

Hypertension in Haemodialysis

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ABSTRACT:

BACKGROUND:

Relevant factors involved in the pathogenesis of hypertension among dialysis patients include sodium and water retention, dialysate composition and prescription, increased activity of vasoconstrictive systems (sympathetic nervous system, rennin-angiotensin system, endothelin and vasopressin), decrease activity of vasodilatory systems (nitric oxide, kinins), increased intracellular calcium, increased arterial stiffness, sleep apnea, hyperparathyroidism, erythropoietin and renovascular disease

OBJECTIVE:

The objective of this study is to assess the prevalence of hypertension among uremic patients undergoing haemodialysis and to assess difference of blood pressure reading before and after dialysis.

PATIENTS AND METHODS:

140 patients with chronic renal failure & acute renal failure on regular haemodialysis. blood pressure was measured by doctors before dialysis, within 2 hour of dialysis, after dialysis and after 48 hours of dialysis. we averaged six routine predialysis systolic and diastolic blood pressure. The same was carried out for postdialysis.

RESULTS:

Patients with prehaemodialysis (office BP) >130/85 mmHg are considered as hypertensive in chronic renal failure, who made up of 74% of the study population. 40% patients were on monotherapy antihypertensive drug. 65% are taking calcium channel blocker, angiotensin converting enzyme inhibitor 38%, angiotensin II receptor blockers 26% and beta blocker 20%. Prehaemodialysis blood pressure (Office BP) overestimated BP values in relation to 48 h postdialysis

CONCLUSION:

Significant difference was shown between predialysis office blood pressure and 48 hour postdialysis in the recognition of hypertension in haemodialysis patients. the prevalence of hypertension in haemodialysis patients is high (74%). most of the patients used combination of antihypertensive drugs, calcium channel blocker commonly used 65%.

KEYWORDS : haemodialysis, hypertension, predialysis, postdialysis, office blood pressure.

INTRODUCTION:

Hypertension which is an important risk factor for morbidity and mortality from cardiovascular disease in the general population, is an extremely common finding in chronic renal failure patients with prevalence ranging 60 to 100% depending on target population⁽¹⁾

Clinic blood pressure measurements may not indicate the 'real' blood pressure load in the fluctuating blood pressure profile of hemodialysis patients. Indeed, interdialytic ambulatory blood pressure monitoring is agreed by most as the best method to estimate blood pressure in haemodialysis patients, mostly due to its better reproducibility⁽²⁾

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Furthermore, ambulatory blood pressure measurement (ABPM) provides blood pressure during sleep, where most dialysis patients fail to experience a drop in blood pressure (non dipping)⁽³⁾.

Non-dipping is associated with worse cardiovascular outcomes in essential hypertension. In haemodialysis patients an elevated nocturnal systolic blood pressure or non-dipping at baseline predict mortality and persistent non-dipping is linked to increased left ventricular dilatation over time⁽⁴⁾.

In a prospective cross-sectional study examining the influence of home and hemodialysis unit blood pressure recordings we found that home and standardized measurement of blood pressure (BP) was superior to routine recordings in making a diagnosis of hypertension⁽⁵⁾.

Relevant factors involved in the pathogenesis of hypertension in dialysis patients include sodium

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Water retention, dialysate composition and prescription, increased activity of vasoconstrictive systems (sympathetic nervous system, rennin-angiotensin system, endothelin and vasopressin), decrease activity of vasodilatory systems (nitric oxide, kinins), increased intracellular calcium, increased arterial stiffness, sleep apnea, hyperparathyroidism, erythropoietin and renovascular disease⁽⁶⁾.

Ambulatory blood pressure measurement data show that blood pressure in the interdialytic interval is more closely related to post-dialysis blood pressure; it tends to increase during dialysis session independent of the acute interdialytic volume increase and to rise particularly in hours preceding the next dialysis session⁽⁷⁾.

PATIENTS AND METHODS:

The study was performed in AL-Nahrain College of Medicine in AL-Kadhmiya Teaching Hospital in dialysis unit during the period of August 2007 to April 2009. 140 patients (85 male and 55 female) involved in this study of different age group ranging from (15 to 70) years (mean of age 47.6 year) complaining chronic renal failure on regular hemodialysis. Each patient subjected to haemodialysis for period of 4 hours in two or three sessions per week using GAMBRO AK95S haemodialysis apparatus with polyflux™L dialyzer membrane with effective surface area range from 1.4 to 2.1m² and flow rate range from 200 to 300 ml/min

the composition of dialysate was as follows:

sodium	133 mmol/L
chloride	97 mmol/L
calcium	1.5 mmol/L
potassium	1.5 mmol/L
magnesium	0.8 mmol/L
acetate	40 mmol/L
glucose	2.1g/L

All patients underwent a history and physical examination at baseline and investigations include blood urea nitrogen, creatinine, serum calcium, phosphorus,

Those who missed three hemodialysis sessions or more, bleeding complication, infectious disease and chronic atrial fibrillation are excluded from the study.

Blood pressure are measured by using mercury Sphygmomanometer, assessing the Korotkoff phases I and V by dialysis unit doctors before dialysis, within 2 hour of dialysis, after dialysis and after 48 hours of dialysis. blood pressure (BP) was recorded using a standard American Heart Association recommended technique following at least a 5- min rest. we averaged six routine predialysis systolic and diastolic blood pressure. the same was carried out for postdialysis routine.

According to the joint national committee on detection (JNC-VI) nephropathy is considered as

target organ damage and, therefore, patient with even high-normal

blood pressure levels (130—139/85—89 mmHg) should start drug therapy⁽⁸⁾.

Statistical analysis was performed using chi-square test. at level of significance $p \leq 0.05$ regarded as statistically significant.

RESULTS:

The average age of the sample was about 47 years, 64% were men, 36% had diabetes and 82% used antihypertensive drugs. The patients were treated with a variety of antihypertensive drugs. 40% patients were on monotherapy, while the others were on combined treatment (2-4 antihypertensive drugs).

The most frequently used antihypertensive drugs are calcium channel blocker (approximately 65% of the hypertensive patients) followed in order of preference by angiotensin converting enzyme inhibitor 38%, angiotensin II receptor blockers 26% and beta blocker 20%.

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Table 1: Bseline characteristics

Age(year)	47±20
Men	64%
Diabetes mellitus	36%
Haemodialysis vintage (years)	2±1.6
Predialysis weight (Kg)	65±18
Postdialysis weight (Kg)	63±17
Current smokers	26%
Antihypertensive medication use	82%
Number of BP medications	2±1
Anti-hepatitis C virus positive	46%
hepatitis BSAg virus positive	10%
Hemoglobin (g/dL)	10±3
Serum albumin	3.2±0.6

Patients with prehemodialysis (office BP) >130/85 are considered as hypertensive in chronic renal failure, who made up of 74% of the study population.

Table 2: The prevalence of hypertension in haemodialysis

Blood pressure (BP)	percentage
BP <130/85	26%
BP > 130/85	24%
BP 140-159/90-99	32%
BP ≥ 160/≥100	18%

Prehemodialysis blood pressure(Office BP) overestimated BP values in relation to 48 h postdialysis, both in the case of systolic blood pressure(SBP) and diastolic blood pressure (DBP) p.value < 0.01

Table 3: The mean and stander deviation (SD) of systolic and diastolic blood pressure

	Predialysis (office BP)	Interdialysis(2 hour)	Postdialysis (immediately)	48 hour postdialysis	P. value
Systolic BP mg	145±25	140±20	140±15	130±20	p < 0.01
Diastolic BP mg	85±15	75±15	75±15	75±10	P < 0.01

DISCUSSION :

Prevention and treatment of arterial hypertension is a special problem for haemodialysis patients. Unfortunately, there are still no guidelines for the optimal method of measuring blood pressure in these patients, or optimal values of arterial blood pressure, the first drug of choice or optimal combination of therapies. Perhaps because of this cardiovascular morbidity and mortality among these patients is high⁽⁹⁾.

In this study ,the prevalence of hypertension in haemodialysis is high (74%)in compared with other study such as in Fagugli RM et al⁽¹⁰⁾ which show 61.7%.

The high prevalence of hypertension may be duo to inadequate dialysis in removing sodium and water from the body of the patients , may be duo to sympathetic over activity, inadequate or not compliant with antihypertensive drugs. while the 26% are normotensive either duo to effect of antihypertensive drug or actually not hypertensive initially.

Most of the hypertensive patients in haemodialysis have (BP>130/85) (74%) according to guideline of hypertension as mention in patients and methods and most of them receive antihypertensive medication but not response to the treatment in spite of combination more than two drugs, this explain why most hypertensive patients in haemodialysis develop left ventricular hypertrophy , left ventricular overload, coronary heart disease , congestive heart failure and cerebrovascular complications.

Regarding the drugs of choice, although calcium channel blocker was commonly used in this study in hypertensive patients in haemodialysis but some studies are in favor for the angiotensin-converting enzyme(ACE)inhibitors, angiotensin 11 receptor blocker, beta blockers and diuretic such as in Horl MP⁽¹¹⁾

The intermittent nature of haemodialysis treatment and wide fluctuations in extra cellular volume during and between haemodialysis session give

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blood pressure a unique profile in haemodialysis. so the difference between office prehaemodialysis and 48 hour were significant $p < 0.01$.

Dialysis patients are subject to significant variations of fluid volumes and, consequently, of BP during a period of 2 days, changes are dictated by the rapid ultrafiltration exerted during the 4 h of haemodialysis, paired with the extremely frequent absence of diuresis, and on the subsequent volume increase registered during the subsequent 48 h. The peak of fluid overload occurs just before haemodialysis, after which a new 2 day cycle begins again. blood pressure variations can also depend on the discontinuation of therapy before haemodialysis.

Our study outlines and confirms other studies by Cannella G⁽¹²⁾, stressing that predialysis office Blood pressure (OBP) can induce significant errors in establishing hypertension in haemodialysis (HD) patients. Therefore, we argued that the burden of hypertension in haemodialysis (HD) patients cannot be predicted with confidence from office OBP measurements.

CONCLUSION:

Significant difference was shown between predialysis office blood pressure and 48 hour postdialysis in the recognition of hypertension in haemodialysis. the prevalence of hypertension in haemodialysis is high (74%). most of the patients was on combination of antihypertensive drugs, calcium channel blocker are commonly used in 65%.

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