

HYPERTENSION, DIABETES AND CKD THE OMINOUS TRIPLET*Rajkamal Choudhary¹, Abhishek Kumar Tiwar², Surabhi³*¹Associate Professor, Department of Internal Medicine, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar.²Postgraduate Trainee, Department of Internal Medicine, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar.³Postgraduate Trainee, Department of Internal Medicine, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar.**ABSTRACT****BACKGROUND**

Diabetes and disorders of kidney go hand in hand. Various forms of chronic kidney disease are linked with diabetes. Diabetes is the leading cause of kidney disease in India. Kidney ailment can be a shattering impediment, as it is linked with remarkable fall in both extent and quality of life. Hypertension is connected not only with causation, but it is also a foreseeable ending of CKD which abidingly aggravates in CKD Stages 3-5; along with that, acid-base balance, lipid profile, and glucose homeostasis gets disturbed too. HTN, proteinuria, and hyperlipidaemia may come into sight at any stage and therapy must be weighed down to specific levels. The frequency of hypertension has been on a steep rise. Increase in life expectancy and uncontrolled rise in the obesity are the two most important reasons behind this increasing prevalence. Hypertension customarily rides besides the advancing CKD, and it is often appallingly thought to be a cause rather than the effect of CKD.

MATERIALS AND METHODS

We studied 1040 patients presenting to us, in the department of nephrology, JLNCH, Bhagalpur, with renal failure and calculated the prevalence of the two main causes and associated conditions, i.e., diabetes and hypertension.

RESULTS

As high as 3/4th of the cases of ESRD are associated with hypertension and diabetes. Male to female ratio of renal association was 7:3.86%. Patients were above the age of 25 years, just 14% were below 25 years of which less than 1% were below 12 years of age. Out of these, 29 cases were a known case of diabetes mellitus either type I or type II. Of these a staggering 493 cases were having elevated blood pressure.

CONCLUSION

By and large the portrayal here was just a minuscule replica of the situation worldwide. With a great turmoil anticipated at the forefront, unless a brake is applied to the unending outburst of patients with diabetes and hypertension both of which fortunately are preventable and treatable, if managed carefully.

KEYWORDS

Diabetes, Hypertension, Chronic Kidney Disease, Hypertensive Nephrosclerosis.

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BACKGROUND**The Sweet Poison**

Hypertension and diabetes are the evils which drag the patient into the loop hole of chronic disease of kidney which not only complicates the disease further but also takes it to the point of no return. Diseases of the kidney go hand in hand with diabetic disorders, with a major proportion demonstrating signs of renal smash up in their life span.^{1,2} Diabetes is the leading cause of kidney disease in India. Kidney disease can be a catastrophic complication, as it is

allied with noteworthy reductions in both span and quality of life, indeed a sweet poison. Diabetic kidney disease is not a single entity, but as such, a spectrum that includes likes of - ischemic nephropathy, diabetic nephropathy, hypertensive nephrosclerosis.^{3,4}

CKD staging is evolved and delineated into 5 well defined stages to direct its management. During the progressive decline in the eGFR and increasing proteinuria, metabolic affection also begins to engulf the patient's health in a pretty predetermined fashion ultimately leading to the END stage of renal disease. En route to the end stages, bone-mineral metabolism, erythropoiesis acid base balance is badly affected sequentially and substantially.

Newer Route with Same Destination

The incidence of diabetes has never stopped looking skywards after its outburst. This has been firmly backed by the increasing metabolic syndrome in the society. Obesity being the parent entity of the metabolic syndrome, has not only flourished the diabetes but at the same time has helped

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the kidneys destroy its fate along with the mounting hypertension which together strangulates the patient by increasing the risk of cardiovascular morbidity. A study by Burrows NR et al suggested that, overall incidence of the ESRD has de-escalated but cardiovascular involvement which is attributable to the diabetic kidney disease has prevailed.^{5,6,7}

Hypertensive Bullets in the Chest of Kidney

Hypertension has dual relation with the chronic kidney disease. It not only opens the gateway to renal damage but at the same time is an end story of the kidney disease. Moving down the timeline, it along with other metabolic dysfunction occurs without fail in the later stages of the chronic kidney disease. The trio of hypertension, dyslipidaemia and proteinuria are bound to happen irrespective of the stage of the disease, anticipating bombardment of therapies. Chronic kidney disease increases the morbidity and mortality associated with diabetes and hypertension by many folds with the worsening of the situation in the later stages of the disease. As a matter of fact, control of hypertension and diabetes reduces the cardiovascular mortality associated with the chronic kidney disease. Uncontrolled HTN and proteinuria are the two strongest prognosticators for declining kidney function. Normal age-related decline in GFR is $\sim 1 \text{ mL/min/1.73 m}^2/\text{yr}$ after age 30–40 but in diabetics, annual eGFR rates of decline of $>10\text{--}12 \text{ mL/min/1.73 m}^2$ may occur.

The Explosion

Bombarding from where it was way back in 2000, the prevalence of diabetes mellitus is anticipated to cross beyond 360 million by 2030, signifying the fact that CKD prevalence is just at the edge of escalation. In a study involving the German population, the survival of patients of type II diabetes was less than 10 percent and less than 40 percent in young type I patients, 5 years down the line. Fewer patients from the elderly population with diabetes were able to receive a kidney transplant with respect to the non-diabetic population. Story of the untreated diabetes affecting the kidneys begin with hyperfiltration via the glomerulus, which comes into existence by the mesangial scarring. This affection slides through the roller-coaster of micro and macro albuminuria finally leading to full blown nephropathy. Hypertension is a close kin of diabetic kidney disease with more than $2/3^{\text{rd}}$ of the those initiating dialysis being affected by it. Hyperglycaemia unlike other chronic kidney diseases, doesn't result in any fall in the size of the bean shaped organ because of the accumulation of the matrix. Only $1/5^{\text{th}}$ of adult diabetics are spared from being hypertensive. The initial albuminuric phase is marked by infrequent fall in natural nocturnal blood pressure.

The prime markers of CKD are increased urine albumino-creatinine ratio (UACR) and increased SCr estimates of GFR (eGFR), $<60 \text{ mL/min/1.73 m}^2$, from 2 abnormal readings at least 3 months apart. Microalbuminuria ($30\text{--}300 \text{ mg/24 h}$; UACR $3\text{--}30 \text{ mg/g}$) is the earliest clinical sign of diabetic kidney disease and is typically

present in 20–30% of type 1 diabetics $\sim 15 \text{ yr}$ after the onset of DM. Progression to macroalbuminuria ($>300 \text{ mg/24 h}$; UACR $>30 \text{ mg/g}$) is associated with increased progression of CKD and possibly, ESRD.

Thanks to the surplus nutrition and better healthcare we have got more people who are elderly and/or obese both of which increased the incidence as well as the prevalence of hypertension. This higher blood pressure has not only been liked to be a cause of renal derangements but at the same time a faithful company of the end stage renal disease. Not surprisingly hypertension is more a result of chronic kidney disease rather than being a cause. It has been found that together CKD and hypertension increases the risk of stroke by almost above 20 percentage as against those with hypertension alone. This doesn't equate with the statement that, lower the better! In fact, a J curve relationship has been found between blood pressure and deaths attributed to chronic kidney disease when systolic pressure falls below 120 mm of hg

The Obstinate Tension!

Hypertension which develops in the shadows of CKD are seldom amenable to treatment with 1 or 2 antihypertensive agents and most often even 3 agents, including a diuretic thus earmarked as an obstinate and resistant hypertension. These patients characteristically have a high pulse pressure with a wide gap between the systolic and diastolic blood pressures as in the hypervolemic and oedematous states requiring diuretic therapies. With progressive increase in the hypertension there is loss of bodily proteins via kidneys which in turn aggravates fibrosis, atrophy of the tubules and tubulointerstitial inflammation which together kicks the pressure even higher. The proteinuria not only boosts the rate of fall in GFR but at the same time is an independent risk for left ventricular hypertrophy, stroke as well as death. Thus, therapies directed towards reducing proteinuria do the function of reducing the tubulointerstitial inflammation as well as fibrosis hence reducing the further progression of CKD. Thus, the AHA guidelines advocate to maintain blood pressure of hypertensive patients with CKD below 130/80 mm of hg to reduce the risk of adverse cardiovascular outcomes in proteinuric patients particularly those with heart failure or stroke.

Aims and Objectives

To quantify the magnitude of association of diabetes I and II with chronic renal failure and also study its web of association with hypertension.

MATERIALS AND METHODS

The patients who presented to the indoor of department of internal medicine, JLNMC were categorized as having chronic kidney disease if they had glomerular filtration rate (GFR) of less than $60 \text{ mL/min/1.73 m}^2$ for at least 3 months irrespective of the causal aetiology. Patients with pre-renal, renal or post-renal, acute renal failure were excluded from the study.

RESULTS

Snapshot of Condition in JLNMC Bhagalpur, Presenting to Dialysis Unit

Hypertension and diabetes constitute the most important risk factors that prevails among the patients with CKD. Our study was of the opinion that as high as 3/4th of the cases of ESRD are associated with hypertension and diabetes. Male to female ratio of renal association was 7:3.86% patients were above the age of 25 years, just 14% were below 25 years of which less than 1% were below 12 years of age. Local data that indicates the quantum of situation in our locality was meagrely exploited so we worked for a period of 3 years in JLNMC Bhagalpur to ascertain the association of chronic kidney disease with the two giant's diabetes and hypertension. The CKD was defined as either kidney damage or a decreased glomerular filtration rate (GFR) of less than 60 mL/min/1.73 m² for at least 3 months whatever be the underlying aetiology. A total of 1040 cases of renal failure were reported of which 103 were of acute kidney injury and the rest 937 cases were of chronic kidney disease. Male to female ratio of renal involvement was 7:3. 86% patients were above the age of 25 years, just 14% fell below 25 years of which less than 1% were below 12 years of age. Out of these 29 cases were a known case of diabetes mellitus either type I or type II. Of these a whopping 493 cases were having elevated blood pressure. Whether this hypertension was a cause, or an outcome was not specified. Most of the cases had a stubborn hypertension which rarely responded to less than 3 diuretics.

DISCUSSION

Overall the picture patient presenting to our institute was just a miniature model of the situation worldwide. In winding up, although the diabetic nephropathy and hypertensive nephrosclerosis are also the most widespread causes of end stage renal disease in developing countries, nonetheless, possibly because of ignorance of patients with CKD and late referral of patients with CKD to the nephrologists, the causes of ESRD in the significant percent of patients in developing countries are still unheard of and therefore everybody with possible risk of CKD such as high blood pressure, diabetes

mellitus have to be well-informed about the benefits of early detection of the disease and subsequent kidney safeguard through apt interventions.

CONCLUSION

There is a great turbulence expected ahead unless a brake is applied to the ongoing explosion of patients with diabetes and hypertension, both of which fortunately are preventable and treatable, if managed carefully. This by all means shall have a positive impact on the ever-increasing incidence of chronic kidney disease in this changing epidemiological scenario of non-communicable illnesses.

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