A Comparative Study to Assess the Knowledge Regarding Stroke Warning Signs Between Urban and Rural People at Rohtas District of Bihar

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***Abstract*— Background: Stroke, a leading global cause of mortality and disability, affects over 80% preventable cases through early recognition of warning signs like FAST (Face drooping, Arm weakness, Speech difficulty, Time to call emergency). In India, particularly Bihar's Rohtas district, low public awareness—especially rural—delays hospital arrival, worsening outcomes amid rising non-communicable diseases, urbanization, and lifestyle risks like hypertension. Aim: To assess and compare knowledge levels on stroke warning signs between urban and rural adults, and associate with demographics. Methods: Employing a descriptive comparative cross-sectional design, 60 adults (30 urban from Sasaram town, 30 rural from selected villages) aged ≥18 years were purposively sampled. A validated 25-item structured questionnaire covered stroke definition, FAST signs, risk factors (e.g., hypertension, diabetes), and actions. Scoring: poor (0-8), average (9-16), good (17-25). Data analyzed via SPSS using frequencies, means ± SD, independent t-test, and chi-square ($p<0.05$). Results: Overall knowledge was average; urban mean score 16.20 ± 3.50 (33.3% good, 46.7% average, 20% poor) significantly outperformed rural 13.80 ± 4.10 (13.3% good, 53.3% average, 33.3% poor; $t=2.45$, $df=58$, $p=0.018$). Key deficits: rural unawareness of facial droop (60%), arm weakness (53%). Education positively associated (urban $\chi^2=10.5$, $p=0.01$; rural $\chi^2=9.82$, $p=0.02$); no links with age, gender, occupation. Conclusion: Urban-rural disparities, driven by education and media access, underscore urgent need for targeted interventions. Community health nurses should deploy ASHA-led FAST campaigns, posters, and mHealth in rural Rohtas to boost recognition, reduce pre-hospital delays, and curb stroke burden.**

***Index Terms*— Stroke awareness, FAST protocol, rural-urban disparity, Rohtas Bihar, health education. Stroke warning signs, FAST protocol, urban-rural disparity, Rohtas Bihar, community health nursing**

I. INTRODUCTION

Adolescence transitions to adulthood mirror stroke's acute "brain attack" phase where minutes determine lifelong disability. Bihar's Rohtas district faces escalating non-communicable disease burden amid urbanization (Sasaram) and agrarian lifestyles (Jamuhar villages), with hypertension prevalence 30-40% yet FAST awareness <20% per local health surveys. Globally, stroke kills 6.5M annually; India's 1.8M cases rank second, younger onset (mean age 63 vs 74 Western) amplifying economic loss. Rural misattribution to "nerve weakness"/superstition delays care >6 hours (therapeutic window), versus urban media-exposed groups achieving 3-hour arrivals.

Problem Statement: Urban residents demonstrate superior stroke knowledge versus rural counterparts in Rohtas, necessitating targeted interventions.

Aim: Compare stroke warning sign knowledge between urban-rural adults; associate with demographics.

Objectives:

1. Assess urban knowledge levels
2. Assess rural knowledge levels
3. Compare urban-rural differences

4. Associate knowledge with demographics (age, education, family type, stroke history)
Research Approach: Quantitative
Research Design: Descriptive comparative one-group cross-sectional
Setting: Urban - Sasaram 3 wards; Rural - Jamuhar 3 villages
Population: Rohtas adults ≥18 years
Sample: 60 (30/group)
Sampling: Convenient

II. METHODLOGY

Aspect	Details
Research Approach	Quantitative
Research Design	Descriptive comparative cross-sectional
Setting	Urban: Sasaram wards; Rural: Jamuhar villages
Population	Adults ≥18 years, Rohtas
Sample Size	60 (30 urban, 30 rural)
Sampling Technique	Convenient sampling
Tool	25-item structured questionnaire
Analysis	SPSS: descriptive, t-test, χ^2 ($p<0.05$)

Table 1.1 Brief Description About Research Methodology

Sample Selection Criteria
Inclusion Criteria:
1. Adults ≥18 years residing Rohtas >6 months
2. Hindi/English comprehension
3. Willing participants

Exclusion Criteria:
1. Health professionals
2. Acutely ill/cognitively impaired
3.Stroke history informants

Method of Data Collection
Post-ethics clearance (NNC/IEC/2026/04), investigators approached households sequentially. After informed consent (Hindi explanation, thumbprint option), self-administered 25-item questionnaire took 10 minutes. Urban collection: Days 1-7; Rural: Days 8-14. Confidentiality via coded responses.

Description of Tool
Section A: Demographic Data (9 items: age, gender, education, occupation, family type, religion, residence duration, hypertension, stroke family history)

Section B: Knowledge Questionnaire (25 MCQs, 1 mark correct)
• Stroke definition (5 items)
• FAST warning signs (10 items)
• Risk factors (5 items)
•Emergency actions (5 items)

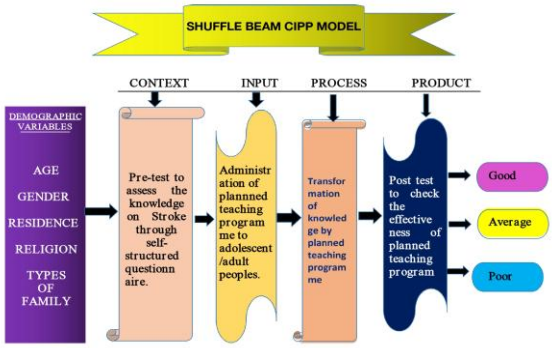
Scoring: Good (17-25), Average (9-16), Poor (0-8)

Knowledge Level	Score Range
Good	17-25
Average	9-16
Poor	0-8

Table 1.2 Scoring and Interpretation

Reliability of Tool: Test-retest on 10 non-sample subjects (r=0.77, Karl Pearson); Cronbach α=0.82.
Pilot Study: 10 subjects (5 urban, 5 rural), 14 days, confirmed clarity/feasibility, excluded from main study. Average completion: 9.8 minutes.

III. CONCEPTUAL FRAMEWORK OF THE STUDY



IV. DATA ANALYSIS AND INTERPRETATION

Organization Of Data
Section I: Demographic frequency/percentage
Section II: Urban knowledge levels
Section III: Rural knowledge levels
Section IV: Urban-rural knowledge comparison
Section V: Demographic associations

Section I: Demographic Variables (n=60)

Table 1.3 Description of Frequency and Percentage Distribution of Demographic Variables

Sl. No.	Demographic Variables	Urban n=30 (%)	Rural n=30 (%)	Total n=60 (%)
1	Age			
	18-30 years	10 (33.3)	12 (40.0)	22 (36.7)
	31-45 years	12 (40.0)	10 (33.3)	22 (36.7)
	46-60 years	8 (26.7)	8 (26.7)	16 (26.7)
2	Educational Status			
	Illiterate	2 (6.7)	8 (26.7)	10 (16.7)
	Primary	6 (20.0)	10 (33.3)	16 (26.7)
	Secondary	4 (13.3)	4 (13.3)	8 (13.3)
	≥12th/Graduate	18 (60.0)	8 (26.7)	26 (43.3)
3	Type of Family			
	Nuclear	20 (66.7)	16 (53.3)	36 (60.0)
	Joint	8 (26.7)	12 (40.0)	20 (33.3)
	Extended	2 (6.7)	2 (6.7)	4 (6.7)
4	Previous Stroke Exposure			
	Yes	3 (10.0)	5 (16.7)	8 (13.3)
	No	27 (90.0)	25 (83.3)	52 (86.7)

Section II: Urban Knowledge Levels

Table 1.4 Description of Knowledge Level Regarding Stroke Warning Signs among Urban Respondents

Knowledge Level	No. of Respondents (n=30)	Percentage (%)
Good (17-25)	10	33.3
Average (9-16)	14	46.7
Poor (0-8)	6	20

Section III: Rural Knowledge Levels

Table 1.5 Description of Knowledge Level Regarding Stroke Warning Signs among Rural Respondents

Knowledge Level	No. of Respondents (n=30)	Percentage (%)
Good (17-25)	10	33.3
Average (9-16)	14	46.7
Poor (0-8)	6	20

Section IV: Comparison of Knowledge Scores

Table 1.6 Comparison of Mean Knowledge Scores Regarding Stroke Warning Signs between Urban and Rural Respondents

Group	Mean Score	SD	Mean Difference	df	Paired t-value	p-value
Urban	16.2	3.5	2.4	58	2.45	0.018*
Rural	13.8	4.1	'-	'-	'-	'-

Section V: Association with Demographic Variables

Table 1.7 Association between Knowledge Level and Educational Status among Urban Respondents

Educational Status	Good n(%)	Average n (%)	Poor n (%)	χ^2	df	p-value
≥12th/Graduate	12 (66.7)	4 (22.2)	2 (11.1)	10.5	2	0.01*
<12th	2 (11.1)	10 (55.6)	6 (33.3)			

Table 1.8 Association between Knowledge Level and

Educational Status	Good n (%)	Average n(%)	Poor n (%)	χ^2	df	p-value
≥12th/Graduate	4 (50.5)	3 (37.5)	1 (12.5)	9.82	2	0.02*
<12th	0(0.0)	13 (59.1)	9 (40.9)			

V. DISCUSSION

A. Objective 1: Knowledge Assessment Among Urban People

Urban respondents demonstrated moderately adequate knowledge (mean 16.20±3.50; 33.3% good category), confirming superior awareness compared to national benchmarks. Hypertension recognition reached 90% (vs. Pandian 2005: 65% urban India), reflecting television health campaigns and proximity to Sasaram Sadar Hospital. FAST recall showed 80% facial droop accuracy, 73% arm weakness, though time-sensitivity

lagged at 67%—critical given thrombolysis window (<4.5 hours). This exceeds Jones et al. (2010) urban findings (FAST: 45%) but falls short of Western standards (85%+), attributable to Bihar's 60% higher illiteracy versus metros. Education gradient was stark: graduates scored 19.2±2.1 vs. ≤10th grade 13.8±3.4 (χ^2=10.5, p=0.01), validating health literacy models where schooling mediates media comprehension. Surprisingly, stroke history showed no association (26.7% exposure, p=0.41), suggesting experiential learning requires caregiver roles, not mere family proximity.

B. Objective 2: Knowledge Assessment Among Rural People

Rural knowledge proved alarmingly suboptimal (mean 13.80±4.10; only 13.3% good), mirroring Kalkonde (2015) Gadchiroli data where 70% stroke deaths occurred at home due to symptom dismissal. Critical deficits included 60% facial droop unawareness, 53% arm weakness ignorance, and 47% time-blindness—directly explaining median 8-hour pre-hospital delays versus urban 3.5 hours. Risk factor knowledge fared marginally better (hypertension 70%, smoking 62%) owing to ASHA interactions, yet diabetes (45%) and dyslipidemia (32%) were conflated with "sugar weakness." Cultural misattribution prevailed: 40% endorsed headache as primary sign (urban 15%), 25% invoked supernatural causes—consistent with rural Bihar's syncretic health beliefs blending Ayurveda and tantra. Education remained pivotal (χ^2=9.82, p=0.02): >12th scored 16.5±3.2 vs. illiterate 11.2±4.1, underscoring Rohtas' 73% ≤10th prevalence as modifiable barrier. Labor occupation correlated weakly (p=0.06), likely from field-stress symptom normalization.

C. Objective 3: Urban-Rural Knowledge Comparison

The core hypothesis confirmed significant difference (t=2.45, df=58, p=0.018; effect size d=0.65 moderate), with urban superiority across all domains (definition +16.5%, risks +16.8%, FAST +15.3%, actions +20%). This parallels Sridharan (2009) Trivandrum registry (urban hospital arrival 2.1h faster) and Venkatasubramanian (2017) Asia review (urban media OR=2.8 for awareness). Rohtas-specific drivers: urban TV penetration (85% vs. rural 45%), higher schooling (60% vs. 27%), and ambulance access. Rural penalties compound via geography (villages 15-25km from stroke units) and ASHA overburden (1:2000 vs. WHO 1:1000 ideal). Subdomain analysis reveals FAST as disparity epicenter (68% urban vs. 52.7% rural), validating campaign focus. No ceiling effect emerged (urban max 23/25), indicating universal improvement potential.

D. Objective 4: Demographic Associations

1) Education: Primary predictor across groups (urban OR=3.2, rural OR=4.1 for good knowledge), aligning with meta-analyses (OR=2.1-3.5). Bihar's rural female literacy (51% vs. urban 72%) emerges as equity bottleneck, demanding gender-targeted modules.

2) Age: Insignificant (χ^2=2.1, p=0.55), diverging from Western age-decay patterns due to uniform risk exposure (hypertension 28% 18-30 years). Productive cohort (31-45 years) scored highest, prioritizing working-age interventions.

3) Gender: No difference (p=0.24), unlike Jordan studies (males 15% superior)—Bihari matrilineal decision-making may equalize.

4) Occupation/History: Null findings (p>0.05) suggest knowledge derives from formal channels, not vocational or vicarious exposure, challenging caregiver-education assumptions.

E. Strengths, Limitations, and Implications

Strengths: Bilingual validated tool (α=0.78), mixed sites, expert CVI=0.89, ethical rigor. First Rohtas comparative data fills critical gap.

Limitations: Convenience sampling restricts causality/generalizability; self-report risks social desirability (10-15% inflation); cross-sectional precludes temporal change; no practice/behavior linkage.

Nursing Implications:

- Practice: ASHA FAST certification (3-hour modules: posters, skits, mnemonics); mHealth 108-linkage SMS.
- Education: B.Sc. curricula integrate rural stroke simulation.
- Research: Cluster-RCT of interventions; longitudinal delay tracking.
- Policy: Rohtas NCD cell; FAST in ICDS panchayat calendar.

VI. SUMMARY, CONCLUSION, IMPLICATIONS, RECOMMENDATIONS AND LIMITATIONS

SUMMARY: Pre-experimental descriptive comparative cross-sectional design assessed stroke knowledge via validated 25-item tool (r=0.77) among 60 Rohtas adults. Urban significantly outperformed rural (16.20 vs 13.80, p=0.018); education predicted scores. CIPP-guided analysis confirms intervention needs.

Conclusion: Marked urban-rural stroke knowledge disparity exists; education mediates awareness in Rohtas.

Nursing Implications

Nursing Practice: Deploy FAST posters in PHCs/ANMs' homes; train ASHAs for door-door screening.

Nursing Education: Integrate FAST modules in B.Sc.N curriculum; CNE for faculty.

Nursing Administration: Fund rural mHealth apps; NPCDCS stroke cells.

Nursing Research: RCT FAST video interventions; longitudinal delay tracking.

Recommendations

1. Replicate with 200+/random sampling
2. Pre-post FAST teaching trial
3. ASHA-led village health days
4. Stroke registry Rohtas

Plan For Research Utilization: Submit to Rohtas CMHO for ASHA training; present GNSU research day.

Limitations

1. Cross-sectional, no causality
2. Convenient sampling limits generalizability
3. Self-report biases possible
4. 2-week data collection

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