Blood Pressure and Some Serum Parameters in Hemodialysis Patients From Basra City

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Abstract: Hemodialysis (HD) is the most common method used to treat advanced and permanent kidney failure. This study investigated that the influence of blood pressure and some serum parameters in such patients compared to control sera .In total,27patients admitted in Al-Basra general hospital were studied , included 19 males and 8 females. Blood pressure (BP) was differ between groups at the time of study .Out of 27 patients ,23 were on medication for hypertension. Our study demonstrate the relationship of some serum parameters with BP, as the follow ; serum cGMP was significantly elevated ($p<0.05$) and there was highly increased in serum creatinine , calcium, potassium, sodium, blood urea .(nitrogen(BUN)($p<0.001$-0.01

Uric acid and phosphate levels in sera of this patients groups . were showed no significant correlation

Introduction:

Healthy kidneys clean the blood by removing excess fluid ,minerals and wastes .They also make hormones that keep the bones strong and healthy [1]

In renal failure, harmful wastes build up in body, for that reason, blood pressure may be rise and the body may retain excess fluid and not make enough red blood cell [2]. More than 200.000 persons were affected by chronic nephritis and urinary systemic disease, they are dialysis in order to stay survive .

Hemodialysis can be successful treatment for these patients and it was the oldest method that used to performs the functions of normal kidney when they fail (kidney failure) [3].Before 1960, the inevitable decline of patients with kidney failure could be reversed, in previous years researchers developed the external shunt, which provided repeated vascular access to enable effective use of the dialysis technology, that had been developed before some earlier years.

Chronic intermitted hemodialysis began in 1960 at the university of Washington, that opens the door for hundreds or thousands to receive life-saving dialysis therapy from kidney failure [4].Renal failure may be caused by a variety conditions that can impair renal function including ;high blood pressure or other kidney problems[5].

Hypertension is prevalent in patients with end-stage renal disease (ESRD), irrespective of the etiology of their renal failure. Many ESRD patients are refractory to multiple antihypertensive agents even in conjunction with fluid restriction and maintenance dialysis fluid removal[5] .The most powerful interventions to take in the pre-dialysis period is control on hypertension to normalize systolic and diastolic pressure [6]

Our study is an attempt to know the relationship between hypertension and the levels of some serum parameter in patients under maintenance hemodialysis.

Materials and methods:

Twenty-seven cases were taken randomly from patients suffering renal failure treated by hemodialysis, admitted at Basra general hospital. They were 19 males and 8 females .25 normotensive persons was selected as control group criteria for control were as follows,

normotensive, healthy individuals with no known illnesses and with out antihypertensive drugs.

At the beginning of study, the patients were characterized in terms of age, gender, years of dialysis treatment, and need for antihypertensive drugs (amount and type). Hypertension measured was defined as supine blood pressure >140/90 mmHg or a history of hypertension,the patients were showed quietly in seated ,and blood sample was obtained at the pre-dialysis from patients who attended the hemodialysis center in the Al-Basra hospital general from Basra city. After clotting ,serum was separated by centrifugation and divide in several aliquots , stored at -20C^{o} until use for further biochemical determination.

We measured serum cGMP levels analysis by biomerix chemicals of ELIZA kits. and serum creatinine, calcium, sodium, potassium, uric acid ,blood urea nitrogen levels were measured by using the enzymatic reagent standard kits.

Acquired data were analyzed using SPSS-WIN statistical software, *t* test, Chi square. all data were expressed as the mean±SD, and statistical significance was considered if the difference reaches $p<0.001$-0.01.

Results: The mean age of the **27** patients was 64±4 years. Of the 27 patients, 19 (70.4%) were men and 8 (29.6%) were women, mean age of male was 62.73±1.40 years and female was 65.73±3.84 years (maximum: 78, minimum: 38).

Table (1): Show measured of blood pressure and biochemical parameters in hemodialysis patients and control

Variable	Control	HD patients
n	25	27
(Sex (M/F	17/8	19/8
Age	60±5	64.2±4
(Body (Wt.Kg	70±2	76±3
(Height (Cm	171±2	174±2
BMI	26.8±0.2	*29±4
SBP mmHg	125	*5 174±
DBP mmHg	78±4	*101±2
S.cGMP pmol/mL	4±0.1	**20±3
S.Creatinine mg/dl	1±0.8	**9.2±0.7
S. Na^{+} meg/L	134±7.5	*140±9.4
S. K^{+} meg/L	3.9±0.61	5.1±0.2
S. Ca^{++} meg/L	81.9±13	*96±21.7
S.Uric acid mg/dl	4.9±1.4	4.8±1.37
S.Phosphate mg/dl	3.7±0.1	3.89±1.1

BUN	Nil	**38±5.1

Values are means±SE**. N** ,number; **M**,male; **F**,female;**SBP**, systolic blood pressure; **DBP**,diastolic blood pressure; **BUN**, blood urea nitrogen ;**S,**serum;**BMI**,body mass index ***P**<0.01-0.05 , ****P**<0.001

In our study investigation, table (1) and figures (1, 2) showed the results of the BP for patients were highly significant increased compared with healthy groups. The cGMP levels of patients were a highly significant increased in this patients *vs.* control groups ($P<0.001$). In addition there were together serum creatinine, calcium, sodium, potassium levels were significant increased in HD patients($p<0.05$). Both condition were associated with higher blood pressure for HD, the serum uric acid and phosphate levels were normal levels(no significant difference $P<0.001$) as compared to control group.

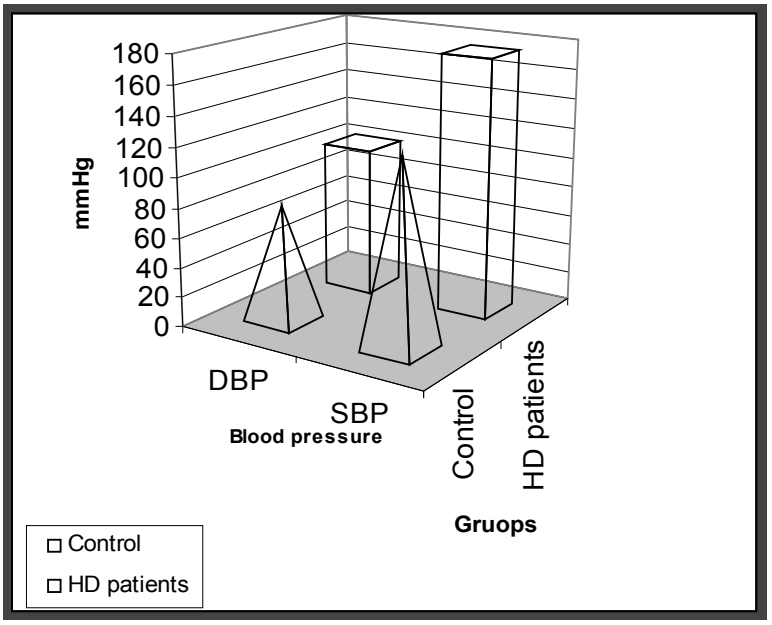

Figure (1) :Incidence of blood pressure in control and HD patients group in this study

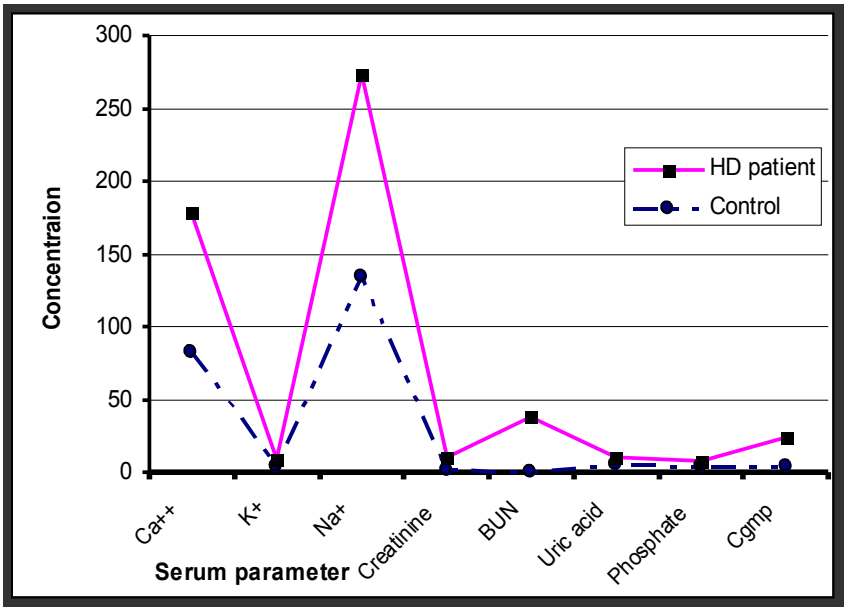

Figure (2) :Incidence of serum parameter in control and HD patients group in this study

Discussion:

The kidney are consider the main organs of excretion in the body, included wastes and excess water from the blood that would otherwise harmful to the body [1] the wastes and excess water removed are excreted as urine.

Two healthy kidneys excrete between 1.5L and 2.5 L of urine daily[2].

During filtration, blood fluid is forced from capillaries in to the renal tubules. As the fluid passes through the renal tubules, however the substance which needed to the body including; water, sodium, phosphorous, potassium and glucose [2]. In this way, the kidneys regulate the level of these vital substances in the blood. In addition to excluding wastes , the kidneys release important substances into the circulation ; erythropoietin , which stimulates erythropoiesis ; rennin an enzymes that is important in blood presser regulation ; calcitrol on active from vitamin D.which helps maintain calcium blood balance [7].

In advancing age, the kidneys function was decreases, rate of the glomeralar infiltration considered indicator for renal function, declines with age at a rate of about [10mL/ min/1.73m^3]for each decade beyond the third decade [16].

The most common disease affecting infection of the kidney was hypertension i.e. it can occurring to the small blood vessels of the kidney , which lead to decreasing their ability to filter wastes from the blood (hypertension nephropathy)[2].

In the present study, the blood pressure (BP) was different between groups that examine at the time of study .This un agreement with other report that showed the BP values for HD patients were not significantly different with control[8,9].The possible causes which considered responsible for the increased risk this disorder were associated with vascular endothelial (NO_x)production[8] and lipid profile specially high serum LP(a) and low HDL-C are highly etherogenic that may be defective in some with primary and secondary hypertension[10].

Serum levels of calcium was significantly elevated in HD of patients, as showed in table (1). This significant result was observed according to age, sex.The same finding was observed in other studies [11,12].

Hypercalcemia was increased due to probably intestinal absorption of calcium (vitamin D intoxication) and increased skeletal resorption (Immobilization) or combinations of these mechanism like (primary hyperparathyroidism)[13] .In this way Wong SY. *etal* was found the highly significant elevation in calcium level on renal failure related to either nutritional factors especially in patients who are intake animal proteins and over

consumption of refined carbohydrate [21]. At another cause it could be due to genetic factors [14].

In the present study ,we had obtained that there is no significant changes in serum phosphate levels between the control and patient groups . The same finding was reported in other study[2].

Imbalances levels of body cium ,phosphorus ,vitamin D and parathyroid hormone continue to be an issue as long as a patient is on hemodialysis, such imbalances requires to control of dietary phosphorus .Recently Nazam AK utilized phosphate binders and calcitriol as therapeutic to improve minimize of phosphate absorption (hyperphosphatemia) and hypercalcimea[15].

Overall results for uric acid analysis in this study have showed significant increased levels of serum uric acid. The same observation was found in other study [16].Hyperuricemia which was observed may be related to the metabolic over production of purines or to the under excretion uric acid (primary gout) [14] .As well as in born errors of uric acid metabolism due to specific enzyme defect (Lesch-Ngham syndrome) , in addition nutritional factors due to over consumption of diet include meat

extract, gravies, fish and legumes that leads to increase uric acid production and its excretion[8].

In the present study, observed significant increase in blood urea nitrogen (BUN). most clinical cases the changes in urea levels are more dependent in kidney and liver fund [20] .Most common, the BUN is measured as a screening test for renal failure, more specifically for glomerular filtration. Blood urea nitrogen were increased production due to either to a high protein diet or to excessive destruction of cellular proteins of the body as in ;fever, heavy infections .At nearly all types of kidney disease will scoring in urea retention[20].

In contrast, there was highly significant in creatinine, i.e., is a waste product of muscle breakdown. The same finding was observed many reviews [11]. Healthy kidneys were exclude creatinine from the blood by the urine , whereas ,the kidney failure creatinine buils in blood until it is removed by dialysis .Lindeman RD .suggested that the causes of creatinine levels elevation in serum of kidney failure as [End Stage Renal Failure (ESRF)] was relative independent of protein ingestion, water intake, and rate of urine production[9].

Also there is evidence, that the serum levels of sodium and potassium in HD patients was increased significantly .This agreement with other reports [2,17]. Most patients need to control the sodium and potassium, for that reason it is helps maintain fluid balance in the body to avoid retention and elevated blood pressure, as well as to prevent hyperkalemia which regarded the most common problem for people on hemodialysis . Some people with (ESRF)can have a total body cell deficit even though plasma potassium is normal, that were because when there is decreased in cell potassium , the body attempt to make the plasma potassium low[18].

On the other hand excess sodium increasing damaged to the cells distal tubules of the kidney as the same as potassium deficiency [11] .

Another study was showed the drinking salt (NaCl) water as a vehicle for the bicarbonate is helpful for increased urine flow increases potassium loss[19], so it indicated that a vary low sodium level intake normally would be the best way to go to avoid hyperkalemia and decreased blood pressure [13].

Acknowledgement

The authors would like to thank Dr.Hashiam AlKhait(surgeries and research scientific consultant), Basra Hospital generals, and Dr.Lamia Alnamai,head of clinical biochemistry, collage of medicine ,Nursing services, Hemodialysis unit staff and all hemodialysis patients and their families who took part to accomplish this study.

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ضغط الدم مع بعض المتغيرات في أمصال مرضى الغسيل الكلوي في مدينة البصرة

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الخلاصة : تم دراسة تأثير ضغط الدم مع بعض المتغيرات لمرضى غسيل الكلية لإيجاد احتمالية مدى التأثير لمثل هذه المتغيرات .شملت هذه الدراسة 27 مريضا , 19 مريض من الرجال و 8 مرضى من النساء و الذين ادخلوا إلى مستشفى البصرة العام وحدة غسل الكلية,ومقارنتهم مع 24 شخصا كانوا من الأصحاء كمجموعة سيطرة,أظهرت النتائج اختلاف في ضغط الدم للمجاميع التي هي تحت الدراسة علما انه كان مابين 27 مريض 23 مريض يتعاطون علاج مضاد لارتفاع ضغط الدم وهم تحت الدراسة.كذلك بينت النتائج وجود زيادة معنوية بمستوى ($p<0.05$) cGMP في أمصال المرضى مقارنة مع

مجموعة السيطرة ,كما لوحظ مستويات عالية من (creatinine , calcium, potassium, sodium, blood urea nitrogen (BUN) Uric acid and phosphate أيضا, بينما مستويات ($p<0.001-0.01$) كانت ضمن الحد الطبيعي للقيم الطبيعية.