

AUGUST 2025

Dear IPNFA®Members, Dear Friends

We present the next IPNFA® Newsletter prepared by the Research Committee. Below you will find the newest articles approved by the members of our committee. You can find also information about newest events in the field of our PNF. Enjoy by reading it

Dear Friends

As we are all aware, the 35th IPNFA® AGM is getting closer.

15-18 October 2025 - CALL THE CORE, ENJOY LIFE MORE – and we hope to see with majority of You in Budapest 😊

Since AGM in Osaka schedules is as follows: Two Instructor days and then Business Day and Educational Day.

During Educational Day we will have the chance to hear many outstanding speakers. One of them will be our IPNFA® Senior Instructor Dominike Beckers from Belgium. He will deliver lecture : PNF on patients with Upper Cross Syndrome (UCS)



16th May 2025 IPNFA Poland and Academy of Physical Education Warsaw co-created the scientific conference “Fascia the network that connects”.

Please let us allow to quote summary of the conference published on the Academy’s of Physical Education webpage.

“The third edition of the "Fascia – The Network That Connects" conference once again combined theory and practice. This year's theme was integrating fascia work with the proven PNF method. Speakers from the Rehabilitation Department and certified IPNFA instructors provided participants with a solid dose of knowledge, and practical workshops enabled immediate application of new skills.

This wasn't just a conference—it was a space for learning, exchanging experiences, and professional development. All in an atmosphere of passion, commitment, and high professionalism. “

Agnieszka Stępień delivered tremendous lecture in the topic of ICF Model.

Joanna Tokarska, Grzegorz Gałuszka & Kuba Marciński showed how PNF Concept can be applied in the treatment of the patients with shoulder problems. Lecture & workshops

Katarzyna Fountoukidis & Monika Piwnicka talked about “Selected PNF Interventions in the Treatment of Hip and Pelvic Joint Dysfunction” Lecture & workshops

Joanna Jaczewska-Bogacka, Agnieszka Stępień & Monika Wilczyńska - Selected PNF Interventions in the Treatment of Hip and Pelvic Joint Dysfunction – continuation Lecture & workshops





Katarzyna Fountoukidis and Joanna Jaczewska-Bogacka were speakers during Joint Preservation Congress in Poland. Katarzyna presented topic about the impact of sagittal plane postural disorders on the knee Joint. Joanna was presenting the issue about mechanotransduction and influence of various stimulation on genetic expression of the tissue. Both of them showed practical examples of PNF treatment. Joanna was asked to become a member of Scientific Committee of the congress. The Joint Preservation Congress is a prominent international scientific conference dedicated to modern techniques in joint treatment and preservation, especially those aimed at delaying or preventing osteoarthritis progression through minimally invasive methods. The congress brings together leading experts: orthopaedic surgeons, biologists, tissue engineers, physiotherapists, and other medical specialists worldwide. During this edition programme included expert lectures and panel discussions, live surgical demonstrations broadcast from a Mobile Lab, satellite sessions tailored for physiotherapists and movement specialists, focusing on rehabilitation and interdisciplinary cooperation.



FACULTY

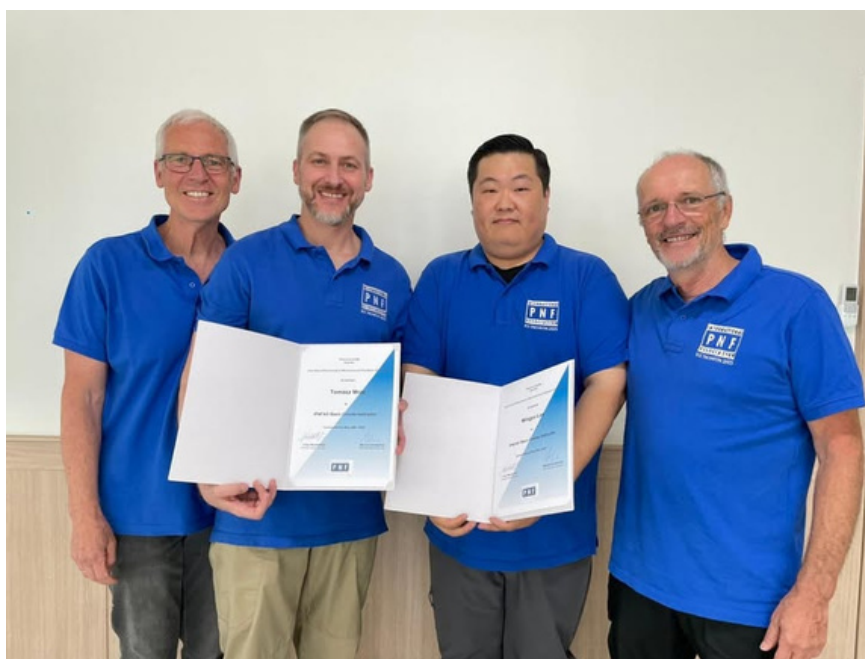
10th
JOINT PRESERVATION
CONGRESS
27-28 June 2025, Warsaw

Kelly Ammann	Jarosław Feluś	Żaneta Nitek
Katarzyna Bażant	Katarzyna Fountoukidis	Łukasz Paczesny
Maciej Biały	Karolina Goławska	Emmanouil Papakostas
Arkadiusz Bielecki	Katarzyna Gosek-Ferenc	Philip Roessler
Lars Blond	Joanna Jaczewska-Bogacka	Anna Rozmus
Mats Brittberg	Kristian Kley	Kristof Sas
Umer Butt	Elizaveta Kon	Jan Sielczak
Piotr Cieblera	Paweł Konarzewski	Paweł Skowronek
Diego Correa	Aleksandra Królikowska	Konrad Słynarski
Mateusz Daniłuk	Karol Kruczek	Mikołaj Stańczak
Francesca de Caro	Sergiusz Kulesza	Peter Verdonk
Laura de Girolamo	Jacek Mańka	Jacek Walawski
Jörg Dickschas	Simon Mastbergen	Adrian Wilson
Jakub Dukiewicz	Mike McNicholas	Mateusz Wyszynski
Alicja Fqfara	Krzysztof Mucha	



In April and May of this year, a course was held in Korea under the supervision of Senior Instructors Marcel Grzebellus and Frits Westerholt.

As a result, we have two new PNF instructors: Mingyu Lee and Tomasz Mraz. Congratulations!



We are delighted to announce that at the beginning of September, IPNFA Senior Instructor Agnieszka Stepień was elected as the new president of the National Chamber of Physiotherapists. Congratulations, Agnieszka. This is the most important role a physiotherapist can hold in Poland.



POST-STROKE HEMIPLEGIC GAIT: NEW PERSPECTIVE AND INSIGHTS**Sheng Li, Gerard E Francisco, Ping Zhou****PMCID: PMC6088193 PMID: 30127749****Front Physiol. 2018 Aug 2;9:1021. doi: 10.3389/fphys.2018.01021****ABSTRACT:**

Walking dysfunction occurs at a very high prevalence in stroke survivors. Human walking is a phenomenon often taken for granted, but it is mediated by complicated neural control mechanisms. The automatic process includes the brainstem descending pathways (RST and VST) and the intraspinal locomotor network. It is known that leg muscles are organized into modules to serve subtasks for body support, posture and locomotion. Major kinematic mechanisms are recognized to minimize the center of gravity (COG) displacement. Stroke leads to damage to motor cortices and their descending corticospinal tracts and subsequent muscle weakness. On the other hand, brainstem descending pathways and the intraspinal motor network are disinhibited and become hyperexcitable. Recent advances suggest that they mediate post-stroke spasticity and diffuse spastic synergistic activation. As a result of such changes, existing modules are simplified and merged, thus leading to poor body support and walking performance. The wide range and hierarchy of post-stroke hemiplegic gait impairments is a reflection of mechanical consequences of muscle weakness, spasticity, abnormal synergistic activation and their interactions. Given the role of brainstem descending pathways in body support and locomotion and post-stroke spasticity, a new perspective of understanding post-stroke hemiplegic gait is proposed. Its clinical implications for management of hemiplegic gait are discussed. Two cases are presented as clinical application examples.

KEYWORDS: gait, stroke, hemiparesis, spasticity, botulinum toxin, motor recovery

PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION APPLIED TO DAIRY FACTORY WORKERS WITH LOW BACK PAIN

Cemira Michelle Pérez Castro, Paola Gabriela Ortiz Villalba, Gerardo Fernando Fernández Soto, Diana Veronica Flores Farinango, Verónica Lucía Molina Andrade

December 2024 Ibero-American Journal of Health Science Research 4(2):305-313

DOI:10.56183/iberojhr.v4i2.689

LicenseCC BY-NC-ND 4.0

ABSTRACT:

Background:

Low back pain is considered a frequent musculoskeletal disorder, generating limitations to perform daily activities and states of disability. The objective is to establish the effectiveness of the Proprioceptive Neuromuscular Facilitation (PNF) technique in reducing lumbar pain of workers in dairy factories.

Methods:

a comparative study among longitudinal cohort groups was carried out. 25 participants were divided into two groups. PNF was applied to group A (n=13) and group B that was the control group (n=12). An initial evaluation was done and 12 weeks after the intervention a final evaluation was done. Pain intensity, the index of disability associated with back pain (BP) and quality of life were measured.

Results:

after 12 weeks of application of the protocol, the PNF technique significantly decreased pain intensity, improved functional disability associated with lumbar pain and quality of life with respect to health ($p < 0.005$). For the control group there were no differences in the variables before and after the protocol was applied.

Conclusions:

The application of FNP in dairy factory workers is effective in reducing pain, disability associated with non-specific lumbar pain and improving the quality of life.

KEYWORDS: muscle stretching exercises; back pain; exercise therapy; postural balance; occupational health

THE EFFECTS OF RHYTHMIC EXERCISE USING PNF PATTERNS ON GAIT VARIABLES IN NORMAL ADULTS

Wontae Gong

PMCID: PMC11191511 PMID: 38669500

Technol Health Care. 2024 May 31;32(Suppl 1):415–422. doi: 10.3233/THC-248036

ABSTRACT:

Background:

Maintaining gait stability is an important factor for preventing falls of normal adults. Thus, it is necessary to conduct research on gait variables in normal adults.

Objective:

In this study, we conducted research on the effect of rhythmic exercise using proprioceptive neuromuscular facilitation (PNF) patterns on gait variables in normal adults.

Methods:

Thirty-two subjects were divided into two groups, the training and control groups, with 16 subjects in each group. We measured various gait variables step time difference (STD), step length difference (SLD), single support difference (SSD), stance phase difference (STPD) and swing phase difference (SWPD) for the pre-test and post-test in each group.

Results:

As a result of paired t-tests on various gait variables (STD, SLD, SSD, STPD, SWPD) of the training and control group, the training group showed significance in SLD, STPD and STD and the control group had no significance in all items.

Conclusions:

In this study, which verified the effect of rhythmic exercise using the PNF patterns on the gait variables of normal adults, there was statistical significance in SLD, STPD, and STD showing that dynamic exercise using the PNF pattern is helpful in improving the walking ability of normal adults.

KEYWORDS: Proprioceptive neuromuscular facilitation, rhythmic exercise, OptoGait, gait analysis

PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION STRETCHING MECHANISMS AND CLINICAL IMPLICATIONS

Melanie J. Sharman, Andrew G. Cresswell and Stephan Riek

February 2006 Sports Medicine 36(11):929-39

Source PubMed Sports Med 2006; 36 (11): 929-939

0112-1642/06/0011-0929/\$39.95/0

2006 Adis Data Information BV. All rights reserved

ABSTRACT:

Proprioceptive neuromuscular facilitation (PNF) stretching techniques are commonly used in the athletic and clinical environments to enhance both active and passive range of motion (ROM) with a view to optimising motor performance and rehabilitation. PNF stretching is positioned in the literature as the most effective stretching technique when the aim is to increase ROM, particularly in respect to short-term changes in ROM. With due consideration of the heterogeneity across the applied PNF stretching research, a summary of the findings suggests that an 'active' PNF stretching technique achieves the greatest gains in ROM, e.g. utilising a shortening contraction of the opposing muscle to place the target muscle on stretch, followed by a static contraction of the target muscle. The inclusion of a shortening contraction of the opposing muscle appears to have the

greatest impact on enhancing ROM. When including a static contraction of the target muscle, this needs to be held for approximately 3 seconds at no more than 20% of a maximum voluntary contraction. The greatest changes in ROM generally occur after the first repetition and in order to achieve more lasting changes in ROM, PNF stretching needs to be performed once or twice per week. The superior changes in ROM that PNF stretching often produces compared with other stretching techniques has traditionally been attributed to autogenic and/or reciprocal inhibition, although the literature does not support this hypothesis. Instead, and in the absence of a biomechanical explanation, the contemporary view proposes that PNF stretching influences the point at which stretch is perceived or tolerated. The mechanism(s) underpinning the change in stretch perception or tolerance are not known, although pain modulation has been suggested.

EFFECT OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ON PATIENTS WITH CHRONIC ANKLE INSTABILITY: A SYSTEMATIC REVIEW AND META-ANALYSIS

Yikun Yin 1, Jialin Wang, Qihan Lin, Yinghang Luo, Yongsheng Liu, Junzhi Sun

Editor: Renato S Melo

PMCID: PMC11717224 PMID: 39787087

PLoS One. 2025 Jan 9;20(1):e0311355. doi: 10.1371/journal.pone.0311355

ABSTRACT:

Objective:

This study conducts a rigorous meta-analysis of existing literature to rigorously examine the efficacy of Proprioceptive Neuromuscular Facilitation (PNF) in ameliorating functional deficits associated with Chronic Ankle Instability (CAI).

Methods:

Literature searches were conducted in multiple databases including China National Knowledge Infrastructure (CNKI), VIP, Wanfang, China Biology Medicine disc (CBM), PubMed, EBSCO (Medline, CINAHL, SPORTDiscus, and Rehabilitation & Sports Medicine Source), Embase, ScienceDirect, ProQuest, Cochrane Library, and Web of Science for randomized controlled trials assessing the effects of Proprioceptive Neuromuscular Facilitation interventions on patients with Chronic Ankle Instability. The publication timeframe spanned from the inception of each database until April 10, 2024. Meta-analysis was performed using STATA 12 software on the included studies.

Results:

① A total of 12 randomized controlled trials were included, encompassing 405 patients with Chronic Ankle Instability, demonstrating a generally high methodological quality of the literature. ② Meta-analysis results indicate that compared to the control group, Proprioceptive Neuromuscular Facilitation (PNF) significantly enhanced the balance ability of patients with Chronic Ankle Instability as measured by the Y Balance Test (YBT) (Weighted Mean Difference (WMD) = 3.61, 95% CI [2.65, 4.56], $z = 7.42$, $P < 0.001$) and the Star Excursion Balance Test (SEBT) (WMD = 5.50, 95% CI [3.80, 7.19], $z = 6.36$, $P < 0.001$), with improvement in all eight directions of SEBT balance ability surpassing that of the control group ($P < 0.05$); muscle strength around the ankle (SMD) = 0.19, 95% CI [0.03, 0.36], $z = 2.26$, $P = 0.024$), with both Plantar flexion and Dorsal flexion muscle strength improvements exceeding those of the control group ($P < 0.05$); Visual Analog Scale (VAS) (WMD = -1.39, 95% CI [-1.72, -1.06], $z = 8.23$, $P < 0.001$); Ankle instability questionnaire (WMD = 2.91, 95% CI [1.92, 3.89], $z = 5.78$, $P < 0.001$). ③ Descriptive analysis results showed that the differences in Inversion Joint Position Sense and Dorsiflexion range of motion between the PNF and control groups were not statistically significant ($P > 0.05$), however, the effects of PNF training persisted for a certain period even after cessation of treatment.

Conclusion:

Proprioceptive Neuromuscular Facilitation (PNF) can significantly improve balance, muscle strength, and pain in patients with Chronic Ankle Instability (CAI). While PNF has shown improvements in joint position sense and dorsiflexion range of motion for CAI patients, with effects that remain for a period thereafter, these improvements were not significantly different when compared to the control group. Further research is required to substantiate these specific effects.

EFFECTIVENESS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION EXERCISE WITH VIRTUAL REALITY MOTION CAPTURE GAMING SYSTEM AND CONCURRENT FEEDBACK ON EARLY SHOULDER MUSCLE ACTIVATION IN HEALTHY INDIVIDUALS

Bosco Seongyeol Park, Jason Verdisco, Matthew Kimball, Aqsa Zuhair, Ayse Ozcan Edeer

Copyright © 2025 Korean Society of Exercise Rehabilitation

Journal of Exercise Rehabilitation 2025; 21(1): 16-24.

Published online: February 28, 2025

DOI: <https://doi.org/10.12965/jer.2448646.323>

ABSTRACT:

This study explores the effect of proprioceptive neuromuscular facilitation (PNF) exercises combined with a virtual reality (VR) motion capture system and concurrent feedback (CF) on early shoulder muscle activation in healthy individuals. Thirty healthy participants sequentially performed three PNF diagonal 2 shoulder exercises: PNF alone, PNF with VR (PNF+VR), and PNF with VR and CF (PNF+VR+CF), with the latter two exercises presented in randomized order. Using wireless surface electromyography and 3-dimensional (3D) inertial measurement units, the activation of the upper trapezius (UT), lower trapezius (LT), infraspinatus (INF), and serratus anterior (SA) muscles, as well as shoulder flexion, abduction, and external rotation range of motion, were recorded during three exercises. INF and LT muscles were activated earlier in abduction and flexion during PNF+VR and PNF+VR+CF exercises than in PNF alone ($P<0.05$). These muscles were also activated during the early external rotation phase during PNF alone ($P<0.05$). No statistically significant differences were observed in UT and SA muscle activation among PNF alone, PNF+VR, and PNF+VR+CF exercises ($P>0.05$). Integrating VR gaming elements and CF into PNF shoulder exercises may promote early muscle activation, offering a promising approach for advanced rehabilitation strategies that can potentially improve patient outcomes. VR motion capture systems have the potential to transform traditional therapeutic approaches by increasing enjoyment and engagement, which can, in turn, enhance patient motivation and adherence.

KEYWORDS: Proprioceptive neuromuscular facilitation, Virtual reality, Feedback, Electromyography, Muscle activation, Shoulder

THE CLINICAL EFFICACY OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION TECHNIQUE IN THE TREATMENT OF SCAPULOHUMERAL PERIARTHRITIS: A SYSTEMATIC REVIEW AND META-ANALYSIS

Chengyu Zhu, Xueyan Huang, Jiaying Yu, Ying Feng, Haifang Zhou,

PMCID: PMC11931788 PMID: 40128679

BMC Musculoskelet Disord. 2025 Mar 24;26:288.

doi: 10.1186/s12891-025-08303-w

ABSTRACT:

Background:

Scapulohumeral periarthritis (SP) is a disease caused by chronic inflammation of the shoulder soft tissue area, which is characterized by shoulder pain and limited mobility. Due to the long course of disease, it often has a great impact on the life and work of patients.

Objectives:

The purpose of this study was to systematically evaluate the effect of proprioceptive neuromuscular facilitation (PNF) stretching technique in the treatment of SP.

Methods:

A systematic search of 10 databases such as China National Knowledge Infrastructure (CNKI), China Biomedical Literature Database, Weipu, Wanfang, PubMed, Embase, Web of Science, Cochrane Library, Clinical Trials, and China Clinical Trial Registry Platform was performed. The retrieval time was from inception to January 2024. Two researchers screened the literature according to the inclusion and exclusion criteria, extracted the data, and evaluated the quality. Revman5.3 software was used for meta-analysis, and only descriptive analysis was performed on the outcome indicators of the number of literature ≤ 2 .

Results:

A total of 12 articles were included, including 968 patients. The results of Meta-analysis showed that PNF technique could reduce pain intensity ((Visual analog scale (VAS) score (SMD = -0.67, 95% CI [-1.18, -0.15], $P = 0.03$), Japanese Orthopaedic Association (JOA) score (subjective pain score standard) (SMD = 0.79, 95% CI [0.23,1.35], $P < 0.01$)), improve the shoulder function of patients (SMD = 1.13, 95% CI [0.96,1.31], $P < 0.01$), and improve the patient's daily living ability (SMD = 1.06, 95% CI [0.77,1.34], $P < 0.01$). The results of descriptive analysis showed that the PNF technique could improve the psychological state of patients with scapulohumeral periarthritis to a certain extent.

Conclusion:

The PNF technique can help patients with scapulohumeral periarthritis to relieve pain, improve shoulder function, and strengthen daily living ability. In addition, a good psychological state is conducive to better recovery of patients' health. In clinical work, medical staff should pay attention to the psychological state of patients with SP.

KEYWORDS: PNF, Proprioceptive neuromuscular facilitation, Scapulohumeral periarthritis, Stretching technique, Clinical efficacy, Meta-analysis

AN INTEGRATED APPROACH TO CHRONIC LOW BACK PAIN: EVALUATING THE IMPACT OF CONSECUTIVE LOOP THERABAND TRAINING COMBINED WITH PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION AND CONVENTIONAL PHYSIOTHERAPY

Priya Tikhile, Deepali S Patil, Pratik R Jaiswal

Editors: Alexander Muacevic, John R Adler

PMCID: PMC11103918 PMID: 38770514

Cureus. 2024 Apr 20;16(4):e58632. doi: 10.7759/cureus.58632

ABSTRACT:

Chronic low back pain (CLBP) is a prevalent musculoskeletal condition characterized by persistent discomfort in the lumbosacral region lasting beyond 12 weeks. Individuals with CLBP often experience limitations in range of motion and compromised performance of affected body parts. Core muscle weakness/delayed activation and impaired lumbar proprioception are established contributors to CLBP. And influence balance dysfunction in CLBP patients. Exercise therapy is a cornerstone in the management of CLBP, aimed at enhancing muscular endurance, strength, and flexibility of the back muscles and soft tissues. However, the efficacy of exercise interventions depends on various factors including the type, intensity, frequency, and duration of exercises. This case report presents the rehabilitation of a corporate employee with a non-specific CLBP. The rehabilitation goals focused on improving balance, reducing disability, and alleviating pain. An integrated approach combining proprioceptive neuromuscular facilitation (PNF) with Consecutive Loop TheraBand (CLX) (The Hygenic Corporation, Akron, USA) along with traditional physical therapy techniques was implemented. PNF, a well-established technique, was chosen for its effectiveness in reducing disability and LBP while enhancing balance. The integration of PNF alongside conventional physiotherapy resulted in notable improvements, including increased lumbar flexion range following the rehabilitation period. This case underscores the importance of early initiation of comprehensive rehabilitation in CLBP patients to preserve strength, alleviate pain, reduce functional disability, and enhance balance. By addressing both the muscular and proprioceptive aspects of CLBP, this integrated approach aims to optimize outcomes in CLBP management.

KEYWORDS: multimodal pain management, theraband training, proprioceptive neuromuscular facilitation, physical therapy, chronic low back pain

PELVIC ROTATION CORRECTION COMBINED WITH SCHROTH EXERCISES FOR PELVIC AND SPINAL DEFORMITIES IN MILD ADOLESCENT IDIOPATHIC SCOLIOSIS: A RANDOMIZED CONTROLLED TRIAL

Yafei Zhang 1, Tingting Chai, Hao Weng, Yang Liu Editor: Sonam Khurana2

PMCID: PMC11288462 PMID: 39078854

PLoS One. 2024 Jul 30;19(7):e0307955. doi: 10.1371/journal.pone.0307955

ABSTRACT:

Introduction:

Individualized treatment of spinal deformity is needed for adolescent idiopathic scoliosis (AIS), and the integration of pelvic rotation correction based on proprioceptive neuromuscular facilitation (PNF) into regular physiotherapy may be a promising approach. However, few high-quality studies have investigated its effects. This study aimed to evaluate the efficacy of pelvic rotation correction combined with Schroth exercises in the treatment of mild AIS.

Methods:

This was a randomized controlled trial. Forty-two AIS patients were randomly divided into experimental and control groups. Both groups underwent 20 therapeutic sessions over 24 weeks. All patients (n = 42) performed Schroth exercises at each session. In addition, the experimental group (n = 21) also participated in a pelvic rotation correction program based on PNF at each session. The primary outcome was the concave/convex ratio of hipbone widths, and the secondary outcomes included the Cobb angle, trunk rotation angle, self-perception, apical vertebral translation, and apical vertebral rotation. Patients were evaluated before and after 24 weeks of intervention.

Results:

There was a significant between-group difference in the change from baseline between the experimental and control groups for the following parameters: concave/convex ratio 2.89% (95% confidence interval [CI], 1.58 to 4.20, $P < 0.001$), trunk rotation angle -1.26° (95% CI, -2.20 to -0.32 ; $P = 0.01$), and apical vertebral rotation improved by at least one class from baseline in 3 patients (14.3%) in the control group and 9 patients (42.9%) in the experimental group ($P = 0.04$). While Cobb angle -1.60° (95% CI, -7.75 to 0.54 ; $P = 0.14$), self-image 0.149 (95% CI, 0.001 to 0.297; $P = 0.049$), apical vertebral translation -0.58 mm (95% CI, -3.83 to 2.67 ; $P = 0.72$), and pelvic obliquity 0.10° (95% CI, -0.21 to 0.41 ; $P = 0.52$) did not differ significantly.

Conclusions:

Pelvic rotation correction combined with Schroth exercises more effectively improved pelvic axial rotation and other spinal deformities, including trunk rotation and apical vertebral rotation, than Schroth exercises alone in the treatment of mild AIS.

PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION AND/OR ELECTRICAL STIMULATION IN PATIENTS WITH PERIPHERAL FACIAL PARALYSIS: A SYSTEMATIC REVIEW

Nerea Dominguez-Defez 1, Juan Lopez-Barreiro 2, Pablo Hernandez-Lucas 3,* , Ana González-Castro 1

Editor: Benedetta Nacmias

PMCID: PMC11858216 PMID: 39997648

Neurol Int. 2025 Jan 23;17(2):17. doi: 10.3390/neurolint17020017

ABSTRACT:

Background:

Peripheral facial paralysis (PFP) affects the facial nerve, the seventh cranial nerve. It has an incidence rate of 20–30 cases per 100,000 habitants. The diagnosis is clinical, though imaging tests may be required in some cases. The treatment protocol includes medication, physiotherapy, and, in certain cases, surgery. Proprioceptive neuromuscular facilitation (PNF) techniques and electrical stimulation have been shown to be significant for recovery. Although PFP has a high recovery rate, up to 40% of patients may experience permanent sequelae. Objective: to assess the efficacy of treatment based on electrical stimulation and/or PNF in patients affected by PFP.

Methods:

A systematic search was conducted across six databases (PubMed, Medline, SportDiscus, CINAHL, Scopus, and Web of Science) in November 2024. Randomized controlled trials were included.

Results:

Fourteen articles were analyzed, applying PNF and/or electrical stimulation methods, pharmacological treatment, low-level laser treatment, subcutaneous collagen injections, and physiotherapy protocols involving facial expression exercises, yielding evidence for the variables assessed.

Conclusions:

PNF and/or electrical stimulation treatment in patients with PFP can be effective when employed early with appropriate parameters, showing promising results in improving quality of life, facial movement quality, and CMAP and reducing both the incidence and degree of synkinesis.

KEYWORDS: Bell's palsy, facial nerve diseases, rehabilitation, exercise therapy, musculoskeletal manipulations, electrotherapy

SHORT TERM EFFECTS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION COMBINED WITH NEUROMUSCULAR ELECTRICAL STIMULATION IN YOUTH BASKETBALL PLAYERS: A RANDOMIZED CONTROLLED TRIAL

Manuel Sos-Tirado 1, Aser Campo-Manzanares 1, Lidia Aguado-Oregui 1, Carles Cerdá-Calatayud 1, Juan Carlos Guardiola-Ruiz 1, Celia García-Lucas 2, Francisco Javier Montañez-Aguilera 1, Juan Francisco Lisón 2,3*, Juan José Amer-Cuenca 1

Editor: Diego Minciocchi

PMCID: PMC11677311 PMID: 39728264

J Funct Morphol Kinesiol. 2024 Dec 20;9(4):280. doi: 10.3390/jfmk9040280

ABSTRACT:

Background:

Hamstring muscle injuries are common in basketball and result in long periods of inactivity. To reduce their incidence, preventive protocols, including proprioceptive neuromuscular facilitation (PNF) stretches, have been proposed. The aim of this study is to compare the short-term effects of PNF and PNF + neuromuscular electrical stimulation (NMES) on hamstring extensibility and, secondarily, on vertical jump capacity in young basketball players.

Materials and Methods:

The study was a randomized controlled trial. One group performed a PNF stretching protocol and the other PNF + NMES. Hamstring extensibility was measured using the Sit and Reach test and the popliteal angle and jump capacity were measured using the Counter Movement Jump, both before and immediately after the intervention.

Results:

Forty-five young male players participated. Both groups showed significant intra-group improvements ($p < 0.001$) in hamstring flexibility after the intervention. However, there were no significant intra-group differences ($p > 0.05$) in jump capacity. Additionally, no significant differences

($p > 0.05$) were observed between the two groups for any of the measured variables.

Conclusions:

Both programs are effective in increasing hamstring flexibility in the short term without impairing vertical jump capacity in young basketball players.

KEYWORDS: hamstring flexibility, vertical jump, young basketball players, PNF, NMES

THERAPEUTIC EFFECT OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION COMBINED WITH MUSCLE ENERGY TECHNIQUE ON POST-STROKE DYSPHAGIA

Boye Ni, Huaping Jin, Wei Wu PMID: PMC11613027 PMID: 39520172

Technol Health Care. 2024 Nov 8;32(6):4331–4342. doi: 10.3233/THC-240220

ABSTRACT:

Background:

According to the Global Burden of Disease Study the prevalence of stroke worldwide has significantly increased from 1990 to 2019, making it the second leading cause of death worldwide. Approximately 70%–80% of stroke patients are unable to live independently due to disability.

Objective:

To explore the therapeutic effect of proprioceptive neuromuscular facilitation (PNF) combined with muscle energy technique (MET) on post-stroke dysphagia.

Methods:

A total of 122 stroke patients with dysphagia admitted to our hospital from January 2017 to December 2020 were divided into the control group ($n=61$) and the study group ($n=61$). Patients in the control group received conventional rehabilitation plans, while those in the study group were given a combined therapy of MET and PNF. Standard Swallowing Function Assessment Scale (SSA), Videofluoroscopic Swallow Study (VFSS), Swallowing Quality of Life (SWAL-QOL) scores, Water Swallow Test (WST) grading, and efficacy indicators were compared between two groups with t -tests, Wilcoxon signed-rank test, χ^2 test or Fisher's exact probability test.

Results:

After treatment, the study group showed lower SSA score ($P=0.036$), and VFSS, $P=0.013$ than the control group. The changes in SSA score ($P=0.013$) and VFSS score ($P<0.001$) in the study group were greater than the control group. Furthermore, after treatment, both the study group and the control group showed a decrease in WST grading ($P<0.001$); and the degree of post-treatment WST grading decline in the study group was higher ($P=0.009$). Besides, after treatment, the SWAL-QOL score of the study group was higher than the control group ($P<0.001$); and the effective rate of patients in the study group was higher than that in the control group ($P=0.021$).

Conclusion:

Compared with traditional rehabilitative training strategies, PNF combined with MET can effectively improve swallowing function, and enhance the quality of life in patients with post-stroke dysphagia.

KEYWORDS: Proprioceptive neuromuscular facilitation, muscle energy technique, stroke, dysphagia

INTEGRAL ROLE OF CHEST PHYSIOTHERAPY AND PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION IN IMPROVING THE OXYGENATION INDEX AND QUALITY OF LIFE OF PATIENTS WITH SQUAMOUS CELL CARCINOMA: A CASE REPORT

Samruddhi Aherrao, Lajwanti Lalwani Editors: Alexander Muacevic, John R Adler

PMCID: PMC11855806 PMID: 40007924

Cureus. 2025 Jan 26;17(1):e78009. doi: 10.7759/cureus.78009

ABSTRACT:

Squamous cell carcinoma (SCC) is the most common malignant tumor of the oral cavity. Eating, speaking, and performing basic dental hygiene are among the activities significantly affected by this condition. A 48-year-old male presented with complaints of pain in his left cheek for the past three months and was subsequently diagnosed with moderately differentiated SCC of the left buccal mucosa. He underwent surgery involving composite resection of the lesion, segmental mandibulectomy, and radical neck dissection on the right side for well-differentiated SCC of the left anterior alveolar region. This case emphasizes the importance of chest physiotherapy and proprioceptive neuromuscular facilitation (PNF) in managing oral SCC. The objective is to enhance the patient's quality of life and reduce dependence on ventilator support by improving the oxygenation index. Chest physiotherapy and PNF are administered to improve chest mobility, optimize breathing patterns, strengthen respiratory muscles, and reduce secretions. In conclusion, chest physiotherapy and PNF benefit patients with oral SCC. These interventions help improve the oxygenation index, reduce weaning time, and enhance overall quality of life.

KEYWORDS: chest physiotherapy, chest proprioceptive neuromuscular facilitation, oxygenation index, squamous cell carcinoma, weaning time

COMPARISON OF 3 GRADING SYSTEMS (HOUSE-BRACKMANN, SUNNYBROOK, SYDNEY) FOR THE ASSESSMENT OF FACIAL NERVE PARALYSIS AND PREDICTION OF NEURAL RECOVERY

Norhafiza MAT LAZIM, Hamizah ISMAIL, Sanisah ABDUL HALIM, Nik Adillah NIK OTHMAN, Ali HARON

Medeni Med J 2023;38:111-119

DOI: 10.4274/MMJ.galenos.2023.42383

ABSTRACT

Objective:

Currently, multiple classification systems exist for the assessment of facial nerve paralysis. This study was designed to choose the most practical system for use in a clinical setting depending on the clinician need. We compared the responsiveness of the 3 facial nerve grading systems, i.e., House-Brackmann, Sydney, and Sunnybrook, as the subjective method and compared the outcomes with the objective method, i.e., the nerve conduction study. The correlation between the subjective and objective assessments was determined.

Methods:

A total of 22 consented participants with facial palsy was assessed with photos and videography recordings where they performed 10 standard facial expressions. The severity of facial paralysis was evaluated with the House-Brackmann, Sydney, and Sunnybrook grading scales subjectively and with the facial nerve conduction study objectively. The assessments were repeated after 3 months.

Results:

A Wilcoxon signed-rank test showed that there were statistically significant change in all three gradings after 3-month of assessment. The responsiveness of the nerve conduction study was significant for the nasalis and orbicularis oris muscles. It was not significant for the orbicularis oculi muscle. The nasalis and orbicularis oculi showed statistically significant correlation with the three classification systems except for the orbicularis oculi muscle.

Conclusions:

All three grading systems, House-Brackmann, Sydney, and Sunnybrook, showed statistically significant responsiveness after 3 months of evaluation. The nasalis and orbicularis oculi muscle can be used to predict facial palsy recovery because they showed strong positive and negative correlations with the extent of facial nerve degeneration from the nerve conduction study.

KEYWORDS: Facial nerve palsy, House-Brackmann classification system, Sydney classification system, Sunnybrook classification system, nerve conduction study

PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION NECK PATTERN AND TRUNK SPECIFIC EXERCISE ON TRUNK CONTROL AND BALANCE—AN EXPERIMENTAL STUDY

Marimuthu Dinesh, Paluchamy Thenmozhi, Selvaraj KalaBarathi

PMCID: PMC9683997 PMID: 36467307

Int J Ther Massage Bodywork. 2022 Dec 1;15(4):9–17.

doi: 10.3822/ijtmb.v15i4.727

ABSTRACT

Background:

Most stroke survivors continue to live with disabilities and may require physical rehabilitation to control the trunk and balance during the post-stroke period. The cause of lack of trunk control and balance among stroke patients is the weakened trunk muscle strength.

Purpose: To study the effect of proprioceptive neuromuscular facilitation (PNF) neck pattern and trunk-specific exercise on trunk control and balance among stroke patients.

Setting: The study was conducted at the medical wards of Saveetha Medical College and Hospital, Chennai, India.

Participants: Sixty patients with stroke who met the inclusion criteria participated in the study.

Research Design: This is a quasi-experimental study.

Intervention: PNF trunk-specific exercise was administered to the experimental group for 45 min of 28 sessions, which contained 15 min of stretching exercise and 30 min trunk-specific exercise. The control group received routine hospital care services.

Main Outcome Measures: The study's primary outcome was balance and trunk control, measured by the Berg Balance Scale (BBS) and Trunk Impairment Scale (TIS) before the intervention and at the end of the intervention of 28 days.

Results:

Within-group analysis, paired t test showed a significant improvement comparing the trunk control and balance score before (13.40 ± 1.04 & 25.40 ± 1.81) and after (15.03 ± 0.96 & 27.07 ± 1.48) the intervention in the experimental group ($p < .001$). Between-group analysis, both the experimental and control group post-test mean score of TIS (15.03 ± 0.96 & 13.70 ± 1.15) and BBS (27.07 ± 1.48 & 25.30 ± 1.73) showed significant difference ($p < .001$).

Conclusion: PNF neck pattern and trunk-specific exercise used in this study effectively improved balance and trunk control among patients with stroke.

KEYWORDS: balance, neck pattern, proprioceptive neuromuscular facilitation, stroke, trunk control, trunk-specific exercise

DOES PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION APPROACH HAVE AN EFFECT ON SWALLOWING FUNCTION, MUSCLE MORPHOLOGY AND QUALITY OF LIFE IN DYSPHAGIC STROKE PATIENTS? A RANDOMISED CONTROLLED TRIAL

Esra Nur Özcan, Nezehat Özgül Ünlüer, Mehmet Öztürk, Ömer Erdur

Trial Registration: ClinicalTrials.gov identifier: NCT05678686

Journal of Oral Rehabilitation, 2025; 0:1–15 <https://doi.org/10.1111/joor.700001>

ABSTRACT:

Objective: To investigate the effects of different exercise methods on swallowing function in dysphagic stroke patients.

Methods: Forty-two patients with dysphagia were divided into three groups: conventional swallowing exercises group; the pro-prioceptive neuromuscular facilitation (PNF) exercises + conventional swallowing exercises group and the Chin-tuck Against Resistance (CTAR) exercises + conventional swallowing exercises. Patients received swallowing rehabilitation twice a week for 8 weeks. Patients were evaluated for swallowing using Fiberoptic Endoscopic Evaluation of Swallowing (FEES) with the Penetration-Aspiration Scale. Suprahyoid muscle thickness, tongue root area and hyolaryngeal elevation were measured by ultrasound before and after treatment. Furthermore, scales such as the National Institutes of Health (NIH) swallowing safety scale, Functional Oral Intake Scale (FOIS), Eating Assessment Tool-10 (EAT-10) and Swallowing Quality of Life Scale (SWAL- QOL) were utilised.

Results: The clinical and demographic characteristics of all three groups were similar at baseline ($p > 0.05$). Positive improvements were identified following treatment in terms of muscle thickness, as determined by FEES evaluation of swallowing functions and ultrasound evaluations, in all groups ($p < 0.05$). In the PAS liquid food evaluation, the highest effect was found in the PNF group ($\eta^2 = 0.858$). All ultrasound evaluations showed greater improvement in the PNF and CTAR groups compared to the conventional group ($p < 0.05$). The SWAL QOL also showed significant improvements in all groups after treatment ($p < 0.05$).

Conclusion: In this study, all three groups contributed to swallowing rehabilitation, but the PNF group improved the most. PNF exercises, delivered by physical therapists without the need for specialised equipment, will make swallowing rehabilitation more effective. Trial Registration: ClinicalTrials.gov identifier: NCT05678686 This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

KEYWORDS: dysphagia | proprioceptive neuromuscular facilitation | quality of life | stroke rehabilitation | ultrasonography

EFFICACY OF MYOFASCIAL TECHNIQUES AND PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION IN THE TREATMENT OF PATIENTS WITH SYSTEMIC LUPUS ERYTHEMATOSUS—RANDOMIZED CROSSOVER CLINICAL STUDY

José-María Torres-Quiles 1, Rubén Cuesta-Barriuso 2,3*, Raúl Pérez-Llanes 1,3

Editors: Adam Kawczyński, Gianluigi Pasta

PMCID: PMC12250343 PMID: 40648648

Healthcare (Basel). 2025 Jul 7;13(13):1625. doi: 10.3390/healthcare13131625

ABSTRACT:

Background/Objectives: Systemic lupus erythematosus is an autoimmune disease. The musculoskeletal system is affected in 90% of patients. The most common symptoms are myalgia, arthralgia, and arthritis. The objective was to analyze the efficacy of an intervention using myofascial techniques and proprioceptive neuromuscular facilitation in patients with systemic lupus erythematosus.

Methods: A randomized, single-blind, crossover clinical trial. Seventeen patients with systemic lupus erythematosus were randomly assigned to two sequences: Sequence A–B (intervention phase first, then control phase) and Sequence B–A (control phase first, then intervention phase). The intervention lasted for four weeks, with two weekly sessions lasting 50 min each. The intervention consisted of myofascial and proprioceptive neuromuscular facilitation techniques. The variables were: pain intensity (Visual Analog Scale), functional capacity of lower limbs (2-Minute Walk Test), physical function (Timed Up and Go Test), and fatigue (Fatigue Assessment Scale). After a 2-week follow-up and a 2-week washout period, the patients switched groups, and the methodology was replicated.

Results: None of the patients developed injury or adverse effects as a direct consequence of the intervention. There were statistically significant differences between groups ($p < 0.001$) in the intensity of ankle ($\eta^2_p = 0.38$) and knee ($\eta^2 = 0.37$) pain, functional capacity ($\eta^2 = 0.33$), and physical function ($\eta^2 = 0.56$). There were also intergroup changes in fatigue ($\eta^2 = 0.52$), and the relevant mental ($\eta^2 = 0.26$) and physical ($\eta^2 = 0.45$) components.

Conclusions: Proprioceptive myofascial and neuromuscular facilitation techniques are safe in patients with systemic lupus erythematosus. This physical therapy protocol can improve the intensity of knee and ankle joint pain in these patients. This intervention can improve functional capacity, physical function, and fatigue in people with systemic lupus erythematosus.

KEYWORDS: systemic lupus erythematosus, physiotherapy, joint pain, range of motion, physical function, balance, fatigue

SURFACE ELECTROMYOGRAPHY ANALYSIS OF CONTRALATERAL MUSCLE IRRADIATION IN PROPRIOCEPTIVE FACILITATION

Maria Carolina Isaías Oliveira, Maria Ester Ibiapina Mendes de Carvalho, Daniele Alves da Silva, Riccardo Samuel Albano Lima, Sara Sampaio de Macêdo, Lia de Sousa Pádua, Laiana Sepúlveda de Andrade Mesquita

Fisioter. Mov., 2025, v. 38, e38108 DOI: 10.1590/fm.2025.38108

ABSTRACT:

Introduction:

Proprioceptive neuromuscular facilitation (PNF) is a concept that promotes functional movement through facilitation, inhibition, strengthening, and relaxation of muscle groups. Among its principles, irradiation is defined as the propagation of the response to the stimulus, which can be evidenced as increased contraction or relaxation in synergistic muscles and movement patterns.

Objective:

To evaluate PNF patterns in muscle irradiation to the contralateral lower limb through surface electromyography in physical therapy students.

Methods:

This is a cross-sectional study with a quantitative and analytical approach. Thirty healthy volunteers participated in the study and were evaluated with surface electromyography as they performed PNF and rectilinear movement patterns. Results: It was found that PNF patterns radiate to the contralateral limb, with the flexionabduction-internal rotation pattern with knee flexion being statistically significant ($p < 0.05$). It was observed that the upper patterns do not significantly irradiate to the contralateral limb when compared with lower limb movements (LL). In the correlation between strength and electromyographic activation, the medial gastrocnemius obtained the greatest strength and the lowest muscle activation in movements involving hip or shoulder flexion.

Conclusion:

PNF diagonals irradiate to the LL contralateral to that tested in the electromyography. New studies with a larger sample size are needed to investigate contralateral muscle irradiation in healthy individuals through surface electromyography in order to obtain a more robust correlation

KEYWORDS: Health research evaluation. Muscle strength. Stretching exercises. Electromyography

PHYSIOTHERAPY INTERVENTION FOLLOWING EXCISION OF BRAINSTEM CAVERNOMA –A CASE REPORT

C.Sumithra and Rajeswari Muthusamy

Indian Journal of Natural Sciences www.tnsroindia.org.in ©IJONS Vol.16 / Issue 90 / June / 2025

International Bimonthly (Print) – Open Access ISSN: 0976 – 0997

ABSTRACT:

Brainstem cavernomas are rare vascular malformations that can lead to severe neurological deficits following haemorrhage. Surgical removal of brain stem cavernomas result in severe neurological deficits due to their anatomical position. Specific physiotherapy intervention combined with Proprioceptive neuromuscular facilitation (PNF) stabilization exercises, Frenkel exercises, strength and endurance exercises have improved postural control, balance and coordination. This case report analyses the eight week targeted physiotherapy intervention following post excision of brainstem cavernoma.

KEYWORDS: brainstem cavernoma, physiotherapy, PNF stabilization

ACUTE EFFECTS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION COMPARED TO ACTIVE RANGE OF MOTION EXERCISES ON RESPIRATORY AND HEMODYNAMIC RESPONSES IN CRITICALLY ILL PATIENTS: A PILOT STUDY

Burcin Aktar, Seher Ozyurek, Ugur Koca, Ali Necati Gokmen

J Basic Clin Health Sci 2025; 9: 327-334

<https://doi.org/10.30621/jbachs.1529638>

ABSTRACT

Background and Purpose:

Proprioceptive Neuromuscular Facilitation (PNF) is a widely used rehabilitation approach. However, limited studies examine the effect of PNF in a critical care setting. We aimed to investigate the acute effects of PNF-based exercises compared to active range of motion (ROM) exercises on respiratory and hemodynamic responses in critically ill patients.

Methods:

Twenty-one spontaneously breathing non-intubated critically ill patients were randomly assigned to either PNF-based (n=10) or active ROM exercise group (n=11). Respiratory rate (RR; breath/min), peripheral oxygen saturation (SpO₂; %), heart rate (HR; beat/min), systolic blood pressure (SBP; mmHg), diastolic blood pressure (DBP; mmHg) and mean blood pressure (MBP; mmHg) were measured using bedside monitoring system. The dyspnea severity and perceived exertion of patients were evaluated using the 0-10 numeric rating scale. Data was recorded before, immediately after, and 5 minutes after each exercise session.

Results:

There were no clinically significant differences between groups in RR (breath/min), SpO₂ (%), HR (beat/min), SBP (mmHg), DBP (mmHg), and MBP (mmHg), the severity of dyspnea and perceived exertion ($P>0.05$).

Conclusion:

In the treatment of spontaneously breathing non-intubated patients, PNF technique can be applied safely in terms of respiratory and hemodynamic responses, similar to active ROM exercises.

KEYWORDS: Critically ill patients, Proprioceptive Neuromuscular Facilitation, Physiotherapy

THE EFFECT OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION TECHNIQUES ON PAIN, MOTOR FUNCTIONS, FATIGUE AND HEALTH RELATED QUALITY OF LIFE IN INDIVIDUALS WITH MULTIPLE SCLEROSIS: A RANDOMIZED, SINGLE-BLIND STUDY

Bircan Yucekaya, Seda Nur Kemer, Elif Asan, Huseyin Gerdan, Nilay Comuk Balci, Deniz Cakir, Mine Pekesen Kurtça, Murat Keskin, Murat Terzi

PMID: 40194905 DOI: 10.1080/01616412.2025.2490086

Randomized Controlled Trial Neurol Res. 2025 Jul;47(7):537-549. doi: 10.1080/01616412.2025.2490086. Epub 2025 Apr 7.

ABSTRACT

Purpose: This study aimed to evaluate the effects of PNF on pain, motor function, fatigue, and quality of life in MS patients.

Method: A randomized, controlled, single-blind study was conducted. Forty-four patients were randomly assigned to either the PNF Group (PNFG, n = 22, 16 female) or the Control Group (CG, n = 22, 16 female). PNFG underwent supervised combined aerobic and PNF training thrice weekly for 8 weeks, while CG followed a home exercise regimen. Various measures were employed, including the Visual Analogue Scale (VAS) for pain, Timed Up and Go (TUG) test, Functional Reach Test (FRT), Six-Minute Walk Test (6-MWT), Fatigue Severity Scale (FSS), Fatigue Impact Scale (FIS), Dexterity Questionnaire-24 (DextQ-24) and Multiple Sclerosis Quality of Life-54 (MSQoL-54).

Results: PNFG exhibited significant improvements in VAS ($p = 0.000$), FRT ($p = 0.001$), TUG ($p = 0.000$), 6-MWT ($p = 0.000$), FIS ($p = 0.007$), DextQ-24 ($p = 0.033$), MSQoL-54 scores (Physical Health Composite, Mental Health Composite, $p = 0.005$, $p = 0.002$, respectively) ($p < 0.05$). CG also showed improvements in VAS ($p = 0.018$), TUG ($p = 0.000$), 6-MWT ($p = 0.000$), FSS ($p = 0.006$), psychosocial function ($p = 0.007$), MSQoL-54 (Physical Health Composite, Mental Health Composite, $p = 0.017$, $p = 0.001$, respectively), DextQ-24 ADL scores ($p = 0.045$) ($p < 0.05$). PNFG outperformed CG in DextQ-24 (Dressing, $p = 0.038$) and MSQoL-54 subscales (emotional well-being, energy, health perception, $p = 0.007$, $p = 0.037$, $p = 0.044$, respectively) ($p < 0.05$).

Conclusions: This is the first randomized controlled trial to show that PNF improves upper limb motor function (skill) and quality of life in MS patients. PNF and home physiotherapy effectively improved pain, motor function, fatigue and quality of life, with the PNF group achieving better outcomes. Both modalities offered accessible rehabilitation options.

KEYWORDS: Multiple sclerosis; fatigue; motor functions; pain; proprioceptive neuromuscular facilitation; quality of life.