International Journal of Research in Medical Sciences
Pathak A et al. Int J Res Med Sci. 2016 Jul;4(7):3002-3008
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20161993

Research Article

To study the clinical profile of chronic kidney disease and associated comorbidities in geriatric patients

Ashvani Pathak, Lalit Jain*, Praveen Jaiswal

Netaji Subhash Chandra Bose Medical College Jabalpur, Madhya Pradesh, India

Received: 27 May 2016
Revised: 01 June 2016
Accepted: 17 June 2016

***Correspondence:**
Dr. Lalit Jain,
E-mail: doc_jain_lalit@yahoo.co.in

ABSTRACT

Background: Chronic kidney disease (CKD) has become a major issue in our nation. CKD does not have a specific target, but individuals with diseases such as diabetes mellitus, cardiovascular disease, and obesity are all at increased risk. The chronic kidney disease (CKD) is associated with many features like hyperkalemia, hypocalcemia, hyponatremia, anaemia, hypoalbuminemia, high blood pressure etc. So if we detect all these features early, we can extend the quality life of CKD patients. Aim and objectives of the study were early detection of CKD in elderly people at Initial stage to prevent progression of disease, to study the clinical and biochemical profile and co-morbidities in elderly people with CKD.
Methods: This Hospital based descriptive study was done in the Department Of Medicine, NSCB Medical college, Jabalpur from October 2014 to October 2015 including 100 patients of 60+ years of age.
Results: In present study the etiology of chronic kidney disease was diabetes in 45.0%, hypertension in 38.0%, obstructive uropathy in 8.0% and undetermined etiology was 9.0%. Cardiovascular disease was present in 28% cases, stroke in 22% cases. Most common clinical features was dyspnoea [63.0% ($p<0.001$)] pedal oedema (31%), high blood pressure [54.0% ($p<0.001$)], pallor [49.0% ($p<0.001$)], and pedal oedema (31.0%).The abnormality in the laboratory profile was dyslipidemia in 73% hypoalbuminemia in 31.0% ($p<0.05$), albuminuria in 73.0% ($p<0.001$), hypocalcemia in 54.0% ($p<0.001$), hyponatremia in 23.0%, hyperkalemia in 14%, anemia in 60.0% ($p<0.05$). LVH on echocardiography is present in 34.0% ($p<0.05$) cases.
Conclusions: The major causes of CKD in descending order were, type 2 diabetes mellitus, hypertension, and obstructive uropathy. All these features needs prompt detection and correction at earlier stages of CKD to delay progression and reduce associated morbidity and exacerbating factors and to prevent early mortality.

Keywords: CKD, Geriatric patients

INTRODUCTION

Old age is unpreventable physiological state and epidemiologically independent risk factor for chronic non-communicable diseases. Decline in the young population proportion along-with increased life span of individuals due to reduced fertility and mortality rate has led to an increased elderly people proportion in the total population.[1] However, the geriatric age group suffers from the dual medical conditions; where age-related declined immunity and physiological changes has led to an increased burden of communicable diseases as well as non-communicable chronic diseases.

Equally, defining aging is problematic, and each expert in the field will have his or her own version. We believe that aging is the consequence of two associated, but not identical, processes: the decline in function and the

reduction in adaptive capacity. The most important is in identifying a group of healthy, older individuals wide enough to obtain reference values for this age group. Another important methodological problem would be determining the cut- off for "old age". There has been great difficulty in reaching an agreement between gerontologists in this area, probably due to the fact that the age of 65 is more a political than a biological distinction.[2]

The United Nations (UN) defines a country with more than 7% of the total proportion of people over 60 years as aging or greying nation. India has, thus, acquired the label of an aging nation with 7.47% proportion in 2001, 8.3% in 2008, and has been expected to reach 12.6% by 2025. The UN has further made projection that 21% (about 324 million) of the Indian population will be above 60 years by 2050 which was 6.8% in 1991.[3]

Chronic kidney disease (CKD)

CKD has become a major issue in our nation. CKD does not have a specific target, but individuals with diseases such as diabetes mellitus, cardiovascular disease, and obesity are all at increased risk.

Elderly people are especially at increased risk for developing CKD due to decrease in kidney function and other physiologic changes. Early stages of CKD can be detected through laboratory testing only.[4,5] The CKD is a known end result of type 2 diabetes mellitus and hypertension in recent times, it is associated with many features like hyperkalemia, hypocalcemia, hyponatremia, anaemia, hypoalbuminemia etc. So if we detect all these features early, we can extend the quality life of CKD patients by timely interventions.[4-6]

The CKD is defined as kidney damage for 3 months, as shown by structural or functional abnormalities of the kidney, with or without decreased GFR, manifest by either pathological abnormalities or by markers of kidney damage, including abnormalities in the composition of the blood , urine, or in imaging tests and also defined by GFR < 60 ml/min/1.73 m^2 for 3 months, with or without kidney damage.[7] The GFR is considered as the best measure of overall kidney function. A GFR below 60 mL/min/1.73m^2 represents loss of one half or more of the adult level of normal kidney function. Normal GFR varies according to patient´s age, sex, and body size.

Recommended equation for estimation of GFR [NKF/KDOQI]

MDRD equation for EGFR (ml/min per 1.73 m^2)

$$EGFR = 1.86 \times (P_{cr})^{-1.154} \times (age)^{-0.203}$$

Multiply by 0.742 for women and multiply by 1.21 for Africans/Americans.

Aim and objectives of the study were early detection of CKD in elderly people at Initial stage to prevent progression of disease, to study the clinical profile and Biochemical changes in elderly people with CKD and to study the co-morbidities (diabetes mellitus, hypertension, cardiovascular disease, stroke) having predilection for developing CKD in elderly patients.

METHODS

This Hospital based descriptive study was done in the Department Of Medicine, NSCB Medical College, and Jabalpur from October 2014 to October 2015 including 100 patients of 60+ yrs of age. Informed consent was obtained from all the subjects. All participants were administered a structured questionnaire, taking into account the educational status and employment status. All were questioned about the presence or absence of symptoms suggestive of renal disease. Past medical history of diabetes mellitus, hypertension, ischemic heart disease and stroke was elicited. Questions pertaining to smoking, alcohol or tobacco consumption was asked. They were then subjected to detailed physical examination.

Statistical analysis

Statistical analysis was performed using SPSS version 11 (SPSS Inc., Chicago). In the descriptive analysis, continuous variables were expressed as mean ± standard deviation (SD) and categorical variables were expressed as count (percentages). Non-parametric test Pearson Chi-square test was used to study the association between categorical variables. Appropriate univariate and bivariate analysis comparing distributions of clinical/ historical measures between CKD groups were carried out using the independent student t- test for the normally distributed continuous variable. All means are expressed as mean + standard deviation. $P \leq 0.05$ were considered to be statistically significant.

Inclusion criteria

- Patients with the age of 60 years and above diagnosed as chronic kidney disease as per NKF/KDOQI guidelines.
- Patients willing to be a part of study.

Exclusion criteria

- Patients below the age of 60 years.
- Patients with acute kidney injury.
- Patients not willing to be a part of study.

RESULTS

In our study the mean age was 69.06±8.34 years. There was male preponderance in cases [n=56 (56.0%)] the causes of CKD includes diabetic nephropathy in 45%, hypertensive nephropathy in 38%, obstructive uropathy in 8% and undetermined etiology in 9%.

Cardiovascular diseases and stroke were present in 28% and 22% cases respectively.

Anaemia (<11gm/dl) was seen in 60.0% (p<0.05), hyperkalemia (>5.5meq/l) in 14%, hyponatremia (<135meq/l) in 23.0%, hypocalcaemia (<9 mg/dl) in 54.0% (p<0.001), hypoalbuminemia (<3.5g/dl) in 31.0% (p<0.05) cases. The total 48.0% of the cases was seen to have renal parenchymal disease on ultrasonography.

Table 1: Distribution of the subjects by age.

Age class	Cases	Controls	Total
	29	16	45
60-64	29.0%	53.3%	34.6%
	25	9	34
65-69	25.0%	30.0%	26.2%
	20	3	23
70-74	20.0%	10.0%	17.7%
	09	0	9
75-79	9.0%	0.0%	6.9%
	13	2	15
80-84	13.0%	6.7%	11.5%
	00	0	0
85-89	0.0%	0.0%	0.0%
	2	0	2
90-94	2.0%	0.0%	1.5%
	2	0	2
95-99	2.0%	0.0%	1.5%
	100	30	130
TOTAL	100.0%	100.0%	100.0%

Table 2: Distribution of subjects by sex.

Sex	Cases	Controls	Total
Male	56	20	76
	56.0%	66.6%	58.5%
Female	44	10	54
	44.0%	33.3%	41.5%
Total	100	30	130
	100.0%	100.0%	100.0%

Table 3: Distribution of the subjects by stages of CKD and age.

Age	CKD stages						Total
	1	2	3a	3b	4	5	
60-64	0	11	7	2	6	3	29
	0.0%	28.2%	35.0%	14.3%	35.3%	30.0%	29.0%
65-69	0	14	3	1	6	1	25
	0.0%	35.9%	15.05	7.1%	35.3%	10.0%	25.0%
70-74	0	4	4	4	2	6	20
	0.0%	10.3%	20.0%	28.6%	11.8%	60.0%	20.0%
75-79	0	1	3	3	2	0	9
	0.0%	2.6%	15.0%	21.4%	11.8%	0.0%	9.0%
80-84	0	9	2	2	0	0	13
	0.0%	23.1%	10.0%	14.3%	0.0%	0.0%	13.0%
85-89	0	0	0	0	0	0	0
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
90-94	0	0	1	1	0	0	2
	0.0%	0.0%	5.0%	7.1%	0.0%	0.0%	2.0%
95-99	0	0	0	1	1	0	2
	0.0%	0.0%	0.0%	7.1%	5.9%	0.0%	2.0%

Table 4: Distribution of subjects by etiology.

Etiology	Cases	%
Diabetic nephropathy	45	45.00%
Hypertensive nephropathy	38	38.00%
Obstructive uropathy	8	8.00%
Undetermined	9	9.00%
Total	100	100.00%

Table 5: Distribution of subjects by comorbidities.

Co morbidities	Cases	Controls	P value
DM	47	0	<0.001
	47.0%	0.0%	
HTN	53	0	<0.001
	53.0%	0.0%	
Dyslipidemia	73	8	<0.001
	73.0%	26.6%	
CAD/IHD	28	3	0.042
	28.0%	10.0%	
Stroke	22	4	0.29
	22.0%	13.3%	
Obstructive uropathy	8	0	0.11
	8.0%	0.0%	

Table 6: Distribution of subjects by clinical features.

Signs	Cases	Controls	P value
Edema	31	1	0.002
	31.0%	3.3%	
Oliguria	15	0	0.024
	15.0%	0.0%	
Dyspnoea	63	6	<0.001
	63.0%	20.0%	
Pallor	49	2	<0.001
	49.0%	6.7%	

Most common symptom was dyspnoea [63.0% (p<0.001)] followed by pedal oedema (31%), most common signs were high blood pressure [54.0% (p<0.001)], pallor [49.0% (p<0.001)], and pedal oedema (31.0%).

The abnormality in the laboratory profile of the patients were found to be dyslipidemia in 73% [hypercholesterolemia 22.0%, low HDL 73.0% (p<0.001), high LDL 33.0%, hypertriglyceridemia 15.0%], albuminuria in 73.0% (p<0.001), LVH On Echocardiography was found in 34.0% (p<0.05) cases.

DISCUSSION

The present study consists of 100 patients of 60 years and above diagnosed as CKD using MDRD eGFR equation. These patients fulfilled the criteria set by the National Kidney Foundations, Kidney Disease Outcome Quality Initiative for diagnosing CKD.

They were studied and evaluated for clinical symptoms and signs and associated comorbidities by clinical and laboratory investigations. The age of cases was in range from 60 years to 99 years.

The mean age was 69.06±8.34 years and 65.17±5.55 years in cases and controls respectively. Maximum number of subjects in cases were in age group of 60-64 years. There was male preponderance in cases [n=56 (56.0%)] as well as controls [n=20 (66.6%)].

In present study the etiology of chronic kidney disease was diabetes in 45.0%, hypertension in 38.0%, obstructive uropathy in 8.0% and undetermined etiology was 9.0%. (Chronic glomerulonephritis, ADPKD and drug induced (NSAID) nephropathy was not diagnosed

because biopsy was not done for making the diagnosis, due to this 9.0% cases were of undetermined etiology). This trend of diabetic nephropathy and hypertensive nephropathy as etiology of chronic kidney disease is similar to that reported by – Prasad R et al, Dash et al, Lysaght et al in American populations.[8-10] In the study conducted by Xue et al the number of patients with diabetic nephropathy were almost 50% of the study groups.[11]

The mean Hemoglobin level was 10.08±2.55. Moderate anemia was observed in most of the cases (42.0%) and severe anemia was observed in 18.0% cases. There was statistically significant difference ($p<0.05$) in hemoglobin level between two groups. The haemoglobin levels were below 11 gm/dl in 60% of the patients. The McGonigle and Wallin et al studied 863 patients for anaemia and was found upto 90% of patients to have haemoglobin less, than 10 gm/dl.[12]

The mean serum sodium (Na^+) and serum potassium (K^+) level was 138.63±5.13 and 4.43±0.66. Hyperkalemia was found in 14% of patients, as per the study conducted by Lisa. Einhorn M et al on the frequency of hyperkalemia and its significance in CKD, the hyperkalemia increases the odds of mortality within 1 day of presentation.[13]

Hyperkalemia was 34.0% in a descriptive study by Prasad R et al.[8] Hyponatremia was reported in 23.0% patients in present study, which is a known association with CKD. Hpyonatremia was 24.0% in a study by Prasad R et al.[8] Study conducted by Sushrut S et al showed that even mild hyponatremia is associated with increased risk of mortality in CKD patients.[14] In present study hypocalcemia was observed in 54.0% cases. There was statistically significant difference ($p<0.001$) in serum calcium between two groups. The mean serum calcium (Ca^{++}) level was 8.87±1.04. Hypocalcemia is a known entity in patients with CRF. In another study on CKD patients by Coen et al found that, with the creatinine clearance of 20 to 59ml/ min, 87% of patients had abnormal bone histology and the majority had lesions of high bone formation rate associated with hyperparathyroidism.[15] Hypocalcemia was 46.0% in a study by Prasad R et al.[8]

On Echocardiography in cases and controls LVH was found in 34.0%. There was statistically significant difference ($p<0.05$) in Echo (LVH) between the two groups. In the present study albuminuria was present in 73.0% cases with CKD. Albuminuria was statistically significant ($p<0.001$). In present study hypoalbuminemia was observed in 31.0% of the cases. There was statistically significant difference ($p<0.05$) in hypoalbuminemia between two groups. This is consistent with the study done by Kopple et al.[16] and Prasad R et al.[8]

In the present study most common symptom was dyspnoea, present in 63.0% cases of CKD, followed by pedal oedema in (31%), oliguria in (15%). The most common signs were high blood pressure (54.0%), pallor (49.0%), and pedal oedema (31.0%) When compared with controls dyspnoea and pallor was statistically significant ($p<0.001$). National Kidney Foundations K/DOQI evaluated 26 studies which related blood pressure to the level of GFR decline in univariate and/or multivariate analysis. In another study conducted by Yano Y et al on the association between prehypertension and CKD showed that, the prevalence of CKD increased with the severely raised blood pressure.[17]

In present study lipid profile was compared between cases and controls group, hypercholesterolemia was found in 22.0% of cases and 5.0% controls, low HDL in 73.0% cases and 8.0% controls, high LDL in 33.0% cases and 7.0% controls, hypertriglyceridemia in 15.0% cases and 1.0% controls. There was statistically significant difference only in HDL between the two groups ($p<0.001$). Serum cholesterol levels were high in chronic kidney disease patients compared to control subjects, but there was no statistically significant difference ($p>0.05$). Attman et al in their study showed no significant change in levels of total cholesterol in patients with chronic kidney disease.[18]

Similar results were obtained in study by Kawagishi et al.[19] Quasctining T et al reported combined hyperlipidemia (elevated total cholesterol and triglycerides) in their study. Attman et al in their study showed decrease in HDL concentration in patients with chronic kidney disease.[18] Preston et al and Shoji et al showed similar result.[20]

Old age definition and cut off

There is a need to redefine old age. Although we used 60 year of age as cut off value to define old age as there is no universal acceptance among different countries and United Nation agreed to take 60 year as cut off value for old age. There is no specific definition to define old age as most developed countries take 65 year as cut off probably due to higher life expectancy at birth and at 60 year respectively and most developing countries take 60 year as cut off probably due to low life expectancy at birth and at 60 year respectively.

Since aging is a biological process and determined by various factors which are different in every individual so applying a single chronological age as old to all population is questionable. Similarly rate of ageing is different in different people so how all the people will become old at a particular fix chronological age.

Old age definition should not be based on only chronological age but biological processes and various factors like systemic consequences of ageing i.e. body composition (weight, height, lean body mass); balance between energy availability and energy demand (peak oxygen consumption, resting metabolic rate); signaling

networks that maintain homeostasis (hormones, inflammatory mediators, antioxidants); neurodegenration should also be included. It should be more than 60 years for developing countries. In summary in spite of saying a person to 60 or 65 year old it should be such that at the age of 60 or 65 year how much he is old.

CONCLUSION

Elderly patients with CKD are a growing social and economic problem. Early identification and appropriate treatment of CKD in this population may prevent its future expansion. Measurement of kidney disease burden is important for understanding disease trends and development of evidence-based health policy.

Diabetes and hypertension are the leading causes of CKD throughout the world. CKD increases risk of development of CVD. CKD care is expensive and imposes large micro- and macro-economic burden on individuals and countries. The projected increase in the prevalence of diabetes, hypertension and CVD is likely to increase the CKD burden further. High-quality studies using uniform definitions and methodology are required to accurately assess disease burden and help health care policy planners to devise appropriate preventive strategies.

It is of importance to find under recognized diabetes mellitus and hypertension and to treat them adequately with medications, which delay the development and progression of kidney failure.

It is also important to detect the earlier stages of chronic kidney disease by means of evaluation, classification and stratification, applying therapeutic interventions to delay progression and reduce associated morbidity and exacerbating factors.

ACKNOWLEDGEMENTS

Authors would like to thank Dr. M. K. Parashar, Professor and HOD, Department of Medicine, NSCB Medical College Jabalpur, Madhya Pradesh, India.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Chakrabarti S, Sarkar A. Pattern and Trend of Population Ageing in India, The Indian Journal of Spatial Science. 2011;2(2):1-11.
2. Juan F. Macias Nunez, Oreopoulos DG. The Aging Kidney in Health and Disease; Springer International Edition. 2008;65.
3. United Nations, The sex and age distribution of population. 1990.
4. Mani M.K Prevention of chronic renal failure at the community level. Kidney International. 2003;63:586-9.
5. Agarwal SK, Dash SC, Mohammad I, Sreebhuasn R, Singh R, Pandy RM. Prevalence of chronic renal failure in adults in Delhi, India. Nephrology Dial Transplantation. 2005;21:232-3.
6. Agarwal SK. Chronic kidney disease and its prevention in India. Kidney International. 2005;68(98):S41-5.
7. National Kidney Foundation. K/DOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification. Am J Kidney Dis. 2002;39:S18.
8. Prasad R. Murthy K. Clinical and biochemical spectrum of chronic kidney disease in tertiary care center"- journal of evolution of medical and dental science. 2012;1(6)1214-22.
9. Dash SC, Agarwal SK. Incidence of chronic kidney disease in India. Neprhol dial transplant 2006;21:232-3.
10. Lysaght MJ. Maintenance dialysis population dynamics: Current trends and long-term implications. J Am Soc Nephrol. 2002;13:S37-40.
11. Xue JL, Ma JZ, Louis TA, Collins AJ. Forecast of the number of patients with the end stage renal disease in United States. Am J Kidney Dis. 2001;12:2753-8.
12. McGonigle RJ, Wallin JD, Shadduck RK, Fisher JW. Erythropoietin deficiency and inhibition of erythropoiesis in renal insufficiency Kidney. Int. 1984;25:437-44.
13. Einhorn LM, Zhan M, Hsu VD, Walker LD, Moen MF, Seliger SL, et al. The frequency of hyperkalemia and its significance in chronic kidney disease. Arch Intern Med. 2009;169(12):1156-62.
14. Waikar SS, Mount DB, Curhan GC. Mortality after Hospitalization with Mild, Moderate, and Severe Hyponatremia Am J Med. 2009;122(9):857-65.
15. Coen G, Manni M, Addari O, Ballanti P, Pasquali M, Bonucci E. Metabolic acidosis and osteodystrophic bone disease in predialysis chronic renal failure. Miner Eectrolyte Metabo. 1995;21:375-82.
16. Kopple JD, Greene T, Chumlea WC, Hollinger D, Manoni BJ, Merill D, et al. Relationship between nutritional status and the albumin levels: results from MDRD study. Kidney Int. 2000;57:1688-703.
17. Yano Y, Fujimoto S, Sato Y, Konta T, Iseki K, Moriyama T, et at. Association between prehypertension and chronic kidney disease in, the Japanese general population. Kidney Int. 2012;81(3):293-9.
18. Attman PO, Alaupovic P, Tavella M, Knight-Gibson C. Abnormal lipid and apolipoprotein composition of major lipoprotien density clases in patients with chronic renal failue. Nephrol dial transplant. 1996;11:63-9.
19. Kawagishi T, Nishizawa Y, Konishi T, Kawasaki K, Emoto M, Shoji T, et al. High resolution B-mode

ultrasonography in evaluation of atherosclerosis in uremia. Kidney Int. 1995;48:820-6.
20. Preston E, Ellis MR, Kulinskaya E, Davies AH, Brown EA. Association between carotid artery intima-media thickness and cardiovascular risk factors in CKD. Am J Kidney Dis. 2005;46:856-62.

Cite this article as: Pathak A, Jain L, Jaiswal P. To study the clinical profile of chronic kidney disease and associated comorbidities in geriatric patients. Int J Res Med Sci 2016;4:3002-8.