MEDICO RESEARCH CHRONICLES
ISSN NO. 2394-3971
DOI No. 10.26838/MEDRECH.2022.9.1.580
Contents available at www.medrech.com

UNRECOGNIZED RENAL DYSFUNCTION IN PATIENTS WITH ACUTE STROKE-CROSS SECTIONAL STUDY

G. Gowthaman[1*], P. Kalavathy[2], N. D. Srinivasa Prasad[3], M. Edwin Fernando[4]
1. Senior Resident, Department of Nephrology,
2. Senior Resident, Department of Internal Medicine
3. Assistant Professor, Department of Nephrology
4. Professor & Head, he Department of Nephrology
Government Stanley Medical College, TamilNadu Dr. M.G.R Medical University, Chennai, TamilNadu, India.

ARTICLE INFO

Article History
Received: December 2021
Accepted: January 2022
Keywords Clinico-pathological, Unilateral nasal mass, Neoplastic pathology.

Corresponding author
Dr. G. Gowthaman*

ABSTRACT

Background and Objectives: Unrecognized renal insufficiency, defined as an estimated glomerular filtration rate <60 mL/min/l .73 m2 in the presence of normal serum creatinine levels, is a common comorbid condition among patients with various cardiovascular conditions. The current study was aimed to evaluate the prevalence and clinical significance of unrecognized renal dysfunction in patients admitted with acute stroke.

Patients & Methods: This cross sectional study consisted of patients with acute stroke admitted in medical ward at Stanley medical college. Estimated glomerular filtration is estimated using MDRD and CKD — EPI formula. Study group is divided into three groups (Normal renal function, Unrecognized and Recognized renal dysfunction) as per eGFR. The two primary outcomes such as severe disability at hospital discharge and in-hospital mortality are compared in each group.

Results: Of the 100 patients with stroke included in the study, 62% had normal renal function, 31% had recognized renal insufficiency, and 7% had unrecognized renal insufficiency. Mortality rates are higher in patients with recognized and unrecognized renal insufficiency compared with patients with normal renal function (29% and 28.5% and 9.6%) respectively, P <0.04053). Similarly, severe disability rates at discharge are also higher in patients with recognized and unrecognized renal insufficiency compared with patients with normal renal function (72.27%, 80 %, and 32.14%) respectively.

Conclusion: Unrecognized renal insufficiency is common among patients with acute stroke and is associated with adverse short-term outcomes.

ORIGINAL RESEARCH ARTICLE

2022, www.medrech.com

INTRODUCTION

Stroke or cerebrovascular accident is defined as abrupt onset of neurological disorder such as sudden decrease or loss of consciousness, voluntary movement or sensation caused by occlusion of blood vessel or rupture [7]. Renal insufficiency is a strong predictor of adverse out-comes in patients with various cardiovascular disorders including stroke. Despite its clinical significance, renal insufficiency is frequently unrecognized. Although the renal function has been assessed routinely using serum creatinine, it is an unreliable proxy influenced by various factors including age, sex, race, and lean body weight. Patients with serum creatinine levels slightly more than the upper limit or even within the normal range may have renal dysfunction, which may often be clinically significant. The term unrecognized renal insufficiency is defined as an estimated glomerular filtration rate <60 mL/min/l .73 m2 in the presence of serum creatinine ≤ 1.2 mg/ dl.

The group of patients having unrecognized renal insufficiency signify a high-risk group with greater mortality rate compared to patients with normal renal function. Hence, renal function in stroke patients should be assessed by glomerular filtration rate instead of serum creatinine [8].

OBJECTIVES

To determine the prevalence of the unrecognized renal insufficiency in patients admitted with acute stroke and its clinical significance. To evaluate role of unrecognized renal insufficiency as a risk factor contributing to short term mortality.

PATIENT & METHODS

Study design: Cross sectional study

Study center: Government Stanley Medical College, Chennai

Study duration: March 2017 to August 2017

Inclusion criteria: All patients admitted with acute stroke (defined as abrupt onset of neurological disorder such as sudden decrease or loss of consciousness, voluntary movement or sensation caused by breach or occlusion of a blood vessel of the brain).

Exclusion criteria: Acute stroke in < 18 years, Head injury.

All patients were included in this study after obtaining written consent. institutional ethical committee clearance was obtained.

The study group consisted of 100 patients with acute stroke admitted at our center with stroke (defined as abrupt onset of neurological deficit [9]). The detailed history clinical examination was done for each patients. Hemogram, Metabolic profile, chest radiography, ECG and brain imaging (CT / if needed MRI brain) were done in all patients. The estimated glomerular filtration rate is calculated using the simplified Modification of Diet in Renal Disease formula and Chronic Kidney Disease Epidemiology Collaboration equation [2,3].

The study groups are stratified into 3 groups according to the renal function assessment (Normal renal Function, Unrecognized renal insufficiency, and Recognized renal insufficiency). Unrecognized renal insufficiency is defined as an estimated glomerular filtration rate <60 mL/min/l .73 m^2 in the presence of serum creatinine I .2 mg/dL.

MDRD formula:

186 x [Serum creatinine (mg/ dl)] - l. 154 x [age in years] - 0.203.

For women, the product of this equation was multiplied by a factor of 0.742. The two primary outcomes are in-hospital mortality and severe disability at discharge in 3 groups are estimated and compared within 3 groups.

STATISTICAL ANALYSIS

Descriptive statistics were done for all data and were reported in terms of mean values and percentage. Suitable statistical tests of comparison were done. Continuous variables were analysed with the unpaired t test and ANOVA., Categorical variables were analysed with the Chi-Square Test and Fisher

Exact Test. Statistical significance was taken as $P < 0.05$. The data was analysed using SPSS version 16 and Microsoft Excel 2007.

RESULT AND DISCUSSION

Out of the 100 patients with acute stroke included in the study, 62 (62%) have normal renal function, 31 (31%) have recognized renal insufficiency, and 7 (7%) have unrecognized renal insufficiency.

Table 1: Renal insufficiency distribution among the patient

Study subjects	Normal Renal Function	Unrecognized Renal Insufficiency	Recognized Renal Insufficiency
Number	62	7	31
Percentage	62%	7%	31%

While analyzing age distribution in relation to renal function among stroke patients, it was observed that majority of the study subjects in normal renal function group were distributed in 41-60 years' age group (n=33, 53.23%), 61-80 years' age group in unrecognized renal insufficiency group (n=4, 57.14%) and recognized renal insufficiency group (n=15, 48.39%).

Table 2: Percentage Renal insufficiency distribution among the patient at different age group

Age Groups	**Normal Renal Function**	**%**	**Unrecognized Renal Insufficiency**	**%**	**Recognized Renal Insufficiency**	**%**
≤ 40 Years	4	6.45	0	0.00	2	6.45
41-60 Years	33	53.23	2	28.57	14	45.16
61-80 years	25	40.32	4	57.14	15	48.39
80 Years	0	0.00	1	14.29	0	0.00
Total	62	100.00	7	100.00	31	100.00

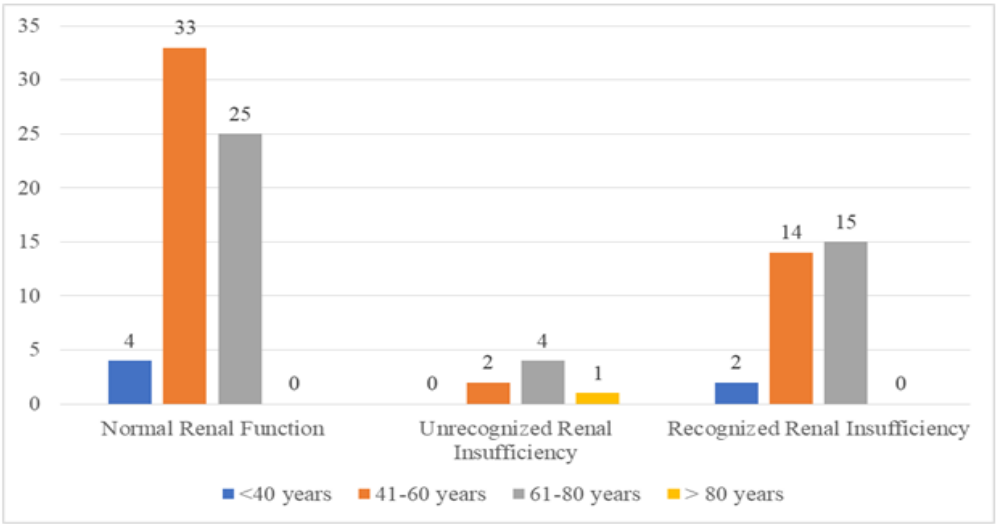

Fig1: showing age distribution in relation to renal function

Table 3: Mean Renal insufficiency distribution among the patient at different age group

Age Distribution	Normal Renal Function	Unrecognized Renal Insufficiency	Recognized Renal Insufficiency
Mean	57.19	68.29	58.97
SD	8.97	10.92	9.67
P Value Single Factor ANOVA Test			0.0135

When the type of stroke between three groups was analyzed statistically using fishers exact test, the difference in percentage of infarct type in normal renal function group (80.65%), unrecognized renal insufficiency group (85.71%) and recognized renal insufficiency group (61.29%) was found to be statistically insignificant (p >0.05).

In a study conducted in Medical University of Bialystok, Poland found that patients with hemorrhagic stroke experienced more worsening of renal function compared to ischemic stroke [10] But in our study we found that variable type of stroke is normally distributed across the three study groups and has no bearing on renal function among stroke patients.

MODIFIED RANKIN SCALE

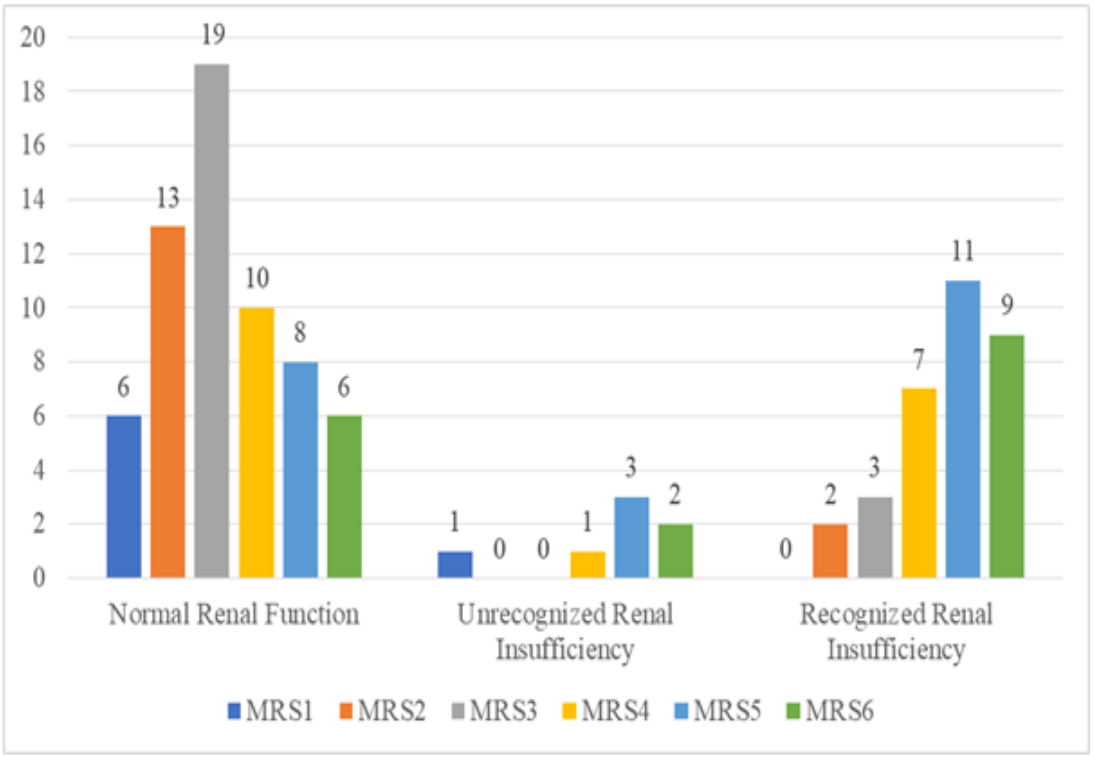

Fig 2 : showing Modified Rankin Scale

Table 4: Modified ranking in renal insufficiency

The Modified Ranking	Normal Renal Function	%	Unrecognized Renal Insufficiency	%	Recognized Renal Insufficiency	%
Scale MRS 1	6	.8 9.68	1	14.29	-	0.00
MRS 2	13	20.97	-	0.00	2	6.45
MRS 3	19	30.65	-	0.00	3	9.68
MRS 4	10	16.13	1	14.29	7	22.58
MRS 5	8	12.90	3	57.14	11	35.48
MRS 6	6	9.67	2	28.57	9	29.0
Total	62	100.00	7	100.00	31	100.00

While analyzing MRS distribution in relation to renal function among stroke patients, it was observed that majority of the study subjects in normal renal function group were distributed in MRS 3 group (n=19, 30.65%), MRS 5 group in unrecognized renal insufficiency group (n=4, 57.14%) and MRS 5 group in recognized renal insufficiency group (n=l l, 35.48%).

Table 5: Mean and SD ranking in renal insufficiency

The Modified Rankin Scale Distribution	Normal Renal Function	Unrecognized Renal Insufficiency	Recognized Renal Insufficiency
Mean	3.32	4.43	4.65
SD	1.47	1.62	1.17
P Value Single Factor ANOVA Test			0.0001

When the MRS distribution between three groups was analyzed statistically using single factor ANOVA test, the mean difference of MRS in unrecognized renal function group compared to normal renal function group was 1.11 (25 % increase) and between recognized renal insufficiency group compared to unrecognized renal insufficiency group was 0.22 (5 % increase). This was found to be statistically significant ($p < 0.05$). Similarly, on calculating the effect size of MRS using Cohen's "d" value (d = 1.00), a high practical significance was observed (84% of study subjects with MRS above 5 will have recognized and unrecognized renal insufficiency)

We can conclude that MRS was significantly higher in patients with recognized renal insufficiency compared to unrecognized renal insufficiency patients.

SEVERITY DISABILITY RATE

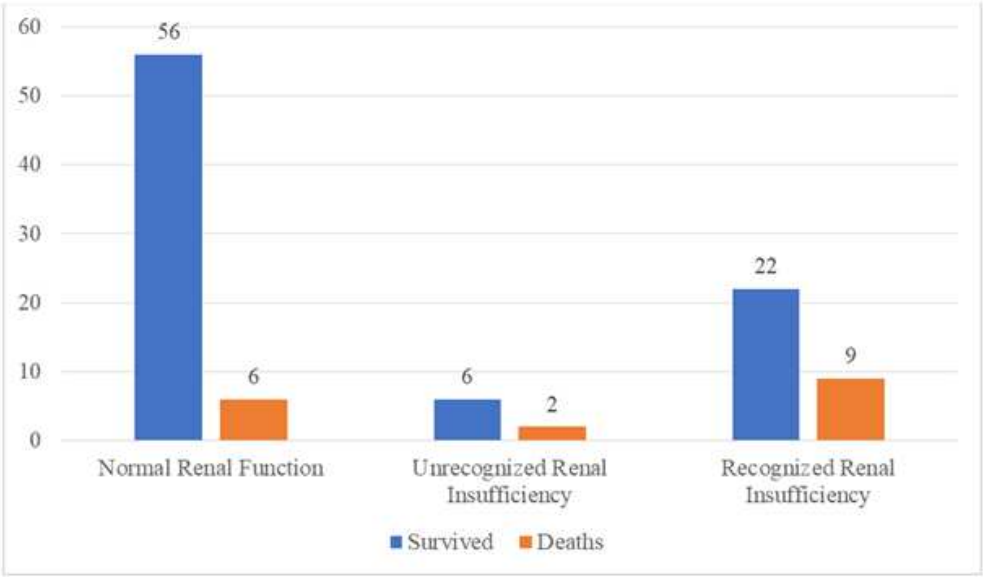

Fig.3 Showing Severity disability rate

Of the 100 patients with stroke included in the study, 62% had normal renal function, 31% had recognized renal insufficiency, and 7% had unrecognized renal insufficiency. Mortality rates are higher in patients with recognized and unrecognized renal insufficiency compared with patients with normal renal function (29%, %, and 28.5% and 9.6%) respectively, $P < 0.05$). Similarly, severe disability rates at discharge are also higher in patients with recognized and unrecognized renal insufficiency compared with patients with normal renal function (72.27%, 80 %, and 32.14%) respectively, $P < 0.05$.

LIMITATIONS:

Evaluation of renal function was based on a single serum creatinine measurement taken on admission. Single admission creatinine levels may not reflect their baseline renal function. Less number of patient are included in study.

CONCLUSION

Unrecognized renal insufficiency is found to be a common comorbidity among patients with acute stroke in our study. Unrecognized renal insufficiency is significantly common among older age group and more frequently in females compared to male in our study group. Mortality rate and severe disability rate are higher in patients with recognized and unrecognized renal insufficiency compared to patients with normal renal function. Our study did not show any significant difference in all outcomes between recognized and unrecognized renal insufficiency.

ACKNOWLEDGEMENTS

We would like to acknowledge the Dept. of Internal Medicine & Dept. of Neurology for their support conducting the cross sectional study.

CONFLICTS OF INTEREST: None

REFERENCES

1. Pereg, D., Rozenbaum, Z., Vorobeichik, D., Shlomo, N., Gilad, R., Bloch, S., Mosseri, M. and Tanne, D., 2016. Prevalence and Significance of Unrecognized Renal Dysfunction in Patients with Stroke. The American journal of medicine, 129(10), pp. 1074-1081.

2. Florkowski, c.M. and Chew-Harris, J.s., 2011. Methods of estimating GFRdifferent equations including CKD-EPI. The Clinical Biochemist Reviews, 32(2),p.75.
3. Inker, L.A. and Levey, AS., 2013. Pro: Estimating GFR using the chronic kidney disease epidemiology collaboration (CKD-EPI) 2009 creatinine equation: the time for change is now, Nephrologv Dialysis Transplantation, 28(6), pp. 1390-1396.
4. Snarska, K., Kapica-Topczewska, K., Bach6rzewska-Gajewska, H. and Malyszko, J., 2016. Renal Function Predicts Outcomes in Patients with Ischaemic Stroke and Haemorrhagic Stroke. Kidney and Blood Pressure Research, 41(4), pp.424-433.
5. Mac Walter, R.s., Wong, s.Y., Wong, K.Y., Stewart, G., Fraser, c.G., Fraser, H. W. , Ersoy, Y., Ogston, S.A. and Chen, R., 2002. Does renal dysfunction predict mortality after acute stroke?. Stroke, 33(6), pp. 1630-1635.
6. Tsagalis, G., Akrivos, T., Alevizaki, M., Manios, E., Stamatellopoulos, K. , Laggouranis, A. and Vemmos, K.N., 2008. Renal dysfunction in acute stroke: an independent predictor of long-term all combined vascular events and overall mortality. Nephrology Dialysis Transplantation, I), pp. 194-200.
7. Easton, J.D., Saver, J.L., Albers, G.W., Alberts, M.J., Chaturvedi, S., Feldmann, E., Hatsukami, T.S., Higashida, R.T., Johnston, S.C., Kidwell, C.S. and Lutsep, H.L., 2009. Definition and evaluation of transient ischemic attack. Stroke, 40(6), pp.2276-2293.
8. Prowle, J.R., Ishikawa, K., May, C.N. and Bellomo, R., 2010. Renal plasma flow and glomerular filtration rate duringacute kidney injury in man. Renal failure, 32(3), pp.349-355.
9. Fisher, M. and Furie, K., 2017. Practicing Evidence-Based Stroke Medicine
10. Zacharia, B.E., Ducruet, A.F., Hickman, Z.L., Grobelny, B.T., Fernandez, L., Schmidt, J.M., Narula, R., Ko, L.N., Cohen, M.E., Mayer, S.A. and Connolly, E.S., 2009. Renal dysfunction as an independent predictor of outcome after aneurysmal subarachnoid hemorrhage. Stroke, 40(7), pp.2375-2381.
11. Neaton JD, Wentworth DN, Cutler J, Stamier J, Kuller L. Risk factors for death from different types of stroke. Multiple Risk Factor Intervention Trial. Research Group. Ann Epidemiol. 1993:3 :393 493-499
12. Arboix, A., 2015. Cardiovascular risk factors for acute stroke: Risk profiles in the different subtypes of ischemic stroke. World Journal of Clinical Cases: WJCC, 3(5), p.418.
13. Sandilands, E.A., Dhaun, N., Dear, J.W. and Webb, D.J., 2013. Measurement of renal function in patients with chronic kidney disease. British journal of clinical pharmacologv, 76(4), pp.504-515.
14. Anupama, Y.J. and Uma, G., 2014. Prevalence of chronic kidney disease among adults in a rural community in South India: Results from the kidney disease screening (KIDS) project. Indian journal of nephrology, 24(4), P•[214]'
15. Eswarappa, M., Gireesh, M.S., Ravi, V., Kumar, D. and Dev, G., 2014. Spectrum of acute kidney injury in critically ill patients: A single center study from South India. Indian journal of nephrology, 24(5), p.280.
16. Reddy, N.P.K., Annigeri, R., Ramakrishnan, N. and Venkataraman, R., 2014. Epidemiology, outcomes and validation of RIFLE and AKIN criteria in acute kidney injury (AKI) in critically ill patients: Indian perspective. Renal failure, 36(6), pp.831-837.

17. Kumar, S., Selim, M.H. and Caplan, L.R., 2010. Medical complications after stroke. The Lancet Neurology, 9(l), pp. 105-118.

18. Eddy, A.A., 2005. Progression in chronic kidney disease. Advances in chronic kidney disease, 12(4), pp.353-365.