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Erectile Dysfunction and End-Stage Kidney Disease

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Abstract

Aim

Erectile dysfunction (ED) is common amongst men with kidney failure requiring kidney replacement therapy. We aimed to ascertain the prevalence of ED in men with kidney failure in a single nephrology centre in Ireland.

Methods

The Sexual Health Inventory for Men (SHIM) questionnaire was distributed to 48 men attending the nephrology service over a 2-month period in mid-2020. It consists of 5 questions scored 0-5 or 1-5 with a summative score ranging between 1-25 to assess sexual function over the last 6 months.

Results

48 patients with kidney failure were invited to participate in the questionnaire. Response rate were 43/48 (89%). 25/29 (86.2%) patients on haemodialysis (HD), 1/1 (100%) patient on peritoneal dialysis (PD) and 11/13 (84.6%) patients with kidney transplant (Tx) completed the questionnaire in full. Amongst patients on HD, 17/25 (68%) reported severe ED. The patient on PD reported no ED. In the Tx group, 2/11 (18.2%) reported severe ED.

Discussion

The prevalence of ED in our cohort of patients were 24/25 (96%) of HD and 7/11 (63.6%) of patients with Tx. The high prevalence of ED presents an unmet need to increase awareness amongst healthcare workers regarding ED in this cohort of patients, to identify interventions for prevention and treatment.

Introduction

Erectile dysfunction (ED) is common amongst men with kidney failure. Its prevalence ranges between 21 to 43% among patients on haemodialysis (HD) and patients with kidney transplant (Tx)[1]. In a recently published systematic review and meta-analysis, the pooled prevalence of ED in kidney failure is 71%[2]. There is a positive association between ED and cardiovascular disease,

with studies suggesting that ED can be used as a marker of systemic endothelial dysfunction[3]. However, the frequency of ED in patients living with kidney failure living in Ireland has not, to our knowledge, previously been studied. Despite its prevalence, it is a topic rarely discussed and addressed in nephrology clinics. This represents an unmet need within our cohort of patients. We aimed to determine the prevalence and risk factors for ED in patients attending a large nephrology centre in Ireland.

Methods

For the year ending 2020[4], we had 331 patients living with kidney failure on kidney replacement therapy; 72 patients on in-centre HD in our parent unit, 83 patients on HD in a satellite unit, 6 patients on peritoneal dialysis (PD) and 170 patients with kidney Tx. Using a validated Sexual Health Inventory for Men (SHIM) questionnaire[5,6], we aimed to determine the prevalence as well as risk factors for ED in patients attending a large nephrology centre in Ireland. ED is classified into five groups; no ED (SHIM total score, 22–25), mild (17–21), mild to moderate (12–16), moderate (8–11), and severe ED (1–7). This data was compared with published prevalence rates internationally and will be used to develop a pathway that facilitates earlier recognition and treatment of ED in this patient cohort.

Inclusion criteria includes male gender, age 18 and over with a diagnosis of kidney failure treated with kidney replacement therapy such as HD, PD or kidney Tx. The SHIM questionnaire was distributed to 48 men attending the nephrology service at our centre over a 2-month period in mid-2020 via convenience sampling. Patients in the satellite unit were excluded as they are geographically distant from our parent unit.

We performed a two-tail student t-test to compare the means of SHIM scores of patients on HD and patients with Tx.

Results

A total of 48 patients living with kidney failure were invited to participate in the questionnaire. The group consisted of 34/48 (70.8%) patients on haemodialysis (HD), 1/48 (2.1%) patient on peritoneal dialysis (PD) and 13/48 (27.1%) patient with kidney transplantation (Tx). Response rates were 43/48 (89%); 29/43 (67.4%) patients on HD, 1/43 (2.3%) patient on PD and 13/43 (30.2%) patients with Tx. The overall mode of the age group is 55-64. 29/43 (67.4%) were married, 13/43 (30.2%) were employed or self-employed, 39/43 (90.7%) were non-smokers, 27/42 (62.8%) reported no alcohol consumption, and 1/43 (2.3%) reported the use of recreational cannabis. Table 1 shows a summary of demographics and results based on the type of kidney replacement therapy received.

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Total (n=43)		Dialysis (n=29)	Transplant (n=13)	PD (n=1)	Total (n=43)
Age groups	18-24, n (%)	0	0	0	0
	25-34, n (%)	1 (3.44)	2 (15.38)	0	3 (6.98)
	35-44, n (%)	3 (10.34)	4 (30.77)	1 (100)	8 (18.60)
	45-54, n (%)	2 (6.90)	1 (7.69)	0	3 (6.98)
	55-64, n (%)	8 (27.59)	4 (30.77)	0	12 (27.91)
	65-74, n (%)	6 20.69)	2 (15.38)	0	8 (18.60)
	>75, n (%)	9 (31.03)	0	0	9 (20.93)
Race	White, n (%)	28 (96.55)	11 (84.62)	1 (100)	40 (93.02)
	Black, n (%)	0	1 (7.69)	0	1 (2.33)
	Asian, n (%)	1 (3.45)	1 (7.69)	0	2 (4.65)
Marital status	Married, n (%)	20 (68.97)	9 (69.23)	0	29 (67.44)
	Separated, n (%)	1 (3.45)	0	1 (100)	2 (4.65)
	Single, n (%)	6 (20.69)	4 (30.77)	0	10 (23.26)
	Widowed, n (%)	2 (6.90)	0	0	2 (4.65)
Employment status	Employed, n (%)	4 (13.79)	5 (38.46)	0	9 (20.93)
	Unemployed, n (%)	1 (3.45)	3 (23.08)	0	4 (9.3)
	Unable to work, n (%)	13 (44.83)	2 (15.38)	1 (100)	16 (37.21)
	Retired, n (%)	9 (31.03)	1 (7.69)	0	10 (23.26)
	Self employed, n (%)	2 (6.90)	2 (15.38)	0	4 (9.30)
Currently smoking	Yes, n (%)	3 (10.34)	1 (7.69)	0	4 (9.30)
	No, n (%)	26 (89.66)	12 (92.31)	1 (100)	39 (90.70)
Currently consuming alcohol	Yes, n (%)	7 (24.14)	8 (61.54)	1 (100)	16 (37.21)
	No, n (%)	22 (75.86)	5 (38.46)	0	27 (62.79
Currently using recreational drugs	Yes, n (%)	0	1 (7.69)	0	1 (2.33)
	No, n (%)	29 (100)	12 (92.31)	1 (100)	42 (97.67)
Haemodialysis access	Permacath, n (%)	23 (79.31)			
	Fistula, n (%)	6 (20.69)			
SHIM Question 1 How do you rate your confidence that you could get and keep an erection ?	Did not complete, n (%)	2 (6.90)	0	0	2 (4.65)
	1, n (%)	16 (55.17)	1 (7.69)	0	17 (39.53)
	2, n (%)	4 (13.79)	1 (7.69)	0	5 (11.63)
	3, n (%)	6 (20.69)	7 (53.85)	0	13 (30.23)
	4, n (%)	1 (3.45)	2 (15.38)	0	3 (6.98)
	5, n (%)	0	2 (15.38)	1 (100)	3 (6.98)
SHIM Question 2 When you had erections with	Did not complete, n (%)	3 (10.34)	0	0	3 (6.98)
	0, n (%)	16 (55.17)	1 (7.69)	0	17 (39.53)
		1 (3.45)	1 (7.69)	0	2 (4.65)

sexual stimulation, how often were your erections hard enough for penetration (entering your partner) ?	1, n (%) 2, n (%) 3, n (%) 4, n (%) 5, n (%)	4 (13.79) 0 1 (3.45) 4 (13.79)	1 (7.69) 3 (23.08) 3 (23.08) 4 (30.77)	0 0 1 (100) 0	5 (11.63) 3 (18.60) 5 (2.33) 8 (18.60)
SHIM Question 3 During sexual intercourse, how often were you able to maintain your erection after you had penetrated (entered) your partner ?	Did not complete, n (%) 0, n (%) 1, n (%) 2, n (%) 3, n (%) 4, n (%) 5, n (%)	1 (3.45) 16 (55.17) 2 (6.90) 4 13.79) 1 (3.45) 1 (3.45) 4 (13.79)	0 2 (15.38) 0 2 (15.38) 3 (23.08) 2 (15.38) 4 (30.77)	0 0 0 0 0 1 (100) 0	1 (2.33) 18 (41.86) 2 (4.65) 6 (13.95) 4 (9.30) 4 (9.30) 8 (18.60)
SHIM Question 4 During sexual intercourse, how difficult was it to maintain your erection to completion of intercourse ?	Did not complete, n (%) 0, n (%) 1, n (%) 2, n (%) 3, n (%) 4, n (%) 5, n (%)	1 (3.45) 17 (58.62) 2 (6.90) 0 2 (6.90) 2 (6.90) 5 (17.24)	2 (15.38) 2 (15.38) 0 1 (7.69) 3 (23.08) 1 (7.69) 4 (30.77)	0 0 0 0 0 0 1 (100)	3 (6.98) 19 (44.19) 2 (4.65) 1 (2.33) 5 (11.63) 3 (6.98) 10 (23.26)
SHIM Question 5 When you attempted sexual intercourse, how often was it satisfactory for you ?	Did not complete, n (%) 0, n (%) 1, n (%) 2, n (%) 3, n (%) 4, n (%) 5, n (%)	1 (3.45) 16 (55.17) 3 (10.34) 1 (3.45) 1 (3.45) 1 (20.69) 6 (20.69)	0 2 (15.38) 0 1 (7.69) 3 (23.08) 3 (23.08) 4 (30.77)	0 0 0 0 0 0 1 (100)	1 (2.33) 18 (41.86) 3 (6.98) 2 (4.65) 4 (9.30) 4 (9.30) 11 (25.58)
Completed SHIM, n (%)		25 (86.21)	11 (84.62)	1 (100)	37 (86.05)
Total SHIM score		177	171	23	371
Mean SHIM score ± SE		7.08 ± 1.57*	15.55 ± 2.39*	23.00 ± 0	10.03 ± 1.46
Wish to speak to doctor regarding ED	Yes, n (%) No, n (%)	10 (34.48) 19 (65.52)	4 (30.77) 9 (69.23)	0 1 (100)	14 (32.56) 29 (67.44)

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Table 1 : Demographics and SHIM score for participants on HD, PD and with Tx. *t(34) = 2.03, p = 0.005

Of those who participated in the questionnaire, 37/43 (86%) completed the SHIM section of the questionnaire in full; 25/29 (86.2%) patients on HD, 11/13 (84.6%) patients with Tx and as did the only patient on PD. The mean (SE) SHIM score for those completed the survey was 7.08 ± 1.57 in the group on HD, 15.55 ± 2.39 in the group with Tx and 23 in the group on PD. We performed a two-tail student t-test to compare the means of SHIM scores indicating severity of ED of patients on HD and patients with Tx. There was a significant difference between the severity of ED between patients on HD and patients with Tx ($t(34) = 2.03$, $p = 0.005$). There is a significantly higher severity of ED among patients on HD than those with kidney Tx.

We identified an overall prevalence of ED of 31/37 (83.8%) in our cohort. The proportion was higher in men receiving haemodialysis; 24/25 (96%) than in those treated with kidney transplantation; 7/11 (63.6%). No ED was reported in the patient on PD. Among the patients on HD, the proportion of those with severe, mild-to-moderate, mild, and no ED were 17/25 (68%), 3/25 (12%), 4/25 (16%), and 1/25 (4%) respectively. In the cohort with kidney Tx, the proportion of those with severe, mild-to-moderate, mild, and no ED were 2/11 (18.2%), 4/11 (36.4%), 1/11 (9.1%), and 4/11 (36.4%) respectively. The patient on PD reported no ED, 1/1 (100%). Figure 1 shows the proportion of patients with various severities of ED in each kidney replacement therapy group. Amongst those with severe ED in the cohort on HD, 13/17 (76.5%) has a central venous access; Permacath for HD access.

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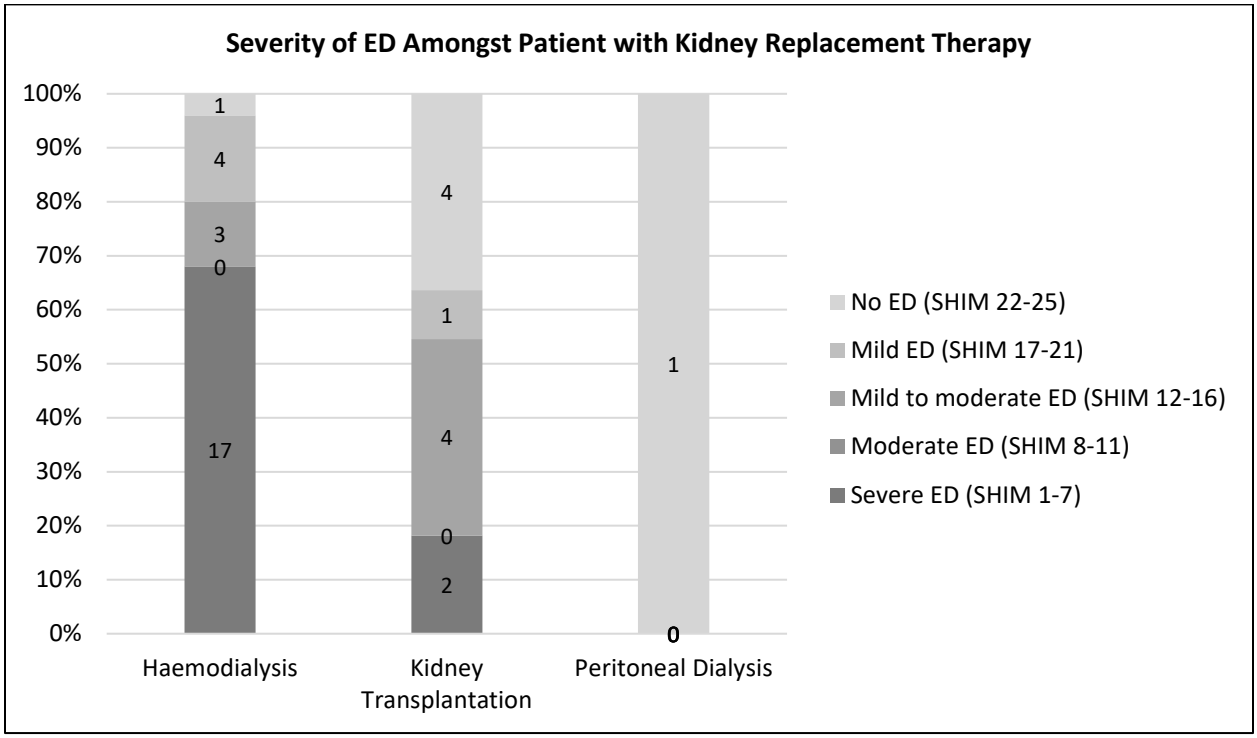

Figure 1: Proportion of patients with various severities of ED in each kidney replacement therapy group.

Figure 2 shows the age distribution of severity of ED in cohort on HD and with Tx. There is an increasing prevalence of severe ED with increasing age in both cohorts; patients on HD and those with kidney Tx. 14/43 (32.6%) reported that they would avail of an opportunity to speak to a doctor about ED if presented with the opportunity; 10/29 (34.5%) patients on HD and 4/13 (30.8%) patients on Tx.

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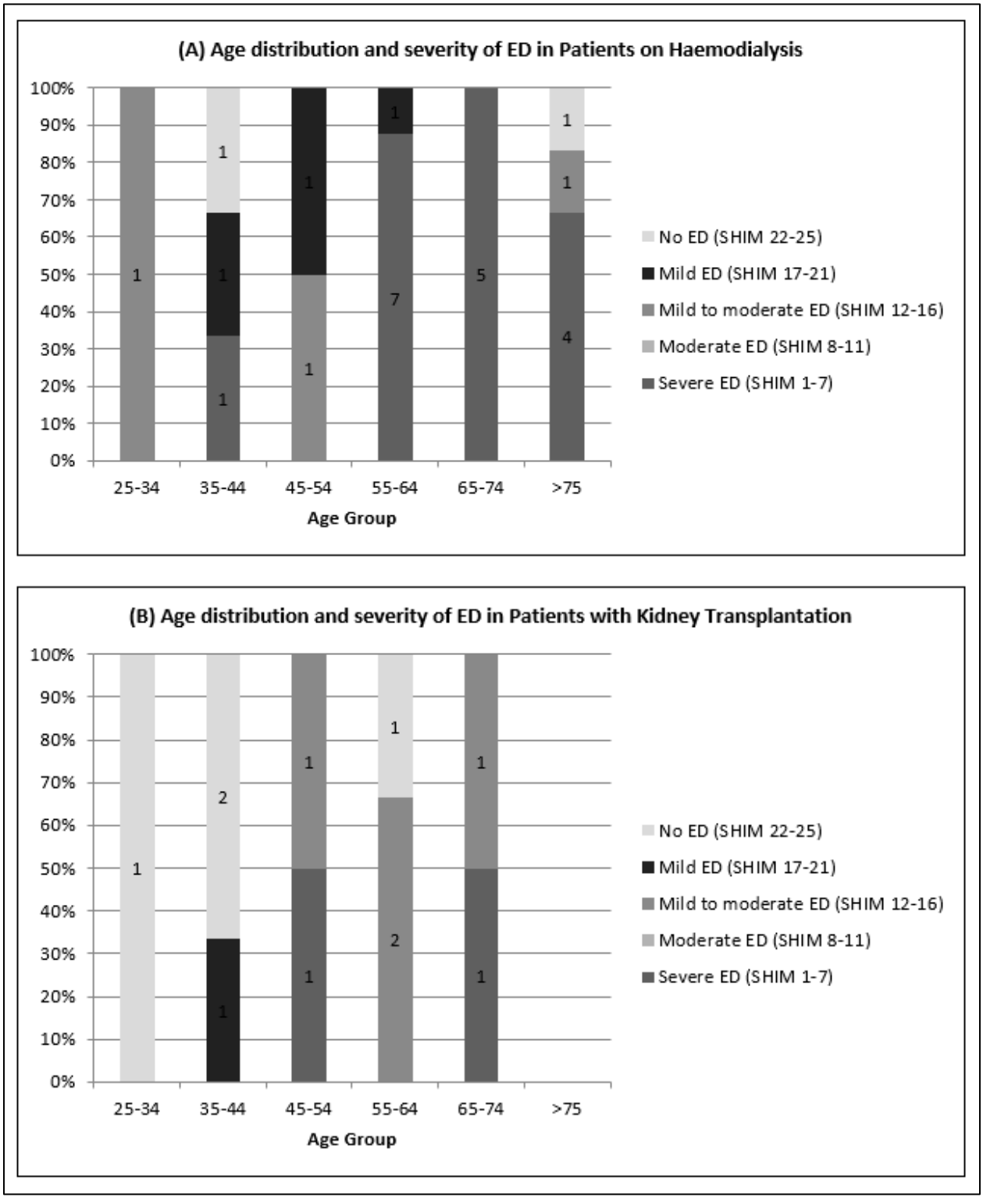

Figure 2: (A) Age distribution and severity of ED in patients on HD. (B) Age distribution and severity of ED in patients with Tx.

Figure 3 shows the reported severities of ED and their type of vascular access used for HD. In the cohort on HD, 17/25 (68%) of patients had severe ED, 13/17 (76.5%) have a Permacath for their HD access, whereas 4/17 (23.5%) of patients who reported severe ED have an arteriovenous (AV) fistula for their HD access. In the mild to moderate ED group, there are more patients with a Permacath; 2/3 (66.7%) than AV fistula; 1/3 (33.3%). All 4 patients who reported mild ED has a Permacath as their HD vascular access.

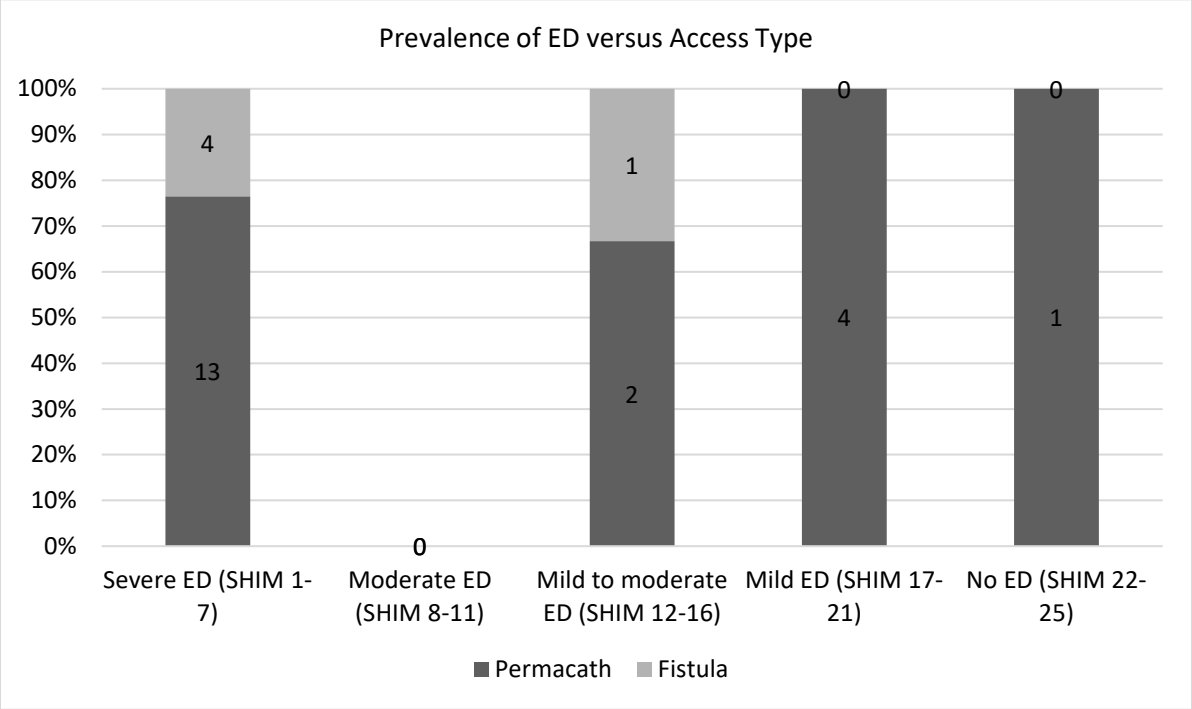

Figure 3 : Severities of ED and vascular access n patients on HD.

Discussion

In this single-centre study of 43 men with kidney failure living in Ireland, 37/43 (86%) completed the SHIM questionnaire in full. We identified an overall prevalence of ED of 31/37 (83.8%). The proportion was higher in men receiving haemodialysis; 24/25 (96%) than in those treated with kidney transplantation; 7/11 (63.6%). There was a positive association between ED and receiving HD for kidney replacement therapy in patients living with kidney failure. There is also an

association between ED and increasing age. In patients receiving HD, there is an association between ED and having a Permacath for HD vascular access.

In a recently published systematic review and meta-analysis that included 94 studies with 110 patient group entries and a total of 10320 male individuals with kidney failure with a mean age of 48.8 ± 14.25 years, the pooled prevalence of ED in kidney failure is 71% [2]. Within this cohort of patients, the pooled prevalence was 59% among patients with Tx, 79% among patients on HD, 71% among patients on PD and 82% in patients with CKD 5 starting dialysis [2]. There are currently no published data on the prevalence of ED in those with kidney failure in Ireland. When this prevalence is applied to the Irish population, there is an estimate of about 1500 patients living with kidney failure currently suffering from ED. The prevalence of ED in our study is higher when compared to the systematic and meta-analysis above; 96% on HD have ED as compared to 79% [2], and 63.6% with Tx have ED as compared to 59% [2]. We only have one questionnaire completed by a patient on PD and he reported no ED. ED is more prevalent in the HD than Tx and PD in our cohort.

Erectile dysfunction has been associated with cardiovascular disease which is a common finding in the population with kidney failure. A systematic review of the association between erectile dysfunction and cardiovascular disease showed that erectile dysfunction tends to precede cardiovascular disease and has suggested that erectile dysfunction could be used as a marker of systemic endothelial dysfunction [3]. Erectile dysfunction is however often the result of multi-system processes involving the hypothalamic-pituitary-gonadal axis and penile tissue fibrosis, not limited to endothelial dysfunction [7]. Other psychological features such as fatigue, stress and depression which may result from chronic illness such as diabetes, hypertension and kidney failure can contribute further to loss of erection [7].

Despite its apparent high prevalence, ED is under-reported in medical case records of chronic kidney disease (CKD) and patients living with kidney failure. Our study showed that 14/43 (32.6%) of our patients indicated that they wish to speak to a doctor about erectile dysfunction, hence representing an unmet need in this population. ED should be screened for in patients with chronic kidney disease and kidney failure, in the hope that detecting and treating it may improve quality of life and potentially modify cardiovascular risk [8]. Therefore, healthcare providers should be more proactive at screening for ED and offering treatment for patients living with kidney failure. The SHIM questionnaire is a useful initial screening tool for ED. The SHIM questionnaire was initially validated in the International Journal of Impotence Research in 1999 [9] to diagnose presence and severity of erectile dysfunction. Since then, it has been widely used in both clinical and research settings. A 5-year review of SHIM in 2005 [6] showed that it is widely used in the end-

stage kidney disease cohort. It consists of 5 questions scored 0-5 or 1-5 with a summative score ranging between 1-25 to assess sexual function over the last 6 months.

We hypothesized that patients with arteriovenous fistula for HD access has less peripheral vascular disease and less severe endothelial dysfunction in this cohort [10], therefore lower prevalence of ED. Our study concur with our hypothesis as there is a relatively lower incidence of severe ED in patients with an arteriovenous fistula. However, from our study, the only patient who reported having no ED has a Permacath instead of a fistula. The questionnaire was filled out anonymously, therefore limiting retrospective analysis to identify the reason why a fistula is not created for this one patient. This finding is limited by the small sample size, hence may not be a true reflection of the general population.

A systematic review and meta-analysis recently reported that renal transplantation improves erectile function [11]. There is evidence to suggest that hormonal imbalance resolves post-transplantation by increasing renal clearance and improving hormonal secretion [11]. These include increase in testosterone level and decrease in prolactin and luteinizing hormone [12]. Hence, steps for prevention of the occurrence of cardiovascular disease are still warranted in these patients.

Limitations of this study include the small number of participants in this study, and lack of information regarding confounding comorbidities such as cardiovascular disease, diabetes mellitus, peripheral vascular disease and mental health status which may contribute to the development of erectile dysfunction. The study also did not include previous and current ED treatment which can contribute to bias in our results. We only surveyed one patient on PD therefore inadequate sampling results in inability to generalized our data to the PD population. In our study, 5/48 (10.4%) of participants had refused consent to participate in the survey after explaining what the survey entails. 20/42 (47.6%) did not include their name on the survey which was optional. This was an interesting observation suggesting that barriers to discussion about ED need to be explored.

Though the numbers in this study are small, it is clear that ED is very common in men attending our nephrology centre. The prevalence amongst men with a functioning kidney transplant is significantly lower compared with patients on HD in our centre, however higher than reported in international cohorts for both groups. The numbers of patients who stated they wished to speak to a doctor about ED reflects a significant unmet need. ED should be examined carefully in patients with CKD and kidney failure to improve their quality of life and for early detection and intervention for cardiovascular disease. We have presented our findings both locally and internationally to raise awareness amongst clinician, nurses and allied healthcare professionals

regarding the prevalence of ED among patients living with kidney failure requiring kidney replacement therapy. We hope that this will increase detection and treatment of ED to improve quality of life and potentially modify cardiovascular risk in this cohort.

Declarations of Conflicts of Interest:

None declared.

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