (IS) function, but normal orgasmic (OF) function. Sexual desire (SxD) function of RTRs group, although subnormal, was better than that of hemodialysis patients. Overall satisfaction (OS) of RTRs, unlike that of hemodialysis patients, was normal. Sexual dysfunction is prevalent even in NDM hemodialysis patients and RTRs. Although ED is equally prevalent among these two groups, it is more profound among the former one. OF is spared in these patients. Renal transplantation seems to normalize OS and improve SxD function of nondiabetic male renal transplant recipients (NDM RTRs).

Introduction

Disturbance in sexual function is a common feature of chronic renal failure. Approximately 50% of uremic men complain of erectile dysfunction (ED) while an even greater percentage of them complain of decreased libido and a marked decline in the frequency of intercourse. The genesis of sexual dysfunction in these patients is multifactorial and is primarily organic in origin. In addition to the uremic milieu, peripheral neuropathy, autonomic insufficiency, peripheral vascular disease, and pharmacologic therapy all play an important role in the genesis of this problem. In addition, psychological and physical stresses are also commonly present in this setting [1–3].

In clinical practice, the attention given to sexual problems in this persistently increasing group of patients is low. Male patients may still suffer from ED in spite of successful renal transplantation [4]. Recent studies showed that 48–56% of renal transplant recipients had ED [4,5].

Diabetes mellitus (DM) has a significantly negative impact on erectile function [6]. Most of the published studies concerned with sexual dysfunction among hemodialysis and renal transplant recipients included diabetic patients. The aim of this study was to evaluate sexual

functions of NDM hemodialysis patients and RTRs, and to compare our results with what have been found by other researchers.

Patients and methods

This study included 25 NDM RTRs, 25 age-matched NDM hemodialysis patients, and 25 age-matched NDM controls. Hemodialysis patients underwent regular dialysis three times a week (4 h each session). RTRs were on regular immunosuppressive medications: prednisolone from 7.5 to 60 mg/day, mycophenolate mofetil from 1 to 2 g/day, and cyclosporine A (18 patients) from 150 to 450 mg/day or tacrolimus (seven patients) from 2 to 8 mg/day, according to the donor/recipient compatibility. Causes of renal failure among the included RTRs and hemodialysis patients are summarized in Table 1.

Inclusion criteria were: (i) Age between 20–50 years, (ii) Sexually active (married), (iii) Well functioning graft, and (iv) Age of the graft is ≥6 months. Exclusion criteria were: (i) DM, (ii) History of graft rejection, and (iii) ED treatment.

After the approval of King Khalid University Hospital Ethics Committee, informed written consent was obtained from each subject. To assess the sexual functions, each subject was interviewed, oriented, and helped to complete the IIEF questionnaire. This questionnaire was developed in 1997 to assess the effectiveness of sildenafil in patients treated for ED [7]. It estimates all aspects of male sexual functions: erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction. The structure of IIEF questionnaire is shown on Table 2.

Demographic data and treatment regimen were collected from patients' files. The degree of erection was assessed on the basis of the score of the six questions from the erectile function domain of the IIEF and classified as normal (score 26–30), mild ED (score 22–25), mild – moderate ED (score 17–21), moderate ED (score 11–16), severe ED (score 6–10).

Table 1. Causes of renal failure in dialysis patients and renal transplant recipients.

Cause of renal failure	Dialysis patients		Renal transplant recipients	
	No. of patients	Percentage	No. of patients	Percentage
HTN	15	60	18	72
IgA	0	0	2	8
MPGN	2	8	1	4
RPGN	2	8	1	4
CKD	1	4	0	0
FN	1	4	0	0
AS	1	4	0	0
OU	1	4	0	0
ADPKD	1	4	0	0
FSGS	1	4	1	4
PN	0	0	1	4
HSP	0	0	1	4
Total	25	100	25	100

HTN, hypertension; IgA, IgA nephropathy (Berger's disease); MPGN, mesangioproliferative glomerulonephritis; RPGN, rapidly progressive glomerulonephritis; CKD, congenital kidney disease; FN, familial Nephropathy; AS, Alport syndrome; OU, obstructive uropathy; ADPKD, adult polycystic kidney disease; FSGS, focal segmental glomerulosclerosis; PN, pyelonephritis; HSP, Henoch-Schönlein purpura.

Table 2. Structure of IIEF questionnaire.

Domain	Questions	Range	Minimum score	Maximum score
Erectile function	1 to 5 and 15	0–5	1	30
Orgasmic function	9 and 10	0–5	0	10
Sexual desire	11 and 12	1–5	2	10
Intercourse satisfaction	6, 7 and 8	0–5	0	15
Overall satisfaction	13 and 14	1–5	2	10

Statistical analysis

Data were entered in MS Excel and analyzed using SPSS PC+ version 13.0 statistical software. Descriptive statistics (mean, standard deviation, median and interquartile range) were used to describe the quantitative and qualitative variables. One-way analysis of variance was used to compare the median values of quantitative outcome variables across the three groups. Duncan's multiple range test was used to test for significant differences between individual pairs of means. The nonparametric Kruskal–Wallis test was used to compare the mean ranks of skewed outcome variable across the three groups. Chi-Squared test was used to determine the significance of the categorical variable differences. A P-value of <0.05 was considered as statistically significant.

Results

Relevant demographic data for controls, hemodialysis patients, and RTRs were summarized and compared in Table 3. IIEF domains mean scores among the three groups were summarized and compared in Table 4.

The prevalence of ED regardless of severity was 56% among hemodialysis patients, 60% among RTRs, and 24% among the controls. Chi-squared test showed that ED was more prevalent among hemodialysis patients and RTRs compared with the controls ($P = 0.04$ and $P = 0.02$ respectively). However, no significant difference in ED

Table 3. Demographic data for controls, dialysis patients and renal transplant recipients.

Clinical data	Controls	Dialysis patients	Transplant patients	*P*-value
Age in years (Mean ± SD)	36.7 ± 7.0	38.2 ± 6.6	36.5 ± 6.3	0.61*
Number of children (Median; IQR)	3; 4	3; 4	2; 5	0.78†
Age of youngest child in years (Median; IQR)	1.5; 2.6	3.0; 5.9	2.0; 4.4	0.32†
Age of graft in years (Mean ± SD)	–	–	4.6 ± 4.8	–
Systolic pressure (Mean ± SD)	121.2 ± 5.1	133.2 ± 10.3	128.6 ± 11.8	<0.0001*
Diastolic pressure (Mean ± SD)	80.6 ± 2.2	86.0 ± 5.2	84.6 ± 8.6	0.006*
Duration of dialysis in years (Mean ± SD)	–	8.2 ± 5.2	–	–

*One-way analysis of variance; †Kruskal–Wallis test; IQR, interquartile range.

Table 4. Comparison of means of IIEF domains scores across the three groups.

IIEF sexual domains	Controls (Mean ± SD)	Dialysis patients (Mean ± SD)	Transplant patients (Mean ± SD)	*F*-value	*P*-value
Total IIEF score	22.47 ± 2.2*	18.4 ± 4.3	19.4 ± 3.7	8.9	<0.0001
EF	27.8 ± 2.9*	22.2 ± 6.3	21.4 ± 5.8	11.1	<0.0001
OF	9.3 ± 1.0	8.4 ± 2.0	8.8 ± 1.3	2.3	0.10
SxD	8.5 ± 1.3**	3.9 ± 1.0**	7.5 ± 1.6**	82.1	<0.0001
IS	12.6 ± 2.3*	9.2 ± 2.8	10.3 ± 2.6	11.6	<0.0001
OS	9.0 ± 1.5†	7.4 ± 2.5	7.9 ± 2.3†	3.7	0.03

Pairwise comparison (Duncan's multiple range test): *Controls mean score is significantly higher than those of dialysis and transplant patients. No significant difference between dialysis and transplant patients, **Mean score is significantly different among each of the three groups, †No significant difference between controls and transplant patients. Significant difference between controls and dialysis patients. No significant difference between dialysis and transplant patients.

prevalence was detected between hemodialysis patients and RTRs ($P = 0.3$).

The prevalence of hypertension among hemodialysis patients, RTRs, and controls was 80%, 64%, and 8%, respectively.

In the dialysis group, eight patients were taking Atenolol (50 mg/day or 100 mg/day), two patients were taking metoprolol (50 mg/day), and one patient was taking propranolol (10 mg/day). In RTR group, seven patients were taking atenolol (50 mg/day or 100 mg/day), and two patients were taking metoprolol (100 mg/day). In the control group, two participants were taking amlor (a calcium channel blocker) (5 mg/day) and none of the rest was on any other medication. No significant difference was found when comparing the mean values of total IIEF score, EF, OF, SxD, IS, or OS score of hemodialysis patients and RTRs in relation to use of beta blockers.

Stratification according to the degree of ED severity among the three groups was summarized in Fig. 1.

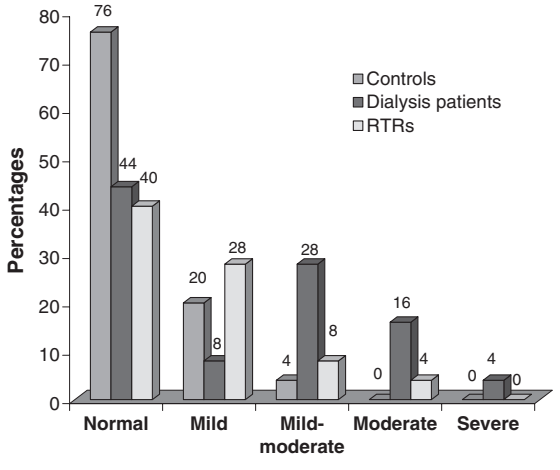

Figure 1 Severity of erectile dysfunction among controls, hemodialysis patients and renal transplant recipients.

Discussion

The prevalence of sexual dysfunction among patients with chronic renal failure was first studied in 1973 when Levy conducted the first epidemiological survey of sexuality in patents with chronic renal disease [8]. This study had strongly suggested that sexuality was already impaired during the uremic phase before dialysis, and in most patients, sexuality did not improve after the start of dialysis.

In subsequent epidemiological studies, ED was found to be the most frequently reported sexual problem in male patients on dialysis. A variety of definitions have been used to define ED in the hemodialysis population in

seven limited studies, which included few hemodialysis patients. Perhaps because of the varied definitions of ED and small sample size, the estimates of the prevalence ranged broadly from 41% to 93% [9–15].

In this study, the prevalence of ED in NDM hemodialysis patients was 56%, which is similar to that reported by David and Koyle [16] and Cerqueira *et al.* [17]. It is lower than that reported by Palmer *et al.* [18]; Turk *et al.* [19]; and Martin-Diaz *et al.* [20].

These findings in addition to the findings in the aforementioned studies; indicated that despite the improvement introduced in the treatment of end-stage renal disease patients, the prevalence of ED remains high among these patients; including nondiabetic ones.

Discordant data exist on ED among RTRs. Salvatierra *et al.* [21] found that 82% of RTRs who had functioning graft for ≥3 years regained the same level of sexual activity that they had experienced before onset of uremia. Fletcher *et al.* [22] analyzed 23 males with renal allograft survival longer than 10 years and found a renewed and heightened interest in sexual activity in all the evaluated patients. Some other initial studies reported that the prevalence of ED in RTRs was in the range of 54–66% [23–26]. Recent studies using IIEF questionnaire, continued to show similar results [5,7].

Using the same questionnaire in this study, a prevalence of 60% was found in NDM RTRs, which was significantly ($P = 0.02$) higher than that of the controls (24%). In this study, the prevalence of ED among NDM RTRs was similar to what have been found by other researchers, who included diabetic recipients. This showed that in spite of successful renal transplantation; the prevalence of ED in these patients, including nondiabetic ones, remained high. Figure 1 showed that most of RTRs, like the controls, had a mild degree of ED while most of hemodialysis patients had a mild-moderate degree. Unlike hemodialysis patients, none of the RTRs had severe ED.

It is worth mentioning, here, that some researchers [27,28] have found that erythropoietin (Epo) therapy improved sexual function. Although all hemodialysis patients in this study were on Epo therapy, ED prevalence was significantly higher among these patients as compared with that among the controls, but not significantly lower than that among RTRs. One can not help but wonder whether the use of Epo among hemodialysis patients included in this study had influenced their degree of ED. In other words, if these patients were not on Epo treatment, would they still have the same degree of ED? To answer this question, a study comparing the degree of ED among hemodialysis patients treated by Epo with those who are not, needs to be conducted. The main obstacle in conducting such a study is the difficulty of recruiting enough number of hemodialysis patients who are not on Epo treatment. Such a treatment has become so prevalent among hemodialysis patients that recruiting a good number of hemodialysis patient not on Epo treatment, especially with the previously mentioned criteria, would be extremely difficult.

It was intriguing to compare among the three groups in regard to the number of children the participant had and age of the youngest child. These two parameters could be considered as a real life estimate of fatherhood capacity which depends, at least partly, on the sexual function of the participant. No significant difference was detected among the three groups in regard to these two parameters. The readers, however, should be warned that as a result of the skewed data distribution of the relevant two variables (number of children and age of the youngest child); Kruskal–Wallis test, a nonparametric test, had to be used to compare the three groups' medians. Nonparametric tests are known to waste some information inherent in the data and a large number of data, which does not apply to this study, is the best approach to minimize such a waste. So a question arises here: would we still reach the same results if more subjects were involved?

It should be clarified that birth control practice among all subjects was inquired about and was not found to be significant enough to compromise the validity of the aforementioned two parameters, as such a practice was admitted by only two control subjects and denied by the remaining 73 subjects.

Since 1980s, several studies assessed the relationship between arterial hypertension and ED [6]. In this study, the prevalence of hypertension was 80% among hemodialysis patients and 64% among RTRs which is 10-fold and eightfold respectively higher than that among the controls (8%), which might contribute to the higher prevalence of ED among hemodialysis patients and RTRs as compared with that among controls. Use of some antihypertensive drugs is considered to be a risk factor for ED. Beta-blockers are the antihypertensive drugs most frequently associated with ED. No significant difference in the score of erectile function domain was detected between those treated by beta-blockers and those who were not, which is similar to the finding reported by Malavaud B *et al.* [5]. No such difference in the score of any of the other four sexual functions domains was found between those treated by beta-blockers and those who were not, either.

As all three groups were age-matched and as none of the subjects was diabetic, this significant difference in ED prevalence among patients (hemodialysis patients and RTRs) and controls could not be attributed to age or to DM.

Regarding IIEF questionnaire, total IIEF score, EF score and IS score of hemodialysis patients and RTRs were significantly lower than those of the controls. No significant difference was detected between hemodialysis patients and

RTRs regarding these scores. OF score was not significantly different among the three groups. SxD score of RTRs was significantly higher than that of the hemodialysis patients, but significantly lower than that of the controls. OS of RTRs was not significantly different from that of the controls, while it is lower in hemodialysis patients as compared with the controls.

I find it imperative to remind the readers that men tend to hide their sexual problems when present. Such behavior is more prominent in certain communities than the others. Assessing sexual functions by using IIEF questionnaire could be subjected to this kind of bias and could explain why different studies based on this questionnaire, including this study, had different results.

Finally, I would like to comment that this study might have raised as many questions as it has answered. Readers should not find that disappointing, as asking the right questions is as important as answering the already asked ones.

Conclusions

Neither hemodialysis nor renal transplantation fully normalizes sexual functions of uremic patients. Sexual dysfunction is prevalent in male hemodialysis patients and renal RTRs, including nondiabetic ones. Although the prevalence of ED among hemodialysis patients was not significantly different from that among RTRs, it seems that ED among the former group is more profound.

Regarding individual sexual function domains: Orgasmic satisfaction is the only sexual function spared among these patients. RTRs and hemodialysis patients have depressed erectile and intercourse satisfaction functions. RTRs seem to have normal overall satisfaction function and improved, but non normalized, sexual desire function, which could be attributed to the better organic and psychological well being of RTRs as compared with hemodialysis patients.

Authorship

KH: designed study, collected data, analyzed results, and wrote manuscript.

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