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Original Research Article

FREQUENCY OF URINARY TRACT INFECTION IN STROKE PATIENTS WITH INDWELLING CATHETER AT LADY READING HOSPITAL PESHAWAR

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ABSTRACT

Background: *Urinary tract infection (UTI) is a common complication in stroke patients, especially those with indwelling urinary catheters. These infections can significantly impact patient outcomes and prolong hospital stays. Identifying risk factors can guide preventive strategies.* ***Objective:*** *To evaluate the frequency of urinary tract infection (UTI) frequency in stroke patients with indwelling catheters and identify associated risk factors.* ***Study Design:*** *Cross-sectional observational study.* ***Setting:*** *Department of Medicine, Lady Reading Hospital, Peshawar, Pakistan.* ***Duration of Study:*** *Six months (12-November-2023—12-May-2024).* ***Methods:*** *A total of 111 stroke patients aged 30–70 years with indwelling urinary catheters were enrolled. UTI was diagnosed based on urine culture showing bacterial growth >10^5 CFU/mL, specifically of Escherichia coli, Klebsiella, or Pseudomonas species. Data on demographics, hospital stay duration, and gender were collected. Statistical analysis was performed using the chi-square test with significance set at $p < 0.05$.* ***Results:*** *The mean age of participants was 46.91 ± 10.68 years. UTIs were diagnosed in 21.6% of patients. Notably, UTI occurrence was significantly higher in patients aged >50 years (79.2%, $p = 0.0001$), females (83.3%, $p = 0.0001$), and those with prolonged hospital stays (75%, $p = 0.002$).* ***Conclusion:*** *The frequency of UTI in stroke patients with indwelling urinary catheters was 21.6%. Risk factors significantly associated with UTI included older age, female gender, and prolonged hospitalization. Preventive strategies targeting these risk groups may help reduce infection rates in this population.*

Keywords: Urinary Tract Infection, Hemorrhagic Stroke, Catheter, Ischemic Stroke, Hospitalized

INTRODUCTION

Stroke represents the main contributor to long-term disability among adults as well as ranks as the fifth most common cause of mortality i, with an estimated 795,000 stroke incidents annually (1,2). The aging population, along with a decline in case fatality rates following a stroke, are expected to contribute to an increase in the incidence of stroke by 3.4 million people worldwide from 2012 to 2030 (3, 4). Although there has been a decrease in stroke mortality in the US over the last twenty years, recent data indicates that this trend may have plateaued, with indications that stroke mortality might be on the rise once more. The causes for this remain unclear; however, they may be indicative of the repercussions caused by the obesity epidemic as well as its association with diabetes. The incidence of morbidity caused by stroke continues to be significant, with financial implications displayed at $34 billion annually for healthcare services, pharmaceuticals, as well as lost productivity due to missed workdays (3-5).

Urinary tract infections (UTIs) symbolize a significant health concern, manifesting in the urethra, bladder, or kidneys. These infections are among the most prevalent worldwide, impacting approximately 150 million individuals annually. The associated morbidity is considerable, which results in substantial medical expenses; for instance (6, 7). Urinary tract infections have been linked to adverse outcomes, including mortality as well as disability. Previous studies indicate that factors such as female sex, history of stroke, catheterization of the urinary tract, raised initial modified Rankin Scale scores, higher NIHSS scores, advanced age, impaired consciousness, as well as diabetes mellitus, are linked to a greater incidence of infection (8, 9).

An indwelling urinary catheter is a widely utilized procedure in clinical settings, implemented to guarantee patient safety. This device serves multiple purposes, such as tackling urinary incontinence, retention, benign prostatic hyperplasia, the aftermath of traumatic injuries, as well as various neurological disorders, by facilitating bladder drainage (10). The use of a urinary catheter is linked to various complications as well as adverse events. Potential complications include the formation of stones, blockages, leaks, dislodgement, sediment accumulation, twists, symptomatic bacterial infections, trauma, and hypersensitivity reactions (11). A study reported the rate of UTI 24.2% in stroke patients with indwelling catheter (10).

Prior research has not been conducted within our general population. This research will enhance patient outcomes by decreasing infection rates via effective catheter management strategies. The information will assist hospital administrators in effectively distributing resources for infection control and antibiotic stewardship initiatives aimed at this at-risk population. This research aims to provide novel and meaningful insights into the frequency of UTIs in catheterized stroke patients, as no local studies have previously addressed this issue. The findings will enhance the quality of care at Lady Reading Hospital, Peshawar.

METHODOLOGY

This study employed a cross-sectional design and was conducted at Lady Reading Hospital, Peshawar, from November 12, 2023, to May 12, 2024, after securing ethical clearance from our institute. We selected 111 patients for this study. The sample was based on calculations: 95% confidence level, 8% margin of error, and an expected UTI frequency of 24.2% (12). Patients were selected using a non-probability consecutive sampling approach.

Patients aged 30-70 years of both genders who were admitted with confirmed stroke diagnoses and indwelling urinary catheters were selected. Stroke diagnosis was established through CT scan findings with hemorrhagic stroke identified by acute hyperdense blood compared to brain parenchyma and ischemic stroke which was define

by grey-white matter differentiation loss or cortical hypodensity with parenchymal swelling. Patients with pre-existing urinary tract abnormalities, current UTI treatment, recent antibiotic use which was confirmed by bacteriuria at enrollment or immunosuppressed status were not enrolled.

After obtaining consent and demographic and clinical information from the patients, approximately 10ml of urine was aseptically aspirated from the indwelling catheter near the urethral site using sterile technique by trained nurses and physicians for detecting UTI. Collected samples were immediately transported to the hospital laboratory for microbiological analysis. Urinary tract infection was defined as bacterial growth exceeding 10^5 colony-forming units per milliliter of Pseudomonas, Escherichia coli, or Klebsiella species.

Statistical analysis was performed by employing SPSS 26. Variables like age, duration of admission, and BMI were calculated by mean and SD. Gender, residence, socioeconomic status, smoking, hypertension, and UTI were assessed using frequencies and percentages. For association of UTI with demographics and clinical parameters we used Chi Square test, we kept P value notable at ≤ 0.05.

RESULTS

We recorded a mean age of 46.91 ± 10.68 years, with a mean BMI of 24.40 ± 1.95 kg/m², and the average duration of hospital admission was 5.56 ± 1.34 days. The sample comprised of 57 (51.4%) males and 54 (48.6%) females (Figure 1). Hypertension was present in around 38 (34.2%) patients while smoking was reported by 20 (18.0%) patients (Table 1). Urinary tract infection (UTI) was identified in 24 (21.6%) patients, while 87 (78.4%) had no evidence of disease (Table 2).

Age distribution revealed a potential association with UTI (p = 0.0001) as 19 (79.2%) infected patients were aged 51–70. Gender also exhibited a strong relation with UTI (p = 0.0001), with 20 (83.3%) females having UTI. The duration of admission also showed a notable association, as patients who stayed longer than 5 days were infected 18 (75.0%) (p = 0.002). The rest of the demographic and clinical variables did not yield a notable significance (P > 0.05) (Table 3).

Table 1: Demographics and clinical profile of the patients

Demographics and clinical profile		N	%
Gender	Male	57	51.4%
	Female	54	48.6%
Residence	Urban	62	55.9%
	Rural	49	44.1%
Socioeconomic status	Lower class	29	26.1%
	Middle class	59	53.2%
	Upper class	23	20.7%
Hypertension	Yes	38	34.2%
	No	73	65.8%
Smoking	Yes	20	18.0%
	No	91	82.0%

Table 2: Frequency of urinary tract infection

Urinary tract infection	Frequency	Percent
Yes	24	21.6
No	87	78.4
Total	111	100.0

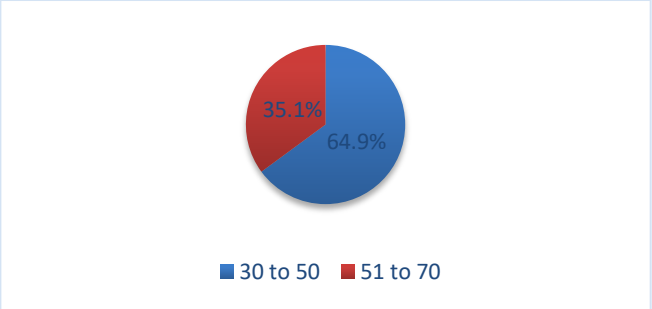

Figure 1: Age distribution

Table 3: Association of UTI with demographics and clinical profile

Demographics and clinical profile		Urinary tract infection				
		Yes		No		
		N	%	N	%	
Age distribution (Years)	30 to 50	5	20.8%	67	77.0%	0.0001
	51 to 70	19	79.2%	20	23.0%	
Gender	Male	4	16.7%	53	60.9%	0.0001
	Female	20	83.3%	34	39.1%	
Residence	Urban	10	41.7%	52	59.8%	P > 0.05
	Rural	14	58.3%	35	40.2%	
Socioeconomic status	Lower class	10	41.7%	19	21.8%	P > 0.05
	Middle class	12	50.0%	47	54.0%	
	Upper class	2	8.3%	21	24.1%	
Hypertension	Yes	11	45.8%	27	31.0%	P > 0.05
	No	13	54.2%	60	69.0%	
Smoking	Yes	3	12.5%	17	19.5%	P > 0.05
	No	21	87.5%	70	80.5%	
BMI (kg/m2)	< = 25	18	75.0%	67	77.0%	P > 0.05
	> 25	6	25.0%	20	23.0%	
Duration of admission (Days)	1 to 5	6	25.0%	53	60.9%	0.002
	> 5	18	75.0%	34	39.1%	

DISCUSSION

Our study included 111 stroke patients with a mean age of 46.91±10.68 years and found UTIs in 21.6% of patients. This is comparable to the 28.8% UTI frequency reported by Ahmad et al. in their study, in which 69.6% were those patients who had UTI due to a Foley tube catheter (13). The higher UTI incidence in Ahmad et al.'s study may relate to their older patient population which is a known

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factor for UTIs due to weakened immunity and more comorbidities, another possible reason is due to the fact that we did not include a control group like Ahmad et al, we included all patients with indwelling catheter.

Gender differences revealed that females accounted for 83.3% of UTI cases compared to 16.7% of males. This observation fits well with Ahmad et al.'s observation that female gender potentially increased UTI risk (OR=0.327) though they found a smaller proportion of females with UTIs (56.5%) (13). The gender difference may be explained by anatomical factors and higher susceptibility to bacterial colonization in females. However, Jitpratoom et al did not find noteworthy gender differences in their larger study of 342 patients, they identified catheter use a notable factor for UTI in their study which accounted for 80.6% cases, we also attribute their higher frequency of UTI due to catheter use to our lack of control group (14).

The duration of hospital admission showed a clear link with UTIs in our study, where around 75% of infected patients stayed longer than 5 days compared to 25% of patients staying for 5 or fewer days. This resonates with Net et al.'s findings, which reported that longer hospital stays in catheterized stroke patients showed a notable link with UT (15). Similarly, Poisson et al. highlighted that UTIs extend hospital stays and increase costs, particularly problematic in resource-limited centers (16).

Catheter use emerged as a critical risk factor across all aforementioned studies. While our study focused only on indwelling catheters, suggests similar risks like other catheters mentioned in the studies above. Ahmad et al. found that Foley catheterization notably increased UTI risk (OR=4.229) while Jitpratoom et al reported an even stronger association (OR=14.10) (13, 14). Net et al. also identified indwelling catheters similar to our study, as a primary risk factor of patients developing UTIs (15). These consistent findings underscore the need for alternatives to indwelling catheters.

Our study's limitations include its single-center design, lack of a control group which may have affected generalizability. However, the consistency of key findings with broader literature supports the validity of our study. To reduce UTI risks, we recommend minimizing unnecessary catheter use through strict adherence to guidelines, which could notably lower UTI rates. Nurse-driven protocols for early catheter removal may prevent prolonged catheterization as well.

CONCLUSION

In conclusion, the risk of UTI in stroke patients with indwelling catheter in our study was 21.6%, associated factors identified were increasing age, female gender and longer admission days.

DECLARATIONS

Data Availability Statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned. (IRB-999/LRH/MTI)

Consent for publication

Approved

Funding

Not applicable

CONFLICT OF INTEREST

The authors declared an absence of conflict of interest.

AUTHOR CONTRIBUTION

ALISHBA SHAHI (Post Graduate Resident)

Conception of Study, Data Collection, Development of Research Methodology Design, Study Design, Review of manuscript, final Manuscript drafting.

Manuscript revisions, critical input.

Study Design, Review of Literature.

ZIA-UD-DIN (Professor)

Conception of Study, Critical Input, Final approval of manuscript.

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