International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 26-03-2019; Accepted: 29-04-2019
www.medicalsciencejournal.com
Volume 5; Issue 5; May 2019; Page No. 125-128

Occurrence of acute-on-chronic renal failure in patients above 58 years of age admitted to IGIMS, Patna

Dr. Satyam Mohan[1], Dr. Sujay Ranjan[2*]
[1, 2] Senior Resident, Department of Nephrology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India
[*] Corresponding Author: Dr. Sujay Ranjan

Abstract
In India, nationally representative, population-based data for renal failure incidence, prevalence, and deaths are absent at both a national and a subnational level. However, several factors suggest morbidity and mortality from renal failure is likely to be a growing public health concern for India. The prevalence of diabetes is estimated at 9% among adults in urban India, and is greater among those who are overweight or wealthy. The present study was designed to evaluate the risk factors and to study the degree of their reversibility in cases of acute-on-chronic renal failure.
The present study was planned in the Department of Nephrology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar from September 2018 to Feb 2019. Total 25 individuals diagnosed with acute-on-chronic renal failure were enrolled in the present study. The diagnosis of acute-on-chronic renal failure was based on the presence of evidence of underlying chronic renal disease in patients presenting with signs and symptoms of acute renal failure or in patients known to have chronic kidney disease who presented with rise in serum creatinine of 0.5 mg/dl, if baseline serum creatinine was < 3 mg/dl or rise of 1 mg/dl, if baseline was > 3 mg/dl within one week period.
The aging of the general population means that older people now account for a much greater proportion of patients with or at risk for kidney disease and kidney failure. Chronological age alone will not be sufficient as the basis for clinical decisions and a more nuanced approach is required-based on the comorbidities, functional status, quality of life and preferences of each individual patient.

Keywords: acute-on-chronic renal failure, risk factors, chronic kidney disease

1. Introduction
Kidney failure, also known as end-stage kidney disease, is a medical condition in which the kidneys no longer function. It is divided into acute kidney failure (cases that develop rapidly) and chronic kidney failure (those that are long term). Symptoms may include leg swelling, feeling tired, vomiting, loss of appetite, or confusion. Complications of acute disease may include uremia, high blood potassium, or volume overload. Complications of chronic disease may include heart disease, high blood pressure, or anemia [1].
Causes of acute kidney failure include low blood pressure, blockage of the urinary tract, certain medications, muscle breakdown, and hemolytic uremic syndrome. Causes of chronic kidney failure include diabetes, high blood pressure, nephrotic syndrome, and polycystic kidney disease. Diagnosis of acute disease is often based on a combination of factors such as decrease urine production or increased serum creatinine. Diagnosis of chronic disease is typically based on a glomerular filtration rate (GFR) of less than 15 or the need for renal replacement therapy. It is also equivalent to stage 5 chronic kidney disease [2].
Treatment of acute disease typically depends on the underlying cause. Treatment of chronic disease may include hemodialysis, peritoneal dialysis, or a kidney transplant. Hemodialysis uses a machine to filter the blood outside the body. In peritoneal dialysis specific fluid is placed into the abdominal cavity and then drained, with this process being repeated multiple times per day. Kidney transplantation involves surgically placing a kidney from someone else and then taking immunosuppressant medication to prevent rejection. Other recommended measures from chronic disease include staying active and specific dietary changes [3].
In the United States acute disease affects about 3 per 1,000 people a year. Chronic disease affects about 1 in 1,000 people with 3 per 10,000 people newly develop the condition each year. Acute disease is often reversible while chronic disease often is not. With appropriate treatment many with chronic disease can continue working [3].
Kidney failure can be divided into two categories: acute kidney injury or chronic kidney disease. The type of renal failure is differentiated by the trend in the serum creatinine; other factors that may help differentiate acute kidney injury from chronic kidney disease include anemia and the kidney size on sonography as chronic kidney disease generally leads to anemia and small kidney size.
Acute kidney injury (AKI), previously called acute renal failure (ARF), is a rapidly progressive loss of renal function, generally characterized by oliguria (decreased urine production, quantified as less than 400 mL per day in adults, less than 0.5 mL/kg/h in children or less than 1 mL/kg/h in infants); and fluid and electrolyte imbalance. AKI can result from a variety of causes, generally classified as prerenal, intrinsic, and postrenal. Many people diagnosed with paraquat intoxication experience AKI, sometimes requiring hemodialysis [4]. The underlying cause must be identified and treated to arrest the progress, and dialysis may be necessary to bridge the time gap required for treating these

fundamental causes.

Chronic kidney disease (CKD) can also develop slowly and, initially, show few symptoms [5]. CKD can be the long term consequence of irreversible acute disease or part of a disease progression.

Acute kidney injuries can be present on top of chronic kidney disease, a condition called acute-on-chronic kidney failure (AoCRF). The acute part of AoCRF may be reversible, and the goal of treatment, as with AKI, is to return the person to baseline kidney function, typically measured by serum creatinine. Like AKI, AoCRF can be difficult to distinguish from chronic kidney disease if the person has not been monitored by a physician and no baseline (i.e., past) blood work is available for comparison.

Chronic kidney failure is measured in five stages, which are calculated using the person's GFR, or glomerular filtration rate. Stage 1 CKD is mildly diminished renal function, with few overt symptoms. Stages 2 and 3 need increasing levels of supportive care from their medical providers to slow and treat their renal dysfunction. People with stage 4 and 5 kidney failure usually require preparation towards active treatment in order to survive. Stage 5 CKD is considered a severe illness and requires some form of renal replacement therapy (dialysis) or kidney transplant whenever feasible.

A normal GFR varies according to many factors, including sex, age, body size and ethnic background. Renal professionals consider the glomerular filtration rate (GFR) to be the best overall index of kidney function [6]. The National Kidney Foundation offers an easy to use on-line GFR calculator [7] for anyone who is interested in knowing their glomerular filtration rate. (A serum creatinine level, a simple blood test, is needed to use the calculator.)

Before the advancement of modern medicine, renal failure was often referred to as uremic poisoning. Uremia was the term for the contamination of the blood with urea. It is the presence of an excessive amount of urea in blood. Starting around 1847, this included reduced urine output, which was thought to be caused by the urine mixing with the blood instead of being voided through the urethra. The term uremia is now used for the illness accompanying kidney failure [8].

In India, nationally representative, population-based data for renal failure incidence, prevalence, and deaths are absent at both a national and a subnational level. However, several factors suggest morbidity and mortality from renal failure is likely to be a growing public health concern for India. The prevalence of diabetes is estimated at 9% among adults in urban India, and is greater among those who are overweight or wealthy [9]. Hypertension prevalence is also rising in both urban and rural India [10]. Because the development of chronic kidney disease is insidious, and aetiologies such as diabetes and hypertension are often underdiagnosed at the population level, presentation with kidney disease is typically late [11]; for example, in one study [12], end-stage renal failure accounted for about half of all chronic kidney disease presentations in India. The present study was designed to evaluate the risk factors and to study the degree of their reversibility in cases of acute-on-chronic renal failure.

2. Methodology

The present study was planned in the Department of Nephrology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar from September 2018 to Feb 2019. Total 25 individuals diagnosed with acute-on-chronic renal failure were enrolled in the present study. The diagnosis of acute-on-chronic renal failure was based on the presence of evidence of underlying chronic renal disease in patients presenting with signs and symptoms of acute renal failure or in patients known to have chronic kidney disease who presented with rise in serum creatinine of 0.5 mg/dl, if baseline serum creatinine was < 3 mg/dl or rise of 1 mg/dl, if baseline was > 3 mg/dl within one week period.

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

3. Results & Discussion

In the absence of a renal registry, the exact disease burden of CKD/ESRD in the Indian population cannot be assessed accurately. In the most representative population-based study from North India, using a multistage cluster sampling technique in which serum creatinine and urine samples were examined in every subject studied, the prevalence of CKD stage 3 and beyond was found in 0.79% subjects out of 4,972 examined [13].

The elderly patients kept under regular surveillance in the nephrology clinic tended to have more advanced renal impairment and were more likely to have a rapid decline in kidney function. This suggests that nephrologists were able to correctly identify the patients whom they predicted may require specialist renal input in terms of managing complications of CKD and provision of renal replacement therapy. However, very few patients kept under regular follow-up actually underwent renal-specific intervention and even fewer were started on dialysis. This raises the question of the clinical benefit provided by the nephrology clinic for such elderly patients and suggests that in many cases their care could be safely and appropriately managed in the primary care setting.

Table 1: Various Risk Factors

Factor (s)	Incidence Observed in No. of Cases
Volume depletion	4
Hypotension	3
Bleeding	1
Congestive heart failure	1
Left ventricular failure	2
Infection	10
Urinary tract obstruction	6
Electrolyte imbalance	6
Hyperuricaemia	2
Nephrotoxic drug(s)	2
Contrast media	0
Accelerated hypertension	9
Hypercalcaemia	0

Table 2: Stage-wise reversibility in acute-on-chronic renal failure

Factor (s)	Basal GFR (ml/min)	GFR at 1 week (ml/min)	GFR at 2 weeks (ml/min)	Mean change in GFR after 2 weeks (ml/min)
Volume depletion	2.6 – 13.5	11.4 – 18.3	18.5 – 29.4	13.00
Urinary tract obstruction	8.6 – 18.3	17.2 – 26.9	22.2 – 30.4	13.3
Infection	3.6 – 11.5	5.4 – 16.3	8.9 – 24.6	8.1
Hypotension	1.8 – 5.3	2.2 – 11.3	6.3 – 14.1	4.5
Electrolyte imbalance	2.2 – 8.9	3.4 – 11.3	5.6 – 16.7	3.5
Accelerated hypertension	2.6 – 11.2	3.9 – 13.3	4.5 – 16.8	5.1

Table 3: Stage-wise reversibility in acute-on-chronic renal failure

Stage of renal failure	Basal GFR (ml/min)	GFR at 1 week (ml/min)	GFR at 2 week (ml/min)	Mean change in GFR after 2 weeks (ml/min)
Stage 3	31.2 – 48.3	22.5 – 45.3	45.3 – 63.9	18.3
Stage 4	16.5 – 21.5	15.3 – 47.5	28.3 – 59.7	22.3
Stage 5a	8.70 ± 2.80	8.6 – 19.8	9.2 – 27.6	8.3
Stage 5b	1.3 – 3.8	1.5 – 7.6	2.3 – 11.9	4.3

It has been known for decades that estimated glomerular filtration rate (eGFR) declines in parallel with age [14]. The prevalence of CKD among females in the Chinese general population increases from 7.4% among those aged 18-39 years to 18.0% and 24.2% among those aged 60-69 and 70 years respectively [15]. Relative increases in the prevalence of CKD with age are equally striking for populations in the US, Canada and Europe [16-18], although there are between-country differences in the absolute prevalence.

At older ages, an increased proportion of prevalent CKD cases has low eGFR alone (when compared with albuminuria alone, or both low eGFR and albuminuria) [19]. Although this might suggest that many older people with CKD can expect lower rates of kidney function loss, available data are inconclusive-and current knowledge does not allow clinicians to reliably distinguish between those whose CKD will and will not progress

Like younger people, older people with advanced CKD are at increased risk of death, kidney failure, myocardial infarction and stroke compared with otherwise similar people with normal or mildly reduced eGFR [20-21]. Although death is by far the most common of these adverse outcomes, this does not mean that older patients with clinically relevant CKD cannot benefit from timely specialist referral.

Our nationally representative mortality surveys show that renal failure contributes substantially to adult premature death before 70 years of age in India, and represents a growing cause of death. In 2015, we estimate that about 136 000 Indian adults died prematurely as a result of renal failure, representing about 3% of all premature adult mortality, 1·5 times the proportions observed a decade earlier. Renal failure deaths now exceed AIDS-related deaths in India [22].

Prevention of any illness needs patience. It should also be a priority area for any government. From that perspective, CKD prevention is still far away. There are certain facts which need to be kept in mind. Public health expenditure in India is around 1% of the gross domestic product (GDP), with a central share of 30% and a state share of 70%. As India's GDP is constantly increasing, even if public health expenditure is being maintained at 1% of the GDP, the actual public sector expenditure shows a gradually increasing trend every year. However, this increase is very low in comparison to the needs and requirements of the health sector. Therefore, with limited budgetary support, we are organizing a prevention program. Vertical health and family welfare programs are getting adequate synergization at operational levels through the National Rural Health Mission (NRHM). A focused Information, Education and Communication (IEC) campaign for CKD is being planned through various related national programs, i.e. National Programme of Diabetes Mellitus, CVD, stroke and NOTP. All secondary prevention activities are being taken care by the National Programme of Diabetes Mellitus, CVD, Stroke & NRHM [23].

The limitations of the present study are this is a single-centre study. The patient numbers are small and observational data such as these will always generate unavoidable bias and confounding that we were unable to adjust for with our study design.

4. Conclusion

The aging of the general population means that older people now account for a much greater proportion of patients with or at risk for kidney disease and kidney failure. Chronological age alone will not be sufficient as the basis for clinical decisions and a more nuanced approach is required-based on the comorbidities, functional status, quality of life and preferences of each individual patient.

5. References

1. Liao, Min-Tser Sung, Chih-Chien Hung, Kuo-Chin Wu, Chia-Chao Lo, Lan Lu, Kuo-Cheng. Insulin Resistance in Patients with Chronic Kidney Disease. Journal of Biomedicine and Biotechnology. 2012, 1-5. doi:10.1155/2012/691369. PMC 3420350.
2. Cheung Alfred K. Primer on Kidney Diseases. Elsevier Health Sciences, 2005, 457. ISBN 1416023127.
3. Kidney Failure. National Institute of Diabetes and Digestive and Kidney Diseases. Retrieved, 2017.
4. nih.gov: Predictors of acute kidney injury after paraquat intoxication, 2017, doi: 10.18632/onco target.17975.
5. Medline Plus. Chronic kidney disease". A.D.A.M. Medical Encyclopedia. National Institutes of Health. Retrieved, 2013.
6. Fadem Stephen Z, MD, FACP, FASN. Calculators for HealthCare Professionals. National Kidney Foundation, 2008.
7. GFR calculator. Kidney.org. Retrieved, 2011.
8. Meyer Timothy W, Hostetter Thomas H. Uremia. New England Journal of Medicine. 2007; 357(13):1316-25.

doi:10.1056/NEJMra071313. PMID 17898101.
9. Ramachandran A, Snehalatha C, Kapur A, *et al*. High prevalence of diabetes and impaired glucose tolerance in India: National Urban Diabetes Survey Diabetologia. 2001; 44:1094-1101.
10. Devi P, Rao M, Sigamani A, *et al*. Prevalence, risk factors and awareness of hypertension in India: a systematic review J Hum Hypertens. 2013; 27:281-287.
11. Parameswaran S, Geda SB, Rathi M, *et al*. Referral pattern of patients with end-stage renal disease at a public sector hospital and its impact on outcome Natl Med J India. 2011; 24:208-213.
12. Rajapurkar MM, John GT, Kirpalani AL, *et al*. What do we know about chronic kidney disease in India: first report of the Indian CKD registry BMC Nephrol. 2012; 13:10.
13. Agarwal SK, Dash SC, Irshad M, *et al*. Prevalence of chronic renal failure in adults in Delhi, India. Nephrol Dial Transplant. 2005; 20:1638-1642.
14. Davies DF, Shock NW. Age changes in glomerular filtration rate, effective renal plasma flow, and tubular excretory capacity in adult males. J Clin Invest. 1950; 29:496-507.
15. Zhang L, Wang F, Wang L, Wang W, Liu B, Liu J, *et al*. Prevalence of chronic kidney disease in China: A cross-sectional survey. Lancet. 2012; 379:815-22.
16. Coresh J, Selvin E, Stevens LA, Manzi J, Kusek JW, Eggers P, *et al.* Prevalence of chronic kidney disease in the United States. JAMA. 2007; 298:2038-47.
17. Zhang QL, Rothenbacher D. Prevalence of chronic kidney disease in population-based studies: Systematic review. BMC Public Health. 2008; 8:117.
18. Arora P, Vasa P, Brenner D, Iglar K, McFarlane P, Morrison H, *et al*. Prevalence estimates of chronic kidney disease in Canada: Results of a nationally representative survey. CMAJ. 2013; 185:E417-23.
19. James MT, Hemmelgarn BR, Tonelli M. Early recognition and prevention of chronic kidney disease. Lancet. 2010; 375:1296-309.
20. Hemmelgarn BR, Manns BJ, Lloyd A, James MT, Klarenbach S, Quinn RR, *et al*. Relation between kidney function, proteinuria, and adverse outcomes. JAMA. 2010; 303:423-9.
21. Hare AM, Bertenthal D, Covinsky KE, Landefeld CS, Sen S, Mehta K, *et al*. Mortality risk stratification in chronic kidney disease: One size for all ages? J Am Soc Nephrol. 2006; 17:846-53.
22. UNAIDS The Gap Report, UNAIDS, Geneva, Switzerland, 2014.