



Systematic Review

Approaches used for the Quantification of Pain in Physical Therapy Practices-A Systematic Review

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Abstract

Background: This study aimed to determine the most common pain intensity assessment tool that has been used in different physical therapy management-based studies as a primary outcome measure for the quantification of pain.

Methodology: The electronic databases including PubMed, Google Scholar, PEDro, and Cochrane Library were searched to identify relevant studies from January 2015 to September 2021 by using keywords like 'pain,' 'pain intensity,' 'Visual Analogue Scale,' and 'Numeric Pain Rating Scale.' Randomized controlled trials or quasi-experimental studies in which pain management is considered an outcome measure published in the English language were included. In contrast, Non-RCTs were excluded that were based on pain management strategies other than physical therapy or conducted in inpatient department or based on approaches of telerehab.

Results: The findings revealed that n=1,292 participants were given different physical therapy interventions in which n=792 (61.3%) were evaluated for their pain on VAS, followed by n=453 (35%) on NPRS and n=169 (13%) on PPT of the total population.

Conclusion: VAS was the most frequently used tool to determine the patient's perception of pain, followed by NPRS and McGill Pain Questionnaire.

Keywords

Physical Therapy, Pain Management, Activities of Daily Living, Neck Pain, Quality of Life.

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Introduction

Pain is considered a fifth vital sign, and hence its precise assessment is important for its management¹. Pain is examined using both subjective and objective methods since a patient's sense of pain fluctuates based on their physiological or psychological status at the time, and they may not perceive a reduction in symptoms while being treated by a physiotherapist². The patient reports his or her pain, which is subsequently documented in a subjective technique, whereas pain is measured indirectly in objective approaches. Physiotherapists, however, do not commonly evaluate and quantify pain, even though it is becoming a trend in their field. Although several scales have been established for the subjective assessment of pain that clinicians use to construct suitable management strategies, most approaches are subjective. They rely heavily on the patient's self-reported strategy for correct assessment².

For assessing the pain, it is of utmost importance for the physical therapist to identify its component and which are type, duration, intensity, and location of the pain. Besides that, another important factor is used to define pain, which is its aggravating and alleviating factor³. Literature has provided evidence that is typically defining pain in terms of its type studies have agreed upon the concept that patient feelings about pain reveal the type of pain from which the patient is going through⁴. Researchers have agreed that while defining the type of pain, the most widely used types are neuropathic, somatic, and visceral, which have further classified into deep, viscerosomatic, and referred⁵. Further, while evaluating the location of pain, the physical therapist must identify the exact location on the patient's body where the pain is being perceived

either due to direct contact or in the form of referred pain⁶.

Besides that, determining the intensity of pain is one of the essential factors and, indeed, a tool for devising a physical therapy management strategy for relief for the patient. Studies have come across multiple subjective assessment tools that the physical therapist is extensively using to determine the intensity of pain among patients and out of all the available pain intensity assessment tool setups for quantifying pain⁷. Duration of pain is yet another important component that indeed provides information regarding the severity of pain and combined with exacerbating and relieving factors; this information is vital for the physical therapist to identify the patient's accurate source of pain and devise its management strategies accordingly⁸.

Literature has provided evidence that most patients referred to Physical therapy outpatient departments (OPDs) either self-referral or via physician and surgeons, the most common problem they revealed is pain⁹. It is also evident from the data that most of the physical therapy-based studies available on the database like Google Scholar, Cochrane, and other; include pain assessment tool. It is consider the most common outcome measure that has been used as a primary source of assessment to identify the efficacy and efficiency of any treatment protocol used in the clinical setups. Hence it is for this purpose that the current study is aimed to determine the most common pain intensity assessment tool that has been used in different physical therapy management-based studies as a primary outcome measure for quantification of pain.



Methodology

Study Protocol

All of the findings were based on previously published studies. As a result, no ethical approval or patient consent was required. The review was carried out according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.

Sources of Information and Search Strategy

From January 2015 to September 2021, the electronic databases PubMed, Google Scholar, PEDro, and the Cochrane Library were searched for relevant studies using keywords such as 'pain,' 'pain intensity,' 'Visual Analogue Scale (VAS),' and 'Numeric Pain Rating Scale (NPRS)'. Additional papers were found by manually searching relevant journals, conference papers, and reference lists.

Criteria for Eligibility

Experimental research, including Randomized Controlled Trials (RCTs) or quasi-experimental designs conducted in physical therapy settings between 2015 and 2021 with pain management as an outcome measure published in English, was included. Non-RCT or non-clinical trials based on pain treatment techniques other than physical therapy, trials done in an inpatient setting, trials that incorporated domiciliary physical therapy services, and trials based on telerehab approaches were eliminated. Abstracts that did not have a complete matching article published in a

peer-reviewed publication or that did not include particular data were also removed.

Outcome Measures

The primary outcome measures were Visual Analogue Scale (VAS), Numerical Pain Rating Scale (NPRS), Nottingham Health Profile (NHP), Northwick Park Neck Pain Questionnaire (NPNPQ) score, Pressure Pain Threshold (PPT), McGill Pain Questionnaire, and Pain Catastrophizing Scale. If multiple scales were used to evaluate the same outcome index in research, the primary outcome scale or the most representative scale was chosen for analysis.

Search Methods for Identification of Studies

Two authors independently assessed the search results to choose potentially relevant papers and screened the titles, abstracts, and full texts of discovered references.

Extraction of information

Basic study details, total sample size, and results were among the data retrieved.

Evaluation of the Quality Level

The PEDro scale was used to measure the quality of the studies. To authenticate their PEDro scale score, all included trial reports were reviewed in the PEDro database. Trials with a score of 6 points were deemed "good," while those with a score of 5 were deemed "bad." The analysis was omitted because of the low quality of the research.

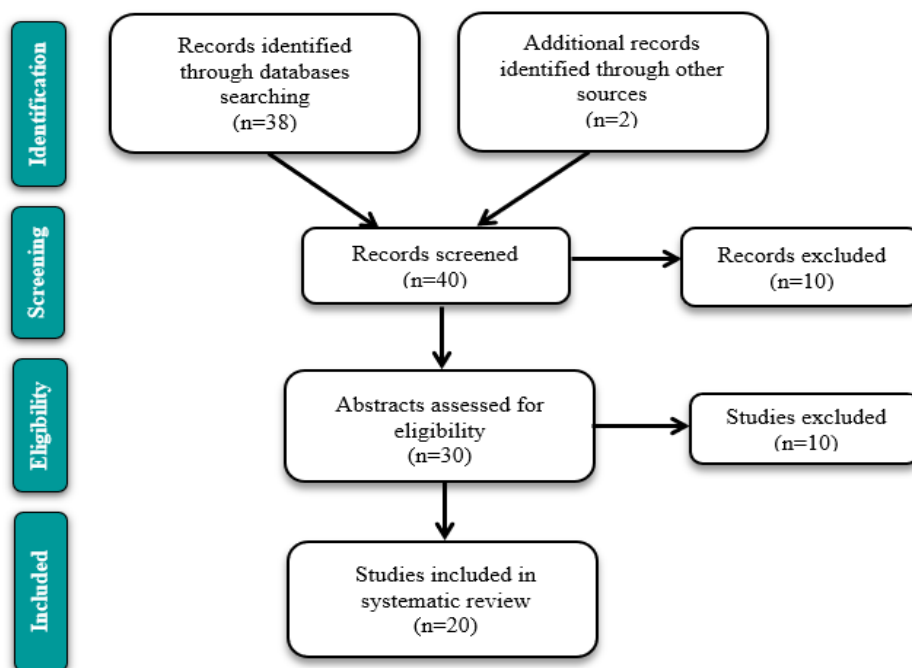


Figure 1: Flowchart of the study procedure

Articles that were included according to inclusion and exclusion criteria have been represented in Table 1 as follows:

S#	Study	Year	Sample Size	Outcome Measure	Pedro Quality Assessment
1	The effect of mulligan mobilization on pain and life quality of patients with rotator cuff syndrome ¹⁰	2019	30	VAS	Good
2	Short-term effects of mulligan mobilization with movement on pain, disability, and kinematic spinal movements in patients with non-specific low back pain ¹¹	2015	32	VAS	Good
3	The effects of the number of physical therapy sessions on pain, disability, and quality of life in patients with chronic low back pain ¹²	2017	60	VAS & Nottingham Health Profile	Moderate
4	Effect of isometric back endurance exercises on patients with non-specific chronic low back pain ¹³	2021	60	VAS	Good



5	Swiss ball exercises as an alternative to McKenzie exercises in treating chronic low back pain among poultry workers ¹⁴	2020	60	NPRS	Moderate
6	Effect of lumbar stabilization versus McKenzie exercises on pain and functional disability in patients with the post-laminectomy syndrome ¹⁵	2019	45	VAS	Good
7	Effectiveness of mulligans mobilizations with upper limb movement and McKenzie exercises with neural mobilizations in patients with cervical spondylitis ¹⁶	2018	60	VAS score and Northwick Park Neck Pain Questionnaire	Good
8	Kinesio taping reduces pain and improves disability in low back pain patients ¹⁷	2019	108	NPRS	Moderate
9	Comparison of dry needling and Kinesio taping methods in the treatment of myofascial pain syndrome ¹⁸	2021	88	Pressure Pain Threshold & VAS	Low
10	Comparison of different electrotherapy methods and exercise therapy in shoulder impingement syndrome ¹⁹	2018	83	VAS	Good
11	Effectiveness of dry needling versus a classical physiotherapy program in patients with chronic low-back pain: a single-blind, randomized, controlled trial ²⁰	2017	34	VAS & McGill Pain Questionnaire score	Good
12	A comparison of physical therapy modalities versus acupuncture in the treatment of fibromyalgia syndrome ²¹	2018	44	McGill Pain Questionnaire score	Moderate
13	Pain management using a multimodal physiotherapy program including a biobehavioral approach for chronic non-specific neck pain: a randomized controlled trial ²²	2018	47	Pain Catastrophizing Scale & VAS	Moderate



14	Effectiveness of standard cervical physiotherapy plus diaphragm manual therapy on pain in patients with chronic neck pain ²³	2021	40	NPRS & PPT	Good
15	The effect of mulligan mobilization technique in older adults with neck pain ²⁴	2018	42	VAS	Moderate
16	Effectiveness of physiotherapy for seniors with recurrent headaches associated with neck pain and dysfunction ²⁵	2017	65	VAS	Good
17	Is a combined program of manual therapy and exercise more effective than usual care in patients with non-specific chronic neck pain? ²⁶	2019	64	NPRS	Low
18	Manual therapy compared with physical therapy in patients with non-specific neck pain ²⁷	2017	181	NPRS	Low
19	Effects of myofascial release on pressure pain thresholds in patients with neck pain ²⁸	2018	41	VAS & PPT	Moderate
20	Effectiveness of core stabilization exercises and routine exercise therapy in the management of pain in chronic non-specific low back pain ²⁹	2017	108	VAS	Good

Results

Study Selection

Literature research of 40 studies was conducted on several databases to investigate pain assessment techniques, of which 30 papers were initially selected and

included in this study. The publications were accepted based on inclusion/exclusion criteria that were created specifically for this study. Figure 1 depicts a flow chart of the schematic portrayal of the full research search based on our study's criteria.



Methodological Quality

The PEDro ratings were used to assess the methodological quality of the selected studies. After deliberation and consensus among the reviewers, all disparities in the PEDro scales were addressed. Table 1 shows the results of the quality scores, which varied from 3 to 8 on a scale of 10 points. Ten studies were of high quality, six were of moderate quality, and four were of low quality.

Synthesized Findings

Our data indicated that VAS is the most prevalent outcome measure widely used to quantify pain. Aside from VAS, the Numeric Pain Rating Scale, Pressure Pain Threshold Scale, and McGill Pain Questionnaire score were some of the most frequently employed outcome measures in clinical settings by physical therapists. However, the Nottingham Health Profile (NHP), Pain Catastrophizing Scale, and Northwick Park Neck Pain Questionnaire (NPNPQ) score were the least commonly used instruments in the study that quantified pain in response to physical therapy. Figure 2 shows a diagrammatic depiction of the research findings.

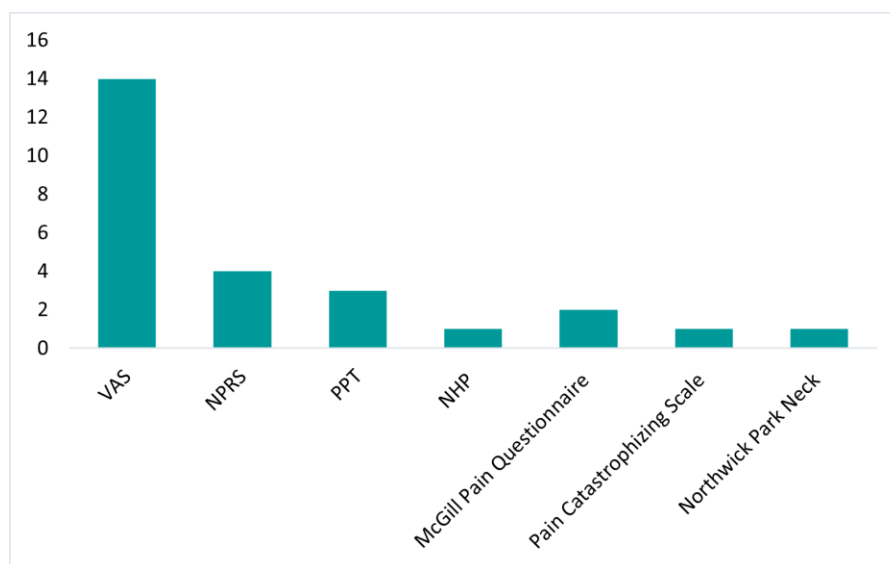


Figure 2: Frequency of different Pain Scale commonly used by PTs

The result of our study had revealed that of the total number of literature that we reviewed, a total number of $n=1,292$ participants were given different physical therapy interventions. In the literature reviewed $n=792$ participants were evaluated for their pain on VAS outcome measure that, make a total percentage of 61.3% of the total population of this study. NPRS was used to analyze $n=453$ participants, which comprised 35% of the participants, followed by $n=169$ who were evaluated through PPT, which comprises 13% of the total population. McGill Pain Questionnaire score was used for 78 participants making a 6% of the total population. Nottingham Health Profile (NHP) and Northwick Park Neck Pain Questionnaire (NPNPQ) score were used in $n=60$ participants making a total population of 4.6%. Pain Catastrophizing Scale was used in $n=47$ participants, making it the least used scale by physical therapists 3.6% for quantifying pain in the clinical setups. The population-wise frequently used pain assessment tool, according to our findings, has been demonstrated in Figure 3.

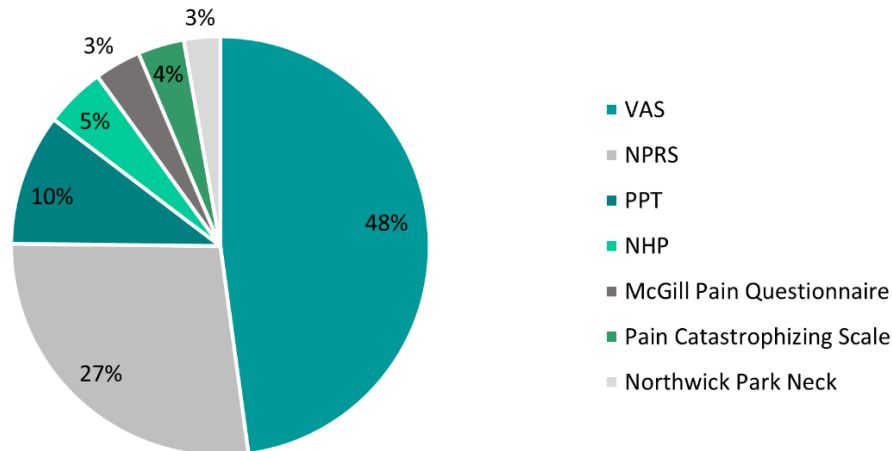


Figure 3: Pain Assessment tool commonly used by PTs in the population

Discussion

The findings of our study have revealed that VAS is the most frequently used tool to quantify pain along with NPRS. This may be since both these assessment tools are user-friendly perception-based tools to determine pain severity among patients in physical therapy clinic setups. According to Lazaridou et al., VAS has been considered a measure of choice for pain assessment as the assessment tool has good validity and is also sensitive to treatment effect. In another study, the researcher considered VAS an important tool to track pain progression among patients and compare the pain of patients diagnosed with similar conditions³⁰. The numeric pain rating scale was the second most common tool as per our finding the physical therapists were using that in the clinical setups. Literature from the previous studies has revealed that NPRS, like VAS, had been based on patient perception of pain, but unlike VAS, the tool has a different format of pain intensity³⁰. NPRS has three different scales, 0 to 10, 0 to 20, and 0 to 100 making this scale slightly more complex than VAS as it turns the researcher into a perplexed state that out of three different scales, which scale is to be

used³¹. The pressure pain threshold scale was yet another pain assessment scale we, during our search, had come across in several studies. This scale had five gradings where 0 suggested no sign of pain, and IV was considered as a noxious intolerable pain³².

Although the scale was considered valid and reliable, it was observed that the scale was not found to be sensitive enough. Hence, the scale gets obsoleted from clinical and research perspectives³². McGill pain questionnaire was another frequently used tool for pain assessment, and it comprised three different components that were sensory, affective, and cognitive. Each component had various descriptors ordered from no pain to severe³³. The complex arrangement of the questionnaire made the researchers shift towards a short form of the questionnaire that too comprises 15 descriptors ordered from 0 to 3, where 0 represents no pain, and 3 indicates severe pain³³. Moving further into the list, we have come across two other questionnaire-based pain assessment tools: NHP and NPNPQ. NHP was a comprehensive questionnaire intended to determine the overall condition of patient health based on emotional, social,



and physical health problems. The questionnaire was based on six sub-areas: energy level, pain, emotional reaction, sleep, social isolation, and physical abilities. The questionnaire was related to the overall health-related condition of the patient, and the pain was only a single component of the questionnaire. Hence it was limited to studies in which the patient's overall health-related problems were in question, and also the questionnaire did not contain parameters to determine the intensity of pain hence that was the reason why the questionnaire was not widely used in research to determine the intensity of the pain³⁴. NPNPQ was designed to quantify neck pain while performing the activity of daily living (ADLs) as the question within the tools were mostly related to neck-related pain; hence not been used widely for pain intensity quantification purposes³⁵.

The Pain Catastrophizing scale was the most frequently used tool we found during a literature search. The scale comprises 13 questions ranging from 0 to 4, where 0 indicates not at all, and 4 represents all the time. Further, the entire scale had three categories for assessing the patient situation: rumination, magnification, and helplessness³⁶. Though simple in approach, the pain catastrophizing scale was not widely found among studies which may be due to its subscale classification that did not reflect patients' pain intensity perception; rather, it was more towards patient fear of pain.

Conclusion

The findings of our study revealed that of all the pain assessment tools, VAS was the most frequently used tool to determine the patient perception of pain, followed by NPRS and McGill pain Questionnaire. The rest of the three assessment tools that included NHP, NPNPQ, and Pain

Catastrophizing scale were not frequently found in the studies, which may be because NPNPQ was more towards neck-related pain problems. NHP was based on the overall well-being of the patient, and the pain was only one of the subclass of the questionnaire. The Pain Catastrophizing scale was more towards the patient's perception of pain-related fear rather than pain intensity quantification.

References

1. Levy N, Sturgess J, Mills P. "Pain as the fifth vital sign" and dependence on the "numerical pain scale" is being abandoned in the US: why? *Br J Anaesth*. 2018;120(3):435-8.
2. Wideman TH, Edwards RR, Walton DM, Martel MO, Hudon A, Seminowicz DA. The multimodal assessment model of pain: a novel framework for further integrating the subjective pain experience within research and practice. *Clin J Pain*. 2019;35(3):212.
3. Gregory J. Use of pain scales and observational pain assessment tools in hospital settings. *Nursing Stand*. 2019;34.
4. Jonsdottir T, Gunnarsdottir S, Oskarsson GK, Jonsdottir H. Patients' perception of chronic-pain-related patient-provider communication in relation to sociodemographic and pain-related variables: A cross-sectional nationwide study. *Pain Manag Nurs*. 2016;17(5):322-32.
5. Dalens BJ, Storme B. The physiology of pain. In *Pediatric Regional Anesthesia* 2019:59-70. Routledge.
6. Chimenti RL, Frey-Law LA, Sluka KA. A mechanism-based approach to physical therapist management of pain. *Physical therapy*. 2018;98(5):302-14.
7. Pulik Ł, Dyrek N, Piwowarczyk A, Jaśkiewicz K, Sarzyńska S, Łęgosz P. The update on scales and questionnaires used to assess cervical spine disorders.



- Physical Therapy Reviews. 2020;26(2):150-8.
8. Gruss S, Geiger M, Werner P, Wilhelm O, Traue HC, Al-Hamadi A, Walter S. Multi-modal signals for analyzing pain responses to thermal and electrical stimuli. *JoVE*. 2019;146s:e59057.
 9. Boissonnault WG, Vanwye WR. *Primary Care for the Physical Therapist E-Book: Examination and Triage*. Elsevier Health Sci; 2020.
 10. Menek B, Tarakci D, Algun ZC. The effect of Mulligan mobilization on pain and life quality of patients with Rotator cuff syndrome: A randomized controlled trial. *J Back Musculoskelet Rehabil*. 2019;32(1):171-8.
 11. Hidalgo B, Pitance L, Hall T, Detrembleur C, Nielens H. Short-term effects of Mulligan mobilization with movement on pain, disability, and kinematic spinal movements in patients with non-specific low back pain: a randomized placebo-controlled trial. *J Manipulative Physiol Ther*. 2015;38(6):365-74.
 12. Ökmen BM, Koyuncu E, Uysal B, Özgirgin N. The effects of the number of physical therapy sessions on pain, disability, and quality of life in patients with chronic low back pain. *Turk J Med Sci*. 2017;47(5):1425-31.
 13. Dewir IM. Effect of isometric back endurance exercises on patients with non-specific chronic low back pain: Randomized control trail. *Science*. 2021;25(113):1710-6.
 14. Villarin RR, Marasigan PN, Cabatay WA, Oarga V, Flores MS. Swiss Ball Exercises As An Alternative To Mckenzie Exercises In Treating Chronic Low Back Pain Among Poultry Workers. *Eur J Mol Clin Med*. 2020;7(2):4197-207.
 15. Farahat SA. Effect Of Lumbar Stabilization Versus Mckenzie Exercises On Pain And Functional Disability In Patients With Post Laminectomy Syndrome: A Randomized Controlled Trial. *IJRMR*. 2019:4991-4995
 16. Kotagiri S, Songa AK, Gad MV, Sulthan N. Effectiveness of mulligans mobilizations with upper limb movement and McKenzie exercises with neural mobilizations in patients with cervical spondylitis. *IAIM*. 2018;5:146-55.
 17. de Brito Macedo L, Richards J, Borges DT, Melo SA, Brasileiro JS. Kinesio taping reduces pain and improves disability in low back pain patients: a randomised controlled trial. *Physiotherapy*. 2019;105(1):65-75.
 18. Groeneweg R, van Assen L, Kropman H, Leopold H, Mulder J, Smits-Engelsman BC, Ostelo RW, Oostendorp RA, van Tulder MW. Manual therapy compared with physical therapy in patients with non-specific neck pain: a randomized controlled trial. *Chiropr Man Ther*. 2017;25(1):1-2.
 19. Ucurum SG, Kaya DO, Kayali Y, Askin A, Tekindal MA. Comparison of different electrotherapy methods and exercise therapy in shoulder impingement syndrome: A prospective randomized controlled trial. *Acta Orthop Traumatol Turc*. 2018;52(4):249-55.
 20. Tüzün EH, Gildir S, Angın E, Tecer BH, Dana KÖ, Malkoç M. Effectiveness of dry needling versus a classical physiotherapy program in patients with chronic low-back pain: a single-blind, randomized, controlled trial. *J Phys Ther Sci*. 2017;29(9):1502-9.
 21. Ozen S, Saracgil Cosar SN, Cabioglu MT, Cetin N. A comparison of physical therapy modalities versus acupuncture in the treatment of fibromyalgia syndrome: a pilot study. *J Altern Complement Med*. 2019;25(3):296-304.
 22. López-de-Uralde-Villanueva I, Beltran-Alacreu H, Fernández-Carnero J, La Touche R. Pain management using a



- multimodal physiotherapy program including a biobehavioral approach for chronic non-specific neck pain: a randomized controlled trial. *Physiotherapy theory and practice*. 2018.
23. Simoni G, Bozzolan M, Bonnini S, Grassi A, Zucchini A, Mazzanti C, Oliva D, Caterino F, Gallo A, Da Roit M. Effectiveness of standard cervical physiotherapy plus diaphragm manual therapy on pain in patients with chronic neck pain: A randomized controlled trial. *J Bodyw Mov Ther*. 2021;26:481-91.
 24. Buyukturan O, Buyukturan B, Sas S, Karartı C, Ceylan I. The effect of mulligan mobilization technique in older adults with neck pain: A randomized controlled, double-blind study. *Pain Res Manag*. 2018;2018.
 25. Uthaihpun S, Assapun J, Watcharasakul K, Jull G. Effectiveness of physiotherapy for seniors with recurrent headaches associated with neck pain and dysfunction: a randomized controlled trial. *The spine J*. 2017;17(1):46-55.
 26. Domingues L, Pimentel-Santos FM, Cruz EB, Sousa AC, Santos A, Cordovil A, Correia A, Torres LS, Silva A, Branco PS, Branco JC. Is a combined programme of manual therapy and exercise more effective than usual care in patients with non-specific chronic neck pain? A randomized controlled trial. *Clinical Rehab*. 2019;33(12):1908-1918.
 27. Groeneweg R, van Assen L, Kropman H, Leopold H, Mulder J, Smits-Engelsman BC, Ostelo RW, Oostendorp RA, van Tulder MW. Manual therapy compared with physical therapy in patients with non-specific neck pain: a randomized controlled trial. *Chiropr Man Ther*. 2017;25(1):1-2.
 28. Rodríguez-Huguet M, Gil-Salú JL, Rodríguez-Huguet P, Cabrera-Afonso JR, Lomas-Vega R. Effects of myofascial release on pressure pain thresholds in patients with neck pain: a single-blind randomized controlled trial. *Am J Phys Med Rehabil*. 2018;97(1):16-22.
 29. Akhtar MW, Karimi H, Gilani SA. Effectiveness of core stabilization exercises and routine exercise therapy in management of pain in chronic non-specific low back pain: A randomized controlled clinical trial. *PJMS*. 2017;33(4):1002.
 30. Lazaridou A, Elbaridi N, Edwards RR, Berde CB. Pain assessment. In *Essentials of pain medicine*. Elsevier. 2018:39-46.
 31. Halm M, Bailey C, Pierre JS, Boutin N, Rojo S, Shortt M, Theobald L, Pettycrew E. Pilot evaluation of a functional pain assessment scale. *Clinical Nurse Specialist*. 2019;33(1):12-21.
 32. Cheatham SW. Validation of a Pressure Pain Threshold Scale in Patients Diagnosed with Myofascial Pain Syndrome and Fibromyalgia. Nova Southeastern University; 2016.
 33. Alharbi HA, Albabtain MA, Alobiad N, Alhasan JA, Alruhaimi M, Alnefisah M, Alateeq S, Alghosoon H, Alarfaj SJ, Arafat AA, Algarni KD. Pain perception assessment using the short-form McGill pain questionnaire after cardiac surgery. *Saudi J Anaesth*. 2020;14(3):343.
 34. Yüksel S, Elhan AH, Gökmen D, Küçükdeveci AA, Kutlay Ş. Analyzing differential item functioning of the Nottingham health profile by mixed Rasch model. *Turk J Phys Med Rehabil*. 2018;64(4):300.
 35. Ilinca I, Rosulescu E, Danoiu M. The Importance of Physiotherapy Intervention In The Functional Rehabilitation Of Patients With Cervical Postural Syndrome. Editorial Staff.
 36. Darnall BD, Sturgeon JA, Cook KF, Taub CJ, Roy A, Burns JW, Sullivan M, Mackey SC. Development and validation



of a daily pain catastrophizing scale. J
Pain. 2017;18(9):1139-49.

