JETR

JOURNAL OF
EXERCISE THERAPY
AND REHABILITATION

Journal of Exercise Therapy and Rehabilitation. 2026;13(2):179-186. DOI: 10.15437/jetr.1621233

ORIGINAL ARTICLE

Relationship between kinesiophobia and trunk control, functional mobility, fear of falling and quality of life in stroke patients

İnmeli hastalarda kinezyofobinin gövde kontrolü, fonksiyonel mobilite, düşme korkusu ve yaşam kalitesi ile ilişkisi

Selin KORKMAZ ERMAN[1], Osman ÇOBAN[2]

Abstract

Purpose: The aim of our study was to investigate the relationship between kinesiophobia, trunk control, functional mobility and fear of falling and quality of life in stroke patients.
Methods: This study was designed as a cross-sectional observational study. 50 patients participated in the study. Kinesiophobia was assessed using the Tampa Scale for Kinesiophobia (TSK), trunk control using the Trunk Impairment Scale (TIS), functional mobility using the Timed Up and Go Test (TUG), fear of falling using the Tinetti Falls Efficacy Scale (TFES), and quality of life using the Short Form-12 (SF-12) physical Component (SF-12 PC) and Mental component (SF-12 MC) scores.
Results: The TSK showed a strong negative correlation with both the SF-12 PC Score ($r=-0.652$, $p<0.01$) and the SF-12 MC Score ($r=-0.391$, $p<0.01$). A strong positive correlation was observed between TSK and TFES total scores ($r=0.790$, $p<0.01$). Additionally, TSK demonstrated low-to-moderate negative correlations with TIS total scores ($r=-0.425$, $p<0.01$) and trunk performance ($r=-0.353$, $p<0.05$).
Conclusion: Considering the detrimental impact of post-stroke kinesiophobia on trunk control, quality of life, and fear of falling, incorporating kinesiophobia-focused interventions into rehabilitation programs may enhance therapeutic outcomes.
Keywords: Stroke, Fear, Postural balance, Quality of life

Öz

Amaç: *Çalışmamızın amacı inmeli hastalarda kinezyofobinin gövde kontrolü, fonksiyonel mobilite, düşme korkusu ve yaşam kalitesi ile ilişkisini incelemekti.*
Yöntem: *Bu çalışma kesitsel gözlemsel bir çalışma olarak tasarlandı. Çalışmaya inme geçirmiş 50 birey katıldı. Kinezyofobi Tampa Kineziyofobi Ölçeği (TKÖ) ile, gövde kontrolü Gövde Bozukluğu Ölçeği (GBÖ) ile, fonksiyonel mobilite Zamanlı Kalk ve Yürü Testi (ZKYT) ile, düşme korkusu Tinetti Düşme Etkinliği Ölçeği (TDEÖ) ile ve yaşam kalitesi Kısa Form 12 (SF-12) fiziksel (SF-12 FK) ve mental skorları (SF-12 MK) ile değerlendirildi.*
Bulgular: *TKÖ ile hem SF12-FK ($r=-0,652$, $p<0,01$) hem de SF12-MK ($r=-0,391$, $p<0,01$) arasındaki korelasyon negatif ve yüksek düzeyde; TDEÖ toplamı ($r=0,790$, $p<0,01$) ile pozitif ve yüksek düzeyde, GBÖ toplam skorları ile negatif yönde ve zayıf düzeyde anlamlı bir ilişki ($r=-0,353$, $p<0,05$) bulundu.*
Sonuç: *İnme sonrası kinezyofobinin gövde kontrolünü ve yaşam kalitesini olumsuz etkilediği, ayrıca düşme korkusunu arttırdığı göz önüne alındığında, kinezyofobiye yönelik müdahalelerin tedavi sonuçlarını olumlu yönde etkileyebileceği düşünülmektedir.*
Anahtar kelimeler: *İnme, Korku, Postural denge, Yaşam kalitesi*

1:Department of Neuroscience, Health Science Institute, Uskudar University, Istanbul, Türkiye.
2:Department of Physical Therapy and Rehabilitation, Faculty of Health Science, Uskudar University, Istanbul, Türkiye.
Corresponding Author: Osman Çoban: osman.coban@uskudar.edu.tr
ORCID IDs (order of authors): 0009-0004-3139-0969; 0000-0003-4493-2478
Received: January 16, 2025. Accepted: January 6, 2026

INTRODUCTION

Stroke is a disease lasting more than 24 hours and characterized by the rapid onset of signs and symptoms of acute, focal cerebral dysfunction attributed to vascular damage (infarction, hemorrhage) of the central nervous system.[1] Although its incidence has decreased by 30% and its associated mortality rate by 14% in recent years, it continues to be a major burden at both the individual and the societal levels, and is the third leading cause of serious and long-term disability worldwide and the second leading cause of death.[2-4]

Following a stroke, motor, sensory, and cognitive disorders usually occur. Almost 50% of cases have motor deficits that lead to a general decrease in walking, balance, and physical function[5], while 11%–60% have sensory disorders.[6] As a result of musculoskeletal and psychosocial complications, stroke patients experience postural disorders, balance and mobility losses, and falls, leading to reduced independence in daily living and lower overall quality of life.[7, 8]

Kinesiophobia is a concept that describes the fear of physical activity resulting from an individual's sensitivity to painful injury or re-injury.[9] Kinesiophobia can lead to avoidance behavior, which over time results in disability, immobility, hopelessness, and resulting in the patient being caught in a cycle of increasing fear of pain, worsening disability, and greater distress.[10] It also increases with emotional and physical traumatic experiences, causing a decrease in physical activity level and quality of life.[9-11]

Postural disorders and balance impairments frequently observed after stroke may increase the risk of falls, which can subsequently intensify both fear of falling and kinesiophobia. Prior research in stroke populations has demonstrated that kinesiophobia is associated with stroke severity and disease duration, although no significant relationship has been identified with neuropathic pain.[12] Studies have also shown that individuals with higher levels of kinesiophobia exhibit greater fear of falling[13], and emerging evidence indicates that both kinesiophobia and quality of life are significant determinants of physical activity levels in stroke survivors, underscoring the broader functional implications[14], and evidence from other clinical populations further supports these findings, demonstrating strong associations between kinesiophobia and impaired postural control, more severe depressive symptoms, and higher pain levels.[15] Despite the frequent coexistence of these factors in individuals with stroke, comprehensive investigations examining the relationship between kinesiophobia, trunk control, functional mobility, fear of falling, and health-related quality of life remain scarce. To address this gap, the present study examined these associations and was guided by the hypothesis that higher levels of kinesiophobia would be associated with poorer trunk control, reduced mobility, increased fear of falling, and lower quality of life. Clarifying these relationships may assist clinicians and caregivers in recognizing the impact of kinesiophobia and integrating targeted strategies into stroke rehabilitation to enhance functional independence and overall quality of life.

METHODS

The ethics approval for the study was obtained from the Ethics Committee of Uskudar University (61351342-08.2023-48) and a clinical trial record was created on the ClinicalTrial.gov website (Clinical Trial, NCT06088342). Patient selection and recruitment was conducted by the Declaration of Helsinki, revised in 1983, and all subjects signed a written informed consent form before their inclusion in the study. This study was designed as a cross-sectional observational study.

Participants

Between October and December 2023, fifty-five stroke patients were evaluated at the Physical Therapy Clinic of NPİstanbul Brain Hospital. The inclusion criteria required participants to be 18 years of age or older; to have sufficient cognitive capacity to meet the study requirements (Mini-Mental State Examination score >21); to have an ischemic or hemorrhagic stroke confirmed by neuroimaging; to be at least three months post-stroke; and to have had independent walking ability prior to the stroke. Among these patients, five with musclesketeal disorders and brain tumor, or

cranial surgery complaints were excluded from the study. An evaluation was conducted regarding patients' demographic and physical characteristics along with their medical history. Kinesiophobia with the Tampa Scale of Kinesiophobia (TSK); trunk control with the Trunk Impairment Scale (TIS); functional mobility and balance with the Timed Up and Go Test (TUG); fear of falling with the Tinetti Falls Efficacy Scale (TFES); quality of life with Short Form (SF-12) were evaluated.

Assessment

Mini Mental State Examination (MMSE)

The Mini Mental State Examination is a 30-point questionnaire widely used in clinical and research settings to measure cognitive impairment, including simple tasks in several domains: time and place testing, repeated word lists, arithmetic such as serial subtraction of seven, language use and comprehension, and basic motor skills.[16] Cognitive impairment is classified based on total scores as follows: severe (<10), moderate (10–20), mild (21–27), and none (>27).[17]

Tampa Scale of Kinesiophobia (TSK)

It is a patient-reported outcome measure designed to help identify kinesiophobia.[18] The Tampa Scale of Kinesiophobia, which has been validated and shown to be reliable in Turkish, comprises 17 items and is scored using a 4-point Likert scale.[19] The total score is between 17 and 68 points. A score above 37 is considered high kinesiophobia.[20]

Trunk Impairment Scale (TIS)

This scale, which evaluates static and dynamic sitting balance and trunk coordination, consists of 17 parameters. The total score is a minimum of 0 and a maximum of 23 points. A higher score indicates better performance.[21] The highest scores found after the measurements used in TIS are repeated three times are used.[22] The validity and reliability of the Turkish version of the survey have been established through psychometric evaluation.[23]

Timed Up and Go Test (TUG)

TUG is used to assess functional mobility and dynamic balance.[24] The individual stands up from a chair, walks 3 meters, returns, and sits down again. The test is repeated twice. The elapsed time is measured in seconds.[25] A time of 14 seconds or more is considered a high risk of falling[26].

Tinetti Falls Efficacy Scale (TFES)

The Tinetti Falls Efficacy Scale is a 10-activity scale used to assess the degree of perceived effectiveness (i.e., self-confidence) in preventing falls during activities of daily living and the fear of falling. In the Turkish version of the validated questionnaire, items are scored from 0 (indicating a high sense of safety) to 10 (indicating a low sense of safety), and a total score exceeding 70 is considered indicative of a significant fear of falling.[27, 28]

Short Form (SF-12)

The Short Form Health Survey (SF-12), validated and reliable in Turkish, is a questionnaire that examines summary scores related to physical and mental health components.[29,30] It contains 12 items covering eight domains: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. The Physical and Mental Components are derived from these domains. Both the domains and summaries are scored from 0 to 100, with higher values representing better health.[31]

Statistical analysis

An a priori power analysis was conducted using G*Power software (Version 3.1.9.6) to determine the required sample size. Based on the effect sizes reported by Demirci et al.[27] regarding the relationships between fear of movement, balance, and fear of falling in individuals with stroke, and assuming a two-tailed significance level of $\alpha = 0.05$ and a desired statistical power of 0.95, the minimum required sample size was calculated as 40 participants. In line with this estimation, at least 40 patients were planned for recruitment, and a total of 50 stroke survivors were ultimately included in the study. All statistical analyses were performed using the NCSS (Number Cruncher Statistical System) 2007 software (Kaysville, Utah, USA). The distribution characteristics of the data were examined using the Shapiro–Wilk test, in addition to descriptive statistical indicators such as mean, standard deviation, median, frequency, percentage, minimum, and maximum values. The relationships between quantitative variables were assessed using Spearman's correlation analysis. In interpreting correlation coefficients, values between 0.00–0.19 were considered very weak, 0.20–0.39 weak, 0.40–0.59 moderate, 0.60–0.79 strong, and 0.80–1.00 very strong. Positive coefficients

indicated a direct relationship, whereas negative coefficients indicated an inverse relationship between variables.[32] Statistical significance was evaluated at the levels of $p < 0.01$ and $p < 0.05$.

RESULTS

All analyses were conducted on data obtained from the 50 participants included in the study. Descriptive statistics are presented in Table 1.

TSK showed a strong negative correlation with the SF-12 PC Score ($r=-0.652$, $p<0.01$) and SF-12 MC ($r=-0.391$, $p<0.01$). A strong positive correlation was observed between TSK and TFES total scores ($r=0.790$, $p<0.01$). In addition, TSK demonstrated low negative correlations with TIS total scores ($r=-0.353$, $p<0.05$) (Table 2).

DISCUSSION

Our study was conducted to examine kinesiophobia in people with stroke and its relationship with quality of life, fear of falling, trunk balance and functional mobility. According to the findings of our study, stroke patients who met the inclusion criteria showed impaired trunk control and functional performance, increased levels of kinesiophobia and fear of falling, and reduced quality of life.

The presence of a neurological disease increases the risk of the emergence or exacerbation of fear of movement (kinesiophobia). In the study conducted by Wasiuk-Zowada et al. with individuals who had Parkinson's, multiple sclerosis and stroke, they reported that 67% of the cases had kinesiophobia.[32] Demographic differences such as age, gender, and level of education affect the level of kinesiophobia in patients. In the study conducted by Gunay on the evaluation of kinesiophobia in patients with neck pain and its relationship with demographic data, pain, and quality of life, the level of kinesiophobia in women was found to be significantly higher than in men, and lower in university graduates than in others. A weak negative correlation was observed between kinesiophobia and quality of life (SF-36).[14] In this study, no statistically significant association was found between age and kinesiophobia, fear of falling, or quality of life. However, women participants demonstrated significantly higher levels of kinesiophobia and fear of falling compared to men, alongside lower scores in both the mental and physical components of the SF-12 quality of life scale. These findings indicate that after experiencing a stroke, women tend to be more affected by kinesiophobia and a fear of falling than men, which may lead to a more significant decline in their overall quality of life.

Balance and postural control disorders seen in stroke patients are accompanied by kinesiophobia and fear of falling, which significantly negatively affects the quality of life and rehabilitation of the patients. Savcun Demirci et al. [27] conducted a study to evaluate the relationship kinesiophobia, balance and fear of falling in stroke patients with shoulder pain and determined that there was a negative correlation between shoulder pain and fear of falling and kinesiophobia, and a positive correlation between fear of falling and kinesiophobia. In another study examining fear of falling and balance performance in stroke patients, Oğuz et al.[33] evaluated the relationship between objective balance, fear of falling and perceived sense of balance measurements obtained from Berg Balance Scores and fear of falling obtained from the Falls Efficacy Scale. They showed that there was a strong negative correlation between Berg Balance Scores and falls efficacy measurement scores; a strong positive correlation between perceived sense of balance and falls efficacy measurement scores; a negative correlation was observed between perceived sense of balance measurement scores and Berg balance measurements in left hemiplegic patients, and there was no relationship between Berg Balance Scores and perceived sense of balance measurement scores in right hemiplegic patients. Consistent with previous studies that share similarities in terms of assessment methods and parameters, our study also identified significant associations between kinesiophobia and both fear of falling and the physical component scores of quality of life, as well as between functional mobility (TUG) scores and trunk control (TUS) scores. Based on these findings, we believe that evaluating and taking into consideration the fear of falling and

Table 1. Baseline characteristics (N=50).

	Mean±SD
Age (years)	60.94±12.85
Height (cm)	167±7.0
Weight (kg)	75.3±12.62
Body Mass Index (kg/m²)	27.01±4.04
Duration of Illness (Month)	35.82±67.43
Tampa Scale of Kinesiophobia (TSK)	40.14±4.87
SF-12 Physical Component (SF12-PC) Score	33.92±7.04
SF-12 Mental Component (SF12-PC) Score	38.90±7.34
Timed Up and Go test (TUG)	23.13±11.11
Tinetti Falls Efficacy Scale (TFES)	55.92±21.33
Trunk Impairment Scale (TIS) Total Score	12.66±4.82
	n (%)
Gender (Female/Male)	17/33 (34/66)
Lesion location (Right/Left)	26/24 (52/48)

Table 2. Correlation between SF-12, Timed up Go Test, Tinetti Falls Efficiency Scale, Trunk Impairment Scale (TIS) Total Score and Tampa Scale of Kinesiophobia (TSK).

	Tampa Scale of Kinesiophobia (TSK)
	r (p)
SF-12 Physical Component (SF12-PC) Score	-0.652 (<0.01)
SF-12 Mental Component (SF12-MC) Score	-0.391 (<0.01)
Timed Up and Go Test (TUG)	0.393 (<0.01)
Tinetti Falls Efficacy Scale (TFES)	0.790 (<0.01)
Trunk Impairment Scale (TIS) Total Score	-0.353 (<0.05)

r: Spearman's Rho Test.

kinesiophobia in the rehabilitation of stroke patients will positively affect both quality of life and functional performance.

There is a similarity between kinesiophobia and movement avoidance behavior due to fear of falling in stroke patients. Both start with pain or the experience of falling. Physical activity avoidance behavior that develops due to these experiences may reduce the patients' muscle strength, performance in daily life activities and postural control. In the study by Jo et al.[34] examining the relationship between fear of falling (TFES), activity-specific balance, confidence scale (ABC) and kinesiophobia (TSK), they reported that TSK and TFES had a weak negative correlation, TSK and ABC had a moderate negative correlation; TFES had a very strong positive relationship when compared to Activity-specific balance, ABC. Those who had previously experienced falling had significantly lower TFES and ABC scores than those who had not fallen. In our study, there is a positive and highly significant correlation between kinesiophobia (TSK) and fear of falling. These results show that kinesiophobia develops in stroke patients and that kinesiophobia is associated with fear of falling. Kinesiophobia should be evaluated in stroke rehabilitation.

Body awareness, one of the basic factors affecting the daily living activities and motor

function during rehabilitation of stroke patients, is closely related to postural control and degree of independence.[35] In the study by Sarıçan et al., in which they evaluated the relationship between body awareness in stroke patients and trunk control (TIS), affected upper extremity function (Motor Activity Diary-28), balance (Berg Balance Scale), fear of falling (TFES), functional level (Barthel Daily Living Activities Index) and independence level (Functional Independence and Independence Level Measures), they stated that body awareness is one of the factors affecting trunk control, affected upper extremity function, balance, fear of falling, functional level and independence level.[36] In our study, there is a negative and weakly significant relationship between the fear of falling (FES) and the total trunk impairment scale; and between kinesiophobia (TKS) and trunk control (TIS). Based on these findings, we conclude that in addition to the studies conducted on trunk control and functional performance in rehabilitation programs, approaches aimed at preventing the fear of falling and movement may be useful in providing body awareness.

There are few studies showing the determinant value of gaining trunk control in the early period after stroke on daily living activities. In the study conducted by Hsieh et al. to evaluate the relationship between trunk control and comprehensive ADL (Activities of Daily Living) function in the early stage 6 months after stroke, they showed that trunk control scores, age, Fugl-Meyer motor test score and Barthel Index score were the strongest determinants of comprehensive ADL function.[37] In another study conducted by Karthikbabu et al. to evaluate the relationship between trunk control, core muscle strength and balance confidence in chronic paralysis patients, they showed that trunk control, core muscle strength and balance confidence were significantly and strongly positively correlated.[38] In our study, similar to the studies of Hsieh and Karthikbabu, trunk control was positively and moderately correlated with quality of life (SF-12 physical scores; a negative and moderately significant correlation was found between functional performance measurements. Considering that trunk control is one of the important goals of stroke rehabilitation, we believe that treatment approaches aimed at gaining trunk control will improve the functional performance and trunk control of the patients and will be an important predictive tool for the prediction of quality of life in the advanced phase.

Limitations

A limitation of this study is the inability to stratify participants by stroke subtype, which may restrict the generalizability of the results. Additionally, heterogeneity in stroke duration and rehabilitation processes may have confounded the observed outcomes.

Conclusion

In our study, which aimed to investigate the the relationship between kinesiophobia and trunk control, functional mobility and fear of falling and quality of life in stroke patients. It was shown that kinesiophobia is an important finding which was related to quality of life, fear of falling and trunk control and also negatively affect quality of life in stroke survivors, increase fear of falling and risk of falling. We believe that considering it in the rehabilitation process and developing rehabilitation approaches to reduce kinesiophobia and fear of falling will positively affect the results of stroke treatment.

Acknowledgement: *None*

Authors' Contributions: SKE: Case recruitment, data collection, literature review;**OÇ:** Hypothesis formulation, study design, data analysis and writing

Funding: *None*

Conflicts of Interest: *None*

Ethical Approval: The ethics approval for the study was obtained from the Ethics Committee of Uskudar University (61351342-08.2023-48)

REFERENCES

1. Murphy SJ, Werring DJ. Stroke: causes and clinical features. Medicine. 2020;48:561-566.
2. Amoah D, Schmidt M, Mather C, et al. An international perspective on young stroke incidence and risk factors: A scoping review. BMC Public Health. 2024;24:1627.
3. Saini V, Guada L, Yavagal DR. Global epidemiology of stroke and access to acute ischemic stroke interventions. Neurology. 2021;97:S6-S16.

4. Potter TB, Tannous J, Vahidy FS. A contemporary review of epidemiology, risk factors, etiology, and outcomes of premature stroke. Curr Atheroscler Rep. 2022;24:939-948.
5. Einstad MS, Saltvedt I, Lydersen S, et al. Associations between post-stroke motor and cognitive function: A cross-sectional study. BMC Geriatrics. 2021;21:103.
6. Tyson SF, Crow JL, Connell L, et al. Sensory impairments of the lower limb after stroke: A pooled analysis of individual patient data. Top Stroke Rehabil. 2013;20:441-449.
7. Hammad U, Anderson AW, Scammon E, et al. Balance and walking speed outcomes in individuals receiving inpatient rehabilitation for acute cerebellar stroke. Nurs Rep. 2024;14:2935-2945.
8. Krause AA, Reimold NK, Embry AE, et al. Effect of mediolateral leg perturbations on walking balance in people with chronic stroke: A randomized controlled trial. Plos one. 2024;19:e0311727.
9. Asiri F, Reddy RS, Tedla JS, et al. Kinesiophobia and its correlations with pain, proprioception, and functional performance among individuals with chronic neck pain. PloS One. 2021;16:e0254262.
10. Chen X, Yang X, Li Y, et al. Influencing factors of kinesiophobia among stroke patients with hemiplegia: A mixed methods study. Clin Neurol Neurosurg. 2024;240:108254.
11. Eren F, Yucel K. Comparison of blood lipid parameters in ischemic and hemorrhagic stroke patients and their relationship with mortality. Sakarya Med J. 2021;11:400-408.
12. Koca TT, Gülkesen A, Nacitarhan V, et al. Does kinesiophobia associated with poststroke neuropathic pain and stroke severity? Pain. 2019;22:60-65.
13. Adlı H, Talu B. Is the cause of kinesiophobia in stroke patients pain, or is it due to a lack of postural control, the affected side, and depression? Turk J Neurol. 2025;31:25-33.
14. Gunay Ucurum S. The relationship between pain severity, kinesiophobia, and quality of life in patients with non-specific chronic neck pain. J Back Musculoskel Rehabil. 2019;32:677-683.
15. Bąk E, Młynarska A, Marcisz C, et al. Kinesiophobia in elderly polish patients after ischemic stroke, including frailty syndrome. Neuropsychiatr Dis Treat. 2022;18:707-715.
16. Jia X, Wang Z, Huang F, et al. A comparison of the Mini-Mental State Examination (MMSE) with the Montreal Cognitive Assessment (MoCA) for mild cognitive impairment screening in Chinese middle-aged and older population: A cross-sectional study. BMC Psychiatry. 2021;21:485.
17. Arevalo-Rodriguez I, Smailagic N, Figuls MR, et al. Mini-Mental State Examination (MMSE) for the detection of Alzheimer's disease and other dementias in people with mild cognitive impairment (MCI). Cochrane Database Syst Rev. 2015;2015:CD010783.
18. Neblett R, Hartzell M, Mayer T, et al. Establishing clinically meaningful severity levels for the Tampa Scale for Kinesiophobia (TSK-13). Eur J Pain. 2016;20:701-710.
19. Aydeniz B, Ersoy S, Çinicioğlu M, et al. Evaluation of kinesiophobia, pain and functional status in adhesive capsulitis and rotator cuff syndrome. Bagcilar Med Bull. 2023;8:270-277.
20. Uluğ N, Yakut Y, Alemdaroğlu İ, et al. Comparison of pain, kinesiophobia and quality of life in patients with low back and neck pain. J Phys Ther Sci. 2016;28:665-70.
21. Yu S-H, Park S-D. The effects of core stability strength exercise on muscle activity and trunk impairment scale in stroke patients. J Exerc Rehabil. 2013;9:362.
22. Sorrentino G SP, Solaro C, Rabini A, et al. Clinical measurement tools to assess trunk performance after stroke: A systematic review. Eur J Phys Rehabil Med. 2018;54:772-784.
23. Sağ RB, Şahin F, Sağ M, et al. Assessing the validity and reliability of the Turkish version of the Trunk Impairment Scale in stroke patients. North Clin Istanb. 2019;6:156-165.
24. Lee K, Lee D, Hong S, et al. The relationship between sitting balance, trunk control and mobility with predictive for current mobility level in survivors of sub-acute stroke. PLoS One. 2021;16:e0251977.
25. Huisinga J, Bruetsch A, Mccalley A, et al. An instrumented timed up and go in facioscapulohumeral muscular dystrophy. Muscle Nerve. 2018;57:503-506.
26. Shumway-Cook A, Brauer S, Woollacott M. Predicting the probability for falls in community-dwelling older adults using the Timed Up & Go Test. Phys Ther. 2000;80:896-903.
27. Demirci CS, Sertel M, Önal B, et al. The relationship between fear of movement, balance and fear of falling in stroke patients with shoulder pain. Turkiye Klinikleri J Health Sci. 2021;6:274-80.
28. Durmuş MS, Sertel M, Arslan SA. Reliability and validity of the Turkish version of the Tinetti Falls Efficacy Scale in older adults and comparison with other fall scales. Top Geriatr Rehabil. 2025;41:14-23.
29. Arovah NI, Heesch KC. Assessment of the validity and reliability of the Indonesian version of Short Form 12 (SF-12). J Prev Med Hyg. 2021;62:E421.

30. Gündüz ÖS, Mutlu S, Basli AA, et al. Validation of the Turkish Form of Short Form-12 health survey version 2 (SF-12v2). Arch Rheumatol. 2021;36:280-286.
31. Jankowska A, Golicki D. Self-reported diabetes and quality of life: findings from a general population survey with the Short Form-12 (SF-12) Health Survey. Arch Medi Sci. 2021;18:1157-1168.
32. Wasiuk-Zowada D, Knapik A, Szefler-Derela J, et al. Kinesiophobia in stroke patients, multiple sclerosis and parkinson's disesase. Diagnostics. 2021;11:796.
33. Oguz S, Demirbuken I, Kavlak B, et al. The relationship between objective balance, perceived sense of balance, and fear of falling in stroke patients. Top Stroke Rehabil. 2017; 24:527-532.
34. Jo S, Choi W, Jung J, et al. Convergence study on the relationship between kinesiophobia and fear of falling in patients with stroke. J Korean Chem Soc. 2019;10:33-41.
35. Ahn S-N. Differences in body awareness and its effects on balance function and independence in activities of daily living for stroke. J Phys Ther Sci. 2018;30:1386-9.
36. Sarıçan Y, Erdoğanoğlu Y, Pepe M. The effect of body awareness on trunk control, affected upper extremity function, balance, fear of falling, functional level, and level of independence in patients with stroke. Top Stroke Rehabil. 2023;30:681-690.
37. Hsieh C-L, Sheu C-F, Hsueh I-P, et al. Trunk control as an early predictor of comprehensive activities of daily living function in stroke patients. Stroke. 2002;33:2626-2630.
38. Karthikbabu S, Verheyden G. Relationship between trunk control, core muscle strength and balance confidence in community-dwelling patients with chronic stroke. Top Stroke Rehabil. 2021;28:88-95.