

Analysis of Prevalence of Renal Impairment in the Elderly Hospitalized Population at a Tertiary Care Hospital

Amit Kumar Singhal¹, Chandra Shekhar Kumar^{1*}

¹Assistant Professor, Department of General Medicine,
Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India.

ABSTRACT

Introduction: Chronic kidney disease (CKD) could typically be defined by the impaired estimated glomerular filtration rate (eGFR) and occurrence of albuminuria. It is considered as a major public health issue worldwide.¹ CKD has the prevalence rate ranged between 11 to 13% of the population globally and is an independent risk factor for the cardiovascular problems which can cause mortality. Early diagnosis, intervention and management of patients affected with CKD is therefore play a crucial role in reducing the morbidity and mortality, delaying the progression of disease and greatly enhancing health outcomes. CKD is reportedly common in hospital inpatient settings which can occur in about 39% of all the hospitalized patients.

Materials and Methods: A retrospective cross-sectional study was designed based on the assessment of the prevalence of the missed chronic renal impairment in hospitalised elderly patients. The study population included in the study comprised of about 98 inpatients (n = 98) who were reported to the Department of Medicine and the study duration were priorly set up as 6 months. The patients comprised all aged over 60 years who were 72 women and 26 men all aged over 60 years. Medical and laboratory records for each subject were collected and recorded which included serum creatinine levels and the weight of each patient were noted promptly. The glomerular filtration rate (GFR; mL/min) for each patient was calculated using the modified *Cockcroft–Gault* formula. This was adjusted for International System of Units (SI) units.

Results: The degree of renal impairment was categorized based on the GFR like under the following parametres: no renal impairment where GFR > 90 mL/min; mild impairment in which GFR 60–89 mL/min; moderate renal impairment showing GFR 30–59 mL/min; and severe renal impairment where GFR 15–29 mL/min. 25 patients (27.5%, 95% confidence interval

[CI]: 7.6–30.6) had mild renal impairment, 56 (57.1%, 95% CI: 47–67) had moderate renal impairment, 11 (11.2%, 95% CI: 5.2–18.2) had severe impairment, and only four (4.3%, 95% CI: 0.3–8) had normal renal function. The mean total GFR was ranged at 44.5 ± 20.9 mL/min.

Conclusion: To conclude, CKD is common in adult patients admitted to the internal medicine wards of our hospital. About 34% of our patients admitted to the internal medicine wards had CKD according to the diagnosis criterion of impaired eGFR and/or albuminuria, but only 21.6% of affected patients were aware of their condition.

These findings highlight the need for feasible approaches to timely identify kidney disease and raise awareness on the importance of early detection and intervention in the inpatient populations. However, the present findings should be confirmed in a larger multicenter study.


Keywords: CKD, Renal Impairment, Glomerular Filtration Rate.

*Correspondence to:

Dr. Chandra Shekhar Kumar,
Assistant Professor,
Department of General Medicine,
Muzaffarnagar Medical College,
Muzaffarnagar, Uttar Pradesh, India.

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INTRODUCTION

Chronic kidney disease (CKD) could typically be defined by the impaired estimated glomerular filtration rate (eGFR) and occurrence of albuminuria. It is considered as a major public health issue worldwide.¹ CKD has the prevalence rate ranged between 11 to 13% of the population globally and is an independent risk factor for the cardiovascular problems which can

cause mortality.^{2,3} It has also been shown to be a major risk factor for cardiovascular disease and is reported to be closely associated with the possible adverse outcomes which include hospitalizations and progression to kidney failure which could have major impacts on the quality of life and available health care system.^{4,5} Early diagnosis, intervention and management of

patients affected with CKD is therefore play a crucial role in reducing the morbidity and mortality, delaying the progression of disease and greatly enhancing health outcomes. CKD is reportedly common in hospital inpatient settings which can occur in about 39% of all the hospitalized patients.⁶ In hospitalized patients, CKD has been found to be more commonly associated with an increased risk for duration of hospital stay, acute renal failure, in-hospital mortality and associated health-related expenses.⁷⁻¹⁰ The presence of CKD has been also shown to be a risk factor for certain adverse outcomes which include drug toxicity, dose adjustment issues etc.¹¹⁻¹⁴ All the hospitalized patients affected with CKD also have an associated burden of comorbidities, including underlying diseases and consequences of CKD such as diabetes, hypertension, anaemia and bone & mineral disease which can contribute to increase the risk for adverse outcomes and makes management potentially difficult. The reasons for the missed diagnosis of CKD could be attributed that the diagnosis of renal impairment may be missed because of the inadequacy in screening method. Progression to end-stage renal failure may be paused when detected at an early stage. Also, chronic renal failure places a major burden on health resources because dialysis or transplantation is mandatory to prevent death. Additionally, renal impairment is closely related with increased cardiovascular risk factors. Associated complications may be minimized with effective early detection and treatment. The evaluated life-time risk and reduction in the life expectancy associated with end-stage renal failure which is comparable with that of colorectal cancer, breast cancer and prostatic cancer.¹ Hence, the purpose of this study was to evaluate the prevalence of undiagnosed renal impairment in the hospitalized elderly population.

MATERIALS AND METHODS

A retrospective cross-sectional study was designed based on the assessment of the prevalence of the missed chronic renal impairment in hospitalised elderly patients. The study population included in the study comprised of about 98 inpatients ($n = 98$) who were reported to Department of Medicine and the study duration were priorly set up as 6 months. The patients comprised all aged over 60 years who were 72 women and 26 men all aged over 60 years. Medical and laboratory records for each subject were collected and recorded which included serum creatinine levels and the weight of each patient were noted promptly. The glomerular filtration rate (GFR; mL/min) for each patient was calculated using the modified *Cockcroft-Gault* formula. This was adjusted for International System of Units (SI) units.

RESULTS

The degree of renal impairment was categorized based on the GFR like under the following parametres: no renal impairment where $GFR > 90$ mL/min; mild impairment in which $GFR 60-89$ mL/min; moderate renal impairment showing $GFR 30-59$ mL/min; and severe renal impairment where $GFR 15-29$ mL/min.⁶ As shown in Table - 1, 25 patients (27.5%, 95% confidence interval [CI]: 7.6-30.6) had mild renal impairment, 56 (57.1%, 95% CI: 47-67) had moderate renal impairment, 11 (11.2%, 95% CI: 5.2-18.2) had severe impairment, and only four (4.3%, 95% CI: 0.3-8) had normal renal function. The mean total GFR was ranged at 44.5 ± 20.9 mL/min.

Table 1: Glomerular filtration rate (GFR) distribution

GFR (mL/min)	No. of patients
15 – 29	27
30 – 59	56
60 – 89	11
>90	4

DISCUSSION

The present study was conducted to be aimed towards the determination of the prevalence and factors associated with impaired renal function (eGFR) and reported albuminuria in hospitalised adult patients. Findings obtained from this study shows that 27.5% of the patients had impaired eGFR (< 29 mL/min/1.73 m²). A study was conducted in adult patients admitted to Jimma University Medical Center in Southwest Ethiopia reported the prevalence rate of impaired eGFR to be 27% by the same definition with MDRD equation.¹⁵ The prevalence of reduced eGFR among patients admitted to a general medical ward in Uganda was found to be 15.3% by using the MDRD equation.¹⁶ A study conducted in Botswana, the prevalence of CKD stages 3-5 (Egfr MDRD < 60 ml/min/1.73 m²) among patients admitted to the medical wards was estimated at 16.3%.²⁴ Furthermore, in a retrospective cohort study of acute medical admissions in London, UK and other European countries, the prevalence of renal impairment of the same degree using the same MDRD equation was found to be at 27.7%.¹⁷

In a retrospective cross-sectional study conducted in China, 14.82% of hospitalized adult patients had CKD using the same indicators of renal disease.¹⁸ The Brazilian retrospective study similarly reported a lower prevalence of CKD of 12.7% among adult patients who were admitted to the internal medicine wards but the criterion of CKD was based on the presence of medical diagnosis available in the medical records.^{19,20} Other studies conducted in countries like Kenya⁶ and Uganda¹⁶ observed a higher prevalence of CKD when compared to the current study of about 38.6% and 57.3% respectively. The discrepancy could be clearly attributed by the differences in CKD definition used and also the methods for assessing albuminuria and eGFR. In the Kenyan study, a diagnosis of CKD was defined as the presence of markers of renal damage which include renal imaging, serum phosphate and calcium levels and eGFR as determined by the chronic kidney disease.

Present study shows a report of lower awareness of CKD among the patients admitted to the internal medicine wards, only 21.6% of the adults with any degree of kidney disease (impaired eGFR and/or albuminuria) were quite understanding about their condition. Although awareness was higher among patients with advanced disease, even among those with CKD stage 3b where the awareness was only 33.3%. Same results have been reported in some of the previous studies on hospitalised patients. In a retrospective study conducted in the general medicine inpatients from the University of Chicago Hospitalist Project, only 32% of patients with CKD were aware of their CKD. In addition, only 48% of patients with CKD stage 4 and 63% with stage 5 were aware of their disease.²¹ In a cross-sectional study of general medicine inpatients at an urban academic medical centre, awareness of CKD was at 33%.²² In the Belgium study, more than a third of the

CKD patients were not aware of their condition and only 65% of those with CKD stage 3b or 4 were aware of suffering from renal failure.²³ In the Botswana study, over half (53.5%) of the CKD cases were unaware of their disease.²⁴ The high prevalence and low awareness of CKD in this study support the evidence that CKD is frequently unrecognized in the inpatient settings, and that awareness is low among both physicians and affected patients.²⁵⁻²⁷ In in-hospital patients, CKD is often not recognized until it is advanced and poorly documented in the medical record despite being present.^{26,18}

Even in CKD stage 3a or higher, it has been reported that as many as 70% of patients don't carry a diagnosis in their medical record, suggesting the poor awareness that the inpatient community have in recognizing kidney disease.²⁵ By identifying and informing patients with CKD, a higher awareness of the disease can be obtained, leading to a significant improvement in outcomes.²³ Thus, inpatient screening for impaired eGFR and albuminuria, and education on the importance of detection and early intervention may help identify kidney disease earlier and raise awareness in this setting.

CONCLUSION

To conclude, CKD is common in adult patients admitted to the internal medicine wards of our hospital. About 34% of our patients admitted to the internal medicine wards had CKD according to the diagnosis criterion of impaired eGFR and/or albuminuria, but only 21.6% of affected patients were aware of their condition. These findings highlight the need for feasible approaches to timely identify kidney disease and raise awareness on the importance of early detection and intervention in the inpatient populations. However, the present findings should be confirmed in a larger multicenter study.

REFERENCES

1. Levey A, Atkins R, Coresh J, Cohen E, Collins A, Eckardt K-U, et al. Chronic kidney disease as a global public health problem: Approaches and initiatives—a position statement from Kidney Disease Improving Global Outcomes. *Kidney Int.* 2007;72:247–59.
2. Hill NR, Fatoba ST, Oke JL, Hirst JA, O'Callaghan CA, Lasserson DS, et al. Global Prevalence of Chronic Kidney Disease—A Systematic Review and Meta-Analysis. *PLoS ONE.* 2017;11(7):e0158765.
3. Matsushita K. Association of estimated glomerular filtration rate and albuminuria with all-cause and cardiovascular mortality: a collaborative meta-analysis of general population cohorts. *Lancet.* 2010;375(9731):2073–81. PMID:20483451
4. Go AS, Chertow GM, Fan D, McCulloch CE, Hsu C. Chronic Kidney Disease and the Risks of Death, Cardiovascular Events, and Hospitalization. *N Engl J Med.* 2004;351(13):1296–1305. PMID:15385656
5. 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(5):423–9. PMID:20124537
6. Mwenda V, Githuku J, Gathecha G, Wambugu BM, Roka ZG, Ongor WO. Prevalence and factors associated with chronic kidney disease among medical inpatients at the Kenyatta National Hospital, Kenya, 2018: a cross-sectional study. *Pan Afr Med J.* 2019 Aug 23;33:321. PMID:31692795

7. Su G, Xu H, Marrone G, Lindholm B, Wen Z, Liu X, et al. Chronic kidney disease is associated with poorer in-hospital outcomes in patients hospitalized with infections: Electronic record analysis from China. *Sci Rep.* 2017;7(1):11530. PMID:28912532
8. Grams ME, Astor BC, Bash LD, Matsushita K, Wang Y, Coresh J. Albuminuria and Estimated Glomerular Filtration Rate Independently Associate with Acute Kidney Injury. *J Am Soc Nephrol.* 2010;21:1757–64. PMID:20671214
9. Yong T, Fok J, Ng P, Hakendorf P, Ben-Tovim D, Roberts S, et al. The significance of reduced kidney function among hospitalized acute general medical patients. *Q J Med.* 2013;106:59–65. PMID:23070207
10. Luders F, Furstenberg T, Engelbertz C, Gebauer K, Meyborg M, Malyar NM, et al. The Impact of Chronic Kidney Disease on Hospitalized Patients With Peripheral Arterial Disease and Critical Limb Ischemia. *Angiology.* 2017 Feb;68(2):145-150. doi: 10.1177/0003319716638797. Epub 2016 Jul 11.
11. Bohlouli B, Tonelli M, Jackson T, Hemmelgarn B, Klarenbach S. Risk of Hospital-Acquired Complications in Patients with Chronic Kidney Disease. *Clin J Am Soc Nephrol.* 2016;11:956–63. PMID:27173168
12. Corsonello A, Pedone C, Corica F, Mussi C, Carbonin P, Incalzi RA; for the Gruppo Italiano di Farmacovigilanza nell'Anziano (GIFA) Investigators. Concealed Renal Insufficiency and Adverse Drug Reactions in Elderly Hospitalized Patients. *Arch Intern Med.* 2005;165:790–5. PMID:15824299
13. Seliger SL, Zhan M, Hsu VD, Walker LD, Fink JC. Chronic Kidney Disease Adversely Influences Patient Safety. *J Am Soc Nephrol.* 2008;19:2414–9. PMID:18776123
14. Chao C-T, Tsai H-B, Chiang C-K, Huang J-W, Hung K-Y. Dipstick proteinuria level is significantly associated with premorbid and in-hospital functional status among hospitalized older adults: a preliminary study. *Sci Rep.* 2017;7:42030. PMID:28176820
15. Adugna T, Merga H, Gudina EK. Impaired glomerular filtration rate, high grade albuminuria and associated factors among adult patients admitted to tertiary Hospital in Ethiopia. *BMC Nephrol.* 2018;19 (1):345.
16. Kalima NA, Gabriel BK, Muhindo R, Musingo A. Chronic kidney disease in patients admitted to the medical ward of Mbarara Regional Referral Hospital in southwestern Uganda: Prevalence and associated factors. *Int J Med Biomed Res.* 2015;4(2):107–16.
17. Annear N, Banerjee D, Joseph J, Harries T, Rahman S, Eastwood J. Prevalence of chronic kidney disease stages 3–5 among acute medical admissions: another opportunity for screening. *Q J Med.* 2008;101:91–7.
18. Liu B-C, Wu X-C, Wang Y-L, Wang B, Gao J, Zhang Q-J, et al. Investigation of the prevalence of CKD in 13,383 Chinese
19. Kaba M, Camara M, Béavogui M, Bah A, Fousény D, Kourouma M, et al. Risk Factors for Chronic Kidney Disease among Patients admitted to the Medical Wards in Conakry. *Saudi J Kidney Transpl.* 2016;27(5):1073–5.
20. Pinho NA, Silva GV, Pierin AM. Prevalence and factors associated with chronic kidney disease among hospitalized patients in a university hospital in the city of São Paulo, SP, Brazil. *J Bras Nefrol.* 2015;37(1):91–7.
21. Saunders MR, Kim SD, Patel N, Meltzer DO, Chin MH. Hospitalized Patients Frequently Unaware of Their Chronic Kidney Disease. *J Hosp Med.* 2015;10(9):619–22.

22. Saunders MR, Snyder A, Chin MH, Meltzer DO, Arora VM, Press VG. Health Literacy Not Associated with Chronic Kidney Disease Awareness. *Health Lit Res Pr.* 2017;1(3):e117–27.
23. De Wilde M, Speeckaert M, Van Biesen W. Can increased vigilance for chronic kidney disease in hospitalised patients decrease late referral and improve dialysis-free survival? *BMC Nephrol.* 19:74. Published: 02 April 2018
24. Rwegerera G, Bayani M, Taolo E, Habte D. The Prevalence of Chronic Kidney Disease and Associated Factors Among Patients Admitted at Princess Marina Hospital, Gaborone, Botswana. *Niger J Clin Pr.* 2017;20:313–9.
25. Ferris M, Shoham DA, Pierre-Louis M, Mandhelker L, Detwiler RK, Kshirsagar AV. High Prevalence of Unlabeled Chronic Kidney Disease Among Inpatients at a Tertiary-Care Hospital. *Am J Med Sci.* 2009;337(2):93–7.
26. Campos Gutiérrez B, Lou Arnal LM, Gimeno Orna JA, Gracia García O, Cuberes Izquierdo M, Turón Alcaine JM, et al. Undiagnosed kidney disease in hospitalised patients: an opportunity for improvement. *Nefrologia.* 2011;31(1):70–5.

27. de Francisco A, Fernandez E, Cruz J, Casas MT, Gómez-Gerique J, León A, et al. Under-recognized renal insufficiency in hospitalized patients: Implications for care. *Eur J Intern Med.* 2010;21(4):327–32.

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