

The Impact of Hemodialysis on Sexual Function in Male Patients using the International Index of Erectile Function Questionnaire (IIEF)

Hossein Savadi¹, Morteza Khaki², Maryam Javnbakht³, Hasan Pourrafiee⁴

¹M.D, Department of Medicine, Mashhad Medical Science Branch, Islamic Azad University, Mashhad, Iran

²Internist, Department of Internal Medicine, Ghaem Hospital, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

³Psychiatrist, Department of Psychiatry, Mashhad Branch, Islamic Azad University, Mashhad, Iran

⁴Internist, Department of Internal Medicine, Emam Reza Hospital, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Type of article: Original

Abstract

Introduction: Routine hemodialysis is one of the preferred treatment methods in patients with chronic kidney disease. It seems that routine hemodialysis can be effective in improving sexual function in these patients. This study aimed to determine the effect of routine dialysis sessions over a six-month period on the status of sexual function in men with chronic renal failure using the International Index of Erectile Function (IIEF) questionnaire.

Methods: The cross-sectional study was conducted from November 2015 to November 2016 on patients with chronic renal failure who were first-time candidates for routine hemodialysis and who were referred to Imam Reza Hospital of Mashhad. All of the patients completed the IIEF questionnaire before their first hemodialysis. Afterwards, all of the patients underwent routine dialysis sessions over a six-month period and completed the IIEF questionnaire again at the end of the sixth month. The prevalence of sexual dysfunction was assessed before and after hemodialysis. The scores on the two IIEF questionnaires were compared according to five domains, i.e., erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction. The comparisons were done before and after hemodialysis using the paired-samples t-test. Statistical analyses were performed using SPSS version 19.

Results: The study included 30 men with a mean age of 40.2 ± 8.2 . The prevalence of sexual dysfunctions in the order of their frequency was as follows: intercourse satisfaction (100%), overall satisfaction (100%), sexual desire (96.7%), orgasmic function (93.3%), and erectile function (90%). After six months of treatment with hemodialysis, the ratings of all areas of sexual dysfunction were improved significantly (p -value = 0.00 for all domains).

Conclusion: According to the results of this study, it seems that a six-month course of hemodialysis can improve erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction in patients with chronic kidney disease.

Keywords: International Index of Erectile Function (IIEF), sexual dysfunction, chronic kidney disease

1. Introduction

Chronic renal failure (CRF) has emerged as an important public health problem with an increasing annual incidence (1). Various treatment methods for this disease have increased patients' life expectancy. However, due to the increase in life expectancy, the patients have encountered new problems that can have adverse effects on their quality of life (2). Sexual dysfunctions, such as erectile dysfunction (ED), are common complications of CRF. ED is described as the inability to achieve or maintain an erection sufficient for satisfactory sexual functioning (3). The cause of ED in men with CRF is multifactorial and conditions such as aging, drug abuse, and various diseases such

Corresponding author:

Dr. Morteza Khaki, Department of Internal Medicine, Ghaem Hospital, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran. Tel.: +98.9151515999, Email: Drm.khaki@gmail.com

Received: January 03, 2016, Accepted: March 06, 2016, Published: May 2016

iThenticate screening: March 06, 2016, English editing: April 16, 2016, Quality control: May 04, 2016

© 2016 The Authors. This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

as diabetes, and heart diseases can be associated with an increased prevalence (3-5). Based on different definitions and methods in previous studies, the prevalence of ED in patients with CRF has been reported in the range of 22-88% (3, 5-12). In various studies, this rate has been reported as 82.7% in patients with CRF who had been dialyzed recently (13), 51.9-88% in patients on peritoneal dialysis (14, 15), and about 87.5% in patients on hemodialysis (HD) (16, 17). To date, in four valid studies that we were able to identify in Iran, 86.6-100% of patients on HD have had sexual dysfunction (10, 16-18). HD is one of the most common treatments for kidney disease, and some studies also have reported improvement in sexual function following HD in addition to other benefits reported for HD (19-22). However, these findings are summarized in limited studies with low statistical volume, and there also are some disagreements among these limited studies. However, the studies also are very limited concerning their assessment of conventional hemodialysis. In addition, most of the studies have investigated the effects of frequent nocturnal hemodialysis (NHD) compared to conventional hemodialysis. To date in Iran, no study has addressed the effect of HD on changes in sexual dysfunction in patients with CRF, and four available studies only addressed the prevalence of ED and its risk factors in HD patients (10, 16-18) This study aims to evaluate the changes in sexual function following a six-month course of HD using the International Index of Erectile Function (IIEF) questionnaire.

2. Material and Methods

2.1. Study Design and setting

This was a cross-sectional study that was conducted from November 2015 to November 2016 of first-time patients with CRF who were referred to Imam Reza Hospital's Dialysis Center in Mashhad, Iran. The initial population of patients admitted to hospital for HD was diagnosed with CRF by a nephrology subspecialist. The inclusion criteria were as follows: 1) patients who were 18 or older, 2) 2) patients experiencing their first session of hemodialysis, 3) a dialysis schedule of three times per week for at least six months, 4) having a sexual partner, and 5) being male. Exclusion criteria included not completing a six-month period of hemodialysis; have concurrent heart, liver, and lung as well as collagen vascular diseases; taking drugs to boost sexual performance; and any previous surgical manipulations of the urogenital system.

2.2. Sample determination

According to the findings of Mehrban et al. (23), the sample size was set at 30 patients, considering $\alpha = 0.05$ and $\beta = 0.10$ and using the comparison of two means formulas (23). The simple non-random sampling technique was used to obtain participants in the study from the initial population.

2.3. Study variables

The patients' age was recorded. All patients completed the IIEF questionnaire before the first session of HD and again six months after the routine HD (three times per week) (24).

2.4. International Index of Erectile Function

The instrument used in this study to evaluate sexual function was the IIEF questionnaire that was translated from English into Persian. The validity and reliability of this translated questionnaire were approved by the previous Iranian studies (10). The IIEF questionnaire (8) was completed by the patients, and it used 15 questions to investigate erectile function in men in five domains, i.e., 1) erectile function, 2) orgasmic function, 3) sexual desire, 4) satisfaction with intercourse, and 5) overall sexual satisfaction. Questions 1-5 and question 15 on this questionnaire were related to the erectile function domain; questions 9 and 10 covered the orgasmic function, questions 11 and 12 were related to sexual desire, questions 6-8 covered their satisfaction with intercourse, and questions 13 and 15 were related to the overall satisfaction domain. Each question contained six options, and, depending on the option that was selected, it could have scores in the range of 0-5. The results that were obtained from the five domains were interpreted as shown in Table 1.

2.5. Ethics of research

This study was approved by the Ethics Committee of the Medical Faculty of Islamic Azad University of Mashhad, and all patients were informed about the content of the plan, and they signed written consent before being included in the study. The patients' privacy and dignity always were maintained, and the information was coded and entered into the statistical analysis program, and the results were published without specific reference to any specific participants.

2.6. Statistical Analysis

SPSS 19 statistical software was used to analyze the data. Initially, the data were distributed normally, and mean scores before and after HD were compared using the paired-samples t-test. A 95% confidence interval was considered, and statistical significance was set at $p = 0.05$.

Table 1. Interpreting the results of the five domains of the International Index of Erectile Function (IIEF) questionnaire

| The Studied Domain-Achieved Scores | Severe Dysfunction | Moderate impairment | Mild-to-moderate impairment | Moderate Impairment | No Impairment |
|------------------------------------|--------------------|---------------------|-----------------------------|---------------------|---------------|
| Erectile function | 0-6 | 7-12 | 13-17 | 19-24 | 25-30 |
| Orgasmic function | 0-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Sexual desire | 0-2 | 3-4 | 5-6 | 7-8 | 9-10 |
| Intercourse satisfaction | 0-3 | 4-6 | 7-9 | 10-12 | 13-15 |
| Overall satisfaction | 0-2 | 3-4 | 5-6 | 7-8 | 9-10 |

3. Results

3.1. Baseline characteristics

Over the one-year period of the study, 145 patients met the inclusion criteria and provided informed consent, and 30 were chosen as participants. The results of the 30 patients with available baseline and six-month HD information were analyzed. The mean age of the 30 male patients was 40.2 ± 8.2 . All of the patients were having HD for the first time. The results of sexual dysfunction were examined according to the five domains of the IIEF questionnaire.

3.2. International Index of Erectile Function

The results of this study showed that the highest prevalence of sexual dysfunction occurred in domains related to Intercourse Satisfaction and overall satisfaction. The prevalence of sexual dysfunction in the five studied domains before HD in order of frequency was as follows: Intercourse Satisfaction (100%), overall satisfaction (100%), sexual desire (96.7%), the function of orgasm (93.3%), and erectile function (90%). Based on the results, a 6-month course of HD can lead to a significant improvement in sexual function in the five domains (Table 2). In the meantime, the greatest degree of improvement in scores on the five domains of IIEF questionnaire was related to erectile function score. The scoring upgrade is as follows from high to low: Erectile Function score (10.00 ± 1.22 scores), Intercourse Satisfaction (5.56 ± 0.60 scores), Orgasmic function (3.10 ± 1.93 scores), overall satisfaction (2.83 ± 0.36 scores), and sexual desire (2.50 ± 0.31 scores). Moreover, the results of this study showed that the mean score on each of the five domains of the IIEF-5 questionnaire before and after a six-month course of HD was significantly different (Table 2). Also, the results showed that the prevalence of sexual dysfunction following routine dialysis sessions over a six-month period was reduced. The prevalence of sexual dysfunction in the five studied domains, after starting hemodialysis, was as follows in order of frequency: overall satisfaction (73.3%), sexual desire (70%), orgasmic function (70%), erectile function (57%), and Intercourse Satisfaction (50%).

Table 2. Comparison of the five domains of the IIEF questionnaire before and after a six-month course of routine hemodialysis

| The Studied Domain (Mean Score) | Before the First Session of Hemodialysis (n = 30) | After Six Months of Hemodialysis (n = 30) | p-value |
|---------------------------------|---|---|---------|
| Erectile function | 7.05 ± 10.4 | 7.38 ± 20.4 | 0.00 |
| Orgasmic function | 2.35 ± 4.1 | 1.97 ± 7.20 | 0.00 |
| Sexual desire | 2.05 ± 4.80 | 1.91 ± 7.30 | 0.00 |
| Intercourse satisfaction | 3.22 ± 5.00 | 3.67 ± 10.56 | 0.00 |
| Overall satisfaction | 2.08 ± 4.33 | 2.24 ± 7.16 | 0.00 |

4. Discussion

This study aimed to investigate the effect of six months of HD on sexual function in men with chronic kidney disease, and the results showed that the prevalence of sexual dysfunction in all five assessed domains using the IIEF questionnaire following six months of HD was reduced. However, the quantitative analysis also indicated a significant decrease in sexual dysfunction in the five domains under study. Sexual dysfunctions affect interpersonal functioning and quality of life. Effective treatment of ED has been associated with significant improvements in mood and quality of life (25). In addition to other etiologies that have been proposed, sexual dysfunction is

associated with chronic kidney disease. More than 50% of uremic men complain of erectile dysfunction, decreased sexual desire, and a significant reduction in the number of penetrations (26-28). Diabetes, cardiovascular diseases, aging, and drug use can have an increased prevalence of ED in these patients (3-5). The pathophysiology of sexual dysfunctions in patients with CRF includes peripheral neuropathies, autonomic dysfunction, peripheral vascular diseases, drug treatments, and physical and psychological stresses, which are commonly observed in these patients (27, 29, 31). In these patients, total and free testosterone levels normally decrease, which can affect sexual function and patient's satisfaction (32). Given all the above, and taking sexual activities into account as a factor influencing the quality of life, study in this field is justified to improve the conditions of patients with chronic kidney disease. In Mekki et al., a study in Sudan, the prevalence of ED was reported to be 83% among HD patients (13). In Makarem et al.'s study in Iran, the prevalence of ED in patients on HD was reported to be 86.6% (18). In Malekmakan et al.'s study in Iran, the prevalence of ED was reported to be 87.7% (10). Mumtaz et al. reported the prevalence of ED as 86% in Pakistan (11). In the present study, the prevalence of this factor in patients undergoing HD was reported to be 90%, which was consistent with the mentioned studies; the minor differences probably were due to differences in the sample sizes.

The main objective of this study was to investigate the effect of HD on improving erectile function. It was observed that all factors involved in this index were enhanced after six months of HD in patients with chronic kidney disease. Some studies reported the improvement of the quality of life factors, such as sexual function, following nocturnal HD (19-22). Some mechanisms have been proposed to explain why sexual function improves after hemodialysis. For example, HD improves hormonal disorders by cleansing the toxin-induced uremic patients' blood. Furthermore, an increase in hematocrit during HD may help to improve erections (9). In contrast, it is stated that HD was unable to compensate for vascular and nervous damages and emotional and social problems caused by CRF, while the impact of these factors was demonstrated in the incidence or severity of ED (33). The studies that have specifically improved sexual function in these patients during HD courses are very limited, and they have often investigated the effects of nocturnal hemodialysis. It is worth mentioning that this study is the first case of its kind in Iran. Bass et al.'s study in Canada examined the efficacy of two conventional HD methods (three times per week) or frequent nocturnal HD regarding sexual activity of patients with CRF using a Kidney Disease quality of life short-form questionnaire. In this study, there was no difference in sexual activity or sexual dysfunction caused by kidney disease between the two groups after six months, and they did not report improved sexual functioning (9). Regardless of the structural differences between the mentioned study and the present study, including the studies' designs, sample sizes, types of HD, and the questionnaires that were used, a crucial point was the participants' ages. In Bass's study, the mean age of the subjects was approximately 53, but the mean age in this study was 40. The age factor, as will be noted in the following, can make a huge difference in the results. Also, Zamd et al., in their study, did not report an improvement in sexual function after HD, but the sexual dysfunction was intensified in some cases after initiation of dialysis. This researcher knows HD is one of the relatively effective factors in the incidence of sexual dysfunction in patients with CRF, but he emphasized other underlying factors, such as age, social status, and the quality of sexual relations before the study began. He also knows HD is an accelerating factor in the incidence of erectile dysfunction (34). Based on the findings of this study and previous studies, it seems that age has a significant effect in improving or regressing sexual function. It has been reported that younger patients had more improvement in the quality of sexual performance than older patients. This is probably because of fewer complications and fewer debilitating diseases (9, 34). With an increase in age, the incidence of sexual dysfunction also increases (11, 13, 35). The quality of sexual function before the study can impact the results of such studies. For example, if a person is faced with ED due to other reasons, improving uremic conditions has no impact on the improvement of ED before deterioration of renal function and dialysis. However, it is stated that sexual dysfunction is more significant for patients who have had high baseline sexual activity (36). Regardless of treating patients' uremic condition, improving the other underlying causes of sexual dysfunctions, such as endocrine, cardiovascular, psychological, and social disorders, with variable incidence and severity in different samples is effective in response to an improvement in sexual function after hemodialysis. For example, even many CRF patients who underwent a kidney transplant were still suffering from sexual dysfunction despite the improved physiologic conditions and the restoration of normal kidney function (33). Also, due to the high prevalence of depression in this population and the significant role of depression in causing sexual dysfunctions, psychological therapies also can be effective in improving symptoms (5). Thus, the high prevalence of depression or other psychiatric disorders associated with CRF, or the presence of other physiological disorders in samples of a study, can lead to differences in findings related to sexual function compared with similar studies.

Regarding the study limitations, given the multifactorial nature of sexual dysfunctions, it was better to examine more variables, such as family history of sexual dysfunctions, drug use, race, mood disorders, and others in the study. However, to reach a definitive conclusion about the effectiveness of HD on sexual function, it would have been better to conduct a multi-central study.

5. Conclusions

According to results of this study, it seems that a 6-month course of HD in patients with chronic kidney disease can improve erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction. However, this study did not examine the effect of other factors that affect sexual functioning, and more studies are needed in this domain.

Acknowledgments:

The authors express their sincere thanks to the Vice Chancellor for Research at Islamic Azad University, Mashhad Branch, Medical Faculty, for the financial support that was provided for this study. This manuscript was derived from the General Medicine thesis of Dr. Hosein Savadi.

Conflict of Interest:

There is no conflict of interest to be declared.

Authors' contributions:

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

References:

- 1) Messina LE, Claro JA, Archimedes N, Andrade E, Ortiz V, Srougi M. Erectile dysfunction in patients with chronic renal failure. *Int braz j urol.* 2007; 33(5): 673-8. doi: 10.1590/S1677-55382007000500008. PMID: 17980064.
- 2) Coelho-Marques F, Wagner M, De Figueiredo CP, d'Avila D. Quality of life and sexuality in chronic dialysis female patients. *Int J Impot Res.* 2006; 18(6): 539-43. doi: 10.1038/sj.ijir.3901470. PMID: 16554852.
- 3) El-Assmy A. Erectile dysfunction in hemodialysis: A systematic review. *World J Nephrol.* 2012; 1(6): 160-5. doi: 10.5527/wjn.v1.i6.160. PMID: 24175255, PMCID: 3782219.
- 4) Miyata Y, Shindo K, Matsuya F, Noguchi M, Nishikido M, Koga S, et al. Erectile dysfunction in hemodialysis patients with diabetes mellitus: association with age and hemoglobin A1c levels. *Int j urol.* 2004; 11(7): 530-4. PMID: 15242363.
- 5) Peng YS, Chiang CK, Hung KY, Chiang SS, Lu CS, Yang CS, et al. The association of higher depressive symptoms and sexual dysfunction in male haemodialysis patients. *Nephrol Dial Transplant.* 2007; 22(3): 857-61. doi: 10.1093/ndt/gfl666. PMID: 17121784.
- 6) Messina LE, Claro JA, Nardoza A, Andrade E, Ortiz V, Srougi M. Erectile dysfunction in patients with chronic renal failure. *Int braz j urol.* 2007; 33(5): 673-8. PMID: 17980064.
- 7) Coelho-Marques FZ, Wagner MB, Poli de Figueiredo CE, d'Avila DO. Quality of life and sexuality in chronic dialysis female patients. *Int J Impot Res.* 2006; 18(6): 539-43. PMID: 16554852.
- 8) Weiss P, Brody S. International Index of Erectile Function (IIEF) scores generated by men or female partners correlate equally well with own satisfaction (sexual, partnership, life, and mental health). *j sex med.* 2011; 8(5): 1404-10. doi: 10.1111/j.1743-6109.2011.02214.x. PMID: 21324092.
- 9) Bass A, Ahmed SB, Klarenbach S, Culleton B, Hemmelgarn BR, Manns B. The impact of nocturnal hemodialysis on sexual function. *BMC nephrol.* 2012; 13: 67. PMID: 22834992. PMCID: 3457870.
- 10) Malekmakan L, Shakeri S, Haghpanah S, Pakfetrat M, Sarvestani AS, Malekmakan A. Epidemiology of erectile dysfunction in hemodialysis patients using IIEF questionnaire. *Saudi J Kidney Dis Transpl.* 2011; 22(2): 232-6. PMID: 21422619.
- 11) Mumtaz A, Anees M, Barki MH, Sami W, Hussain S, Nazir M. Erectile dysfunction in haemodialysis patients. *J Ayub Med Coll Abbottabad.* 2009; 21(2): 4-7. PMID: 20524457.
- 12) Arslan D, Aslan G, Sifil A, Cavdar C, Celebi I, Gamsari T, et al. Sexual dysfunction in male patients on hemodialysis: assessment with the International Index of Erectile Function (IIEF). *Int J Impot Res.* 2002; 14(6): 539-42. doi: 10.1038/sj.ijir.3900937. PMID: 12494292.
- 13) Mekki MO, El Hassan KA, El Mahdi EM, Haroun HH, Mohammed MA, Khamis KH, et al. Prevalence and associated risk factors of male erectile dysfunction among patients on hemodialysis and kidney transplant

- recipients: a cross-sectional survey from Sudan. *Saudi J Kidney Dis Transpl.* 2013; 24(3): 500-6. PMID: 23640621.
- 14) Lai CF, Wang YT, Hung KY, Peng YS, Lien YR, Wu MS, et al. Sexual dysfunction in peritoneal dialysis patients. *Am J Nephrol.* 2007; 27(6): 615-21. PMID: 17851229.
 - 15) Krishnan R, Izatt S, Bargman JM, Oreopoulos D. Prevalence and determinants of erectile dysfunction in patients on peritoneal dialysis. *Int Urol Nephrol.* 2003; 35(4): 553-6. PMID: 15198165.
 - 16) Pourmand G, Emamzadeh A, Moosavi S, Mehraei A, Taherimahmoudi M, Nikoobakht M, et al. Does renal transplantation improve erectile dysfunction in hemodialysed patients? What is the role of associated factors? *Transplant Proc.* 2007; 39(4): 1029-32. doi: 10.1016/j.transproceed.2007.03.038. PMID: 17524883.
 - 17) Mehraei A, Mousavi S, Nikoobakht M, Khanlarpour T, Shekarpour L, Pourmand G. Improvement of erectile dysfunction after kidney transplantation: the role of the associated factors. *Urol j.* 2006; 3(4): 240-4. PMID: 17559049.
 - 18) Makarem AR, Karami MY, Zekavat OR. Erectile dysfunction among hemodialysis patients. *Int Urol Nephrol.* 2011; 43(1): 117-23. doi: 10.1007/s11255-010-9780-1, PMID: 20535636.
 - 19) Van Eps CL, Jeffries JK, Johnson DW, Campbell SB, Isbel NM, Mudge DW, et al. Quality of life and alternate nightly nocturnal home hemodialysis. *Hemodialysis international International Symposium on Home Hemodialysis. Hemodial Int.* 2010; 14(1): 29-38. doi: 10.1111/j.1542-4758.2009.00419.x. PMID: 20377650.
 - 20) Lockridge RS Jr, Spencer M, Craft V, Pipkin M, Campbell D, McPhatter L, et al. Nightly home hemodialysis: five and one-half years of experience in Lynchburg, Virginia. *Hemodial Int.* 2004; 8(1): 61-9. doi: 10.1111/j.1492-7535.2004.00076.x. PMID: 19379403.
 - 21) Ting GO, Kjellstrand C, Freitas T, Carrie BJ, Zarghamee S. Long-term study of high-comorbidity ESRD patients converted from conventional to short daily hemodialysis. *Am J kidney dis.* 2003; 42(5): 1020-35. PMID: 14582046.
 - 22) McPhatter LL, Lockridge RS Jr, Albert J, Anderson H, Craft V, Jennings FM, et al. Nightly home hemodialysis: improvement in nutrition and quality of life. *Adv Ren Replace Ther.* 1999; 6(4): 358-65. PMID: 10543717.
 - 23) Mehraban D, Shabaninia SH, Naderi GH H, Esfahani F. Farsi International Index of Erectile Dysfunction and Doppler Ultrasonography in the Evaluation of Male Impotence. *Iranian Journal of Surgery.* 2006; 14(1): 25-31.
 - 24) Bellomo R, Mansfield D, Rumble S, Shapiro J, Parkin G, Boyce N. Acute renal failure in critical illness. Conventional dialysis versus acute continuous hemodiafiltration. *ASAIO j.* 1992; 38(3): M654-7. PMID: 1457942.
 - 25) Laumann EO. *The social organization of sexuality: Sexual practices in the United States*; University of Chicago Press; 1994.
 - 26) Palmer BF. Sexual dysfunction in men and women with Chronic Renal Failure and end-stage kidney disease. *Adv Ren Replace Ther.* 2003; 10(1): 48-60. doi: 10.1053/jarr.2003.50003. PMID: 12616463.
 - 27) Holdsworth S, De Kretser D, Atkins R. A comparison of hemodialysis and transplantation in reversing the uremic disturbance of male reproductive function. *Clin nephrol.* 1978; 10(4): 146-50. PMID: 363318.
 - 28) Diemont WL, Vrugink PA, Meuleman EJ, Doesburg WH, Lemmens WA, Berden JH. Sexual dysfunction after renal replacement therapy. *Am j kidney dis.* 2000; 35(5): 845-51. doi: 10.1016/S0272-6386(00)70254-X. PMID: 10793018.
 - 29) Charney DL, Walton DF, Cheung AK, editors. *IMPOTENCE: II. Seminars in Dialysis*; 1994: Wiley Online Library.
 - 30) Steele TE, Wuerth D, Finkelstein S, Juergensen D, Juergensen P, Kliger AS, et al. Sexual experience of the chronic peritoneal dialysis patient. *J Am Soc Nephrol.* 1996; 7(8): 1165-8. PMID: 8866408.
 - 31) Toorians A, Janssen E, Laan E, Gooren L, Giltay E, Oe PL, et al. Chronic renal failure and sexual functioning: clinical status versus objectively assessed sexual response. *Nephrol dial transplant.* 1997; 12(12): 2654-63. doi: 10.1093/ndt/12.12.2654.
 - 32) Lim VS, Fang VS. Restoration of plasma testosterone levels in uremic men with clomiphene citrate. *J Clin Endocrinol Metab.* 1976; 43(6): 1370-7. doi: 10.1210/jcem-43-6-1370, PMID: 1002820.
 - 33) Tsujimura A, Matsumiya K, Tsuboniwa N, Yamanaka M, Miura H, Kitamura M, et al. Effect of renal transplantation on sexual function. *Arch Androl.* 2002; 48(6): 467-74. doi: 10.1080/01485010290099381. PMID: 12425764.

- 34) Zamd M, Gharbi MB, Ramdani B, Zaid D. Sexual dysfunction in male patients undergoing hemodialysis in morocco. *Saudi J Kidney Dis Transpl.* 2005; 16(1): 33-9. PMID: 18209457.
- 35) Nassir A. Erectile dysfunction risk factors for patients entering dialysis programme. *Andrologia.* 2010; 42(1): 41-7. PMID: 20078515.
- 36) Martin-Diaz F, Reig-Ferrer A, Ferrer-Cascales R. [Sexual function and quality of life in hemodialysis male patients]. *Nefrologia.* 2006; 26(4): 452-60. PMID: 17058857.