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Translation, Validation, and Cultural Adaptation of The Barthel Index Questionnaire in Patients with First-Time Ischemic Stroke

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Abstract

Background: Ischemic stroke is one of the leading causes of long-term functional disability, requiring accurate assessment of a patient' s ability to perform activities of daily living. The Barthel Index is a widely used instrument for evaluating functional independence. However, culturally adapted version in both Indonesian and Sundanese languages have not yet been developed for stroke patients in the Tasikmalaya region. **Aim:** This study aimed to conduct the translation, cultural adaptation, and validate of the Barthel Index questionnaire in patients experiencing their first ischemic stroke. **Methods:** An observational study with a cross-sectional design was conducted involving 40 respondents at KHZ Mustofa Hospital, Tasikmalaya. The translation process employed a forward-backward translation method by professional translators, followed by expert reviews and cultural adaptation through panel discussions. Validity testing was performed using criterion validity and construct validity based on Structural Equation Modeling (SEM), while reliability testing used Cronbach's Alpha. **Results:** The results showed path coefficient values ≥ 0.5 and t-statistics > 1.96, indicating strong construct validity. Cronbach's Alpha was 0.870, reflecting high internal consistency. The model also demonstrated acceptable Average Variance Extracted (AVE ≥ 0.5) and Composite Reliability (CR ≥ 0.7). **Conclusion:** These findings confirm that the Indonesian and Sundanese versions of the Barthel Index are valid and reliable instrument for assessing the functional independence of ischemic stroke patients the local cultural context. This instrument is expected to support clinical decision-making and further research in hospital pharmacy and rehabilitation settings.

Keywords: Barthel Index, Ischemic Stroke, Reliability, Validity

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Introduction

Ischemic stroke is recognized as a primary contributor to chronic functional impairment and ranks among the top causes of mortality worldwide (WHO, 2021). In Indonesia, the prevalence of stroke reaches 10.9 per 1000 population, increasing with age (Riskesdas, 2018). West Java is reported the highest estimated number of stroke patients (Permatasari, 2020). Stroke not only has physical impacts but also reduces the patient's independence in carrying out daily activities (Dian Saraswati et al., 2021).

The Barthel Index serves as a standard measure for assessing functional self-sufficiency in individuals after experiencing a stroke (Lee et al., 2022). Several countries have adapted the Barthel Index into their local languages and cultures, as seen in studies (Kahraman et al., 2020) in Turkish, (Galeoto et al., 2015.) in Italy, and (Harith & Tan, 2020) in Malaysia. Although an Indonesian version is available, there is no Barthel Index version adapted into Sundanese, which is widely used in Tasikmalaya. Language and cultural discrepancies can reduce the validity and accuracy of the assessment results (Beaton et al., 2000).

The purpose of this research is to carry out the translation, cultural adjustment, and psychometric validation of the Barthel Index questionnaire into Indonesian and Sundanese for patients experiencing their first ischemic stroke at RS KHZ Mustofa. The validation stages were carried out through construct and reliability tests using the Structural Equation Modeling (SEM) analysis approach. With this adaptation, the Barthel Index is expected to be used more accurately and relevantly in the local cultural context and to support clinical pharmacy practices and stroke patient rehabilitation.

Methods

Study Design and Backround

This Cross-sectional observational study was conducted at KHZ Mustofa Hospital, Singaparna, Tasikmalaya, Indonesia, from February to March 2025. The study aims specifically targeting first-time ischemic stroke patients, while also incorporating adaptation to Sundanese cultural context. Ethical clearance was granted by the Approval was obtained from the Ethics Committee of Bakti Tunas Husada University (No: 014-01/E.01/KEPK-BTH/II/2025), and participants gave their written informed consent.

Sample Research

The study involved 40 first-time ischemic stroke patients (23 males, 17 females) using purposive sampling. Inclusion criteria: (1) confirmed diagnosis of first-time ischemic stroke, (2) willingness to participate, and (3) undergoing treatment at KHZ Mustofa Hospital. Exclusion criteria include recurrent stroke, refusal to participate, or having completed treatment. The chosen sample size aligns with recommendations provided in previous methodological literature (Terwee et al., 2007) which suggest 4–10 samples per questionnaire item; the Barthel

Index with 10 items requires 40 participants.

Research Procedure

The Barthel Index (Collin et al., 1988) was culturally adapted following the cross-cultural adaptation framework proposed by Beaton et al. (2000). The adaptation process began with forward translation, in which two independent bilingual translators fluent in Indonesian and English translated the original English version into Indonesian. The translated versions were then reviewed by an expert panel consisting of language specialists and healthcare professionals, who synthesized the translations and resolved any semantic or conceptual discrepancies. To ensure conceptual equivalence, backward translation was subsequently performed by two different independent translators who translated the Indonesian version back into English.

Following this stage, the Indonesian version was further adapted into Sundanese by two Sundanese language experts, with careful consideration of cultural relevance and linguistic appropriateness; for example, culturally familiar expressions such as "ngarawat diri" were used to replace less contextually appropriate terms like "mencukur." Finally, the Sundanese version underwent pilot testing involving 15 patients to evaluate clarity, comprehension, and cultural suitability, thereby ensuring the instrument's acceptability for use within the Sundanese-speaking population.

Data Collection Technique

Data were obtained through direct interviews employing the Sundanese culturally adapted version of the instrument Barthel Index questionnaire. Demographic variables (age, gender, education level) and the functional independence score (based on 10 activities of daily living) were recorded. Interviews were conducted by researchers with patients; family members assisted if patients experienced communication difficulties.

Research Instrument

The instrument used This research employed the Barthel Index questionnaire as its primary assessment tool consists of 2 parts: the first part is the patient's demographic data, which includes name (initials), gender, religion, occupation, education, and duration of illness. The second part measures the independent variable, which is the Barthel IndexIt includes ten functional tasks, with each item assessed individually based on the respondent's autonomy in performing daily activities, with an overall score ranging from 0 to 15, divided into 4 categories: 0 for the unable category, 5 for the category assisted by 2 people, 10 for the category assisted by 1 person, and 15 for the independent category.

Validity and Reliability

An analysis of the validity and reliability Sundanese-translated was conducted using the

PLS-SEM. The selection of PLS-SEM is based on its suitability for small sample sizes and its ability to model complex relationships between latent variables.

1. Validity Test

Validity describes the extent to which a measurement tool produces accurate and relevant results for the specific construct under evaluation effectively and precisely captures the construct it is designed to measure is supposed to measure. In this study, criterion validity is used, which refers to the relationship between the results of the measuring instrument and other relevant and comparable measuring instruments (Ferdiani & Harianto, 2024; Nur Amalia et al., 2022) This validity is assessed using statistical analysis to evaluate the correlation between instruments based on theory (Achmad et al., 2023).

2. Reliability Test

Reliability measures the consistency of the results of a measuring instrument when used repeatedly under the same conditions. An instrument is considered reliable if it provides stable and consistent results (Ramadhan et al., 2024). The Cronbach' s Alpha method was employed to test internal consistency, with thresholds of 0.7 or above indicating acceptable reliability reliable (Ferdiani et al, 2024).

Results and Discussion

The adaptation and linguistic translation process of the Barthel Index to suit cultural context questionnaire into Indonesian and Sundanese was successfully carried out through a systematic approach following the guidelines (Beaton et al., 2000). Those involved in the translation stage from the source language (English) to Indonesian include English lecturers at Poltekkes Kemenkes Tasikmalaya and English teachers at SMK Negeri 2 Tasikmalaya. In addition, the backward translation process was carried out by the An-Nahl English Language Institute and the English Language Institute at the GO (Ganesha Operation) tutoring centre. After the forward translation and backward translation, a review was conducted to find the most similar translation result. This review is conducted by the researcher with reviewers who meet the criteria, namely being native speakers of the target language of the research, in this case, Indonesian. Then, another requirement for the reviewer is to have conducted research related to questionnaire validation and published the research results (Ingarianti et al., 2022).

Table 1. Results of the Review of Forward Translation and Backward Translation of the Barthel Index Questionnaire

No	Versi asli	Forward translation	Backward translation	Common problem of translator
1.	Feeding: 0= Unable to feed oneself; 5 = Needs assistance with cutting food, spreading butter, or requires a special diet; 10 = Independent in eating	Makan: 0 = Tidak Mampu; 5 = butuh bantuan untuk memotong, mengoles mentega, dan memerlukan diet khusus; 10= Mandiri	Feeding: 0 = Unable to feed oneself; 5 = Needs assistance with cutting food, spreading butter, or requires a special diet; 10 = Independent in eating	"Mentega" dan "diet khusus" kurang relevan secara budaya; tidak semua pasien familiar dengan istilah *modified diet* dapat diganti dengan pola makan yang diatur oleh Dokter.
2.	Bathing: 0 = Dependent on others for bathing; 5 = Bathes independently (including in the shower)	Mandi: 0 = Masih bergantung bantuan orang lain; 5 = Mandiri	Bathing: 0 = Dependent on others for bathing; 5 = Bathes independently (including in the shower)	Istilah "shower" tidak diterjemahkan bisa diganti dengan mandi dengan air mengalir dari atas (pancuran) agar lebih dimengerti responden terutama oleh lansia
3.	Grooming: 0 = Requires help with personal hygiene: 5 = Independent in grooming tasks (face, hair, teeth, shaving) when provided with necessary tools	Perawatan Diri: 0 = Perlu bantuan dalam perawatan pribadi; 5 = Perawatan wajah/ rambut/ gigi/cukur secara mandiri (alat disediakan)	Grooming: 0 = Requires help with personal hygiene; 5 = Independent in grooming tasks (face, hair, teeth, shaving) when provided with necessary tools	Kata "shaving" tidak dikenal semua responden, terutama perempuan lansia. Dapat diganti dengan merapihkan diri.
4.	Dressing: 0 = Completely dependent; 5 = Needs help but is able to perform approximately half of the task without assistance; 10 = Fully independent, including fastening	Berpakaian: 0 = Masih bergantung bantuan orang lain; 5 = membutuhkan bantuan sebagian; 10 = Mandiri (Termasuk memasang kancing, resleting, tali Sepatu, dll).	Dressing: 0 = Completely dependent; 5 = Needs help but is able to perform approximately half of the task without assistance; 10 = Fully independent, including fastening	Istilah "resleting" tidak semua pasien paham. Perlu visualisasi jika digunakan pada pasien lansia. Diganti dengan memakai pakaian lengkap (termasuk kancing dan sepatu).

	buttons, using zippers, and tying shoelaces		buttons, using zippers, and tying shoelaces	
5.	Bowels: 0 = Incontinent or needs enemas; 5 = Occasional accidents; 10 = Fully continent	Buang air besar: 0 = Inkontinensia, atau perlu dberi enema; 5 = kadang mengalami kesulitan; 10 = kontinensia	Bowels: 0 = Incontinent or needs enemas; 5 = Occasional accidents; 10 = Fully continent	Istilah "enema" dan " inkontinensia" tidak dikenal oleh sebagian pasien awam; perlu deskripsi tambahan. Gunakan kata lain " tidak bisa menahan BAB/BAK ".
6.	Bladder: 0 = Incontinent or catheterized and unable to manage independently; 5 = Occasional urinary accidents; 10 = Fully continent	Buang air kecil: 0 = Inkontinensia, atau menggunakan kateter dan tidak terkontrol; 5 = kadang mengalami kesulitan; 10= kontinensia	Bladder: 0 = Incontinent or catheterized and unable to manage independently; 5 = Occasional urinary accidents; 10 = Fully continent	Kateter " Istilah medis yang membingungkan dapat ditambahgkan kata lain" Memakai selang kencing"
7.	Toilet Use: 0 = Fully dependent; 5 = Requires some help but can manage part of the process independently; 10 = Fully independent in toileting, including transferring, dressing, and cleaning	Penggunaan Toilet: 0 = Tergantung / Bergantung; 5 = Memerlukan Bantuan, Namun Mampu Melakukan Sebagian Secara Mandiri; 10 = Mandiri (Melepas Dan Mengenakan Pakaian, Berpakaian, Serta Membersihkan Diri)	Toilet Use: 0 = Fully dependent; 5 = Requires some help but can manage part of the process independently; 10 = Fully independent in toileting, including transferring, dressing, and cleaning	-
8.	Transfers (Bed to Chair and Back): 0 = Unable to transfer and lacks sitting balance; 5 = Requires major physical assistance from one or two people but can sit; 10 = Needs	Pemindahan (Dari Tempat Tidur Ke Kursi Dan Belakang): 0 = Tidak Mampu, Tidak Dapat Duduk Dengan Seimbang; 5 = Bantuan Besar (Satu Atau Dua Orang, Secara Fisik), Dapat Duduk; 10 =	Transfers (Bed to Chair and Back): 0 = Unable to transfer and lacks sitting balance; 5 = Requires major physical assistance from one or two people but can sit; 10 = Needs minimal assistance (verbal or	"Back" diterjemahkan sebagai "belakang" (ambigu). Ganti dengan: "Dari tempat tidur ke kursi dan kembali".

	minimal assistance (verbal or physical); 15 = Completely independent in transferring between bed and chair	Bantuan Kecil (Secara Verbal Atau Fisik); 15 = Mandiri	physical); 15 = Completely independent in transferring between bed and chair	
9.	Mobility (on Level Surfaces): 0 = Immobile or walks less than 50 yards; 5 = Independently uses a wheelchair, able to cover more than 50 yards; 10 = Walks more than 50 yards with the help of one person (verbal or physical); 15 = Walks independently for more than 50 yards, with or without assistive devices (e.g., a cane)	Mobilitas (Pada Tingkat Permukaan): 0 = Tidak Dapat Bergerak Atau Kurang Dari < 50 Yard; 5 = Tidak Bergantung Pada Kursi Roda, Termasuk Tikungan, > 50 Yards; 10 = Berjalan Dengan Bantuan Satu Orang (Secara Verbal Atau Fisik) > 50 Yards; 15 = Mandiri (Tetapi Dapat Menggunakan Alat Bantu Apa Pun; Misalnya, Tongkat) > 50 Yard	Mobility (on Level Surfaces): 0 = Immobile or walks less than 50 yards; 5 = Independently uses a wheelchair, able to cover more than 50 yards; 10 = Walks more than 50 yards with the help of one person (verbal or physical); 15 = Walks independently for more than 50 yards, with or without assistive devices (e.g., a cane)	Mobilitas tidak diterjemahkan secara medis bisa diganti dengan ” gerakan fisik yang dilakukan sehari-hari seperti berjalan. 50 yard diganti dengan 45–50 meter (misal dari rumah ke jalan depan).
10.	Stairs: 0 = Unable to climb stairs; 5 = Requires assistance (verbal, physical, or with aids); 10 = Independent in climbing stairs	Naik Turun Tangga: 0 = tidak mampu; 5 = butuh bantuan (verbal, fisik, dan alat bantu); 10= mandiri	Stairs: 0 = Unable to climb stairs; 5 = Requires assistance (verbal, physical, or with aids); 10 = Independent in climbing stairs	Tidak semua rumah memiliki tangga. Perlu dijelaskan bahwa konteksnya adalah lingkungan umum atau fasilitas publik.

The forward translation stage by professional translators produces an Indonesian version that is semantically equivalent to the original version. However, cultural adaptation is necessary for terms like "modified diet" (adjusted to "doctor-regulated diet") and "shaving" (changed to "grooming") to be relevant to the local context. Backward translation affirms the consistency of meaning without significant deviation. The novelty of this research lies in the double translation (Indonesian-Sundanese), which has not been previously conducted for the ischemic stroke

population in Indonesia.

The next stage is cultural adaptation into the Sundanese language. This adaptation process is carried out by two Sundanese language teachers with educational backgrounds in Education and Sundanese Literature, who are actively teaching at SMAN 1 Singaparna and SMK Bhakti Kencana Ciamis. The involvement of regional language experts is crucial to ensure that the conceptual meaning in each questionnaire item is maintained, and that the use of terms and expressions aligns with local culture and is easily understood by respondents, as per the cross-cultural adaptation principles outlined by (Beaton et al., 2000). The table of the reviewed cultural adaptation results is presented in Table 2.

Table 2. Results of Cultural Adaptation of the Barthel Index Questionnaire

No	Pertanyaan
1.	Tuang 0 = teu tiasa 5 = peryogi bantosan pikeun motong, ngoles mantega, atanapi peryogi tuangeun khusus ti dokter. 10 = bisa sorangan
2.	Mandi 0 = masih gumantung kana bantuan batur 5 = tiasa mandi ku nyalira
3.	Ngurus awak 0 = merlukeun bantosan dina ngurus diri sorangan 5 = tiasa ngurus raray, rambut, waos, atawa nyukuran sorangan (upami alat disayogikeun)
4.	Maké baju 0 = masih gumantung kana bantuan ti batur 5 = merlukeun bantuan sawaréh 10 = tiasa sorangan (kaasup masangkeun kancing, séléting, tali sapatu jeung sajabana
5.	Miceun 0 = heunte lancar , atanapi peryogi dipasihan bantosan ku obat resep dokter 5 = kadang kawis sesah 10 = lancar, normal
6.	Kahampangan 0 = heunteu katahan, atanapi kedah nganggo alat 5 = kadang kawis sesah 10 = lancar, normal
7.	Ngagunakeun jamban 0 = masih gumantung kana bantuan batur

	5 = butuh bantuan, tapi bisa ngalakukeun sorangan 10= bisa sorangan (kaasup ngabuka baju, ngagunakeun jamban, jeung beberesih diri)
8.	Pindah/ngageser (ti kamar kana korsi atanapi ti korsi ka kasur) 0 = teu tiasa, teu ajeg calik 5 = butuh bantosan (ku sajalmi atawa dua jalmi sangkan tiasa calik) 10= butuh bantuan saalit (dibantuan ku sa jalmi kanggé diarahkeun sacara verbal) 15= bisa sorangan
9.	Usik malik dina daérah anu datar 0 = teu usik < 50 *yard* 5 = ngagunakeun korsi roda sorangan > 50 *yard* 10= leumpang di bantuan ku saurang (*verbal* atawa sacara fisik) > 50 *yard* 15= bisa sorangan (sanajan dibantuan ngagunakeun jangka) > 50 *yard*
10.	Naék turun tangga 0 = teu bisa 5 = butuh bantuan (*verbal*, fisik, jeung alat bantu) 10= bisa sorangan

After obtaining the formula from the cultural adaptation into Sundanese, a pilot test was conducted on fifteen patients to measure their understanding of the culturally adapted questionnaire. The next stage involved applying the results of the cultural adaptation pilot test to an assessment related to the assessment of reliability and validity of the Barthel Index adapted into the Sundanese language questionnaire, focusing on its validity and reliability.

Pilot Testing

Pilot testing of the Barthel Index questionnaire in Sundanese was conducted on 15 ischemic stroke patients at RS KHZ Mustofa. The aim is to evaluate the clarity of the language, cultural relevance, and practicality of the instrument. Validity analysis with SPSS shows that all items meet the valid criteria ($p < 0.05$), with the highest Pearson correlation coefficients on the eating item ($r = 0.833$) and defecation item ($r = 0.831$), reflecting the clarity of basic activities in the local context (Terwee et al., 2007). The stair climbing item ($r = 0.564$) recorded the lowest validity due to cultural irrelevance—33.3% of patients residing in Tasikmalaya district reported not having stairs in their living environment (Wardaningtyas et al, 2025). The main barrier identified was the medical term "incontinence," which was only understood by 20% of patients with a basic education (Nurhaswinda et al., 2025). The adaptation solution in the form of changing to a behavioural description ("unable to hold bowel/bladder movements") successfully improved patient understanding of the question item (Beaton et al., 2000). Patient

qualitative feedback confirms the clarity of the language, such as ("The sentences are short but clear..."), which is important to obtain accurate and condition-appropriate independence measurement results (Ozcan Kahraman et al., 2020). The results of the validation test on 15 respondents (pilot testing) using SPSS are presented in Table 3.

Table 3. Results of the Pilot Testing of the Culturally Adapted Barthel Index Questionnaire

Item	r-tabel (df=13, α=0.05)	r-hitung (Korelasi Pearson)	Sig. (2-tailed)	Valid/Tidak Valid
Q01	0.514	0.833**	0.000	Valid
Q02	0.514	0.794**	0.000	Valid
Q03	0.514	0.785**	0.001	Valid
Q04	0.514	0.768**	0.001	Valid
Q05	0.514	0.831**	0.000	Valid
Q06	0.514	0.693**	0.003	Valid
Q07	0.514	0.739**	0.001	Valid
Q08	0.514	0.685**	0.006	Valid
Q09	0.514	0.619**	0.014	Valid
Q10	0.514	0.564*	0.029	Valid

Validity and Reliability Testing Using Smart PLS 4

Before analyzing regarding the associations among variables within the structural frameworl, the initial step that must be taken is aimed at determining the measurement accuracy and internal consistency of the constructs used in the research. This test is important to ensure that the indicators used truly represent the intended the construct demonstrated satisfactory internal consistency. In this research, analyses of validity and reliability were performed using an analytical method employing Partial Least Squares Structural Equation Modeling (PLS-SEM) implemented via the SmartPLS 4 software.

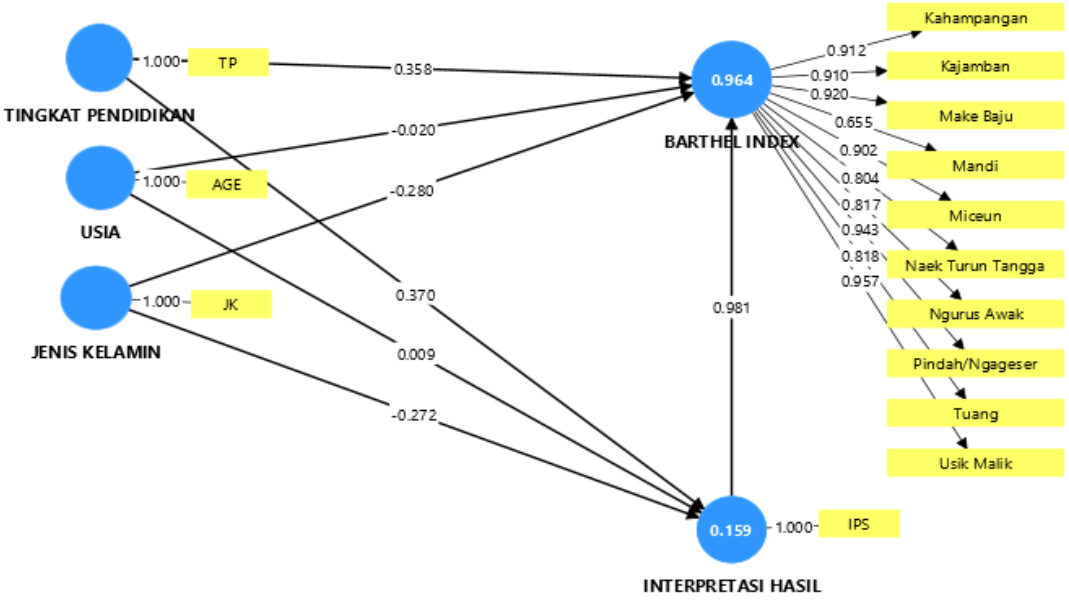

Figure 1. SEM Analysis Results

Structural Equation Modelling (SEM) using SmartPLS 4 on 40 samples shows a very good model fit. The coefficient of determination (R^2) of 0.964 for the Barthel Index construct indicates that 96.4% of the variance in functional independence can be explained by demographic variables (education, age, gender). Education demonstrates a strong and significant positive effect influence ($\beta = 0.358$, $p < 0.01$), a result that corroborates earlier findings (Mather et al., 2024) about the role of health literacy in supporting rehabilitation compliance. On the contrary, the female gender shows a negative influence ($\beta = -0.280$, $p < 0.05$), reinforcing the report (Handoko et al., 2025) regarding more severe disabilities in female stroke patients. The Barthel Index construct itself mediates 98.1% of the variation in clinical outcome interpretation ($\beta = 0.981$, $p < 0.001$), affirming its dominance as the primary predictor of understanding rehabilitation progress (Shah et al 1989).

Table 4 Construct Reliability and Validity

	Cronbach`s alpha	Composite reliability (rho_A)	Composite reliability (rho_c)	Average Variance Extracted (AVE)
Barthel Index	0,962	0,968	0,968	0,754

Convergent Validity in SEM

The assessment of convergent validity relies on the analysis of outer loadings and AVE values, which serve as crucial indicators of construct validity. All questionnaire items recorded outer loading above 0.70 (the ideal validity threshold), except for the "bathing" item (0.655), which was retained due to its clinical significance in the assessment of independence (Collin et al., 1988). The AVE value of the Barthel Index construct is 0.754, convincingly exceeding the minimum threshold of 0.50, indicating that 75.4% of the variance in the indicators is adequately accounted for by the underlying latent construct (Baskara et al., 2024). This achievement is superior compared to the Turkish version adaptation by (Ozcan Kahraman et al., 2020) which reported an AVE of 0.68, simultaneously demonstrating the methodological superiority of cultural adaptation in this research.

Reliability in *SEM*

Cronbach's alpha 0.962 indicates very high internal consistency (Oviantara & Kasmawati, 2024). Composite reliability 0.968 confirms the stability of the measurement (Siti Nurdiyanah et al., 2024). The rho_A value of 0.968 reinforces the reliability findings. This result is superior to the Portuguese adaptation (α 0.89) (dos Reis et al., 2021). These three reliability indicators reinforce the conclusion the Barthel Index version modified for cultural relevance is not only reliable but also highly suitable for measuring the level of individual independence in a cultural

context different from the original version.

The assessment of the functional independence of ischemic stroke patients is an important aspect of the recovery process and the evaluation of therapy success. One of the most commonly used instruments to measure the level of independence is the Barthel Index, which evaluates basic activities of daily living such as eating, bathing, dressing, mobility, and elimination control.

In the study conducted by (Alifiar et al., 2025), the translation, validation, and cultural adaptation process of the Barthel Index in the context of the West Java population, specifically with the Indonesian and Sundanese versions, showed that this measurement tool is valid and reliable with a Cronbach's Alpha value of ≥ 0.87 and an Average Variance Extracted (AVE) of ≥ 0.5. Similar findings were also confirmed in the study by (Alifiar et al., 2025), which stated that the Barthel Index has a strong correlation (r = 0.639–0.846) and high reliability in assessing the daily functions of ischemic stroke patients in the West Java region.

From the perspective of therapy effectiveness, a study by (Kamal et al., 2021) showed that the use of aspirin in stroke patients significantly improved Barthel Index scores. Before therapy, most patients were in the mild to moderate dependency category, but after 30 days of aspirin therapy, 95.24% of patients showed improvement towards the independent category. Another study by (Wisastry et al., 2024) highlights that the use of single antiplatelets (aspirin or clopidogrel) as well as their combination affects the time to stroke recurrence. The combination of aspirin-clopidogrel showed a longer recurrence time (237.39 days), compared to single aspirin (127.86 days) and single clopidogrel (77 days). A similar study at RS X Tasikmalaya by (Rosanti et al., 2024) also found that the combination of antiplatelet agents resulted in the longest average recurrence time (140.16 days) compared to single-agent use. This indicates a better effectiveness in preventing recurrent strokes with combination therapy.

In addition to clinical aspects, bioinformatics approaches such as those conducted by (Astuti et al., 2023) rovide molecular insights into ischemic stroke. This study identified three main genes significantly associated with ischemic stroke: GCKR, ALDH2, and F5, with the highest expression found in liver and blood tissues. Certain SNP polymorphisms such as rs1260326 and rs671 were found to have a strong association with stroke risk. These findings are crucial for the development of genetically based personalized therapies and offer opportunities for early risk detection.

Conclusion

This study successfully conducted a cross-linguistic and contextual adaptation of the Barthel Index to align with the Sundanese cultural context among first-time ischemic stroke patients in West Java. The adapted instrument demonstrated excellent psychometric performance, with strong convergent validity (AVE = 0.754) and high internal consistency (Cronbach’ s α = 0.962), meeting international measurement standards. Cultural and linguistic

refinements—such as simplifying medical terminology and accommodating region-specific living conditions—substantially improved patient comprehension, particularly among individuals with lower educational backgrounds.

Structural Equation Modeling analysis revealed a significant positive effect of educational level on functional independence, while also identifying a negative association with female gender, underscoring the need for education-sensitive and gender-responsive rehabilitation strategies. Despite these strengths, the single-center design may limit the generalizability of the findings. Future studies should validate the instrument across broader Sundanese populations, examine its longitudinal responsiveness, and explore its integration into standardized stroke rehabilitation protocols in West Java in accordance with the Indonesian national health guidelines.

Conflicts of Interest

The author declares no conflict of interest related to this work.

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