

Association of Various Factors with the Presence of Urinary Tract Infections Among Patients Suffering from Stroke

Faisal Shabbir, Shazia Nisar, Babar Ashraf, Imran Ahmed, Hammad Khan

Pak Emirates Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: To assess the association of various factors with the presence of urinary tract infections among patients suffering from stroke.

Study Design: Comparative cross-sectional study.

Place and Duration of Study: Department of Medicine, Pak Emirates Military Hospital, Rawalpindi Pakistan, from Jun to Sep 2021.

Methodology: A total of 130 patients with ischemic or hemorrhagic stroke diagnosed by the consultant medical specialist or neurologist based on clinical and neuro-radiological findings were included in this study. Urinary tract infection was diagnosed based on urine culture and sensitivity test. Age, gender, type of stroke and severity of stroke was associated with the presence of urinary tract infection among the study participants.

Results: Out of 130 patients with acute stroke included in the study, 81(62.3%) were males, while 49(37.3%) were females. The mean age of the stroke patients included in the study was 56.823±8.737 years. In addition, 33(25.4%) patients had urinary tract infections confirmed on the culture and sensitivity report, while 97(74.6%) had no evidence of urinary tract infection. Statistical analysis revealed that female gender and stroke severity had a statistically significant relationship (p -value <0.05) with the presence of urinary tract infection among patients suffering from acute stroke.

Conclusion: Around one-fourth of our patients presenting with acute stroke had urinary tract infections in our study participants. Female patients and patients with severe stroke symptoms were more at risk of urinary tract infections than male patients and patients with less severe symptoms.

Keywords: Severity, Stroke, Urinary tract infection.

How to Cite This Article: Shabbir F, Nisar S, Ashraf B, Ahmed I, Khan H. Association of Various Factors with the Presence of Urinary Tract Infections Among Patients Suffering from Stroke. *Pak Armed Forces Med J* 2022; 72(5): 1522-1525. DOI: <https://doi.org/10.51253/pafmj.v72i5.7962>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Stroke has been the most commonly encountered neurovascular condition causing a significant impact on the quality of life of patients.¹ Previously considered as the disease of the elderly, cerebro-vascular events tend to occur in all age groups across the globe.² Rehabilitation process after stroke and long-term recovery depends upon several factors, including patients' general health and the presence of comorbid illnesses. Three multiple health-related conditions have been closely related to stroke and may adversely affect the short-term and long-term outcomes in these patients.^{3,4}

Urinary tract infections occur in the community and are acquired in hospitalized patients. Many factors predispose patients with various illnesses to acquire urinary tract infections.⁵ Situation gets more complex in the case of nosocomial urinary tract infections. Various neurological disorders have been associated

with increased urinary tract infections.⁶

Stroke patients have been studied for various infections, including urinary tract infections. Wästfelt *et al.* concluded that UTI was one of the common predictors, especially in female patients.⁷ Bogason *et al.* concluded that around 11.7% of their patients had UTI, and most of them had it at the time of admission.⁸ Li *et al.* in 2020, revealed that out of 186 subjects, 35 had urinary tract infections. Elevated interleukin-6, higher NIHSS, and decreased haemoglobin predicted urinary tract infection in their study population.⁹

The management of stroke has always been challenging for treating physicians; a multidisciplinary team usually manages this task. Treatment of these patients may become more complex if other ailments, especially infections, occur along with the course of recovery from stroke. A local study published regarding the quality of life of stroke patients also emphasized that infections, especially urinary tract infection, inversely affects the quality of life and outcome in the patients suffering from a stroke.¹⁰ Unfortunately, the presence of UTIs among patients

Correspondence: Dr Faisal Shabbir, Department of General Medicine, Pak Emirates Military Hospital, Rawalpindi, Pakistan
Received: 30 Dec 2021; revision received: 17 Jun 2022; accepted: 20 Jun 2022

with a stroke at admission is less studied in our part of the world. Therefore, we planned this study to assess the association of various factors with urinary tract infections among patients suffering from a stroke.

METHODOLOGY

This comparative cross-sectional study was conducted at the Medicine/Neurology Department of Pak Emirates Military Hospital, Rawalpindi Pakistan from June to September 2021. The sample size was calculated using the World Health Organization calculator by using the population prevalence of urinary tract infection in stroke as 5.7%.¹¹ Ethical approval was obtained via letter A/28/EC/349/2021. Consecutive non-probability technique was used to gather the sample for the study. Ischemic or hemorrhagic stroke was diagnosed by a consultant medical specialist/neurologist based on clinical findings and a plain CT scan brain done at the time of presentation.

Inclusion criteria: Patients of either gender, aged between 18 to 70 years presenting with acute ischemic or hemorrhagic stroke were included in the study.

Exclusion criteria: Patients with a past or current history of chronic or repeated urinary tract infections, patients with a history of renal or autoimmune disease or a recurrent stroke were excluded from the study. Patients already taking antibiotics before the onset of stroke or those who could not undergo urine culture and sensitivity tests were also not included.

Urinary tract infection was diagnosed with the help of routine urine examination and culture and sensitivity by a consultant microbiologist in the laboratory of our hospital. Midstream voided urine specimen was collected from all the patients who could urinate. The specimen was obtained from the sampling port on the catheter bag or, in the case of a catheter valve, directly from the valve of those who were catheterized. Patients having greater than ten colony forming units were diagnostic of urinary tract infection.

The presence of other neurological illness or relevant renal conditions were identified by detailed history taking, and patients having those were excluded from the study. In addition, the treating physician assessed the severity of the stroke via the National Institutes of Health Stroke Scale (NIHSS).¹² Urine routine examinations and culture and sensitivity were done from the laboratory of the own hospital, and patients were diagnosed with urinary tract infections based on culture and sensitivity report.

All statistical analysis was performed using the Statistical Package for Social Sciences (SPSS-24.0). Characteristics of participants and the presence of urinary tract infections were described by using descriptive statistics. The relationship between age, gender, severity, and type of stroke with urinary tract infection was determined by applying the Pearson chi-square test keeping the *p*-values ≤0.05 as significant.

RESULTS

Out of 130 patients with acute stroke included in the study, 81(62.3%) were males, while 49(37.3%) were females. The mean age of the stroke patients included in the study was 56.823±8.737 years. In addition, 33 (25.4%) patients had urinary tract infections confirmed on the culture and sensitivity report, while 97(74.6%) had no evidence of urinary tract infection. Table-I summarized the general characteristics of stroke patients included in the study. On the National Institutes of Health Stroke Scale, 71(54.6%) had mild, 41(31.5%) had mild to moderately severe, 12(9.2%) had severe, and 6(4.6%) had very severe symptoms. Of 130 patients, 104(80%) had an ischemic stroke, while 26(20%) had a hemorrhagic stroke. Of most patients, 86(66.1%) had E coli as the culprit for urinary tract infections.

Table-I: Characteristics of Stroke Patients (n=130)

Study Parameters	n(%)
Age (years)	
Mean±SD	56.823±8.737 years
Gender	
Male	81 (62.3)
Female	49 (37.7)
Presence of Urinary Tract Infection	
Yes	33 (25.4)
No	97 (74.6)
Type of Stroke	
Ischemic stroke	104 (80.0)
Hemorrhagic stroke	26 (20.0)
Severity of Stroke	
Mild	71 (54.6)
Mild to moderately severe	41 (31.5)
Severe	12 (9.2)
Very severe	06 (4.6)

Table-II showed the results of the statistical analysis. It was revealed that female gender (*p*-value <0.001) and stroke severity (*p*-value<0.001) had a statistically significant relationship (*p*-value <0.05) with the presence of urinary tract infection among patients suffering from an acute stroke while age (*p*-value-0.998) and type of stroke (*p*-value-0.097) had no such relationship in our study participants.

Table-II: Association of Different Variables with Presence of Urinary Tract Infection (n=130)

Socio Demographic Factors	No Urinary Tract Infection (n=97) n(%)	Urinary Tract Infection (n=33) n(%)	p-value
Age			
50 year or less	47 (48.4)	16 (48.4)	0.998
>50 years	50 (51.6)	17 (51.6)	
Gender			
Male	71 (73.2)	10 (30.3)	<0.001
Female	26 (26.8)	23 (69.7)	
Severity of Stroke			
Mild	64 (65.9)	07 (21.2)	<0.001
Mild to moderate	25 (25.7)	15 (45.4)	
Severe	05 (5.1)	07 (21.2)	
Very severe	02 (2.1)	04 (12.1)	
Type of Stroke			
Ischemic stroke	81 (83.5)	23 (69.7)	0.097
Hemorrhagic stroke	16 (16.5)	10 (30.3)	

DISCUSSION

Patients with acute stroke need a holistic approach from the emergency team and the neurology team for good short-term and long-term outcomes. The general health of the body and getting all the parameters within range becomes important when a body is under enormous stress, like after a stroke. Detailed physical examination and relevant investigations may pick some comorbid health-related conditions. Usually, the team gets concerned about managing blood sugar levels, renal functions and blood pressure and a few other relevant conditions may be missed or neglected. In addition, infective pathologies of various systems may occur with any cerebrovascular accidents.^{13,14} We designed this study to assess the association of various factors with urinary tract infections among patients suffering from a stroke.

Smith *et al.*¹⁵ concluded that Post-stroke UTI is associated with prolonged hospital length of stay (LOS), discharge to a Care Home, and increased medical care costs. Though ours was a cross-sectional study, we did not longitudinally study the factors after patients were admitted to the hospital and did not perform long-term follow-ups. However, we still found out that around one-fourth of patients presenting with acute stroke had urinary tract infections in our study participants.

Net *et al.* in 2018 conducted a study on the French population regarding the impact of indwelling urinary catheterization on urinary tract infections after acute stroke.¹⁶ They revealed that from 212 patients they studied, the overall estimated incidence of UTI was 14.2% in patients without catheterization, and 18%

among patients receiving indwelling urinary catheterization. The more the severity of the stroke, the more the chances of receiving indwelling urinary catheterization and having a UTI. Our study design was slightly different, and we did not study the impact of receiving indwelling urinary catheterization on UTI. However, stroke severity was statistically significantly associated with the presence of UTI in our study participants.

A similar study performed on the Turkish population by Ersoz *et al.* investigated the frequencies, possible risk factors of urinary tract infections and other relevant parameters in subacute and chronic stroke patients.¹⁷ They came up with the findings around 27.3% of their patients suffered from urinary tract infection. Gender was statistically significantly associated with significant bacteriuria in their data set. Our results supported the results generated by Ersoz *et al.*

Ifejika-Jones *et al.* in 2013, found that patients with SUTI had 57% less chance of being discharged home compared with the other levels of care. They also revealed that increased stroke severity on NIHSS was associated with the presence of SUTI in their study participants.¹⁸ We did not follow the patients after diagnosis of acute stroke and screening them for UTI. However, our study results showed that female patients and patients with severe stroke symptoms were more at risk of urinary tract infections than male patients and patients with less severe symptoms.

UTI should not be ignored in patients suffering from a stroke. Special attention should be paid to female patients and patients having a severe form of stroke.

LIMITATIONS OF STUDY

There were a few limitations in this study. First, as patients were not screened before the onset of acute stroke, it cannot be concluded that UTI occurred after the stroke, and stroke could be attributed to the presence of UTI in these patients. Future studies with better design can generate better results to ascertain the relationship between these variables.

CONCLUSION

Around one-fourth of our patients presenting with acute stroke had urinary tract infections in our study participants. In addition, female patients and patients with severe stroke symptoms were more at risk of urinary tract infections than male patients and patients with less severe symptoms.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

FS: Study design, data analysis, critical review, drafting the manuscript, critical review, approval of the final version to be published.

SN: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

BA: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

IA & HK: Critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Khan MI, Khan JI, Ahmed SI, Haq U. The Epidemiology of Stroke in a Developing Country (Pakistan). *J Neurol Stroke* 2018; 8(1): 00275. doi: 10.15406/jnsk.2018.08.00275.
2. Venketasubramanian N, Yoon BW, Pandian J, Navarro JC. Stroke Epidemiology in South, East, and South-East Asia: A Review. *J Stroke* 2017; 19(3): 286-294. doi:10.5853/jos.2017.00234.
3. Saengsuwan J, Suangpho P, Tiamkao S. Knowledge of Stroke Risk Factors and Warning Signs in Patients with Recurrent Stroke or Recurrent Transient Ischaemic Attack in Thailand. *Neurol Res Int* 2017; 2017(1): 8215726. doi:10.1155/2017/8215726.
4. Khaku AS, Tadi P. Cerebrovascular Disease (Stroke). In: *Stat Pearls*. Treasure Island (FL): StatPearls Publishing; 2020, [Internet] available at: <https://www.ncbi.nlm.nih.gov/books/NBK430927/>.
5. Aggarwal N, Lotfollahzadeh S. Recurrent Urinary Tract Infections. In: *Stat Pearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2021, [Internet] available at: <https://www.ncbi.nlm.nih.gov/books/NBK557479/>.
6. Tan CW, Chlebicki MP. Urinary tract infections in adults. *Singapore Med J* 2016; 57(9): 485-490. doi:10.11622/smedj.2016153
7. Wästfelt M, Cao Y, Ström JO. Predictors of post-stroke fever and infections: a systematic review and meta-analysis. *BMC Neurol* 2018; 18(1): 49. doi: 10.1186/s12883-018-1046-z.
8. Bogason E, Morrison K, Zalatimo O, Ermak DM, Lehman E, Markley E, et al. Urinary Tract Infections in Hospitalized Ischemic Stroke Patients: Source and Impact on Outcome. *Cureus* 2017; 9(2): e1014. doi: 10.7759/cureus.1014.
9. Li YM, Xu JH, Zhao YX. Predictors of urinary tract infection in acute stroke patients: A cohort study. *Medicine (Baltimore)* 2020; 99(27): e20952. doi: 10.1097/MD.00000000000020952.
10. Khalid W, Rozi S, Ali TS, Azam I, Mullen MT, Illyas S et al. Quality of life after stroke in Pakistan. *BMC Neurol* 2016; 16(1): 250. doi: 10.1186/s12883-016-0774-1.
11. Chen SC, Chen PY, Chen GC, Chuang SY, Tzeng IS, Lin SK. Portable Bladder Ultrasound Reduces Incidence of Urinary Tract Infection and Shortens Hospital Length of Stay in Patients With Acute Ischemic Stroke. *J Cardiovasc Nurs* 2018; 33(6): 551-558. doi: 10.1097/JCN.0000000000000507.
12. Musuka TD, Wilton SB, Traboulsi M, Hill MD. Diagnosis and management of acute ischemic stroke: speed is critical. *Can Med Assoc J* 2015; 187(12): 887-893. doi:10.1503/cmaj.140355
13. Chu CM, Lowder JL. Diagnosis and treatment of urinary tract infections across age groups. *Am J Obstet Gynecol* 2018; 219(1): 40-51. doi: 10.1016/j.ajog.2017.12.231.
14. Brott T, Adams HP Jr, Olinger CP, Marler JR, Barsan WG, Biller J, et al. Measurements of acute cerebral infarction: a clinical examination scale. *Stroke* 1989; 20(7): 864-870. doi: 10.1161/01.str.20.7.
15. Smith C, Almallouhi E, Feng W. Urinary tract infection after stroke: A narrative review. *J Neurol Sci* 2019; 403: 146-152. doi: 10.1016/j.jns.2019.06.005.
16. Net P, Karnycheff F, Vasse M, Bourdain F, Bonan B, Lapergue B. Urinary tract infection after acute stroke: Impact of indwelling urinary catheterization and assessment of catheter-use practices in French stroke centers. *Rev Neurol (Paris)* 2018; 174(3): 145-149. doi: 10.1016/j.neurol.2017.06.029.
17. Ersoz M, Ulusoy H, Oktar MA, Akyuz M. Urinary tract infection and bacteriuria in stroke patients: frequencies, pathogen microorganisms, and risk factors. *Am J Phys Med Rehabil* 2007; 86(9): 734-741. doi: 10.1097/PHM.0b013e31813e5f96. Erratum in: *Am J Phys Med Rehabil* 2007; 86(12): 1038.
18. Ifejika-Jones NL, Peng H, Noser EA, Francisco GE, Grotta JC. Hospital-acquired symptomatic urinary tract infection in patients admitted to an academic stroke center affects discharge disposition. *PM R* 2013; 5(1): 9-15. doi: 10.1016/j.pmrj.2012.08.002.