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Demographic and Clinical Characteristics of Ischemic Stroke Patients with Spasticity

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Abstract

Ischemic stroke remains a leading cause of long-term disability, with muscle spasticity emerging as a highly debilitating motor complication. This study aimed to analyze the demographic and clinical characteristics of ischemic stroke patients presenting with spasticity. A descriptive quantitative study with a cross-sectional approach was conducted, evaluating a single baseline cohort of 70 patients at dr. Zainoel Abidin General Hospital, Banda Aceh. Demographic and clinical profiles were gathered using a structured questionnaire, while spasticity severity was objectively assessed via the Modified Ashworth Scale (MAS). Data were analyzed using descriptive statistics. The results demonstrated that the respondents' ages ranged from 40 to 80 years, predominantly consisting of early elderly individuals (40.0%), females (52.9%), high school graduates (67.1%), married individuals (85.7%), and non-smokers (57.1%). Regarding clinical profiles, the post-stroke duration was mostly clustered in the late subacute phase (44.3%), predominantly following a first stroke attack (67.1%). Diabetes Mellitus emerged as the most prevalent vascular comorbidity (45.7%). All respondents (100.0%) manifested limb spasticity at baseline, with the highest concentration clustered at a moderate grade, specifically MAS score 2 (52.9%), followed by a mild-to-moderate grade, matching MAS score 1+ (47.1%). Ischemic stroke patients with spasticity within this regional setting are predominantly early elderly females comorbid with Diabetes Mellitus, with muscle stiffness largely characterized by a moderate degree. These baseline characteristics provide a critical clinical foundation for designing precise, early neurorehabilitation strategies.

Keywords: Stroke, Ischemic Stroke, Muscle Spasticity, Clinical Profiles, Modified Ashworth Scale

1. Introduction

Stroke is a critical neurological emergency resulting from the disruption of cerebral blood flow, caused by either thromboembolic occlusion (ischemic stroke) or vascular rupture (hemorrhagic stroke). Such focal brain tissue damage triggers long-term motor dysfunction, which severely deteriorates the patient's functional capacity and overall quality of life [1, 2]. Epidemiologically, ischemic stroke represents the globally dominant type and demands comprehensive, structured post-acute management [3] According to the Indonesian Health Survey (SKI) 2023, the prevalence of stroke in Aceh Province stands at 8.8 per 1,000 population, positioning it notably above the national vulnerability threshold of approximately 8.3 per 1,000 population [4]. This high physical morbidity is reflected in the extensive clinical burden at regional referral centers like dr. Zainoel Abidin General Hospital, Banda Aceh, which routinely manages a massive influx of post-acute stroke cases [5].

Among the secondary motor complications hindering the functional recovery of ischemic stroke patients, spasticity is one of the most frequently encountered. Spastisity arises from lesions along the corticospinal tract or upper motor neuron (UMN) system, and is characterized by a velocity-dependent increase in muscle tone accompanied by hyper-excitability of the tendon stretch reflex [6]. This clinical condition affects approximately 20% to 40% of patients transitioning from the subacute to chronic phases of recovery [7]. If left unidentified and unmanaged during the early stages, this sustained increase in muscle tone triggers a destructive structural remodeling of musculoskeletal architecture, manifesting as neuropathic pain, loss of active range of motion, and irreversible joint contracture fixations [8].

Based on the framework of the Roy Adaptation Model (RAM), an individual is conceptualized as an adaptive system reacting to environmental stimuli [9]. The focal stimulus of a cerebral infarction triggers profound disruptions within the body's physiological adaptation mode, specifically impacting motor function. The emergence and severity of spasticity are clinically highly heterogeneous and are heavily influenced by the patient's contextual and residual stimuli, such as age distribution, gender, formal educational level, smoking status, and a history of underlying medical comorbidities [10].

In local clinical settings, optimal neurorehabilitation strategies remain constrained by the scarcity of comprehensive baseline data mapping the overall profiles of affected patients [11, 12]. Previous literature has heavily focused on evaluating the outcomes of specific therapeutic interventions without thoroughly analyzing the fundamental baseline characteristics of the target population. Yet, a clear univariate depiction of a single, localized population is vital for healthcare and nursing practitioners to project patient clinical trajectory, measure physical dependency levels, and establish personalized, precise motor recovery planning. Therefore, this study was conducted to describe the demographic characteristics and clinical profiles of baseline spasticity severity based on the Modified Ashworth Scale (MAS) among ischemic stroke patients.

2. Methods

This descriptive quantitative study with a cross-sectional approach evaluated the baseline characteristics of 70 ischemic stroke patients presenting with spasticity at dr. Zainoel Abidin General Hospital, Banda Aceh. Samples were selected using a consecutive sampling technique across the male and female neurology inpatient wards. The inclusion criteria required a confirmed medical diagnosis of pure ischemic stroke within the subacute to chronic phase and the clinical manifestation of limb spasticity.

Data regarding demographic characteristics (age, gender, educational level, marital status, and occupation) and medical risk profiles (stroke duration, frequency of attacks, smoking status, and comorbidities) were collected using a structured kuesioner. Spasticity severity was objectively measured by the researchers using the gold-standard Modified Ashworth Scale (MAS) through standardized passive joint range-of-motion maneuvers. All collected data were tabulated and analyzed using descriptive statistics. Data distribution testing using the Shapiro-Wilk normality test indicated that the continuous numerical data for age was not normally distributed ($p < 0.001$). Consequently, descriptive analysis for the age variable was presented as a minimum and maximum range, while other categorical data were expressed as frequencies (f) and percentages (%). This research protocol obtained formal ethical approval from the Health Research Ethics Committee of dr. Zainoel Abidin General Hospital, Banda Aceh, under certificate number: 63/ETIK-RSUDZA/2026.

3. Results

This study involved a total of 70 respondents (N=70) who were comprehensively evaluated as a single baseline cohort.

Table 1: Demographic characteristics of respondents (N = 70)

Demographic Characteristics	f	%
Age Range (Min-Max)	40 – 80	
Age Group (Year)		
Young Adult (40–44)	5	7.1
Middle-Aged Adult (45–59)	14	20.0
Older Adult / Early Elderly (60–74)	28	40.0
Late Elderly / Senior (≥ 75)	23	32.9
Gender		
Male	33	47.1
Female	37	52.9
Educational Level		
Elementary School	4	5.7
Junior High School	13	18.6
Senior High School	47	67.1
Higher Education	6	8.6
Marital Status		
Married	60	85.7
Unmarried / Widowed / Divorced	10	14.3
Occupation		
Housewife	28	40
Private Sector Employee	20	28.6
Civil Servant	9	12.9
Farmer	4	5.7
Laborer	4	5.7
Trader	3	4.3
Retired	2	2.9

Based on Table 1, the respondents' ages spanned a minimum of 40 years to a maximum of 80 years. The largest proportion fell into the Older Adult / Early Elderly group, accounting for 28 individuals (40.0%), whereas the smallest proportion was observed in the Young Adult group, with 5 individuals (7.1%). In terms of gender, the population was dominated by females, with 37 respondents (52.9%). Regarding educational backgrounds, most respondents were senior high school graduates (67.1%). Additionally, the majority were legally married (85.7%) and identified occupationally as housewives (40.0%).

Table 2: Clinical profiles of ischemic stroke patients (N = 70)

Clinical Profiles	F	%
Stroke Duration		
Early Subacute	22	31.4
Late Subacute	31	44.3
Chronic	17	24.3
Frequency of Stroke Attacks		
First Attack	47	67.1
Second Attack	23	32.9
Smoking Status		
Non-Smoker	40	57.1
Smoker	30	42.9
Vascular Comorbidities		
Diabetes Mellitus (DM)	32	45.7
Heart Disease	25	35.7
Both DM and Heart Disease	13	18.6

Based on the clinical data in Table 2, the illness duration since the acute onset was most frequently clustered in the late subacute phase, involving 31 individuals (44.3%). The majority of respondents experienced this physical muscle stiffness following their very first stroke attack (67.1%).

Regarding lifestyle risk factors, 40 respondents (57.1%) were identified as non-smokers. In terms of vascular comorbidities, Diabetes Mellitus emerged as the single most dominant condition, affecting 32 patients (45.7%).

Table 3: Baseline spasticity severity using *Modified Ashworth Scale* (N = 70)

Spasticity Grade	F	%
Score 0	0	0.0
Score 1	0	0.0
Score 1+	33	47.1
Score 2	37	52.9
Score 3	0	0.0
Score 4	0	0.0
Total	**70**	**100.0**

The objective spasticity baseline data in Table 3 shows that all respondents within this single population (100%) manifested clear clinical signs of muscle spasticity with varying degrees of severity. At this initial evaluation phase, the highest concentration of data was clustered at a moderate spasticity degree, specifically a MAS score of 2, representing 37 respondents (52.9%), followed closely by a mild-to-moderate degree with a MAS score of 1+ involving 33 respondents (47.1%). There was no representation of patients at extreme scores (score 0, 1, 3, or 4) during the baseline evaluation.

4. Discussion

The univariate findings in this study provide a clear empirical mapping of the demographic characteristics of ischemic stroke survivors experiencing spasticity within the studied region. The observed age range (40–80 years) with an early elderly dominance (40.0%) aligns with the biological aging theory of cerebral blood vessels. As age advances, the macrovascular circulation walls of the brain undergo degenerative processes, namely arteriosclerosis and reduced endothelial elasticity, which trigger the accumulation of atherosclerotic plaques [13-15]. The structural consequences of this aging process drastically elevate the risk of focal thromboembolic occlusions underlying ischemic stroke manifestations. In terms of gender, the female dominance (52.9%) accentuates post-menopausal vascular vulnerability due to declining estrogen levels [16, 17]. The presence of Diabetes Mellitus as the primary comorbidity (45.7%) reinforces the role of metabolic pathologies in accelerating brain vascular damage. Diabetes Mellitus induces chronic hyperglycemia, which accelerates cerebral microangiopathy and macroangiopathy, while compromising systemic hemodynamic perfusion stability when interacting with cardiac comorbidities (35.7%), cumulatively expanding the area of tissue infarction following an attack [18]. From a baseline clinical perspective, the fact that all respondents (100.0%) experienced spasticity at MAS grades 1+ (47.1%) and 2 (52.9%) confirms that Upper Motor Neuron Syndrome is a persistent clinical consequence during the subacute phase of stroke progression. Focal damage to the primary motor cortex disrupts supraspinal inhibitory control over the monosynaptic stretch reflex of the spinal cord [19]. This condition triggers an excessive release of excitatory neurotransmitters in the anterior horn, which clinically presents as a distinct increase in muscle resistance during passive extension and flexion movements of the patient's limbs. Univariate data regarding stroke duration showed a heavy clustering in the late subacute (44.3%) and early subacute (31.4%) phases. This disease duration window serves as a critical clinical indicator in neurorehabilitative care. The subacute phase represents a golden, critical window for optimal neuroplasticity to occur [20].

Within this timeframe, the muscle stiffness remains purely neurogenic due to electrophysiological signaling disruptions rather than structural contractile alterations in the musculoskeletal tissue. If this moderate-grade tonus increase (MAS score 2), which is dominant in 52.9% of the population, is left unaddressed without structured physical mobilization, peripheral muscle tissues undergo secondary pathological remodeling. This includes permanent muscle fiber shortening, loss of sarcomere numbers, and dense intramuscular collagen proliferation, leading to rigid joint contracture fixations [21]. Lastly, the respondents' educational background, dominated by senior high school graduates (67.1%), serves as an advantageous adaptive modality for managing long-term care at home. Based on the concept of adaptation, adequate formal education structurally aids individuals in processing, understanding, and adhering to health education and clinical instructions provided by nursing professionals [7, 21]. Strong baseline literacy among respondents acts as a key variable to bridge the care transition gap from hospital to home settings, ensuring that independent physical activity maintenance and outpatient compliance are consistently implemented to minimize permanent functional disability risks [22].

5. Conclusion

The clinical and demographic profile of 70 ischemic stroke patients with spasticity at dr. Zainoel Abidin General Hospital, Banda Aceh, is characterized by an early elderly age dominance (40.0%), female gender (52.9%), senior high school education (67.1%), and married status (85.7%). Clinically, the population is predominantly in the late subacute stroke phase (44.3%), navigating their first stroke attack (67.1%), non-smokers (57.1%), and presenting with a Diabetes Mellitus comorbidity (45.7%). Objective baseline mapping demonstrates that 100.0% of the patients experience limb spasticity, with severity heavily concentrated at a moderate grade, matching a Modified Ashworth Scale (MAS) score of 2 (52.9%).

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