Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 3 (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Current Evidences of Physiotherapy for Shoulder Pain with Subluxation in Stroke Survivors: A Systematic Review

Piyusha Jadhav[1], Dr Suraj B. Kanase[*2]

[1]Department of Neurophysiotherapy, Krishna college of physiotherapy, Krishna Vishwa Vidyapeeth, Karad.

***Corresponding author:**

Email ID: drsurajkanase7@gmail.com

Cite this paper as: Piyusha Jadhav, Dr Suraj B. Kanase, (2025) Current Evidences of Physiotherapy for Shoulder Pain with Subluxation in Stroke Survivors: A Systematic Review. *Journal of Neonatal Surgery*, 14 (3), 59-69.

ABSTRACT

Introduction: Hemiplegic shoulder pain with subluxation is a prevalent complication in stroke patients, affecting 17-40% of individuals. Reduced functional ability, a lower quality of life, and an increased load on caregivers are some of the possible outcomes. The condition is often characterized by pain, limited range of motion, and decreased strength, making everyday activities challenging. In order to minimize these impacts and encourage the best possible recovery, effective management techniques are necessary.

Methods: A systematic literature review was performed using the Pub Med and Google Scholar databases**.** Keywords used were "hemiplegic shoulder pain", "shoulder subluxation", "stroke patients", and "physiotherapy". Studies published in English within the last 10 years were included. Eight studies published between 2015 and 2024 were included, focusing on randomized trials and observational studies. Studies were excluded if they were non-peer-reviewed, did not focus on physiotherapy, or lacked relevant outcomes.

Results: The inclusion criteria were satisfied by eight articles that demonstrated the efficacy of physiotherapy therapies in the treatment of hemiplegic shoulder pain and subluxation. These treatments included physical therapy, multimodal techniques, and shoulder taping.

Conclusion: This comprehensive review emphasizes how crucial physical therapy is for treating stroke patients' hemiplegic shoulder discomfort and sub luxation. There is evidence to support the effectiveness of physiotherapy interventions in lowering pain and enhancing functional abilities**.**

Keywords: *Hemiplegic Shoulder Pain, Shoulder Sub luxation, Stroke Patients, Physiotherapy, Systematic Revie*

1. INTRODUCTION

Stroke due to paralysis and cognitive disturbance in the patients that survive is a major cause of disability . Rehabilitation for stroke patients is negatively impacted by issues pertaining to the upper extremities. The most significant factor contributing to upper extremity difficulties in stroke patients is shoulder issues. Shoulder discomfort and subluxation are caused by disturbed shoulder biomechanics.[1]

Following a stroke, post-stroke shoulder pain (PSSP) is a common and incapacitating consequence" It is evident that the prevalence of PSSP rises over time after a stroke, however estimates vary widely based on the method and time of measurement, ranging from 16 to 80%.The emergence of PSSP has detrimental effects; in addition to causing the patient discomfort, it is linked to poor functional rehabilitation, decreased mobility, depression, sleep disturbances, decreased life quality, and potentially longer hospital stays Although there is no clear consensus on the relative importance of these factors, Forster1 recently reviewed potential causes of PSSP, including subluxation, abnormal tonal patterns (both flaccidity and hypertonicity), scapular retraction, sensory loss, hemi-neglect, the effects of immobilization, and poor handling. Elderly persons in the community frequently have pre-existing shoulder pain, and any insults brought on by the stroke may make these problems worse. Others have been unable to corroborate the findings of some authors who have connected PSSP to neglect, subluxation, or sensory loss.2. These conflicting findings are a reflection of the small, carefully selected groups of

stroke patients who were evaluated at different times after their stroke. The likelihood of PSSP being multifactorial, with several variables contributing at different stages of the illness, is very high. For instance, early flaccidity may result in glenohumeral joint subluxation, which causes the shoulder capsule and ligaments to extend.Poor handling, the consequences of immobility in a sling, and abnormal tone patterns of the rotator cuff and scapula all contribute to the PSSP. Later on, pain may be mediated by the sympathetic nervous system.[3,4]

The stability of the shoulder,also referred to as the glenohumeral joint, it depends on the proportional roles played by the ligaments, rotator cuff muscles, joint capsule, and glenoid labrum. It is a complex multi-axial synovial ball and socket joint. Secondary musculoskeletal problems in the shoulder area arise from an imbalance between these structures caused by loss of voluntary motor control after a stroke. The most well-known of these, glenohumeral subluxation (GHS) and hemiplegic shoulder pain (HSP), have been documented to occur in 81% and 72% of cases, respectively.Ten There are a number of known causes of HSP, including brachial plexus injuries, rotator cuff tears or impingements, adhesive capsulitis, and shoulder hand syndrome. Eleven to thirteen When HSP manifests early, it can negatively impact rehabilitation and lead to severe disability. HSP may impair daily living activities, affect upper extremity motor recovery, and lower quality of life.[5,6] In a similar vein, GHS poses significant obstacles to upper limb rehabilitation, such as preventing proper posture. Subluxation it has been suggested that potential cause of further post-stroke problems that postpone the recovery of upper limb function.In the absence of treatment, there is a worry that GHS may eventually worsen to an unreversible degree. Consequently, a number of therapeutic approaches have been proposed to treat GHS.[7,8]

According to certain studies, shoulder pain and spasticity are directly related. According to these research, 85% of patients with spastic hemiplegia report having shoulder pain, compared to 18% of individuals with flaccid hemiplegiaA single However, this claim is disputed by other investigations.Although the clinical diagnosis is ambiguous, one study found adhesive capsulitis to be the primary cause of shoulder pain.In terms of when shoulder pain started, one study found that 67% of hemiplegics experienced it when they were initially moved from acute care to a rehabilitation facility, and that the pain worsened there.These studies underlined how important it is to identify targeted therapies early and apply them in acute care and rehabilitation settings.[9]

Various therapies to improve shoulder subluxation have been the subject of numerous research[26], especially in those with shoulder instability or hemiplegia associated to stroke. Randomized controlled trials and systematic reviews have supported the use of neuromuscular electrical stimulation (NMES), which has been the subject of much research. NMES effectively reduces shoulder subluxation by activating muscles such as the deltoid and supraspinatus, helping to realign the humeral head within the shoulder joint. Studies, such as those by Kondo et al. (2012) and Ada & Foongchomcheay (2002), suggest NMES is particularly useful for preventing subluxation in the early stages of recovery, though its effect on long-term or chronic subluxation is less conclusive.

In addition, therapeutic exercise and rehabilitation programs have demonstrated efficacy in improving shoulder stability and function. Studies emphasize the value of exercises that focus on the deltoid and rotator cuff muscles, which are essential for preserving appropriate shoulder alignment. A review by Chantraine et al. (1999) showed that rehabilitation programs, particularly those focusing on strengthening the shoulder girdle and scapular stabilizers, could significantly reduce subluxation and improve functional outcomes .[10, 11, 25]

Research has also been carried out. on manual treatment, which includes soft tissue methods and joint mobilization to restore normal shoulder biomechanics. However, when paired with physical exercise, it appears to be even more effective.A study by Paci et al. (2007) discovered that as compared to manual therapy alone, patients who received both manual therapy and NMES improved more.[10,11,12]

The use of slings and orthotic devices is another common intervention, though evidence supporting their long-term efficacy is mixed. Short-term studies suggest that slings can prevent further subluxation,However, without concurrent exercise, extended use may result in muscular atrophy.According to Hurd et al. (2011),slings could provide temporary shoulder support, but their benefits diminished without active rehabilitation . Additionally, Botulinum toxin (Botox) injections have been investigated to lessen spasticity in muscles contributing to subluxation, with studies showing short-term improvements in alignment and muscle tone, as demonstrated by Yelnik et al. (2007) .[13]

Lastly, functional electrical stimulation (FES), which stimulates muscle contractions during functional tasks, has been found to improve shoulder function and decrease subluxation in stroke patients. A study by Sahin et al. (2012) showed promising results for FES in reducing subluxation and improving arm mobility . While surgical interventions are less common, they are considered in severe or chronic cases when conservative treatments fail, with studies suggesting that surgical options can restore stability but carry higher risks and are are usually only used in severe situations.[14,15]

In conclusion, the research points to a multidisciplinary approach as the most effective for improving shoulder subluxation. Combining NMES, exercise-based therapy, and manual interventions yields the best outcomes, particularly when applied early on in the course of treatment.

2. METHODOLOGY

A systematic search was carried out to find systematic reviews and randomized controlled trials (RCTs) released between 2010 and 2024 that focused on shoulder subluxation associated with shoulder pain in stroke patients. The search aimed to gather evidence on various interventions, including neuromuscular electrical stimulation (NMES), therapeutic exercises, manual therapy, and other conservative treatments targeting post-stroke shoulder subluxation. Several reputable research databases were utilized, including PubMed, Cochrane Library, CINAHL, and PEDro (Physiotherapy Evidence Database), alongside Google Scholar for grey literature. These databases were selected to ensure a broad and comprehensive collection of peer-reviewed studies across various medical and rehabilitation disciplines.

SEARCH STRATERGY:-

A thorough search approach was used to identify current physiotherapy evidences for hemiplegic shoulder pain with shoulder subluxation in stroke patients. Multiple databases, including PubMed and Scopus, were searched using keywords like "hemiplegic shoulder pain" and "physiotherapy". Studies published in English within the last 10 years that investigated physiotherapy interventions in adult stroke patients were included. Studies that didn't meet these criteria, including those with non-physiotherapy interventions or other conditions, were excluded. Relevant results were yielded using Boolean operators.

INCLUSION CRITERIA :-

The review included studies that were published between 2010 and 2024. Quasi-experimental and randomized controlled trials (RCTs) were the study designthat were considered for inclusion s.Participants were required to be adults(≥18 years) with a confirmed diagnosis of stroke. To be eligible, studies had to specifically investigate hemiplegic shoulder pain with shoulder subluxation. Additionally, only studies examining physiotherapy interventions, such as exercise, electrotherapy, manual therapy, and education, were included.

EXCLUSION CRITERIA:-

Studies with non-randomized controlled trial (RCT) or non-experimental designs, Reviews, case series, and case studies were not included. Studies involving participants who had diseases other than stroke, like traumatic brain injury or spinal cord damage, were also disqualified. Furthermore, studies that did not particularly address shoulder subluxation-related hemiplegic shoulder pain or that did not look at physiotherapy interventionswere excluded from the review

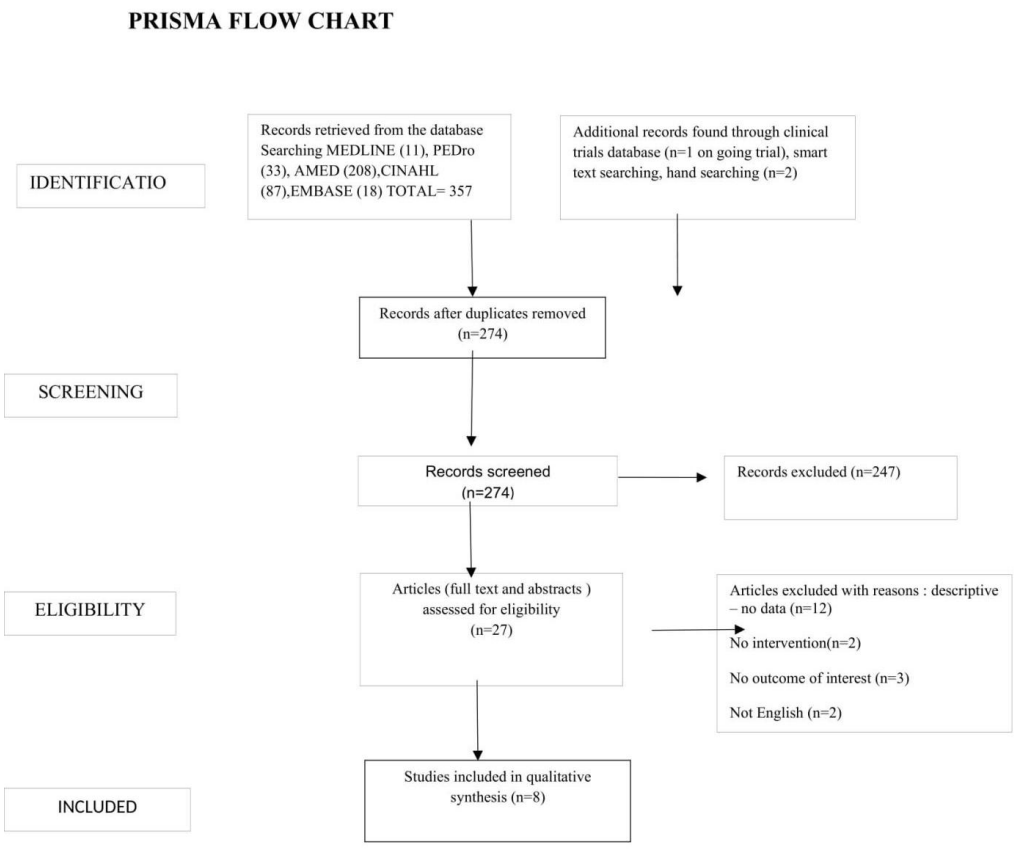

Figure 1: Flowchart of study methodology

RESULTS:

Table 1: Systematic review of past studies

SR NO	TITLE	AUTHOR	INCLUSION	EXCLUSION	OUTCOME	INTERVENTION	CONCLUSION
1	Elastic Dynamic Sling on Subluxation of Hemiplegic Shoulder in Patients with Subacute Stroke: A Multicenter Randomized Controlled Trial	Min Gyun Kim	Patients were included if they were within 4 weeks of their first stroke, had a shoulder dislocation greater than 0.5 finger width and has cognitive function with the ability to express pain.	Patients were excluded if they had shoulder weakness before stroke (which may be due to spinal cord injury and myopathy), inability to evaluate pain (as is seen in patients with total aphasia and cognitive decline), history of shoulder joint disease before stroke, and age < 18 years	Fugl-Meyer assessment (FMA) scale, manual muscle testing (MMT), pain, modified Ashworth scale (MAS), and Korean-modified Barthel index (K-MBI)	experimental group received elastic dynamic shoulder sling and the control group received Bobath sling to support affected upper extremity.	The subluxation distance showed better results in the elastic dynamic sling, which has both proximal and distal parts, than in the Bobath sling, which holds only the proximal part. Both shoulder orthoses showed improvements in the modified Barthel index, upper-extremity function, and manual muscle testing
2	The Effect of Kinesiology Taping on the Hemiplegic Shoulder Pain: A Randomized Controlled Trial	Lin Yang, Jingyi Yang , and Chengqi He	(1) > 30 years of age; (2) period after stroke: >1 month and <6 months; (3) diagnosed as HSP with a period of more than 1 month, accompanied with shoulder subluxation.	(1) history of serious conditions or diseases such as cancer; (2) skin problems, wounds, or infections on the affected shoulder; (3) skin allergy to the tape;	shoulder pain intensity (numerical pain rating scale), magnitude of subluxation, muscle activity (measured by surface electromyography (sEMG)), and shoulder active range of movement (AROM) were assessed at the baseline, on the first day (immediately after taping) and 4 weeks after treatment (without taping)	Patients were randomly assigned into the taping group or control group. ,e taping group received therapeutic kinesiology taping and conventional treatment, while the control group received placebo taping (applied without tension) and conventional treatment	present study revealed the effectiveness of kinesiology taping for HSP. Kinesiology taping might be a good alternative for relieving shoulder pain, improving the AROM, subluxation, and muscle activity of the shoulder in patients with HSP after stroke.
3	Effect of EMG-triggered neuromuscular	Li-Ling Chuang	(1)first stroke that began more than three	(1) electrical stimulation contraindications (e.g., heart	Two pain assessment tools were used as the primary outcome	EMG-triggered NMES was administered	In terms of pain and shoulder impairment,

	electrical stimulation with bilateral arm training on hemiplegic shoulder pain and arm function after stroke: a randomized controlled trial		months before the time of recruitment; (2) hemiplegic shoulder pain that was at least mild when active during the previous seven days (numerical rating scale score ≥ 1); (3) no additional neurological conditions, including multiple sclerosis, epilepsy, Parkinson's disease, etc.; and (4) sufficient cognitive ability (minimum mental state examination score ≥ 24).	pacemaker, metal implants); (2) pre-existing shoulder conditions, such as frozen shoulder, tendinitis, or rotator cuff injuries; (3) involvement in any pharmacological or experimental rehabilitation studies throughout the research period; (4) Modification of painkillers over the research period	measures: a vertical Numerical Rating Scale (NRS) supplemented with a Faces Rating Scale (FRS), and the abbreviated version of the Brief Pain Inventory (BPI-SF), to evaluate pain intensity and its impact on daily activities. To assess the level of upper-limb impairment and dysfunction, two secondary measures were selected: the upper-limb subscale of the Fugl-Meyer Assessment (FMA-UL) and pain-free passive shoulder range of motion.	to participants in the experimental group, while TENS was administered to those in the control group for 20 minutes. Following the EMG-triggered NMES or TENS, each participant got 20 minutes of bilateral arm exercises, which included bilateral shoulder abduction, bilateral arm raising, bilateral arm reaching forward, and bilateral shoulder horizontal abduction at pain-free range. Based on each person's capacity, the number of repetitions of the bilateral arm training exercises was progressively raised during the course of the therapy session.	EMG-triggered NMES with bilateral arm training shown more immediate and long-lasting effects than TENS with bilateral arm training for stroke patients with hemiplegic shoulder pain who were chronic and subacute.
4	The effectiveness of functional electrical stimulation for the treatment of shoulder subluxation and shoulder pain in hemiplegic patients: A	engin koyuncu	A total of 50 hemiplegic patients who presented with both shoulder subluxation and shoulder pain were selected to participate in	study excluded patients with various conditions, including those without shoulder subluxation or pain, cardiac pacemaker or cardiac failure with conduction	Pain levels were measured using the Visual Analog Scale (VAS), while shoulder subluxation levels were evaluated using Van Langenberghe's	The study group received Functional Electrical Stimulation (FES) treatment 5 times a day, 1 hour daily for 4 weeks,	The results of our study have shown that applying FES treatment to the supraspinatus and posterior deltoid muscles in addition to

	randomized controlled trial		the study. These patients were then randomly assigned to one of two groups: the study group or the control group. This randomization process ensured that the patients were evenly distributed between the two groups, minimizing any potential biases and allowing for a more accurate comparison of outcomes between the two groups.	issues, previous contralateral stroke with ongoing neurological deficit, pre-existing shoulder pathology (such as tumor, infection, or scapular instability), complicated regional pain syndrome or brachial plexus lesion, uncooperativeness, and recent epilepsy attacks (within 6 months).	classification and X-ray measurements	targeting the supraspinatus and posterior deltoid muscles. To avoid stimulating the upper trapezius muscle, the electrode was placed over the posterior deltoid muscle. A shoulder sling and armchair arm were used to maintain proper positioning and protect the shoulder joint.	conventional treatment when treating the subluxation in hemiplegic patients is more beneficial than conventional treatment by itself
5	Robotic-Assisted Shoulder Rehabilitation Therapy Effectively Improved Poststroke Hemiplegic Shoulder Pain: A Randomized Controlled Trial	Min-Su Kim, MD, PhD	A total of 59 subacute stroke patients who reported hemiplegic shoulder pain with a minimum visual analog scale (VAS) of 3 points (0- to 10-point scale)	(1) significant cognitive impairment (Korean version of the Mini-Mental State Examination<15) or language deficits; (2) preexisting shoulder pain prior to stroke; (3) definite shoulder abnormalities in the affected limb, on radiographs; and (4) suspected complex regional pain syndrome, central pain, or myofascial pain syndrome.	visual analog scale was the primary outcome, and the pain-free passive range of motion of the shoulder joint, the Korean version of the Shoulder Disability Questionnaire, and ultrasonographic grades were the secondary outcomes	Conventional physical therapy directed at both improving upper extremity mechanics and reducing neurologic injury was performed twice per day in both groups. In the intervention group, additional robotic-assisted shoulder rehabilitation therapy was administered for 30 minutes per day, 5 times per week for 4 weeks.	A prototype shoulder rehabilitation robot as an adjuvant therapy improves hemiplegic shoulder pain and self-reported shoulderrelated disability
6	Peripheral Nerve Stimulation	Richard D. Wilson,	: ≥ 21 years old; ≥ 3 months after	: evidence of joint or overlying skin infection or	The primary outcome was the worst pain in the	A monopolar needle identified the	Short-term PNS is a safe and efficacious

	Compared to Usual Care for Pain Relief of Hemiplegic Shoulder Pain: A Randomized Controlled Trial	MD	stroke with new or worsened shoulder pain on their affected side; HSP rated ≥ 4 out of 10 on the 11-point numeric rating scale (NRS) of the Brief Pain inventory Short Form, question 3 (BPI-SF3)10, 11; duration of HSP ≥ 3 months;	history of recurrent skin infections; insensate skin; ≥1 opioid or nonopioid analgesic daily for shoulder pain; daily intake of pain medications for any other chronic pain; intra-articular or subacromial steroid injections to the shoulder in the previous 3 months	last week (Brief Pain Inventory, Short Form question 3) measured at baseline, and weeks 1,4, 12, and 16. Secondary outcomes included pain interference (Brief Pain Inventory, Short Form question 9), pain assessed using the ShoulderQ Visual Graphic Rating Scales; and health-related quality of life... (SF-36v2)	target site and depth on the deltoid muscle. An insulated introducer with a fine-wire lead was inserted, and strong muscle contraction verified proper positioning. The lead's barb was anchored in the muscle, and the introducer was withdrawn. Stimulation confirmed proper placement, ensuring effective muscle activation.	treatment for shoulder pain. Pain reduction is greater than compared to UC and is maintained for at least 12 weeks after treatment.
7	Functional orthosis in shoulder joint subluxation after ischaemic brain stroke to avoid post-hemiplegic shoulder–hand syndrome: a randomized clinical trial	Maik Hartwig	Patients were eligible for the trial if they were over 18 years of age, had a confirmed ischemic brain stroke through computed tomography within the past 21 days, demonstrated caudal subluxation of the glenohumeral joint, and had hemiparesis of the upper extremity with muscle strength ranging from 0 to 2.	high-grade neglect, severe aphasia, symptoms of transitory psychotic syndrome, opioid or similar substance treatment, orthosis contraindications, planned thermotherapy or electrostimulation, or any physical, mental, or logistical conditions that compromise protocol adherence or participation in another interventional trial.	Weekly shoulder–hand syndrome scores (severity of clinical symptoms ranging from 0 to 14), discomfort caused by the orthosis, and its usage rate. The primary outcome was the average shoulder– hand syndrome score on days 14, 21 and 28, adjusted for the baseline shoulder–hand syndrome score.	Support by functional orthosis Neuro-Lux (Sporlastic, Nürtingen, Germany) on top of usual care according to current guidelines (experimental, n=20) versus usual care alone (control, n=21).	The orthosis examined in this trial has been successfully shown to reduce and prevent the development of clinical symptoms of shoulder–hand syndrome. Future clinical studies should examine the orthosis's application timing and duration as well as how it works in conjunction with other therapeutic interventions.
8	Effects of post stroke shoulder pain on upper	Sardar Changez Khan1	≥18 years, conscious and	Exclusion criteria: shoulder pain due to	Fugl-Meyer Motor Assessment	Participants performed movements	Hemiplegic shoulder pain affects motor

	limb motor function and proprioception. ,		cognitively stable (Mini Mental Score Exam ≥24), adequate tone (Modified Ashworth Scale 1-2).	trauma or other neurological diseases, excessive spasticity, and other conditions not related to stroke.	Scale (Upper Extremity) and Laser Pointer Assisted Angle Reproduction Test (LP-ART) for proprioception. Pain intensity was assessed using Visual Analogue Scale (VAS). Data analysis was performed using SPSS 25 software to evaluate treatment effects.	with a blindfold, and error in proprioception was recorded using a laser pointer. Three trials were conducted and the mean score was calculated. The procedure was identical for painful and non-painful hemiplegic shoulder patients.	function and proprioception . Increase intensity of pain leads to an increase in movement errors as well as decreased motor function.

RESULTS

Min Gyun Kim el.al Summaried that Out of the 72 patients enrolled in the study, 31 hadto be excluded for several reasons, including early discharge and follow-up loss due to Coronavirus disease (COVID-19) (37.5%), stroke recurrence (1.3%), or refusal to wear the Bobath sling (1.3%). In conclusion, there were 41 patients in the final studyThe vertical distance between the Bobath sling and the elastic dynamic sling did not differ much. Eight weeks after sling application, the horizontal distance of the elastic dynamic sling group was considerably smaller compared to the Bobath sling group.($p = 0.006$).[16]

Lin Yang et al.'s study found that kinesiology taping significantly improved pain intensity, shoulder subluxation, and muscleactivitiesin individuals experiencing hemiplegic shoulder pain. Immediately after taping, significant improvements were seen in these outcomes, whereas the control group showed no significant changes. After 4 weeks, the taping group demonstrated greater improvements in pain intensity, subluxation, muscle activity, andrange of mobility in contrast to the group under control.The study's sample size wasjudged adequate, with a statistical power of 0.99.[17]

Li-Ling Chuang et al.'sIn this study stroke patients, bilateral arm training combined with Transcutaneous Electrical Nerve Stimulation (TENS) and Neuromuscular Electrical Stimulation (NMES) significantly decreased shoulder pain at rest ($P = 0.02$). Furthermore, the study revealed significant interactions between time and group for pain reduction during active ($P = 0.01$, partial $\eta 2 = 0.14$) and passive ($P < 0.001$, partial $\eta 2 = 0.25$) shoulder range of motion,suggesting that both treatments effectively reduced pain during movement.[18]

Engin Koyuncu et al.'s study compared 25patients with hemiplegic shoulder pain were compared to a control group of 25 individuals. The demographic characteristics of Both groups were comparable, showing no statistically significant differences in age (60.7±9.49 vs 62.0±9.72), gender (80% vs 64% female), stroke etiology (thromboemboli: 68% vs 60%), hemiplegia duration (median: 180 vs 90 days), or hemiplegic side (68% vs 60% left hemiplegics). These similarities suggest that the groups were well-matched for comparison.[19]

A study by Min-Su Kim et al. divided 36 stroke patients into two groups: an intervention group receiving Robot-Assisted Shoulder Rehabilitation Therapy (RSRT) and a control group. Results showed that the RSRT group experienced a significant reduction in painscores (VAS) from 6.6±0.9 to 4.1±0.7 at T1, and this trend continued at T2. In contrast, the control group showed no significant changes. Post-hoc analysis confirmed significant improvements in painscores in the RSRT group were lower compared to the control group ($t=-5.491$, $P=0.003$ and $t=-5.282$, $P=0.002$, respectively).[20]

Richard D.et al.'sAccording to a study, patients who received peripheral nerve stimulation (PNS) reported far less discomfortcompared to those who received standard care (UC). The pain severity ratings decreased from 7.5±0.7 to 3.2±0.7 at 10 weeks and 3.0±0.7 at 16 weeks in the PNS group, whereas the UC group showed a decrease from 7.6±0.7 to 6.1±0.8 at both 10 and 16 weeks.Notable differences between the groups were observed using pairwise comparisons; after 10 weeks, the difference was 2.9 (95% CI: 0.8-5.0) points, and at 16 weeks, it was 3.1 (95% CI: 1.0-5.2) points.[21]

Maik Hartwig el.al Studied that Forty-one patients out of the 151 assessed to enter the study met the requirements Of the patients qualified for inclusion in the study, 21 were randomly allocated to the control group and 20 to the intervention group. Scores for shoulder-hand syndrome within the intervention group increased whereas the scores in the control group declined.

The mean shoulder-hand syndrome scores for the treated patients in orthosis were 2.7±1.5 on days 14, 21, and 28, the main outcome. That of the control was 4.8±2.1.The shoulder-hand syndrome score dropped by 3.1 points (95% CI 1.9 to 4.3, P<0.0001), per the variance analysis.[22]

Sardar Changez Khan el.at The study found that 80.8% of the 130 participants were men and 19.2% were women, with an average age of 58.97 years. Between the groups with and without hemiplegic shoulder pain (NHSP), there were no discernible variations in the demographic data. In contrast to those without pain, as well as those with hemiplegic shoulder discomfort had worse motor function and proprioception in the afflicted limb, according to a substantial connection (P<0.001) between greater pain and decreased motor function and proprioception.[23]

3. DISCUSSION

Our study found that the elastic dynamic shoulder sling, which supports both the proximal and distal parts of the shoulder, was more effective in adjusting the distance of horizontal subluxation compared to the Bobath sling. This may help reduce supraspinatus tendinitis and pain. Both slings improved motor function, upper-extremity function, and muscle strength in stroke patients. However, additional research is required to determine the superiority of one sling over the other.[16]

This pioneering study examines the effect of kinesiology taping on Hemiplegic Shoulder Pain (HSP), examining its effects on pain, shoulder subluxation, Active Range of Motion (AROM), and muscle activity. The findings suggest that kinesiology taping is a valuable method for managing HSP. Although other studies have examined different taping techniques and materials, most have focused on preventing HSP development. In contrast, this study offers new insights into the therapeutic benefits of kinesiology taping for existing HSP, highlighting its potential as a complementary treatment approach.[17]

Our study shows that bilateral arm training in conjunction with EMG-triggered Neuromuscular Electrical Stimulation (NMES) is an excellent technique for reducing hemiplegic shoulder pain, especially when shoulder movement is involved. This method improves pain-free shoulder abduction and internal rotation in addition to lessening the intensity of the worst shoulder discomfort. Significant improvements in pain interference, motor impairment, and shoulder mobility, including pain-free shoulder abduction, flexion, and external rotation, were shown by both EMG-triggered NMES and Transcutaneous Electrical Nerve Stimulation (TENS) with bilateral arm training. These results highlighthow effective these treatments prove to be at treating hemiplegic shoulder pain and encouraging functional recovery.[18,24]

Our study reveals that incorporating Functional Electrical Stimulation (FES) into conventional treatment protocols yields superior outcomes in managing shoulder subluxation in hemiplegic stroke patients. Specifically, applying FES to the supraspinatus and posterior deltoid muscles, in conjunction with traditional treatment methods, provides greater benefits than conventional treatment alone. This multifaceted approach enhances muscle function, reduces subluxation, and improves overall shoulder mobility, ultimately leading to better patient outcomes and quality of life.[19]

We designed a novel rehabilitation robot that performs joint mobilization and stretching exercises for the shoulder in patients lying down.Our 4-week study revealed that this robot dramatically decreased stroke patients' Hemiplegic Shoulder Pain (HSP) when used in conjunction with conventional therapy. Furthermore, the robot-assisted treatment reduced self-reported shoulder-related disability and enhanced the afflicted shoulder's passive range of motion (PROM). According to these findings, a rehabilitation robot that focuses on passive range-of-motion exercises can improve patient outcomes and quality of life by serving as a useful supplement to traditional therapy for treating HSP following a stroke.[20]

The trial found improvements in secondary outcomes, but the hypotheses that Peripheral Nerve Stimulation (PNS) would lead to greater reductions in pain interference and improvements in Health-Related Quality of Life (HRQoL) compared to Usual Care (UC) were not supported.Although the results did not reach statistical significance, both groups demonstrated decreases in pain and pain interference, with the PNS group showing somewhat larger gains. The groups also showed comparable clinically significant gains, which are defined as a 30% decrease in pain. Similar gains in physical health were made by both groups, mostly as a result of less physical discomfort..[21]

Our study demonstrates the efficacy of the Neuro-Lux functional orthosis in mitigating the debilitating effects of shoulder subluxation in stroke patients. Specifically, we found that the orthosis significantly reduces pain, hand edema, and limitations in movement of the upper extremity. Notably, patients who used the Neuro-Lux orthosis exhibited a marked decrease in shoulder-hand syndrome symptoms after four weeks of treatment, whereas the control group continued to experience a substantial burden of symptoms. Moreover, the orthosis was well-tolerated by patients, underscoring its potential as a valuable adjunctive therapy in the management of post-stroke shoulder subluxation.[22]

This study sheds light on three key aspects of hemiplegic shoulder pain (HSP). Firstly, patients with HSP exhibit significant motor function impairment, highlighting the debilitating impact of this condition on shoulder mobility and overall motor control.Secondly, the findings show a negative correlation between pain intensity and proprioception (awareness of body position and movement). As pain increases, proprioception decreases, leading to impaired motor control and potentially exacerbating the condition.Thirdly, the study shows that proprioceptive control is angle-dependent, with reduced control observed at lower angles of abduction and flexion. This suggests that individuals with HSP might have trouble moving

precisely, especially at smaller ranges of motion, which could further impair their motor function and general quality of life.[23]

4. LIMITATIONS

Current physiotherapy data for stroke patients with hemiplegic shoulder discomfort and shoulder subluxation includes short follow-up periods, limited sample sizes, inconsistent therapies, and no comparison groups. These restrictions have an effect on the findings' dependability and generalizability, underscoring the necessity for additional study.

5. CONCLUSION

The significance of physical therapy in treating hemiplegic shoulder pain and subluxation in stroke patients is emphasized by this systematic studyBased on the research, physiotherapy methods such as task-specific training, manual therapy, electrotherapy, exercise, and functional electrical stimulation can be useful in preventing subluxation, enhancing functional capacity, and lowering pain. In order to provide complete care, physiotherapists should collaborate with other medical specialists. They are essential in the management of hemiplegic shoulder discomfort and subluxation.

ETHICAL APPROVAL:

The study has been approved by Institutional Ethical committee (Protocol number 031/2023-24)

SOURCE OF FUNDING:

Krishna Vishwa Vidyapeeth Deemed to be University Karad.

REFERENCES

[1] Nadler M, Pauls MM. Shoulder orthoses for the prevention and reduction of hemiplegic shoulder pain and subluxation: systematic review. Clinical rehabilitation. 2017 Apr;31(4):444-53.

[2] engin koyuncu, gu¨ ldal funda nakipoglu-yu ¨ zer, asuman dogan & nes¸e o¨ zgirgin The effectiveness of functional electrical stimulation for the treatment of shoulder subluxation and shoulder pain in hemiplegic patients: A randomized controlled trial. Disability and Rehabilitation, 2010; 32(7): 560–566.

[3] Brandstater EM. Stroke rehabilitation. In: DeLisa JA,Gans BM, editors. Physical medicine and rehabilitation.Principles and Practice. Vol. 2, 4th ed. Philadelphia, USA: Lippincott Williams and Wilkins; 2005. pp 1655–1676.

[4] Yu DT, Chae J, Walker ME, Fang ZP. Percutaneous intramuscular neuromuscular electric stimulation for the treatment of shoulder subluxation and pain in patients with chronic hemiplegia: a pilot study. Arch Phys Med Rehabil 2001;82:20–25.

[5] Praveen Kumar, Amanda Saunders, Emily Ellis, Sarah Whitlam Systematic Review.Association between glenohumeral subluxation and hemiplegic shoulder pain in patients with stroke. Physical Therapy Reviews 2013 VOL. 18 NO.2 DOI 10.1179/108331913X13608385943254

[6] Ada, L., & Foongchomcheay, A. (2002). Efficacy of electrical stimulation in preventing or reducing subluxation of the shoulder after stroke: a meta-analysis. Australian Journal of Physiotherapy, 48(4), 257-267.DOI: 10.1016/S0004-9514(14)60174-5

[7] Foongchomcheay A, Ada L, Canning CG. Use of devices to prevent subluxation of the shoulder after stroke. Physiother ResInt. 2005;10:134–45.

[8] Paci M, Nannetti L, Rinaldi LA. Glenohumeral subluxation in 6hemiplegia: an overview. J Rehabil Res Dev. 2005;42:557–68

[9] Tamara Page RN BN GradDipNSc(HighDep) and Craig Lockwood RN BN GradDipClinNurs MNSc Prevention and management of shoulder pain in the hemiplegic patient. JBI REPORTS 2003; 1: 149–165

[10] Kondo, I., Muramoto, T., Suzuki, R., Miura, N., Yamaguchi, Y., & Fujita, N. (2012). Effects of functional electrical stimulation on shoulder subluxation after stroke. Journal of Stroke and Cerebrovascular Diseases, 21(1), 75-81.DOI: 10.1016/j.jstrokecerebrovasdis.2010.05.005

[11] Chantraine, A., Baribeault, A., Uebelhart, D., & Gremion, G. (1999). Shoulder pain and dysfunction in hemiplegia: Effects of functional electrical stimulation. Archives of Physical Medicine and Rehabilitation, 80(3), 328-331.DOI: 10.1016/S0003-9993(99)90142-6

[12] Paci, M., Nannetti, L., Taiti, P., Baccini, M., & Rinaldi, L. A. (2007). Shoulder subluxation after stroke: Relationships with pain and motor recovery. Physiotherapy Research International, 12(2), 95-104.DOI: 10.1002/pri.358

[13] Hurd, W. J., Farrell, K. M., & Morrow, M. M. (2011). Efficacy of slings and shoulder taping in reducing shoulder subluxation in stroke patients: A review. Journal of Rehabilitation Research & Development, 48(7),

1003-1010.DOI: 10.1682/JRRD.2010.06.0113

[14] Yelnik, A. P., Simon, O., Bonan, I., & Lage, G. (2007). Botulinum toxin in the treatment of spastic shoulder after stroke: Clinical and functional evaluation. Stroke, 38(6), 2221-2225 DOI: 10.1161/STROKEAHA.106.474171

[15] Sahin, N., Ugurlu, H., Albayrak, I., & Nazliel, B. (2012). The efficacy of functional electrical stimulation for shoulder subluxation in post-stroke hemiplegia: A randomized controlled trial. NeuroRehabilitation, 31(4), 445-451.DOI: 10.3233/NRE-2012-00809

[16] Min Gyun Kim 1,2 , Seung Ah Lee 1, Eo Jin Park 1, Min Kyu Choi 1, Ji Min Kim 1, Min Kyun Sohn 3,Sung Ju Jee 3, Yeong Wook Kim 4, Jung Eun Son 1, Seo Jun Lee 1, Keum Sun Hwang 1 and Seung Don Yoo 1,5,Elastic Dynamic Sling on Subluxation of Hemiplegic Shoulder in Patients with Subacute Stroke: A Multicenter Randomized Controlled Trial Int. J. Environ. Res. Public Health 2022, 19, 9975. https://doi.org/10.3390/ijerph19169975

[17] Lin Yang, Jingyi Yang , and Chengqi He The Effect of Kinesiology Taping on the Hemiplegic Shoulder Pain: A Randomized Controlled Trial Journal of Healthcare Engineering Volume 2018, Article ID 8346432, 7 pages https://doi.org/10.1155/2018/8346432

[18])Li-Ling Chuang1,2,3, You-Lin Chen1, Chih-Chung Chen1,2,3, Yen-Chen Li4, Alice May-Kuen Wong1,3, An-Lun Hsu5*† and Ya-Ju Chang1,2,6,7*† Chuang et al Effect of EMG-triggered neuromuscular electrical stimulation with bilateral arm training on hemiplegic shoulder pain and arm function after stroke: a randomized controlled trial .Journal of NeuroEngineering and Rehabilitation (2017) 14:122 DOI 10.1186/s12984-017-0332-0

[19] engin koyuncu, gu¨ ldal funda nakipoglu-yu ¨ zer, asuman dogan & nes¸e o¨ zgirgin The effectiveness of functional electrical stimulation for the treatment of shoulder subluxation and shoulder pain in hemiplegic patients: A randomized controlled trial . Disability and Rehabilitation, 2010; 32(7): 560–566

[20] Min-Su Kim, MD, PhD,a Sung Hoon Kim, PhD,b Se-Eung Noh, MD,a Heui Je Bang, MD, PhD,c Kyoung-Moo Lee, MD, PhD Robotic-Assisted Shoulder Rehabilitation Therapy Effectively Improved Poststroke Hemiplegic Shoulder Pain: A Randomized Controlled Trial journal homepage: www.archives-pmr.org Archives of Physical Medicine and Rehabilitation 2019

[21] Maria E. Bennett, MS, and SPR Therapeutics, LLC., Cleveland, Peripheral Nerve Stimulation Compared to Usual Care for Pain Relief of Hemiplegic Shoulder Pain: A Randomized Controlled Trial .OH Am J Phys Med Rehabil. 2014 January ; 93(1): 17–28. doi:10.1097/PHM.0000000000000011

[22] Maik Hartwig1,Götz Gelbrich2 and Bernd Griewing1 Functional orthosis in shoulder joint subluxation after ischaemic brain stroke to avoid post-hemiplegic shoulder–hand syndrome: a randomized clinical trial Clinical Rehabilitation sagepub.co.uk/journalsPermissions.nav DOI: 10.1177/0269215511432355

[23] Sardar Changez Khan1, Seema Gul2, Syed Zain Ul Abidin2, Shakirullah1, Sardar Bakht Khan3,Zakirullah4 Effects of post stroke shoulder pain on upper limb motor function and proprioception Rehman Journal of Health Sciences Vol. 06, No. 01, 2024

[24] Vispute AR, Kanase SB. Effect of electrical stimulation, hot moist pack and exercises on shoulder hand syndrome in stroke patients. Global journal of research analysis. 2018;201.

[25] Sawant VS, Kanase SB. Effect of conventional therapy and positioning with isometric shoulder exercises on functional shoulder subluxation in post-stroke survivors. Indian J Public Health. 2019 Aug;10:536-40.

[26] Kanase SB. Effect of motor relearning programme and conventional training on functional mobility in post stroke patients. Indian Journal of Public Health Research & Development. 2020 May 18;11(5):496-501.