IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 1 Ver. VIII (Jan. 2016), PP 61-65
www.iosrjournals.org

The Impact of Hemodialysis on Serum Prolactin and Testoesrone Level in CKD Male Patients

Nuha Mohammed Osman[1], Amar Mohamed Ismail[*2]
[1]*Department of Clinical Chemistry, Faculty of Medical Laboratory Sciences, AL-Neelain University - Sudan*
[2]*Department of Biochemistry and Molecular Biology, Faculty of Science and Technology, AL-Neelain University - Sudan*

Abstract*: This study was conducted to assess the effect of hemodialysis (HD) on prolactin and testosterone level and their relations with study variables in chronic kidney disease (CKD) male patients. In a cross-sectional study carried out in 80 males aged range from (22 to 80 years old), timed pre and post-HD samples were collected. Serum prolactin, testosterone, urea and creatinine were measured by using TOSOH® Bioscience full automated immunoassay analyzer AIA-360 and Mindary BS-200. Paired t-test found that mean testosterone, urea and creatinine level obtained after HD significantly lower p-value (0.000, 0.000 and 0.000) respectively, while insignificant difference was observed in mean prolactin concentration p-value 0.408. Interestingly change in prolactin after HD had a significant correlation with testosterone level (r = -0.280, p-value 0.042). Present study has shown positive correlation of creatinine with urea and BMI changes after HD (r=0.568, p-value 0.000 and r=0.276, p-value 0.042) respectively, whereas no correlation observed with other study variables. Overall HD causes marked decrease in testosterone and slightly increase in prolactin level, so is contributing factor for the development of hypogonadism, gynecomastia, impotence and loss of libido on regular HD male patients.*

Key Words*: Prolactin, testosterone, CKD, renal failure and hemodialysis*

I. Introduction

Chronic kidney disease CKD is defined as irreversible kidney damage manifested decreased kidney function. CKD patients should be assessed and receive optimal treatment to minimize complications and reduce their morbidity and mortality (1). Dialysis is a renal replacement therapy (2).The procedure of haemodialysis is performed two to three times in a week and the time of dialysis is from two to four hours, the time of dialysis depends on various factors, including kidney function, amount of waste in body, level of salts and body weight (3). Endocrine abnormalities are a common feature of chronic renal insufficiency, and endocrine dysfunction is proportional to the degree of renal impairment. Changes of androgen synthesis and metabolism develop early after the onset of renal insufficiency and are likely to be caused by primary hypogonadism and/or disturbances of the hypothalamic pituitary axis and impaired function of the hypothalamic pituitary gonadal axis is not reversed by initiation of effective hemodialysis or peritoneal dialysis therapy (4-8). CKD causes variation of different serum hormones level for example testosterone and thyroid hormones show a decrease level while prolactin and PTH show increase level (9). Reductions in circulating sex steroid levels may not only lead to clinical hypogonadism, but may also play a role in the pathogenesis and progression of CKD (4).

Hyperprolactinemia is a common endocrine alteration in CKD, for both men and women. Its prevalence in CKD ranges from 30% to 65% being mainly the consequence of reduced renal clearance but also increased production due to altered dopaminergic activity (10). Prolactin levels predicted major cardiovascular events and gynecomastia in men therefore uremia-induced prolactinemia may relate to the increased CVD risk of this patient population (10 - 12).

Hypogonadism testosterone deficiency is the most common gonadal alteration in men, mainly because of reduced prolactin clearance and uremic inhibition of luteinizing hormone signaling at the level of the Leydig cells (13). As many as 40 to 60% of CKD stage-5 men have been reported to be hypogonadal on the basis of low concentrations of total and free testosterone (14, 15), uremia, as well as other comorbid conditions that frequently accompany CKD and medications, may contribute to suppressed sex hormone levels (13, 16). Dialysis could lead to depletion of essential substance (lipophilic and water soluble molecules), accordingly we hypnotized that hemodialysis has an impact on testosterone and prolactin level.

II. Materials And Methods

In this cross-sectional study was carried out on total 80 male patients with CKD underwent hemodialysis two times a week aged (22 to 80 years old) from Academic Hospital, in determined specific time

pre and post-dialysis (5ml) samples were collected under all aseptic and antiseptic condition with sterile syringe. Serum was obtained by centrifugation of blood at 3000 rpm for10 min and stored at -20 °C till used.

2.1 Ethical considerations

The study has been approved by the local ethics committee of Al-Neelain University. All participants in the study were given their written informed consent considering the aims of the study, samples and clinical information's were used anonymously.

2.2 Measurement of BMI

Anthropometric data including weight and height were measured thus body mass index (BMI) was defined as weight (Kg) divided by height squared (m^2).

2.3 Estimation of prolactin

Brief according to the manufacturers, serum level of prolactin was measured by using (TOSOH Bioscience automated immunoassay analyzer AIA-360). Principle the ST AIA-PACK PRL is a two site immunoenzymometric assay which was performed entirely in the ST AIA-PACK PRL test cups, prolactin present in the test sample was bound with monoclonal antibody immobilized on a magnetic solid phase and enzyme labeled monoclonal antibody in the test cups, the magnetic beads were washed to remove unbound enzyme labeled monoclonal antibody and are then incubated with a fluorogenic substrate, 4-methylumbelliferyl phosphate (4MUP) the amount of enzyme labeled monoclonal antibody that binds to the beads is directly proportional to the prolactin concentration in the test sample then absorbance measured at 450 nm. Concentration of the prolactin was calculated by standard curve.

2.4 Estimation of Testosterone

Brief according to the manufacture, serum level of Testosterone was measured by using (TOSOH Bioscience automated immunoassay analyzer AIA-360). Principle ST AIA-PACK Testosterone is a competitive enzyme immunoassay which is performed entirely in the ST AIA-PACK Testosterone test cups. Testosterone present in the test sample competes with enzyme-labeled testosterone for a limited number of binding sites on the testosterone specific monoclonal antibody immobilized on a magnetic solid phase and enzyme labeled monoclonal antibody in the test cups, the magnetic beads were washed to remove unbound enzyme labeled monoclonal antibody were then incubated with a fluorogenic substrate, 4-methylumbelliferyl phosphate (4MUP) the amount of enzyme labeled Testosterone that binds to the beads is inversely proportional to the Testosterone concentration in the test sample.

2.5 Estimation of urea

Brief according to the manufacture, serum level of urea was measured by using Mindary Bs-200, urea is hydrolyzed by urease, and ammonia product helps to turn NADH to NAD which catalysis of GLDH the decrease in absorbance is directly proportional to the concentration of urea.

2.3 Estimation of creatinine

Brief according to the manufacture, serum level of creatinine was measured by using Mindary Bs-200 principle at an alkaline solution creatinine combines with picric acid to formed an orange red colored complex the absorbency increase is directly proportional to the concentration to the creatinine.

2.4 Statistical analysis

The Paired t-test was employed to compare differences between the means of continuous variables and person's correlation to correlate between study parameters and variables. P-values less than 0.05 were considered statistically significant. Data were analyzed by SPSS statistical package of social science (Version 16.0; SPSS Inc.).

III. Results

3.1 Effect of Hemodialysis on Prolactin and Testosterone

Mean prolactin level shows significant difference post-HD p-value 0.408, while HD significantly decrease testosterone concentration p-value 0.000 which presented in figure 3.1 and 3.2 respectively.

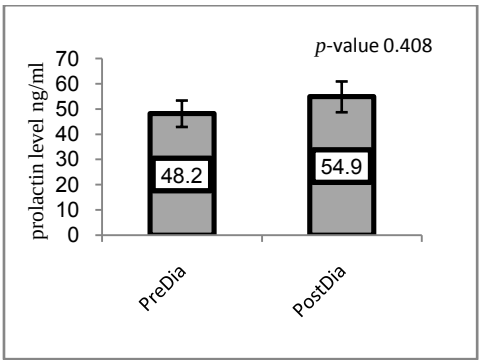

Fig. 3.1 Shows mean prolactin level results expressed as Mean±SD and significant difference considered as p-value ≤0.05.

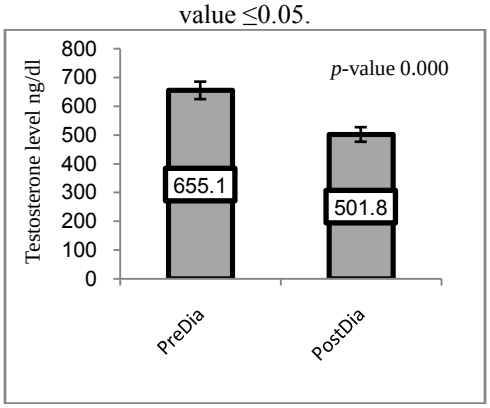

Fig. 3.2 Presenting mean concentration of testosterone, results expressed as Mean±SD and significant difference considered as p-value ≤0.05.

3.2 Effect of Hemodialysis on Urea and Creatinine

HD significantly decreases in urea and creatinine level were observed in post-hemodialysis when compared with pre-hemodialysis sample with p-value 0.000 and 0.000 respectively, the results are presented in figure 3.3.

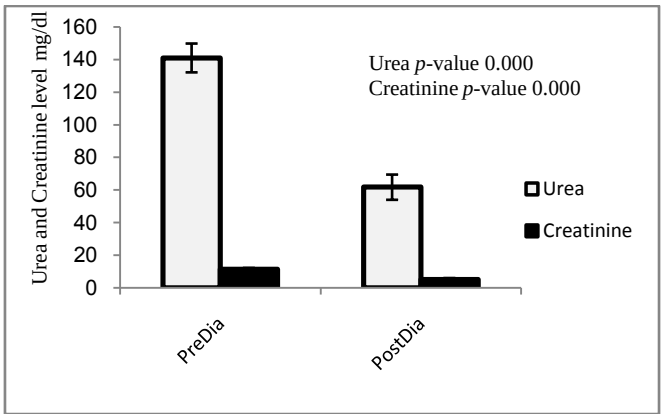

Fig. 3.3 Presenting mean values of urea and creatinine results expressed as Mean±SD and significant differences considered as p-value ≤0.05.

3.3 Changes in Mean Values of Study Parameters after Hemodialysis

The mean change in concentration of prolactin, testosterone, urea and creatinine are presented in figure 3.4, showed marked decrease in urea, creatinine and testosterone and slightly increase in prolactin, results obtained by deduced pre-hemodialysis from post-hemodialysis results.

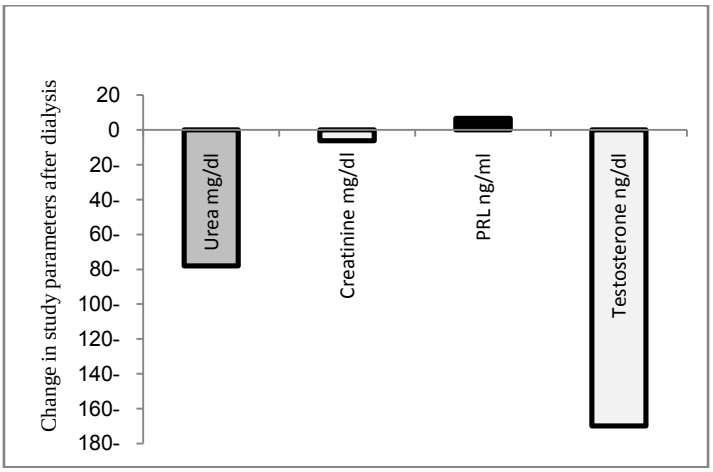

Fig. 3.4 Shows means changes in urea, creatinine, and prolactin and testosterone level, results obtained by deduced pre from post-hemodialysis result.

3.4 Person's Correlation Results

Person's correlations have shown negative correlation between prolactin and testosterone level p-value 0.042, and creatinine correlate positively with urea and BMI with p-value 0.000 and 0.042 respectively, the results are presented in table 3.5.

Parameters		BMI	AGE	C-UREA	C-CREA	C-PRL	C-TEST
BMI	R-value		0.197	-0.030	0.276(*)	0.004	0.109
	P-value		0.111	0.427	0.042	0.491	0.254
AGE	R-value	0.197		-0.029	0.135	-0.095	0.043
	P-value	0.111		0.430	0.202	0.281	0.397
C-UREA	R-value	-0.030	-0.029		0.568(**)	-0.024	-0.200
	P-value	0.427	0.430		0.000	0.443	.112
C- CREA	R-value	0.276(*)	0.135	0.568(**)		-0.092	-0.006
	P-value	0.042	0.202	0.000		0.286	0.486
C-PRL	R-value	.004	-.095	-0.024	-0.092		-0.280(*)
	P-value	.491	.281	.443	.286		0.042
R-TEST	R-value	.109	.043	-.200	-.006	-.280(*)	
	P-value	.254	.397	.112	.486	.042	

Fig. 3.5 R=Positive or negative correlation, P-value=Strength of correlation, *Mean significant correlation. **Mean highly significant correlation. C- Means change after HD.

IV. Discussions

CKD is defined as irreversible kidney damage, hemodialysis treatment for patients may lead to increase or depletion of some biological function substances like hormones, thus could impact positive or negative on hormonal functions. Accordingly the present study aims to evaluate the impact of hemodialysis on serum prolactin and testosterone level and its correlation with study variables in patient with CKD.

The results of present study provide experimental evidence that, mean prolactin level was insignificantly difference in post-hemodialysis versus pre-hemodialysis samples with p-value 0.408. In fact that previous report noted prolactin concentration in CKD patients undergo hemodialysis is significantly increase and correlates negatively with uremia (17). The result of our study suggested hemodialysis has no impact on prolactin level. Thus hyperprolactinemia was result from CKD which caused by filtration dysfunction. In fact that increases prolactin lead to loss of libido, gynecomastia, galactorrhea and infertility also causes secondary hypogonadismin male (18, 19).

In previous report researcher noted that a continuous hemodialysis affect water soluble and lipophilic molecules accordingly level of testosterone concentration in patients undergo hemodialysis is significantly decreased and correlates negatively with uremia (20). Therefore our results revealed significant decrease in mean testosterone level in post-hemodialysis in comparison with pre-hemodialysis samples with p-value 0.000, the essential role of testosterone in libido, male fertility and growth of spermatogenic tissue testis (21), therefore hypogonadism result from continues hemodialysis could contribute to male sterility.

The results of present study showed that, there was significant decrease in urea and creatinine post-dialysis patients versus pre-dialysis with p-value 0.000 and 0.000 respectively, accordingly person's correlation results showed that, there was negative correlation between prolactin and testosterone level with p-value 0.042, in addition the results revealed no association between prolactin, testosterone when correlated with urea,

creatinine, age and BMI. Suggested that decrease in testosterone level mediated by both hemodialysis and hyperprolactinemia which result from chronic renal failure by filtration dysfunction and stress.

V. Conclusions

The study concludes HD causes marked decrease of testosterone and slightly increases of prolactin level, so is contributing factor for the development of hypogonadism, gynecomastia, impotence and loss of libido on regular HD patients. Interestingly our study provided evidence that hypogonadism and hyperprolactinemia result from HD and also previously known contributing factors. Therefore the study recommend monitoring and treatment protocol for regular HD patients.

Acknowledgements

The author acknowledges sincere thanks to Faculty of medical Laboratory Sciences, Al-Neelain University and Academic Hospital staff for the assistance in research work.

References

[1]. Robert Thomas, Abbas Kanso, and John R. Sedor, Chronic Kidney Disease and Its complications Prim Care. (2008); 329-335.
[2]. Kunal Chaudhary, Peritoneal Dialysis Drop-out: Causes and Prevention Strategies, International Journal of Nephrology Volume (2011).
[3]. Unruh A, Kurella M, Brett T, Larive C, Rastogi A and James S. Impact of Sleep Quality on Cardiovascular Outcomes in Hemodialysis Patients: Results from the Frequent Hemodialysis Network Study. American Journal of Nephrology (2011);33:398-406.
[4]. Finkelstein SH, Finkelstein FO. Evaluation of sexual dysfunction in dialysis patients. In: Nissenson AR, Fine RN, editors. Dialysis Therapy. 3rd ed. Philadelphia: Hanley and Belfus; (2002) 368–373.
[5]. Schaefer F, Mehls O, Ritz E.New insights into endocrine disturbances of chronic renal failure. Miner Electrolyte Metab(1992) ; 18: 169–173.
[6]. Clodi M, Riedl M, SchmaldienstS .Adrenal function in patients with chronic renal failure. Am J Kidney Dis (1998); 32: 52–55.
[7]. Schmidt A. Mannliche. Hormone beichronischerm Niereninsuffizienz Spektrum der Nephrologie (2001); 4: 12–18.
[8]. 8-Feinstein E, Wanner C, Bohler J, Horl W. Endocrine and metabolic disorders following kidney transplantation. Am J Nephrol(1992); 12: 363-368
[9]. Shamsadini S. Effects of hemodialysis on thyroid hormone serum level of patients with chronic renal failure. Iran J EndocrinolMetab (2001);2 (3):152-160.
[10]. Carrero J, Kyriazis J, Sonmez A, Tzanakis I, QAR, Stenvinkel P, Prolactin levels, endotelial dysfunction, and the risk of cardiovascular events and mortality in patients with CKD. Clin J Am SocNephrol (2012); 7:207-222.
[11]. Corona G, Rastrelli G, Boddi V, Monami M, Melani C, Balzi D, Prolactin levels independently predict major cardiovascular events in patients with erectile dysfunction. Int J Androl (2011); 34 (3): 217-24.
[12]. Haring R, Volzke H,Vasan R, Felix S, Nauck M, Dorr M, Wallaschofski H. Sex-specific associations of serum prolactin concentrations with cardiac remodeling: longitudinal results from the Study of Health Pomerania (SHIP). Atherosclerosis (2012); 221 (2): 570-275.
[13]. Iglesias P, Carrero J, Diez J. Gonadal dysfunction in men with chronickidney disease: clinical features, prognostic implications and therapeutic options. J Nephrol (2012); 25(1):31-42.
[14]. Carrero J, Qureshi A, Nakashima A,Arver S, Parini P, Lindholm B, Prevalence and clinical implications of testosterone deficiency in men with end-stage renal disease. Nephrol Dial Transplant (2011); 26(1):184-273.
[15]. Yilmaz M, Sonmez A, Qureshi A, Saglam M, Stenvinkel P, YamanH, Endogenous testosterone, endotelialdysfunction, and cardiovascular events in men with nondialysis chronic kidney disease. Clin J Am Soc Nephrol (2011); 6:1617-1641.
[16]. Carrero J, Stenvinkel P. The vulnerable man: impact of testosterone deficiency on the uraemic phenotype. Nephrol Dial Transplant (2012); 27(11):4030-4070.
[17]. Gomez F, de la Cueva R, Wauters J, LemarchandBeruad T. Endocrine abnormalities in patients undergoing long term hem dialysis. The role of prolactin. Am J Med (1980); 68:522-552.
[18]. Bommer J, Ritz E, delPozo E, Bommer G. Improved sexual function in male haemodialysis patients on bromocriptine. Lancet (1979); 2:496-503.
[19]. Piccoli G, Bermont F, Magnano A, Soragna G, TerzoloM. Prolactinoma in a Diabetic Dialysis Patient withErectile Dysfunction: A Difficult Differential Diagnosis. Rev Diabet Stud (2006); 3(4):200-204.
[20]. Anees M, Mumtaz A, Barki M, Ibrahim M, Hussain S, Uzair M. Sex hormones and erectile dysfunction in hemodialysis patients. Pak J Med Sci(2009);25 (6):922-927.
[21]. Kapoor D, Clarke S, Channer K, Jones T. Erectile dysfunction is associated with low bioactive testosterone levels and visceral adiposity in men with type 2 diabetes. Int J Andro 2007;30 (6):500-507.