INPLASY

INPLASY2023110076

doi: 10.37766/inplasy2023.11.0076

Received: 20 November 2023

Published: 20 November 2023

Systematic Review Protocol: Validity and reliability of the Tardieu scale for assessing upper limb spasticity in adults with cerebrovascular disease

Roldan-González, E[1]; Gómez-Rodríguez, FJ[2]; Jácome-Velasco, SJ[3]; Sarria-Gómez, AV[4]; Rosas-Roldán, LA[5].

Corresponding author:
Elizabeth Roldán González

elizabeth.roldan@fumc.edu.co

Author Affiliation:
Fundación Universitaria María Cano.

ADMINISTRATIVE INFORMATION

Support - Authors own.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY2023110076

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 20 November 2023 and was last updated on 20 November 2023.

INTRODUCTION

Review question / Objective The systematic review followed the following PICO protocol: • Population (P): Adults with cerebrovascular disease (stroke) with presence of upper extremity spasticity. • Intervention (I): Not applicable • Comparison (C): Not applicable • Results (O): Validity and reliability of the Tardieu scale. Therefore, the following research question was posed: Is the Tardieu scale valid and reliable for assessing upper limb spasticity in adults with cerebrovascular disease?

Rationale Systematic review is a modality of documentary research that allows the study of accumulated knowledge (written in texts) within a specific area with emphasis on the evaluation of the quality and methodology used in the selected research. The realization of this type of studies in this case, will allow to know the validity and reliability of Tardieu's scale.

It is important to know instruments and research tools validated in the clinical context, in order to broaden academic and professional competences for the evaluation in a more objective and reliable way from Physical Therapy in patients with spasticity in neurological pathologies.

The Tardieu Scale is a clinical measure of spasticity assessment and is more appropriate than other assessment instruments, such as the Ashworth scale, among others. The Tardieu scale assesses resistance to passive movement at both slow and fast speeds and therefore adheres more closely to Lance's definition of spasticity (Haugh et al., 2006). Both parameters of the Tardieu scale have excellent intra-rater and inter-rater reliability in individuals presenting with spasticity (Gracies et al., 2010). However, as with the Ashworth scale some studies mention that they found the Tardieu scale to have insufficient reliability (Ansari et al., 2008b, Mackey et al., 2004, Yam and Leung, 2006), but more rigorous and updated studies are lacking.

Both the Tardieu scale and the Ashworth scale show sufficient inter-rater and intra-rater reliability in adults with spasticity and severe brain injury (Waninge et al., 2011) (Mehrholz et al., 2005). But the Tardieu scale seems to be more feasible and reliable than the Ashworth scale.
(Haugh et al. 2006) stated that further studies are needed to clarify the validity and reliability of the Tardieu scale for a variety of muscle groups in adult neurological patients. So far, no research has been conducted to determine the psychometric properties of the Tardieu scale in neurologically injured persons. Therefore, the purpose of this study is to determine the validity and reliability of the Tardieu scale.
Other studies have analyzed or compared the Tardieu Scale with other scales that when assessing spasticity also consider speed, such as the Australian Spasticity Assessment Scale, without obtaining conclusive results, since the Australian Scale offers a similar level of reliability in adults as the Tardieu Scale when there are no contractures, while in the presence of contracture the Tardieu Scale may be more reliable. They conclude that further studies examining the responsiveness and reliability of the scales in adult neurological cohorts are needed before recommendations can be made (Morris & Williams, 2018).

Condition being studied Stroke is among the four leading causes of death worldwide in the general population, with more than 6 million deaths reported in 2017, representing a 16.6 % increase over the past decade. The prevalence of post-stroke spasticity varies widely, with estimates ranging from 18 % to 42 %. (Rodríguez, et al, 2023))
A variety of patients with neurological disorders suffer from spasticity, which is evident in 38% of stroke patients and a major source of disability. Spasticity impairs voluntary movements, and prolonged spasticity can lead to pain and severely reduced joint range of motion (ROM). These "contractures" and the spasticity itself often reduce limb function and complicate patient care. Therefore, the proper management of spasticity is a major challenge among the professions involved in the rehabilitation process.
This spasticity can be measured with the modified Tardieu scale, which is closer to Lance's (1990) definition, as it assesses velocity-dependent spasticity, (and is therefore suggested to be a more appropriate measure of spasticity). This scale grades according to the muscle response to stretch (resistance to passive movement) at three given velocities (V1= slowest possible, V2= velocity corresponding to the fall of the limb under the action of gravity and V3= velocity of movement as fast as possible). The classification of the degree of spasticity is given according to the intensity of the resistance to movement and the angle at which this resistance occurs (Morris & Williams, 2018)
In rapid stretching, an increase in the muscle tone reflex is elicited and can be felt as a 'catch'. The angle of the joint where this seizure is felt, in reference to the angle where muscle stretch is minimal, is termed the "Angle of Capture" (AoC; equal to Tardieu's R1). As the severity of spasticity increases, the AoC appears earlier in passive ROM (Tardieu's R2), and the Tardieu score (passive ROM-AoC) becomes higher.(Winifred & Horemans, 2011).
The scale scores as follows:
0= No resistance through the course of the stretch.
1= Little resistance at a specific angle throughout the course of the stretch with no obvious muscle contraction (no muscle exhaustion).
2= Evident muscle contraction at a specific angle, followed by relaxation through interruption of the stretch.
3= Clonus (abrupt and uncontrolled movement) appearing at a specific angle lasting less than 10 seconds while the evaluator maintains pressure against the muscle (fatiguable).
4= Clonus appearing at a specific angle that lasts longer than 10 seconds when the evaluator is pressing against the muscle (fatiguable).
The main strength of the modified Tardieu scale is to identify the presence and severity of spasticity by objectively measuring muscle responses to passive stretches at different speeds (Love et al, 2016) in the presence or not of contractures (Morris & Williams, 2018).

METHODS

Search strategy

MeSH Terms. /Términos MeSH
Keywords. /Términos (palabras claves) -
Muscle spasticity, Stroke rehabilitation, scale Tardieu, Validity, Reliability
Espasticidad muscular, rehabilitación de accidente cerebrovascular, escala de Tardieu, Validez, Fiabilidad
SEARCH STRINGS/ CADENAS DE BÚSQUEDA
ENGLISH/ INGLES
("Tardieu scale") AND (validity) AND (reliability)
("Tardieu Scale") AND ("Muscle spasticity") AND (validity)
("Muscle spasticity") AND (physiotherapy OR "physical therapy") AND (adult) AND ("Stroke rehabilitation") AND (Tardieu Test)
(Validity) AND (Reliability) AND ("Tardieu Scale") AND ("Muscle spasticity") AND ("Stroke rehabilitation")

SPANISH /ESPAÑOL
("escala Tardieu") AND (validez) AND (fiabilidad)
("Escala de Tardieu") AND ("Espasticidad muscular") AND (validez)
("Espasticidad muscular ") AND (fisioterapia OR terapia fisica) AND (adulto) AND ("rehabilitación de accidente cerebrovascular" OR "Rehabilitación del Ictus") AND (Escala tardieu)
(Validez AND Fiabilidad AND "Escala Tardieu" AND "Espasticidad muscular ") AND ("rehabilitación de accidente cerebrovascular").

Participant or population Adults with cerebrovascular disease with presence of upper extremity spasticity.

Intervention Not applicable.

Comparator Not applicable.

Study designs to be included Cross-sectional studies, cohort studies, case-control studies, randomized controlled trials, quasi-experimental studies that have as their primary or secondary objective the assessment of upper limb spasticity with the Tardieu scale and report psychometric properties will be included.

Eligibility criteria Inclusion criteria: Articles in English, Spanish, no limit on the year of validation, original research studies (no review), participation of adults with upper limb spasticity. Exclusión criteria: articles that do not include results of the validation/reliability process.

Information sources Electronic databases (search will be done by direct or cross-referencing), contact with authors. A search will be carried out in the following databases Scopus, Science Direct, Epistemonikos, Pubmed, PeDRO, F1000Research, Cochrane.

Main outcome(s) General characteristics of the studies that have carried out validation processes of the Tardieu scale, year, country, population, language. Validation processes to which the scale has been submitted. Measured psychometric properties of the Tardieu scale and results in terms of: reliability or reproducibility - inter-rater and intra-rater validity and safety.

Additional outcome(s) Not applicable.

Data management Each researcher will be assigned a group of databases to review, according to the search strategy previously established by the team. The articles obtained will be uploaded to the Rayyan platform (open access).

The selection process will be carried out in 2 phases: In the first phase, a researcher will review title and abstract of the articles independently, considering the eligibility criteria established by the team.
In the second phase, a researcher will review each full-text article independently, considering the eligibility criteria established by the team.

Quality assessment / Risk of bias analysis The tools proposed by the COSMIN guideline for risk of bias assessment in systematic reviews will be used (Mokkink LB, Prinsen CA, Patrick DL, Alonso J, Bouter LM, De HC, et al. COSMIN methodology for systematic reviews of Patient-Reported Outcome Measures (PROMs). 2018). In addition, the degree of evidence quality will be assessed according to the Grading of Recommendations, Assessment, Development and Evaluation -of GRADE model.

Strategy of data synthesis The synthesis of the evidence will be carried out in three phases: First: the results on general characteristics of the studies, validation processes and information on psychometric properties of the selected measurement instruments will be summarized in tables.
Second: summary tables will be constructed with information on the assessment of risk of bias for each of the psychometric properties and degree of quality of evidence - GRADE, according to the formats proposed in the COSMIN guide.
Third: A narrative synthesis will be made including the information included in the tables.

Subgroup analysis A priori, some subgroup analyses have been defined, which will depend on the findings: Analysis by age groups: Adults. Analysis by sociodemographic characteristics (age, ethnicity, gender). Analysis by chronicity.

Sensitivity analysis The results of the meta-analysis will be reproduced, excluding one of the studies in the review at each step, in order to assess the robustness of the results.

Language restriction English and Spanish.

Country(ies) involved Colombia.

Other relevant information Not applicable.

Keywords Muscle spasticity; Stroke rehabilitation; Scale Tardieu; Validity; Reliability.

Dissemination plans Publish an article in a scientific journal. Make presentations in events (national/international). Develop training activities

of human talent for the CTeI including it as reference material for the training of young researchers and innovators, training practices, for graduate work and research seedlings.

Contributions of each author

Author 1 - Elizabeth Roldán González - The author contributed to conceptualizing the idea and content of all sections of the protocol and drafted and approved the manuscript.
Email: elizabeth.roldan@fumc.edu.co
Author 2 - Fernando José Gómez Rodríguez - The author contributed to the design of all sections of the protocol, strengthened the rationale, and drafted the manuscript.
Email: fernandojosegomezrodriguez@fumc.edu.co
Author 3 - Sandra Jimena Jácome Velasco - The author provided statistical expertise/training and the risk of bias assessment strategy.
Email: sjacome@unicauca.edu.co
Author 4 - Anggie Valentina Sarria Gómez - The author read, provided feedback, performed a style review and approved the final manuscript.
Email: anggievalentinasarriagomez@fumc.edu.co
Author 5 - Luis Alejandro Rosas Roldán - The author read, provided feedback, contributed to documenting the condition or domain under study and approved the final manuscript.
Email: luis_r25@hotmail.com